(19) DANMARK

(10) DK/EP 3615749 T3

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: *E 05 B 13/00 (2006.01)* *E 05 B 13/10 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2021-09-27**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-07-21**

(86) Europæisk ansøgning nr.: **18713580.1**

(86) Europæisk indleveringsdag: **2018-03-15**

(87) Den europæiske ansøgnings publiceringsdag: **2020-03-04**

(86) International ansøgning nr.: **EP2018056611**

(87) Internationalt publikationsnr.: **WO2018197104**

(30) Prioritet: **2017-04-28 DE 102017109289**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

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(56) Fremdragne publikationer:
EP-A1- 1 544 383
WO-A1-02/14634
DE-A1- 10 100 874
DE-A1-102014 103 994
DE-C- 373 259
DE-C- 670 268

WINDOW AND/OR DOOR FITTING

The invention relates to a fitting for actuating a mechanism in a door or a window according to the preamble of claim 1.

Window or door fittings are usually in the form of rotating handles. Such rotating handles or also turning handles have stop means such as escutcheons, stop bodies, base plates, etc. for securing them to a window sash or a door panel. A mechanism dedicated to the fitting, e.g., a closing mechanism in the window sash or door panel is actuated via a polygon in the fitting, e.g., a multi-sided pin, usually a square pin.

With a rigid connection between the polygon and the actuating handle there is the risk with windows, for example, that the window sash will be levered upward against the window frame, and pins used for locking the window sash will have to be actuated with a lever tool from the outside. All of the pins that lock the window are released by the rigid connection between the closing mechanism with the pins and the polygon in the fitting. With such a design for windows - and doors - there is an increased risk of a break-ins.

Various mechanisms have been developed for preventing this risk of break-ins, which make it more difficult to actuate the polygon from the outside or through manipulation of the locking pins normally found in the window sash or door panel.

DE 10 2014 103 994 A1 describes a handle device, by way of example, in which a drive element for actuating the closing mechanism is located in a handle. There is a latching mechanism for protecting the handle device against unauthorized actuation from the outside, which blocks a rotation of the handle by moving the handle in relation to the stop body into a blocking position. The handle is moved to a release position through a movement in relation to the stop body in order to be able to actuate the closing mechanism in the window or door, thus releasing the latching mechanism. The latching mechanism is formed by a sleeve that has bolts at the ends, which engage in pockets in the stop body when the handle device is in the blocking position. In this manner, the drive element engaged in the closing mechanism of the window or door is also blocked, and the window or door cannot be manipulated from the outside.

From WO 02/14634 A1 and DE 670 268 C childproof fittings with an axial decoupling of the handle from the polygon are known.

EP 1 544 383 A1 shows a fail-safe device for a window, a door or the like with a connecting rod fitting, wherein the fail-safe device provides a handle with blocking means.

The blocking means create a form fit between the handle and a stationary component and can be released by pressing on the handle. When the handle is pressed, a sash of the window is pressed against a frame, as a result of which the connecting rod fitting can be adjusted.

DE 101 00874 A1 discloses a fitting for actuating a mechanism in a door or in a window, with a handle, which is rotatably mounted on a rotation axis on or in a stop body, wherein the stop body is attachable to the door or the window, with a polygon for actuating the mechanism in the door or in the window, with a coupling element for coupling the handle to the polygon, wherein in a first handle position the handle is decoupled from the polygon, and in a second handle position the coupling element couples the handle to the polygonal.

DE 373 259 C discloses a fitting for actuating a mechanism in a door or in a window, with a handle, which is rotatably mounted on an axis of rotation on or in a stop body, wherein the stop body is attachable to the door or the window, with a polygon for actuating the mechanism in the door or in the window, and with a blocking device, which in a blocking position blocks the actuation of the polygon around the axis of rotation, wherein the blocking device can be transferred to a release position by axially actuating the handle from a first handle position to a second handle position along the axis of rotation.

The object of the invention is to provide a fitting for actuating a mechanism in a door or in a window that has a simpler and permanently reliable mechanism than that in the prior art. The fitting should also ensure increased protection against unauthorized actuation of the fitting or the mechanism connected to the fitting in the window or door, and should be easy to manipulate. A likewise simpler and less expensive construction is also sought.

The main features of the invention are defined in the characterizing portion of claim 1. Embodiments are the subject matter of claims 2 to 15.

With a fitting for actuating a mechanism in a door or a window that has a handle that can be rotated about an axis on or in a stop body, wherein the stop body can be attached to the door or window, which has a polygon for actuating the mechanism in the door or window, which has a coupling element for coupling the handle to the polygon, and which has a blocking device that blocks actuation of the polygon about the axis of rotation, wherein the blocking device can be moved along the axis of rotation into a

release position through axial actuation of the handle from a first handle position to a second handle position, the invention provides that the handle is disengaged from the polygon when the handle is in the first handle position, wherein the blocking device is in the blocking position, and the coupling element couples the handle to the polygon when the handle is in the second handle position, and retains the blocking device in the release position.

By disengaging the handle from polygon in the first handle position, it is ensured that the window or door cannot be accidentally actuated, because the mechanism in the window or door can first be actuated when the handle has been moved to the second handle position. At the same time, the blocking device in the fitting prevents any actuation of the polygon - as long as the handle is in the first handle position - i.e., the window or door cannot be manipulated and opened from the outside without permission.

The handle must be moved in two steps in order to open the window or door. First, the handle must be moved from the first handle position to the second handle position. Subsequently, the handle must be rotated about its axis of rotation.

The two-step movement of the handle is particularly difficult for children, thus already increasing safety. The blocking device also effectively prevents an unauthorized actuation of the polygon, and thus the mechanism, from the outside. The door or window is first unlocked when the handle is moved from the first handle position to the second handle position. At this point, the coupling element couples the handle to the polygon. At the same time, the blocking device is moved from its blocking position to the release position. The handle, and thus the window or door, can then be actuated as usual.

The combination of decoupling and a blocking device also results in operating safety and protection against break-ins because the blocking device is in a blocking position when the handle is in the first handle position. This offers the advantage that if a window or door is closed, the handle is in a first handle position, and the polygon is prevented from rotating about the axis of rotation by the blocking device. As soon as the window or door is opened, the blocking device is moved to the release position by actuating the handle in relation to the stop body, such that the polygon can be rotated about the axis of rotation by means of the coupling element through the coupling between the polygon and the handle.

A significant embodiment provides that the coupling element has at least one actuating element for the blocking device. Providing such an actuating element has the

advantage that the blocking device can be reliably actuated at any time and can be brought into the release position. If the handle is released, or brought into the first handle position, the blocking device is returned to the blocking position.

In another embodiment of the invention, the blocking device has at least one blocking element that is located or formed separately in the stop body. This results in an extremely robust design of the blocking device with rolling elements, blocking elements, bolts, etc., which increase protection against break-ins, wherein the handle and thus the mechanism in the window or door, can only be actuated when the handle is in the second handle position and thus coupled to the polygon, and when in this position, the actuating elements for the blocking elements of the blocking device are moved into the release position.

The invention also provides that there is a recess in the stop body for each blocking element. These are also guided reliably and precisely in the stop body, and thus ensure that the polygon is reliably blocked when in the blocking position.

The blocking elements can advantageously be moved radially or axially in relation to the axis of rotation. Furthermore, in one embodiment the blocking elements can move radially or axially in relation to the axis of rotation inside the recesses.

It is clear that the blocking elements block the movement of the polygon and thus the movement of the mechanism in a controlled manner in the blocking position, by means of which - with a structurally simple and inexpensive design of fitting - an increased protection against break-ins is obtained. The blocking elements can be advantageously guided and positioned by the recesses in the stop body in relation to the polygon that is to be blocked. Because they can move axially or radially, the blocking elements can also be moved quickly and precisely by the actuating elements from the blocking position to the release position and vice versa. In particular, the stop body may have a really low installation height due to the radial mobility and orientation of the blocking elements.

Furthermore, according to one embodiment of the invention, a radial or axial force is applied each blocking element in relation to the axis of rotation, preferably generated by a spring, i.e., each blocking element is pretensioned in one of the recesses by a spring.

When the blocking elements are pretensioned in position, they must be moved into the release position by the actuating elements counter to the force of spring. If instead, the handle is returned to the first handle position, the springs automatically push the blocking elements back into the blocking position, such that the polygon and thus the

fitting is reliably blocked. This facilitates manipulation of the fitting for moving the blocking device from the blocking position to the release position.

Alternatively, the reverse is also conceivable, in which the release position is maintained by the pretensioning of the spring, and the blocking position can be obtained by actuating the coupling element.

In another development the blocking elements are directly or indirectly engaged with the polygon in the blocking position. This results in a particularly space-saving design of the blocking device. As a result, the stop body can be attractively installed on the door panel or window sash, thus giving the fitting an overall aesthetically pleasing appearance.

According to a significant and advantageous development of the invention, the coupling element can have a two-part design, wherein the coupling element has a handle driver, which is connected to the handle for conjoint rotation, and a polygon driver that is connected to the polygon for conjoint rotation. The two-part design of the coupling element has the advantage that it is possible to actuate the blocking device in a particularly reliable and precise manner, which can also be obtained easily and inexpensively. This also advantageously enables a reliable coupling between the handle and the polygon, in particular when the handle driver and the polygon driver engage with one another.

The handle driver is preferably located or secured in the handle, while the polygon driver is formed on the polygon.

It is structurally beneficial when the actuating element of the coupling element is formed on the handle driver. The actuation of the blocking device only takes place when the coupling is obtained, thus when the handle is in the second handle position.

In one embodiment, the handle driver has a flange section on which the actuating elements are located or formed, wherein the actuating elements are preferably located on a surface of the flange section facing the stop body. The flange section helps ensure that the coupling element is reliably retained in the stop body. In addition, the flange section forms a larger surface for receiving or forming actuating elements, such that they can be sized appropriately for actuating the blocking device.

The invention also provides that there is at least one engagement element on the handle driver or its flange for a reliable coupling of the handle to the polygon via the handle driver and the polygon driver. This or these engagement element(s) is/are preferably located or formed on the surface of the flange section. Placing the engagement

element on the flange has the advantage that the engagement elements can be placed on a larger surface, such that the engagement elements can be larger, and greater forces can be transferred via the engagement elements. This ensures a permanently reliable coupling.

Another optional structural measure provides that the engagement elements are formed as an integral part of the actuating elements. This advantageously results in a greater stability in comparison with separate elements.

For a reliable anchoring of the handle driver in the handle, the handle driver has a neck section, wherein the handle driver has a multi-sided region on the handle end for obtaining a non-rotating connection therewith. The handle driver also has a receiving space extending axially for receiving the polygon driver.

According to a preferred embodiment, the handle driver is secured in the neck of the handle by a fastening means, e.g., a screw, wherein the handle driver can also be connected in a materially bonded manner to the neck of the handle for conjoint rotation, e.g. with an adhesive. The neck region advantageously forms a contact surface. The non-rotating connection between the handle and the handle driver is reinforced by the multi-sided region. The polygonal area supports the torsional strength of the connection between the handle and the handle driver.

The receiving space in the handle driver advantageously serves to receive the polygon and/or the polygon driver such that it can be displaced longitudinally, wherein a limitation in the axial direction can be used as a stopping point for a spring. A polygon and/or polygon driver placed in the receiving space can be tensioned with this spring in relation to the stop body. This pretensioning can be advantageously used as a counterforce against moving the handle from the first handle position to the second handle position. An external spring can preferably also be placed between the handle and the stop body, which tensions the handle in relation to the stop body. At the same time, the length of the polygon that extends out of the stop body at the door or window end can varied as a result.

According to one development of the invention, the polygon driver can have at least one blocking recess for receiving the blocking element, wherein, according to one embodiment, the polygon driver has a first flange section, wherein, according to one development, the blocking recesses are located in the first flange section, wherein,

according to one embodiment, the blocking recesses are located at the circumference in a circumferential surface of the first flange section.

The blocking elements can be reliably brought into engagement with the polygon driver through the blocking recesses in the polygon driver, wherein the blocking recesses can be optimally coordinated to the sizes and dimensions of the blocking elements, in order to be able to reliably receive external forces or torques acting on the polygon and/or the polygon driver.

The first flange section of the polygon driver is preferably located on an end of the polygon driver facing the stop body and is particularly preferably adjacent to a base or opening section of the stop body. A tilting of the polygon and/or the polygon driver against the axis of rotation is further prevented advantageously by the flange section of the polygon driver. This results in the advantage that the fitting can also be reliably actuated when subjected to heavy loads perpendicular to the axis of rotation. The placement of the blocking recesses in the flange section is of further advantage because a radial direction of the retention torque of the blocking device when in the blocking position in relation to the axis of rotation becomes greater as the distance to the polygon and/or the centre of the polygon driver increases. The same applies blocking recesses located in the circumferential surface.

According to another advantageous embodiment, there is at least one recess in the flange section, preferably on the surface facing the handle. This recess receives the handle driver in a form-fitting manner, when the handle is moved from the first handle position to the second handle position, and the coupling element - comprising the handle driver and the polygon driver - couples the handle to the polygon. The recess is preferably closed at the base toward the stop body.

A significant development of the invention is that the actuating elements of the coupling element and/or the handle driver engage in the blocking recesses in the polygon driver when the handle is in the second handle position. It is preferably also provided that the actuating elements are placed in a form-fitting manner in the blocking recesses in the polygon driver when the handle is in the second handle position, and that they particularly preferably close these recesses. In this case, the circumferential surface of the polygon driver is complemented when the handle is in the second handle position.

The engagement of the actuating element of the coupling element and/or the handle driver in the blocking recesses of the polygon driver results in an unblocking of the

blocking device in that the blocking elements are forced out of the polygon or the polygon driver. In addition, due to the form-fitting engagement of the actuating elements in the blocking recesses, a form-fitting engagement is obtained, and thus a coupling that enables a reliable transference of torque from the handle to the polygon. The two-part coupling element thus unblocks the blocking device when the handle reaches the second handle position, and simultaneously couples the handle to the polygon.

Closing the blocking recesses also results in the advantage that the blocking recesses can no longer be brought into engagement with the blocking device when the handle is in the second handle position. Instead, a smooth outer surface is obtained on the polygon driver, which prevents a catching or clamping of the first flange section with other elements of the fitting when it is rotated in the stop body.

The actuating elements preferably engage not only in the blocking recesses in the first flange section of the polygon driver when the handle is in the second handle position. They also engage, preferably in a form-fitting manner, in the recesses in the flange section of the polygon driver. As a result, the walls of the recesses and the lateral surfaces of the actuating elements also contribute to the transference of torque between the handle driver and the polygon driver. This is of particular advantage when large forces must be transferred via the mechanism, as with large windows or doors that have numerous locking or bolting devices.

The engagement elements on the handle driver also contribute to this, in particular when these are formed as an integral part of the actuating elements.

But, if the handle is in the first handle position, the handle driver and polygon driver are not engaged, such that the blocking device prevents an unauthorized actuation of the polygon.

According to one development of the invention, the polygon driver has a polygon receiver, wherein this preferably has the same shape as the polygon. It is also intended that the polygon engages in the polygon receiver.

In this manner, the handle driver of the coupling element, or - when the coupling element has an integral design - the coupling element, can reliably be brought into engagement with the polygon, i.e., a torque can be reliably transferred from the handle to the polygon when the handle is in the second handle position.

The transference of torque can thus preferably take place via the polygon receiver, which in particular has the same shape as the polygon. This is furthermore advantageously

obtained in that the polygon engages in the polygon receiver, preferably in a form-fitting manner. As a result, any play between the polygon and the polygon receiver, and via the transfer of torque by the coupling element between the handle and the polygon, is effectively prevented.

In another embodiment, the polygon driver has a neck section, wherein the neck section is preferably closed at the handle end, and a spring is located between the closure and the polygon.

Providing the neck section has the advantage that the polygon driver is guided over a longer distance with its neck section in the receiving space of the neck section of the handle driver. This axial guidance along the axis of rotation contributes to a torsional stiffness of the fitting, and in particular the drive element of the mechanism located in the fitting. Furthermore, the neck section is advantageous when the polygon driver can be slid axially on the polygon in relation to the axis of rotation, and/or the polygon can be slid axially in the polygon receiver in relation to the axis of rotation. As a result, the neck section of the polygon driver forms a guide with the handle driver extending along the axis of rotation in the axial direction. In this context, the spring loading or pre-tensioning of the polygon driver and/or the polygon is advantageous, because the polygon can thus be adapted to different installation depths.

According to one embodiment, the polygon driver has a second flange section, wherein according to one development, the second flange section adjoins the first flange section at the handle.

The second flange section is advantageous because it increases the torsional stability of the polygon driver. In particular, the polygon driver must accommodate the forces applied when the blocking device is in the blocking position if there is an unauthorized actuation of the closing mechanism via one or more blocking elements of the window sash or door panel, and it cannot fail mechanically, because otherwise the mechanism is released for actuating the remaining blocking elements.

According to another aspect of the invention, there is at least one latching depression for at least one latching element in the second flange section or the first flange section on the circumference, wherein the latching element is preferably located in the stop body. In one embodiment, the latching element is pretensioned radially against the first flange section or the second flange section of the polygon driver by a latching element spring.

The latching element and latching depression are advantageous because latching positions can be generated by actuating the handle. In particular, latching positions at 90° to 180° to the first handle position that are obtained when the handle is rotated about the axis of rotation are advantageous because various states, such as a tilted position or an open position, are indicated haptically to the user that relate to the functioning of the door panel or the window sash. The latching elements can advantageously be placed in the stop body, such that this arrangement saves space.

In another aspect of the invention, the handle driver has at least one positioning web, wherein the positioning web is located at the handle side on the flange section, and the stop body particularly preferably has at least one positioning pocket for the positioning web. In another aspect, the positioning web can be brought into engagement with the positioning pocket when the handle is in the first handle position.

Because of the positioning web, the handle can be advantageously positioned and secured in a defined position via the handle driver that is connected to the handle for conjoint rotation. In particular, the arrangement of the positioning web on the side of the flange section of the handle driver facing the handle can be advantageously obtained because in this manner, an engagement, e.g., with the stationary stop body, can be obtained via the positioning pockets.

In one development of the invention, the stop body has a reinforcement that rests in the stop body and has at least one recess lying in the region where the positioning web engages with the positioning pocket.

The reinforcement preferably absorbs forces that arise when the handle is rotated about the axis of rotation. The recesses are particularly preferably arranged around the positioning pockets, such that forces acting against the engagement of the positioning webs with the positioning pockets are deflected to the reinforcement, and the stop body is substantially prevented from receiving these forces. As a result, the stop body can be made of less mechanically robust materials or in a particularly space-saving manner. The reinforcement is preferably made of metal and is preferably in the form of a plate.

According to another embodiment of the invention, the positioning webs are disengaged from the respective positioning pockets when the handle is in the second handle position.

As a result, the handle cannot rotate about the axis of rotation when it is in the first handle position in which the coupling element is not coupled to it. The handle thus has no functional connection to the mechanism via the polygon.

This positioning of the handle has the advantage that the handle cannot move freely when in the first handle position. An axial movement of the handle in the second handle position along the axis of rotation disengages the positioning webs from the positioning pockets. The distance required to disengage the positioning webs from the positioning pockets is as long as the distance necessary for engaging the actuating elements and/or engagement elements with the recesses and/or the blocking recesses. In this manner, the handle is prevented from assuming an undefined position prior to and during the actuation.

Furthermore, the handle is preferably always in the second handle position when the handle is rotated about the axis of rotation. This can be obtained by a corresponding placement of the positioning webs and the positioning pockets in different angular positions in relation to the axis of rotation of the handle.

In an alternative embodiment, the handle can be moved to a latched position, which can be at 90° for the open position of a window sash or a door panel, or 180°, e.g., for the tilted position of a window sash and/or a door, through a corresponding movement of the handle to the first handle position. In this manner, the actuating elements are also disengaged from the blocking device in these positions, and the handle must then be moved axially along the axis of rotation and subsequently rotated in order to actuate the mechanism. This complication is of particular advantage when it is intended for the operation of the handle to be more difficult.

Further, the handle can have a locking device in one embodiment, for securing it axially, wherein in one development, the locking device has a lock cylinder with a blocking element. This can be a bolt, for example, which bears on the stop body in a locking position and keeps the handle in the first handle position. In one embodiment, the locking device has a locking slide, which places the blocking element in a locking position between the handle driver and the polygon driver and keeps the handle in the first handle position.

Locking devices have the advantage that in addition to the two handle positions, actuation of the fitting by unauthorized parties from the inside is made more difficult by the locking slide and can be substantially prevented if there is a lock.

Further features, details and advantages of the invention can be derived from the wording of the claims and the following description of exemplary embodiments in reference to the drawings. Therein:

Fig. 1 shows a partially cutaway, perspective schematic illustration of an embodiment of a fitting, e.g., for a door panel, a window sash, etc.;

Fig. 2 shows a perspective, schematic illustration of an embodiment of a coupling element for a fitting;

Fig. 3 shows a further perspective schematic illustration of an embodiment of a coupling element for a fitting;

Figs. 4 a) - d) show a perspective and partially cutaway schematic illustration of an embodiment of a fitting in a blocking position;

Figs. 5 a) - d) show a perspective and partially cutaway schematic illustration of an embodiment of a fitting in a release position;

Fig. 6 shows a perspective schematic exploded view of an embodiment of a stop body with a handle driver;

Fig .7 shows a perspective schematic illustration of another embodiment of a stop body with a handle driver;

Fig. 8 shows a cutaway schematic illustration of an embodiment of a fitting with a lock;

Fig. 9 shows a cutaway schematic illustration of an embodiment of a fitting with a locking slide;

Fig. 10 shows a cutaway perspective schematic illustration of an embodiment of a fitting;

Fig. 11 shows a partially cutaway perspective schematic illustration of an embodiment of a fitting with a coupling element and a locking device;

Fig. 12 shows a cutaway schematic illustration of an embodiment of a fitting with a coupling element and a locking device;

Fig. 13 shows a perspective schematic illustration of an embodiment of a coupling element for a fitting; and

Fig. 14 shows a perspective schematic illustration of an embodiment of a coupling element for a fitting.

Fig. 1 shows a partially cutaway perspective schematic illustration of an embodiment of a fitting 1, e.g., for a door panel, a window sash, etc. The elements of the fitting 1 are located along an axis of rotation D, which defines an axial direction. A radial direction runs perpendicular to the axial direction, thus perpendicular to the axis of rotation D.

A handle has a neck 11 in which a handle driver 53 is received such that it rotates conjointly therewith and is axially fixed in place. A polygon driver 60 is located in a receiving space 56 in the handle driver 53, which receives a polygon 40. The polygon 40 passes through a stop body 20 and is connected to a mechanism, not shown, which actuates a locking mechanism in a window or a door.

The polygon driver 60 has a second flange section 64, which is located in front of a base insert 26 of the stop body 20 in the axial direction, inside the stop body 20 on the handle end. The polygon driver 60 also has a first flange section 62 (not visible in Fig. 1), which extends into the base insert 26.

The polygon driver 60 also has a neck section 68a, which is delimited at the handle side by a closure 68b. There is a spring 69 inside the neck section 68a, which pretensions the polygon 40 toward the stop body 20. This is of particular advantage when the installation depth of the polygon 40 is not known or an installation depth dictated by the door panel or the window sash has to be accommodated for.

The base insert 26 of the stop body 20 also has recesses 21 for blocking elements 71 and springs 72 of a blocking device 70. The blocking elements 71 can be brought into engagement with the first flange section 62 of the polygon driver 60. The function of the blocking device 70 shall be explained below in reference to Figs. 4 and 5.

Cams 27 are formed in the base insert 26, which can be brought into engagement with corresponding recesses in the window or door. The base insert 26 is tensioned against a base element 28 of the stop body 20 by a securing means (not shown).

A reinforcement is located between the base element 28 and the cover plate 25, the function of which shall be explained below in reference to Fig. 7.

The handle driver 52 and the polygon driver 60 collectively form the coupling element 50, wherein a torque can be transferred from the handle 10 to the polygon 40 through the coupling element 50.

The handle driver 52 and the polygon driver 60 can be slide axially against one another along the axis of rotation D, wherein the handle 10 can be brought by this means

into a first handle position I and a second handle position II (not shown). In the first handle position I, the handle 10 is at a radial distance to the stop body 20 in this exemplary embodiment, which is greater than when the handle is in the second handle position II (not shown).

The handle 10 is in the first handle position I when the window or door is closed. The return spring 13 located on the outside of the handle driver 52, which engages in a receiving space 14 in the handle, tensions the handle 10 against the stop body 20 such that the handle 10 is pushed into the first handle position I. At the same time, the return spring 13 bears on a cover plate 25 of the receiving element, wherein the cover plate is pressed by the tension of the spring 13 against the stop body 20, in particular against the base element 28 of the stop body 20.

In order to secure the handle driver 52 in the handle neck 11, there is a fastening means 12, formed by a screw in this exemplary embodiment, which extends through a multi-sided region 54 of the handle driver 52 at the handle side, and into the handle neck 11 of the handle 10. Alternatively, the fastening of the handle driver 52 in the handle can also take place with a material bonded connection, e.g. using adhesive.

Fig. 2 shows a perspective schematic illustration of an embodiment of a coupling element 50 for a fitting 1 with a detailed illustration of the handle driver 52 and the polygon driver 60.

The handle driver 52 can be placed in the neck 11 of the handle 10, as described above, and can be secured there for conjoint rotation by a fastening means 12. For this, the handle driver 52 also has a multi-sided region 54 at its end where the handle is. The multi-sided region 54 can engage in a corresponding recess in the handle, such that a rotation of the handle about the axis of rotation D is prevented.

The handle driver 52 also has neck section 53 that is substantially cylindrical. This neck section 53 adjoins the multi-sided region 54 toward the polygon driver 60. The neck section 53 is in the shape of a tube and has a receiving space 56 in which the polygon driver 60 can be at least partially received, for example.

There is a flange section 55 on an end of the handle driver 52 facing the polygon driver 60, wherein the flange section 55 is formed by a flange and extends radially, perpendicular to the axis of rotation D. Positioning webs 66 are located on the flange section 55 of the handle driver 52 on the handle side, which can engage in positioning pockets in the base element 28, as shall be explained below in reference to FIGS. 6 and 7.

Actuating elements 51 and engagement elements 57 are located on the side of the handle driver 52 facing the polygon driver 60. In particular, there are four engagement elements 57 on the flange section 55 that extend along the circumference of the flange section 55 and are spaced apart along the circumference.

The engagement elements 57 extend radially outward from an inner surface of the flange section 55 formed by the receiving space 56, although the engagement elements 57 do not extend over the entire radius of the flange section 55.

The actuating elements 51 are located on ends of the engagement elements 57 lying on the circumference and extend to a radial outer end of the flange section 55.

The actuating elements 51 are formed integrally with the engagement elements 55 and extend circumferentially along the flange section 55 over a smaller region than the engagement elements 51.

The polygon driver 60 has a closure 68b on an end facing the handle driver 52, to which a neck section 68a, a first flange section 62 and a second flange section 64 are adjoined in the direction of the end of the polygon driver 60 facing away from the handle driver. An end side 62b closes the polygon driver 60 at the end lying opposite the handle driver 52.

The neck section 68a of the polygon driver is substantially cylindrical and hollow on the inside, such that a polygon receiver 67 is formed inside the neck section 68a and inside the first flange section 62 and the second flange section 64.

The neck section 68a also has numerous slots in its outer circumference, parallel to the axis of rotation D. This is of particular advantage when the polygon 40 has a square cross section. The edges of the polygon can engage in the slots in the outer circumference of the neck section 68a. This saves space and results in an improved torque transfer between the polygon driver 60 and the polygon 40.

Latching depressions 65 are located in the second flange section 64 along its outer circumference, the function of which shall be explained below. The first flange section 62 has blocking recesses 61, which are arranged and dimensioned such that the actuating elements 51 can be brought into engagement with the blocking recesses 61 in a form-fitting manner.

The radially outer edges of the actuating elements 51 of the handle driver 52 complement the circumferential surface 63 of the first flange section 62 of the polygon

driver 60 in the exemplary embodiment when the flange section 55 of the handle driver 52 is pushed into the flange section 62 of the polygon driver 60.

The flange section 55 of the handle driver 52 has an outer diameter that is smaller than or equal to the inner diameter available in the first flange section 62 of the polygon driver 60.

Fig. 3 shows a perspective schematic illustration of another embodiment of a coupling element 50 for a fitting 1, wherein the handle driver 52 and the polygon driver 60 from FIG. 2 are shown therein.

The multi-sided region 54 of the handle driver 52 has a hole for the fastening means 12.

The positioning webs 66 located on the surface of the flange section 55 of the handle driver 52 at the handle side can be readily seen in FIG. 3. There are three positioning webs 66 located on the flange section 55, which extend in a Y-like configuration from the radial outer edge region of the flange section 55 to the neck section 53 of the handle driver 52.

In the first flange section 62, the polygon driver 60 has an end face 62a, facing the handle 10, of an end side 62b facing the stop body 20, in which the recesses 68 are located.

The recesses 68 can be brought into a form-fitting engagement with the engagement elements 57 and the actuating elements 51. The recesses exhibit a negative form of the engagement elements 57 and actuating elements 51 described above.

The first flange section 62 has a blocking recess 61 in its circumferential surface 63 in the region in which the actuating elements 51 of the handle driver 52 engage with the first flange section 62 of the polygon driver 60.

When the handle driver 52 is slid onto the neck section 68a of the polygon driver 60 such that the neck section 68a of the polygon driver 60 is pushed into the receiving space 56 of the handle driver 52, the engagement elements 57 engage in the recesses 68. In addition, the actuating elements 51 engage with the recesses 68 and the blocking recesses 61, and the flange section 55 of the handle driver 52 engages with the flange section 55 of the polygon driver.

In the engaged position in the second handle position II of the handle (not shown in Fig. 3), the handle driver 52 is connected to the polygon driver 60 for conjoint rotation. They are coupled to one another.

The coupling element 50 couples the handle 10 to the polygon 40 in this state. The blocking recesses 61 are also complemented in this state, such that the circumferential surface 63 of the first flange section 62 is substantially continuous.

Figs. 4 a) - d) show perspective and partially cutaway schematic illustrations of an embodiment 50 of a fitting 1 in a blocking position A, wherein the handle 10 is in the first handle position I.

Fig. 4 a) shows a side view of the fitting with the handle 10, the stop body 20, and the polygon 40 with the handle in the first handle position I, wherein the handle 10 is at a distance to the stop body 20 along the axis of rotation D when the handle is in this first handle position I, which is greater than the distance when the handle is in the second handle position II (cf. Fig. 5a)).

Fig. 4 b) shows a perspective, partial illustration of the fitting with the polygon 40, the base insert 26 of the stop body 20, the blocking device 70, and the polygon driver 60.

In the first handle position I of the handle, the handle driver 52 is not engaged with the polygon driver 60, such that the handle 10 is not coupled to the polygon 40. For this reason, the handle driver 52 is not shown in Figs. 4 b) and c).

The blocking device 70 is in the blocking position A. The blocking elements 71 of the blocking device 70 inserted in the recesses 21 are engaged with the blocking recesses 61 in the first flange section 62 of the polygon driver 60 through the tension applied to them by means of the spring 72.

The blocking elements 71 are in the form of rollers guided by the boundaries of the recesses 21. An alternative embodiment of the blocking elements 71, e.g., as balls or bolts, is also a possibility.

The first flange section 62 is non-rotatably connected to the stop body 20, such that it cannot rotate about the axis of rotation D, through the engagement of the blocking elements 71 with the first flange section 62 of the polygon driver 60.

The polygon 40 received in the polygon receiver 60 is thus also non-rotatably supported in the blocking position A and the first handle position I. The polygon 40 can also be displaced axially in the polygon receiver 60, e.g., when there is a gap, or a spring 69 is located, in the polygon receiver 67 between the polygon 40 and the closure 68b.

The second flange section 64, with the latching depressions 65 located in its circumference, bears on the base insert 26 when the handle is in the first handle position I.

Fig. 4 c) shows a section through the base insert 26, the blocking device 70, the polygon driver 60 in the region of the first flange section 62, and the polygon 40 that has been placed in the polygon receiver 67 in the polygon driver 60, cut along a cutting plane perpendicular to the axis of rotation D. Furthermore, the actuating elements 51 are disengaged from the recesses 68 and the blocking recesses 61, such that the recesses 68 and the blocking recesses 61 are only partially filled through the engagement of the blocking elements 71 in the blocking position A.

Furthermore, it can be clearly seen that, in the blocking position A, the blocking elements 71 of the blocking device 70 are engaged in the blocking recesses 61 in the polygon driver 60. The spring load to the blocking elements 71 caused by the springs 72 ensures that the blocking elements 71 are tensioned radially inward into the recesses 21 in the base insert 78, perpendicular to the axis of rotation D, thus toward the polygon 40.

Fig. 4 d) shows a perpendicular cut through the partially illustrated fitting 1. The handle driver 52 is shown together here with the polygon driver 60 in the blocking position A of the blocking device 70.

It is also clear in Fig. 4 d) that the blocking elements 71 of the blocking device 70 are engaged in the blocking recesses 61 of the polygon driver 60. In the first handle position, the handle driver is in a plane lying above the blocking device, such that the actuating elements 51 lie outside a functional region of the blocking device.

Figs. 5 a) - d) show perspective and partially cutaway schematic illustrations of an embodiment of a fitting 1 in a release position B.

Fig. 5 a) shows a side view of the fitting with the handle 10, the stop body 20, and the polygon 40, with the handle in the second handle position II, wherein the handle 10 is at a distance to the stop body 20 along the axis of rotation D in this second handle position II, that is smaller than the distance when the handle is in the first handle position I (cf. Fig. 4 a)).

Fig. 5 b) shows a perspective, partial illustration of the fitting with the polygon 40, the base insert 26 of the stop body 20, the blocking device 70, the polygon driver 60 and the handle driver 52. The handle driver 52 is engaged with the polygon driver 60 in the second handle position II shown herein.

The blocking device 70 is in the release position B. In this case, the blocking elements 71 of the blocking device 70 that are inserted in the recesses 21 are not engaged in the blocking recesses 61 in the polygon driver 60.

The blocking elements 71 of the blocking device 70 are pushed by the actuating elements 51 of the handle driver into the recesses 21 of the based element 28, counter to the tension of the springs 72, until the blocking elements 71 are disengaged from the blocking recesses 61.

In the release position B, the polygon driver is not non-rotatably blocked by the blocking device, such that a torque can be transferred between the handle driver 52 and the handle 10 that is connected to the handle driver 52 for conjoint rotation, and the polygon 40.

The torque is transferred in particular via the coupling established by the coupling element 50. The coupling is obtained in particular between the handle driver 52 and the polygon driver 60.

Fig. 5 c) shows a section, cut along a cutting plane perpendicular to the axis of rotation D, through the base insert 26, the blocking device 70, the polygon driver 60 in the region of the first flange section 62, the handle driver in the region of the flange section, and in particular in the region of the actuating elements 51 and the polygon 40, which is placed in the polygon receiver 67 of the polygon driver 60.

It is clear here that the actuating elements 51 keep the blocking elements 71 disengaged from the blocking recesses 61 and the recesses 68. Furthermore, the engagement elements 57 are engaged in the recesses 68, such that a coupling is obtained between the handle driver 52 and the polygon driver 60, in particular for a rotation about the axis of rotation D. The coupling ensures that a torque can be transferred between the polygon driver 60 and the handle driver 52, wherein the coupling element 50 is oriented such that the polygon 40 can be actuated by the handle 10 when the handle is in the second handle position II and the blocking device 70 is in the release position B.

Fig. 5 d) shows a perpendicular section through the partially shown fitting 1. The handle driver 52 is shown here with the polygon driver 60 and the handle driver when the blocking device 70 is in the release position B.

It is likewise visible in Fig. 5 d) that the blocking elements 71 of the blocking device 70 are not engaged in the blocking recesses 61 of the polygon driver 60. This is obtained in that the handle is moved along the axis of rotation D into the second handle position II in the handle driver 52 via the axial actuation of the handle 10.

When the handle is in the second handle position II, the handle driver 52 is engaged with the polygon driver via at least the actuating elements 51, wherein the actuating

elements 51 complement the circumferential surface 63 of the first flange section 62 of the polygon driver. The blocking elements 71 are not engaged with the polygon driver, wherein the blocking elements 71 lie in the recesses 21 in the base insert 26 and are pushed against the circumferential surface 63 of the first flange section 62 that is complemented by the actuating elements 51 due to the tension of the springs 72.

Fig. 6 shows a perspective schematic exploded illustration of an embodiment of a stop body 20 with a handle driver 53.

In this illustration, actuating elements 51 and engagement elements 57, described above, can be readily seen on the end facing the stop body.

The base element 28 of the stop body 20 is also shown therein. The stop body 20 contains positioning pockets 22 in the base element 28, which can be brought into engagement with the positioning webs 66 of the handle driver 52 when the handle is in the first handle position I.

When the handle is in the second handle position II, the positioning webs 66 are not engaged in the positioning pockets 22.

The positioning pockets 22 have the same Y-shaped configuration to one another as the positioning webs 66 on the side of the flange section 55 of the handle driver 52 facing the handle 10.

Fig. 7 shows a perspective schematic illustration of another embodiment of a stop body 20 with a handle driver 53.

In this drawing, the cover plate 25 of the stop body 20 is not shown, such that the reinforcement 23 lying beneath the cover plate in the stop body is visible. The reinforcement 23 has recesses lying in the region of the positioning pockets 22. The positioning pockets 22 open toward the flange section 55 of the handle driver 52. The handle driver 52 is guided through a central hole in the stop body 20 and passes through the stop body 20 with the neck section 53 at the side where the handle is.

The recesses 24 in the reinforcement 23 stabilize the base element 28, such that the handle driver 52 with the positioning webs 66 is non-rotatably secured in a first handle position I of the handle 10 and is robust secured by the reinforcement against rotation about the axis of rotation D. The forces acting on the positioning webs 66 and the positioning pockets 22 when it is attempted to actuate the handle in the first handle position through a rotation about the axis of rotation D, are absorbed by the

reinforcement 23, and evenly distributed to the surrounding base element 28, and lastly deflected over the entire stop body 20 with the base element 26 and the cams 27.

Fig. 8 shows a cutaway schematic illustration of an embodiment of a fitting 1 with a locking device, in particular a lock 81. The lock has a closing mechanism, which pushes a bolt 82 against the cover plate 25 of the stop body 20 in the latching position, such that a movement of the handle 10 from the first handle position I to the second handle position II is prevented.

Fig. 9 shows a cutaway schematic illustration of an embodiment of a fitting 1 with a locking device, in particular a locking slide 83. A bolt 84 can be actuated by the locking slide 83, which engages in the receiving space 56 in the handle driver 52 and blocks an axial movement of the handle driver 52 in relation to the polygon driver 60, or vice versa. In this manner, the handle 10 is locked in the first handle position I by means of the locking device 80.

Fig. 10 shows a cutaway perspective schematic illustration of an embodiment of a fitting 1. In this embodiment, the handle 10 is tensioned against the stop body 20 in order to ensure that the handle is in the first handle position I, in that the tension is obtained via an internal spring 95 and an external spring 96. The external spring 96 is located between the handle 10 and the cover plate 25 of the stop body 20 and engages at least partially in the neck 11 of the handle 10.

The polygon driver 60 is designed such that it has a recess in a region facing the handle, in which the internal spring 95 lies in part. The internal spring 95 is located in the receiving space 56 in the handle driver 52, and bears on the boundary of the handle driver 52 and/or the fastening means 12 at the handle side.

The coupling arrangement 50 is pushed apart by the internal spring 95 and the external spring 96 in an axial direction along the axis of rotation D. This tensioning is counteracted by the base element 28, against which the handle driver 52 bears with the positioning webs 66.

The positioning webs 66 allow the handle to assume the first handle position I when engaged with the positioning pockets 22, wherein, when the positioning webs 66 are disengaged from the positioning pockets 22, the handle is kept in the second handle position II.

Fig. 11 shows a partially cutaway perspective schematic illustration of an embodiment of a fitting 1 with a coupling element 50 and a blocking device 70.

In this embodiment, the blocking device acts in the axial direction. The blocking element 71 is supported in this case such that it can be displaced axially in a recess 21 in the stop body 20 by the tension exerted by a spring 72.

When the handle driver 52 is actuated axially, it can be brought into engagement with the polygon driver 60 via the actuating element 51, by means of which the blocking element 71 can be disengaged from the blocking recess 61 in the first flange section 62 of the polygon driver 60.

Fig. 12 shows a cutaway schematic illustration of an embodiment of a fitting 1 with a coupling element 50 and a blocking device 70, wherein the blocking device 70 acts in the axial direction, as described above.

The coupling element 50 is shown in coupled state, i.e., the handle 10, not shown in Fig. 12, is in the second handle position II, and the blocking device 70 is in the release position B.

Fig. 12 also shows a latching element 90 with a latching element spring 91, which is pretensioned against the first flange section 62. The latching element 90 can retain the coupling element 50 in latching positions corresponding to the defined positions of the handle. In order to exit the latching positions, i.e., disengage the latching element 90 from the latching depressions 65, not shown in FIG. 12, the user must exert an increased force, wherein a feedback is generated that can be felt by the user upon reaching a latching position.

Fig. 13 shows a perspective schematic illustration of an embodiment of a coupling element 50 for a fitting 1. The coupling element 50 is designed such that the neck section 68a of the polygon driver 60 and the receiving space 56 in the handle driver 52 are covered over a particularly long axial length in the assembled state. This improves the guidance of the handle 10 in the fitting 1.

According to this embodiment, radial outer projections 68c and radial inner projections 68c are located in the first flange section 62 of the polygon driver 60, which can be brought into engagement with corresponding radial outer and radial inner recesses 59 in the handle driver, when the handle is in the second handle position II.

Fig. 14 shows a perspective schematic illustration of an embodiment of a coupling element 50 for a fitting 1, seen from the perspective of the stop body 20. In this perspective, the radial outer and radial inner recesses 59 of the handle driver can be readily seen. The recesses are located in the flange region 55 of the handle driver 52.

The invention is not limited to the any of the embodiments described above, and instead can be implemented in a number of ways. As such, the coupling element 50 can have an integral design, and brought into engagement with a blocking device 70 located in the stop body 20 such that the coupling element 50 brings the blocking device 70 into engagement with the polygon 40 in order to obtain the blocking position A, or disengages the blocking device 70 from the polygon 40, or allows it to become disengaged therefrom, in order to obtain the release position B.

It can also be the case that the blocking device 70 reaches the blocking position A when the handle 10 is in the second handle position II and the release position B is reached when the handle is in the first handle position I.

Furthermore, the coupling element 50 can be designed such, when it has a two-part design, that the handle driver 52 is inserted into the polygon driver 60.

It is clear that a fitting 1 has a handle 10 for actuating a mechanism in a door or a window, which can be rotated about an axis of rotation D, is supported on or in a stop body 20, wherein the stop body 20 can be fastened to the door or window. The fitting also has a polygon 40 for actuating the mechanism in the door or window, a coupling element 50 for coupling the handle 10 to the polygon 20, and a blocking device 70, which blocks actuation of the polygon 40 about the axis of rotation D when in the blocking position A, wherein the blocking device 70 can be moved to a release position B by axially actuating the handle form a first handle position to a second handle position along the axis of rotation D. In order to increase security against unauthorized actuation of the fitting or the mechanism connection to the fitting in a window or door, and to obtain a fitting that is easy to manipulate and inexpensive to produce, it is provided that the handle is decoupled from the polygon 40 in the first handle position, wherein the blocking device 70 is then in the blocking position A, in that the coupling element 50 couples the handle 10 to the polygon 40 in the second handle position of the handle, and retains the blocking device 70 in the release position B. Upon reaching the second handle position, the handle is then coupled to the polygon, and the mechanism can be actuated.

List of Reference Numerals

1	fitting	62a	end face
10	handle	62b	end side
11	handle neck	63	circumferential surface
12	fastening means	64	second flange section
13	return spring	65	latching depression
14	receiving region	66	positioning web
20	stop body	67	polygon receiver
21	recess	68	recess
22	positioning pocket	68a	neck section
23	reinforcement	68b	closure
24	recess	68c	projection
25	cover plate	69	spring
26	base insert	70	blocking device
27	cam	71	blocking element
28	base element	72	spring
40	polygon	80	locking device
50	coupling element	81	lock cylinder
51	actuating element	82	bolt
52	handle driver	83	locking slide
53	neck section	84	bolt
54	multi-sided region	90	latching element
55	flange section	91	latching element spring
56	receiving space	95	internal spring
57	engagement element	96	external spring
58	surface	D	axis of rotation
59	recess	A	blocking position
60	polygon driver	B	release position
61	blocking recess	I	first handle position
62	first flange section	II	second handle position

Patentkrav

1. Beslag (1) til betjening af en mekanik i en dør eller i et vindue,
- med et greb (10), der er monteret drejeligt om en omdrejningsakse (D) på eller i et anslagslegeme (20),
- idet anslagslegemet (20) kan fastgøres på døren eller vinduet,
- med en polygon (40) til betjening af mekanikken i døren eller i vinduet,
- med et koblingselement (50) til kobling af grebet (10) til polygonen (20)
- og med en spærreindretning (70), der i en spærrestilling (A) spærrer for betjeningen af polygonen (40) om omdrejningsaksen (D),
- idet spærreindretningen (70) ved aksial betjening af grebet fra en første stilling af grebet (I) til en anden stilling af grebet (II) langs omdrejningsaksen (D) kan overføres til en frigivelsesstilling (B),

kendetegnet ved,

a. **at** grebet (10) i der første stilling af grebet (I) er afkoblet fra polygonen (40),

b. idet spærreindretningen (70) befinder sig i spærrestillingen (A), og

c. **at** koblingselementet (50) i den anden stilling af grebet (II) kobler grebet (10) til polygonen (40) og holder spærreindretningen (70) i frigivelsesstillingen (B).

2. Beslag ifølge krav 1, **kendetegnet ved, at** koblingselementet (50) har mindst et betjeningselement (51) til spærreindretningen (70).

3. Beslag ifølge krav 1 eller 2, **kendetegnet ved, at** spærreindretningen (70) har mindst et spærreelement (71), der er anbragt separat i anslagslegemet (20).

4. Beslag ifølge krav 3, **kendetegnet ved, at** spærreelementerne (71) er radialt eller aksialt bevægelige i forhold til omdrejningsaksen (D), idet hvert spærreelement (71) underkastes en kraft i aksial eller i radial retning i forhold til omdrejningsaksen (D).

5. Beslag ifølge krav 3 eller 4, **kendetegnet ved, at** spærreelementerne (71) i spærrestillingen (A) står direkte eller indirekte i indgreb med polygonen (40).

6. Beslag ifølge et af kravene 1 til 5, **kendetegnet ved, at** koblingselementet (50) er udformet i to dele, idet koblingselementet (50) har en grebmedbringer (52), der er forbundet udrejeligt med grebet (10) og har en polygonmedbringer (60), der er forbundet udrejeligt med polygonen (40).

7. Beslag ifølge krav 6, **kendetegnet ved, at** koblingselementets (50) betjeningselementer (51) er udformet på grebmedbringeren (52).

8. Beslag ifølge krav 6 eller 7, **kendetegnet ved, at** polygonmedbringeren (60) har mindst en spærreudsparing (61) til optagelse af spærreelementerne (71).

9. Beslag ifølge krav 6 til 8, **kendetegnet ved, at** polygonmedbringeren (60) har et første flangeafsnit (62).

10. Beslag ifølge krav 9, **kendetegnet ved, at** spærreudsparingerne (61) er anbragt i det første flangeafsnit (62).

11. Beslag ifølge et af kravene 6 til 10, **kendetegnet ved, at** mindst en udsparing (68) er anbragt i en mod grebet (10) vendende endeflade (62a) i en ende (62b) af polygonmedbringeren (60).

12. Beslag ifølge et af kravene 6 til 11, **kendetegnet ved, at** betjeningselementerne (51) i den anden stilling af grebet (II) griber ind i polygonmedbringerens (60) spærreudsparinger (61).

13. Beslag ifølge et af kravene 6 til 12, **kendetegnet ved, at** polygonmedbringeren (60) på grebsiden har et halsafsnit (68).

14. Beslag ifølge et af kravene 6 til 13, **kendetegnet ved, at** polygonmedbringeren (60) har et andet flangeafsnit (64), idet der i det andet flangeafsnit (63) eller i det første flangeafsnit (62) i omkredsen er anbragt mindst en låsefordybning (65) til mindst et låseelement (90).

15. Beslag ifølge et af kravene 6 til 14, **kendetegnet ved, at** grebmedbringeren (52) har mindst en placeringsflig (66), og at anslagslegemet (20) har mindst en

placeringslomme (22) til placeringsfligene, idet hver placeringsflig (66) i den første stilling af grebet (I) kan bringes i indgreb med den i hvert tilfælde tilordnede placeringslomme (22).

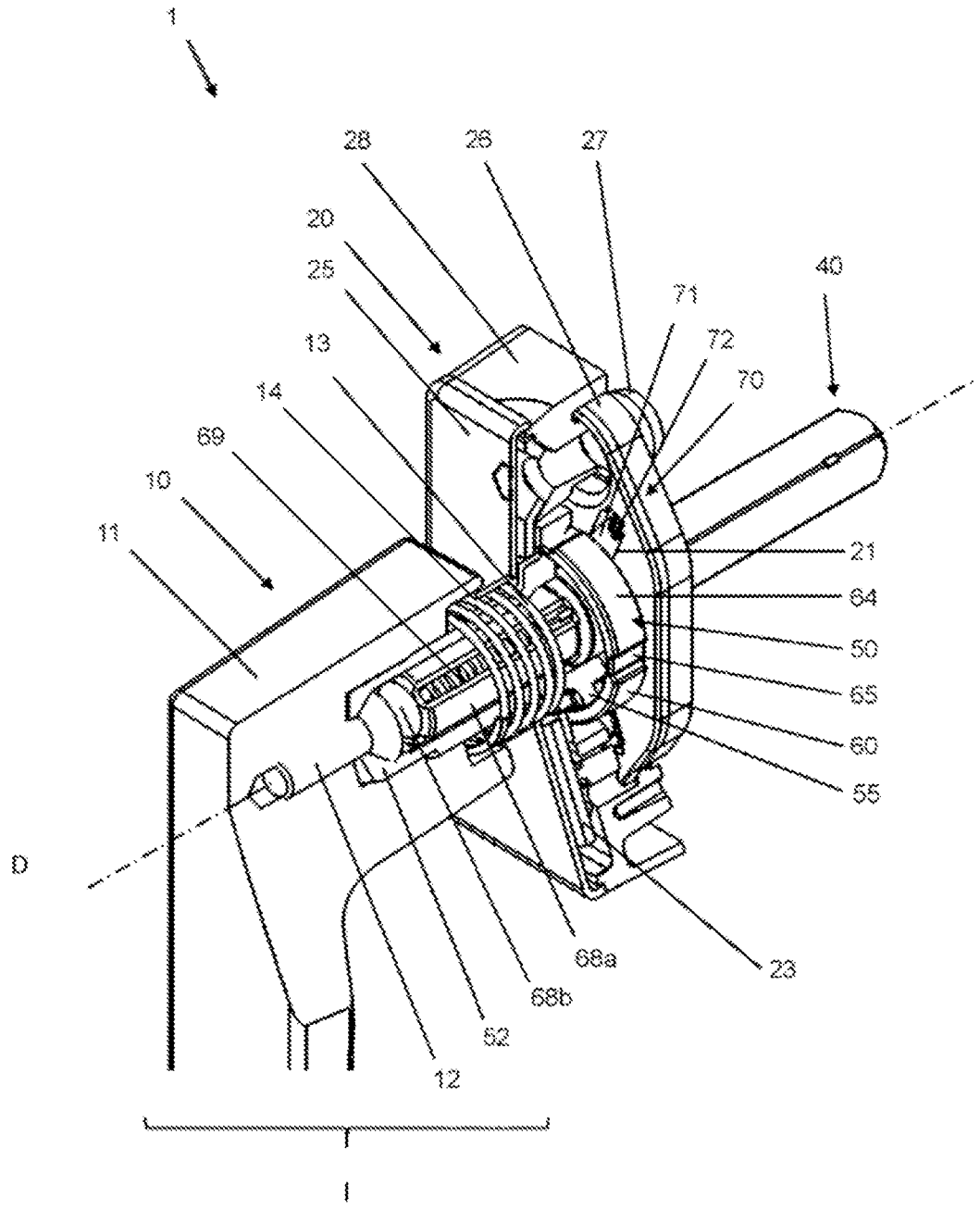
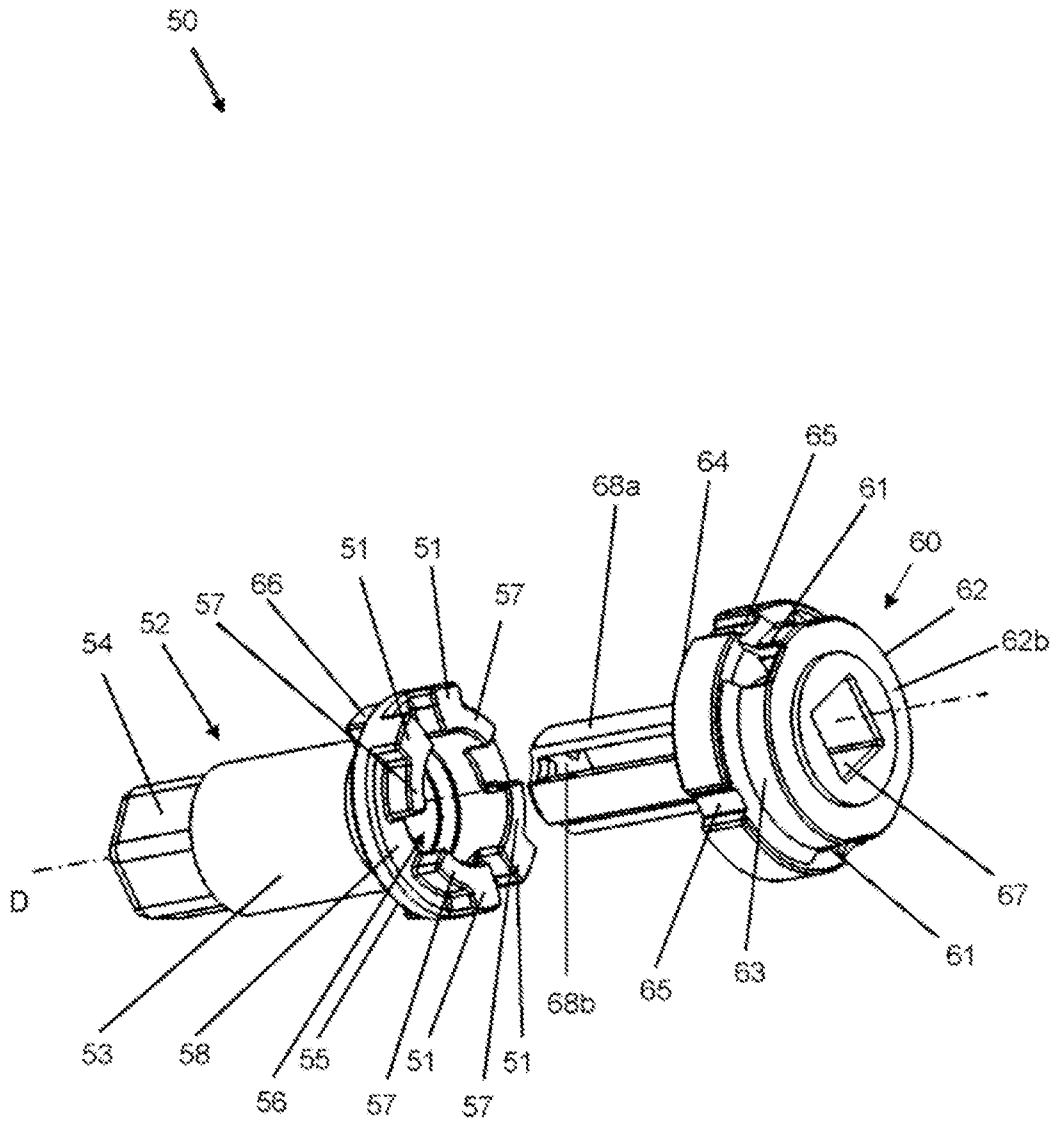

1
28
26
27
20
25
71
72
70
40
13
14
69
10
11
21
64
50
65
60
55
D
68a
23
68b
52
12
I

Fig. 1


50
65
64
68a
61
60
62
62b
51
51
57
66
57
52
54
D
67
61
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68b
53
58
56
55
51
57
51
57

Fig. 2

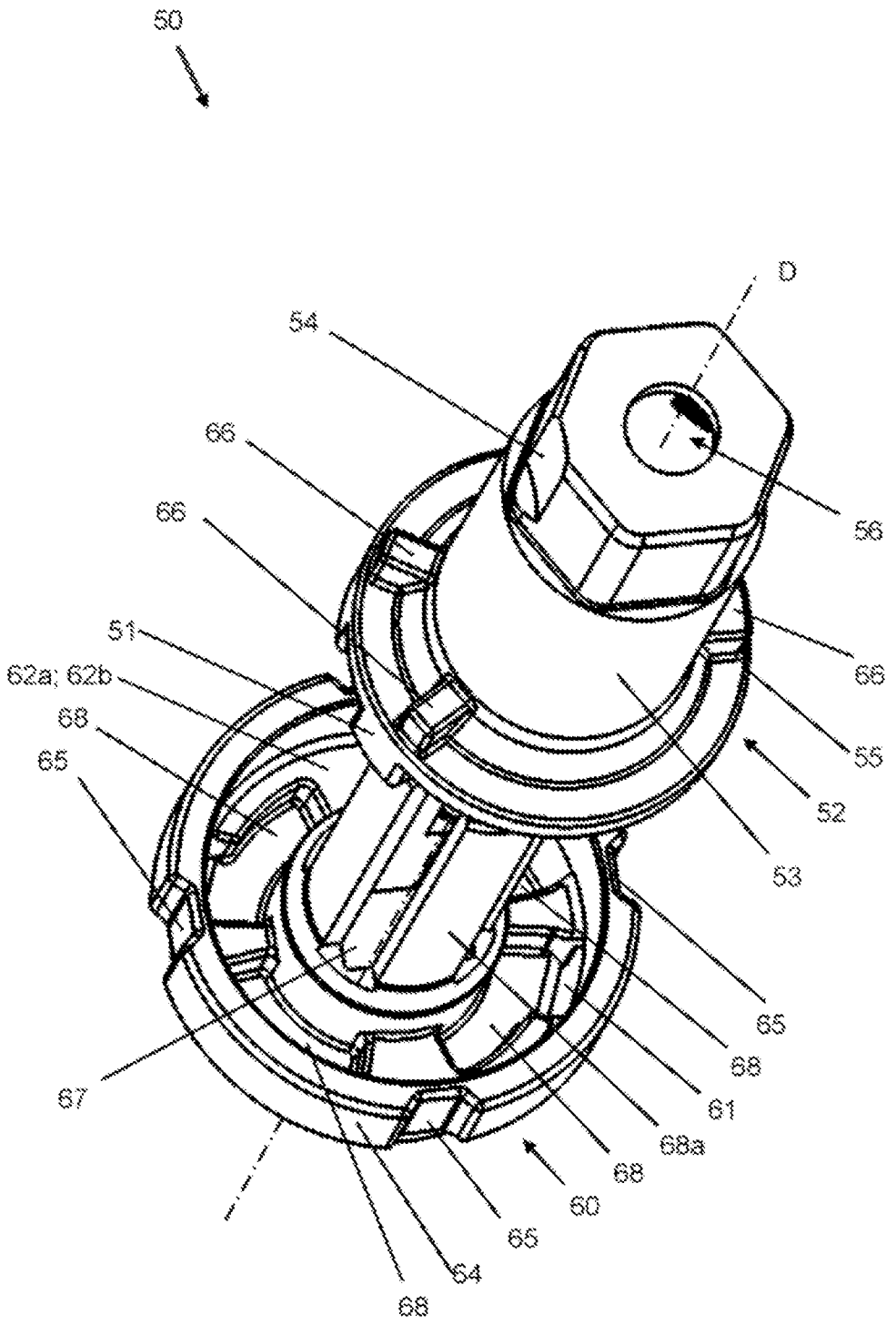
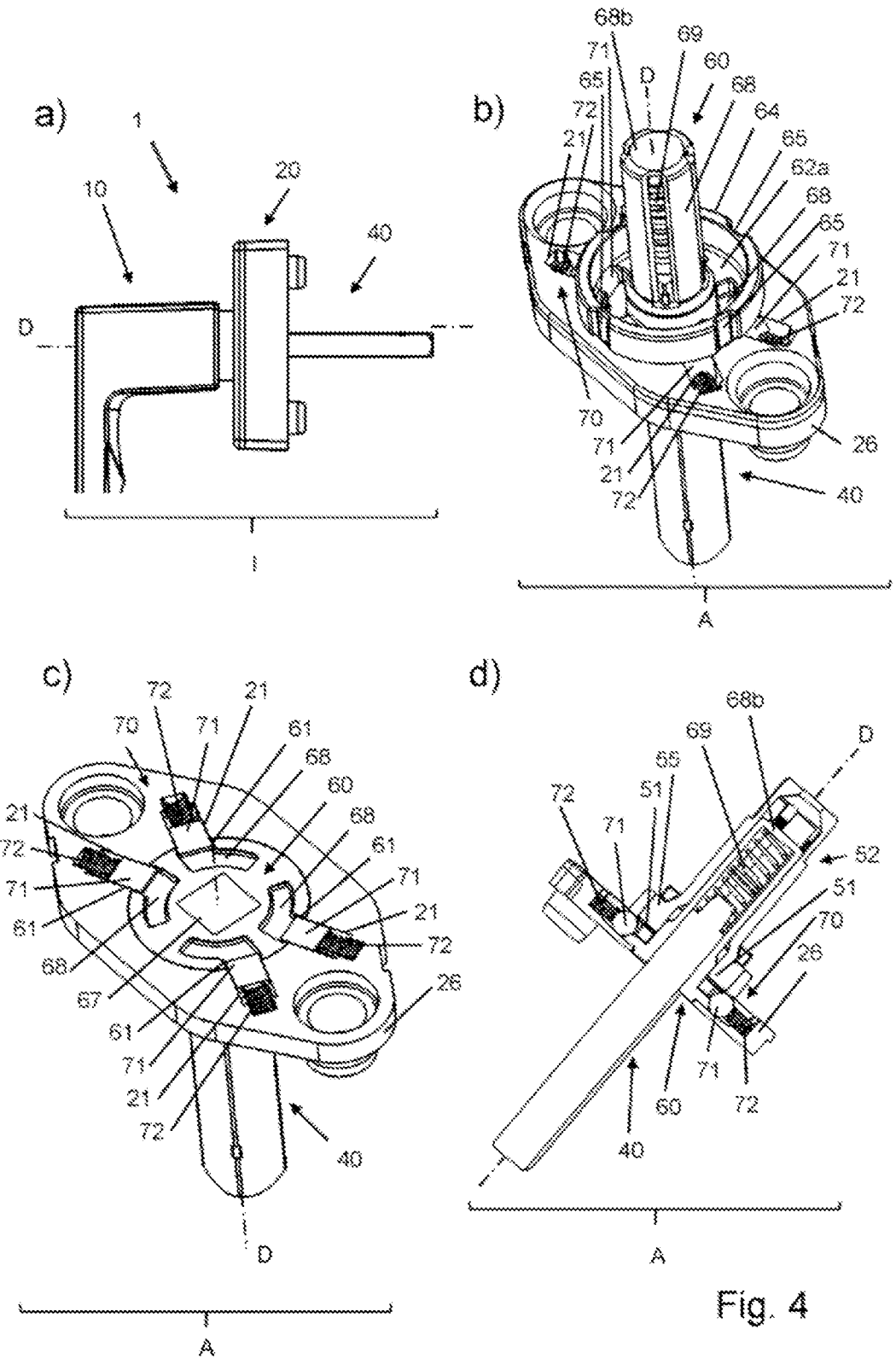

50
D
54
66
66
56
51
66
62a; 62b
55
68
65
52
53
65
68
61
68a
68
60
65
64
68
67

Fig. 3


a)
1
10
20
40
D
I
b)
68b
69
71
60
D
65
68
72
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21
65
62a
68
65
71
21
72
70
71
21
72
26
40
A
c)
72
21
70
71
61
66
60
68
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72
61
71
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21
61
72
68
26
67
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40
D
A
d)
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D
66
72
51
71
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51
70
26
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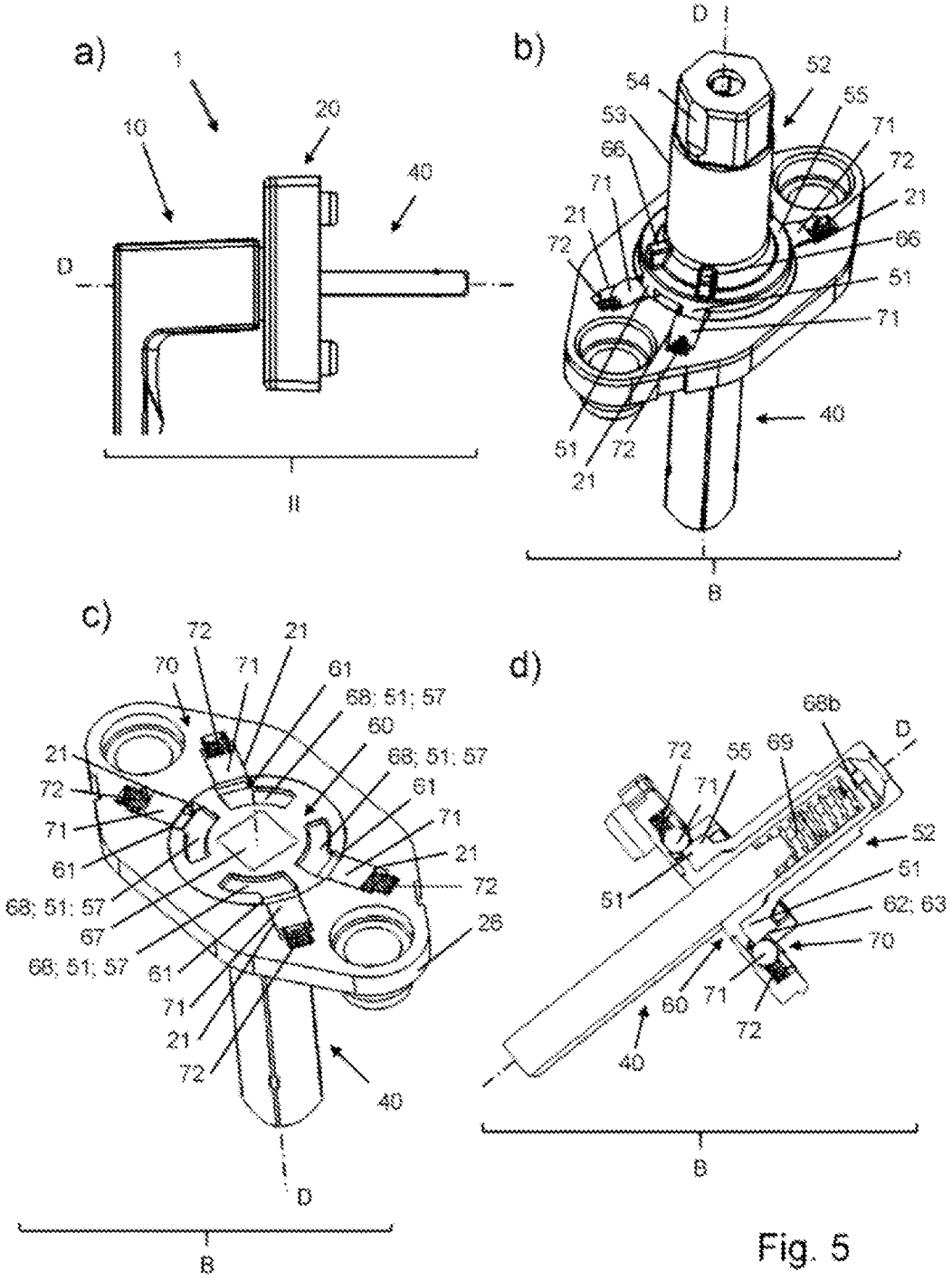
72
40
A

Fig. 4


a)
1
10
20
40
D
II
b)
D
52
54
53
55
71
66
72
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21
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72
66
51
71
40
51
72
21
B
c)
72
21
70
71
61
68; 51; 57
60
66; 51; 57
21
72
71
61
71
21
72
68; 51; 57
67
26
66; 51; 57
61
71
21
72
40
D
B
d)
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51
62; 63
70
60
71
72
40
B

Fig. 5

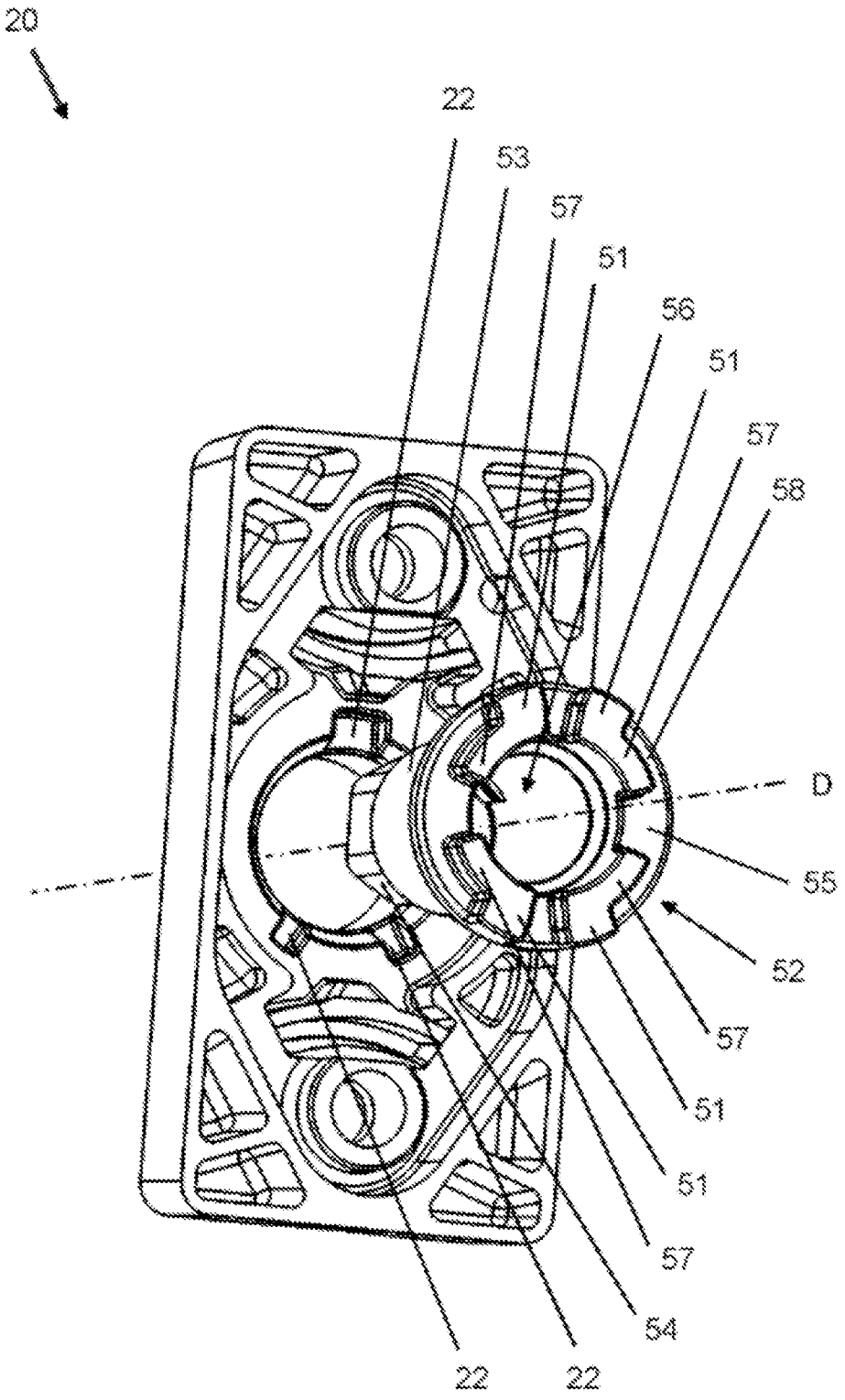

Fig. 6

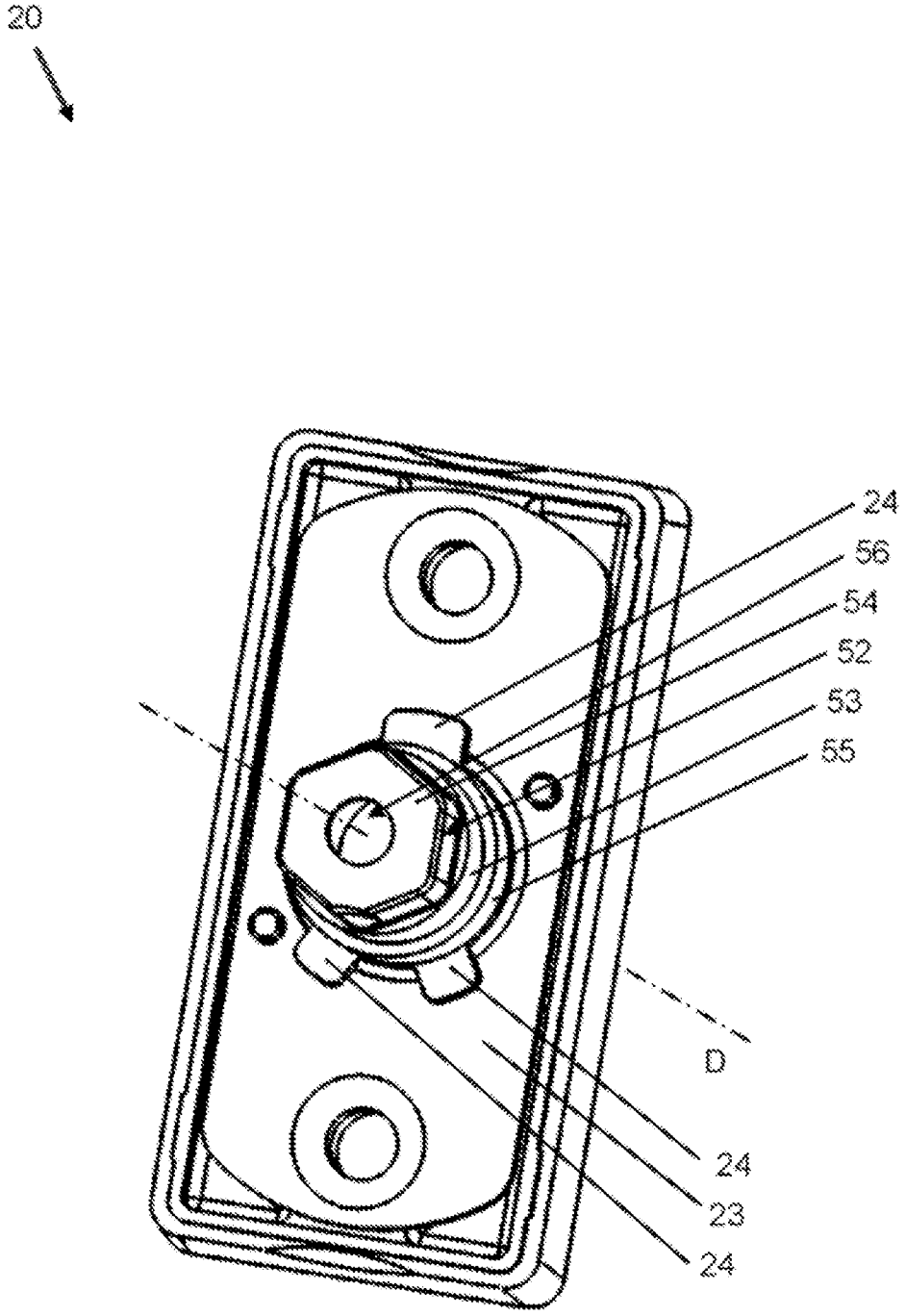

Fig. 7

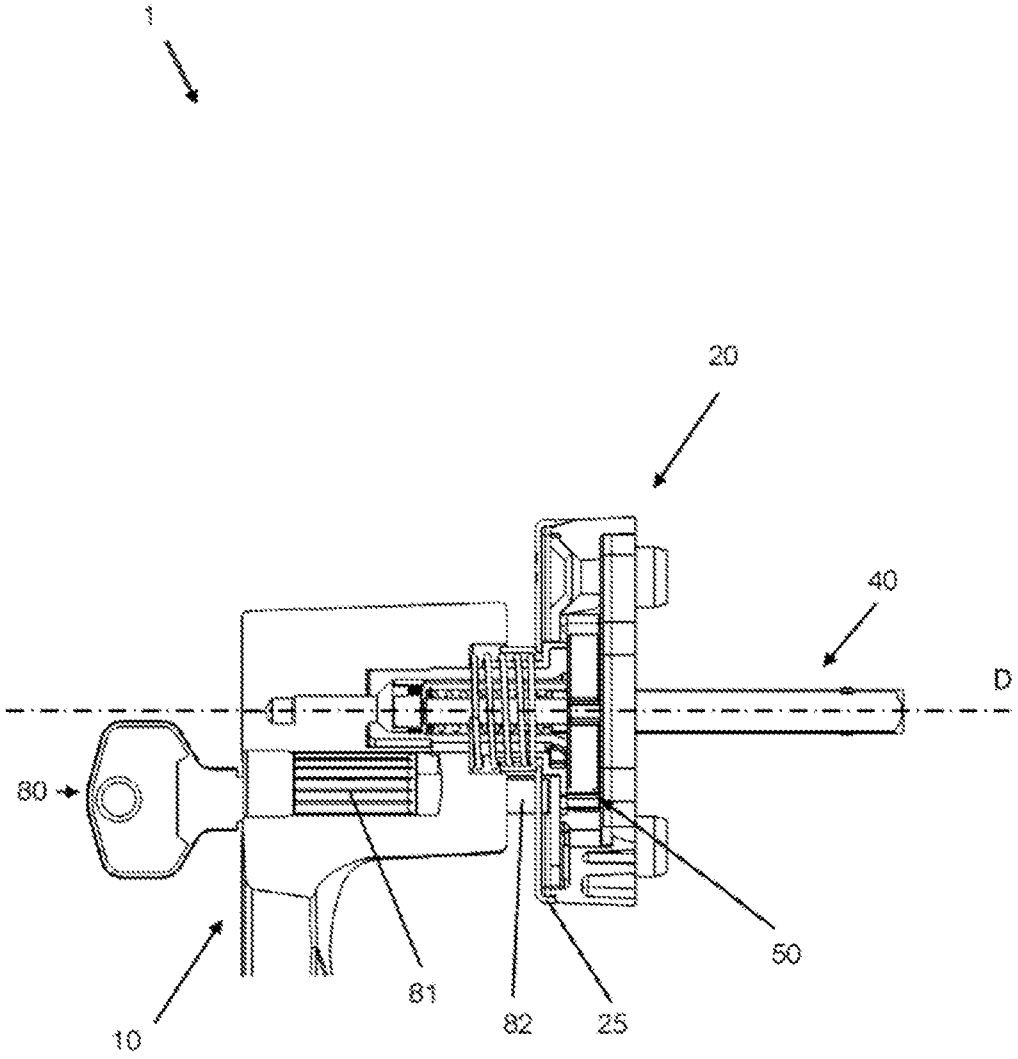

Fig. 8

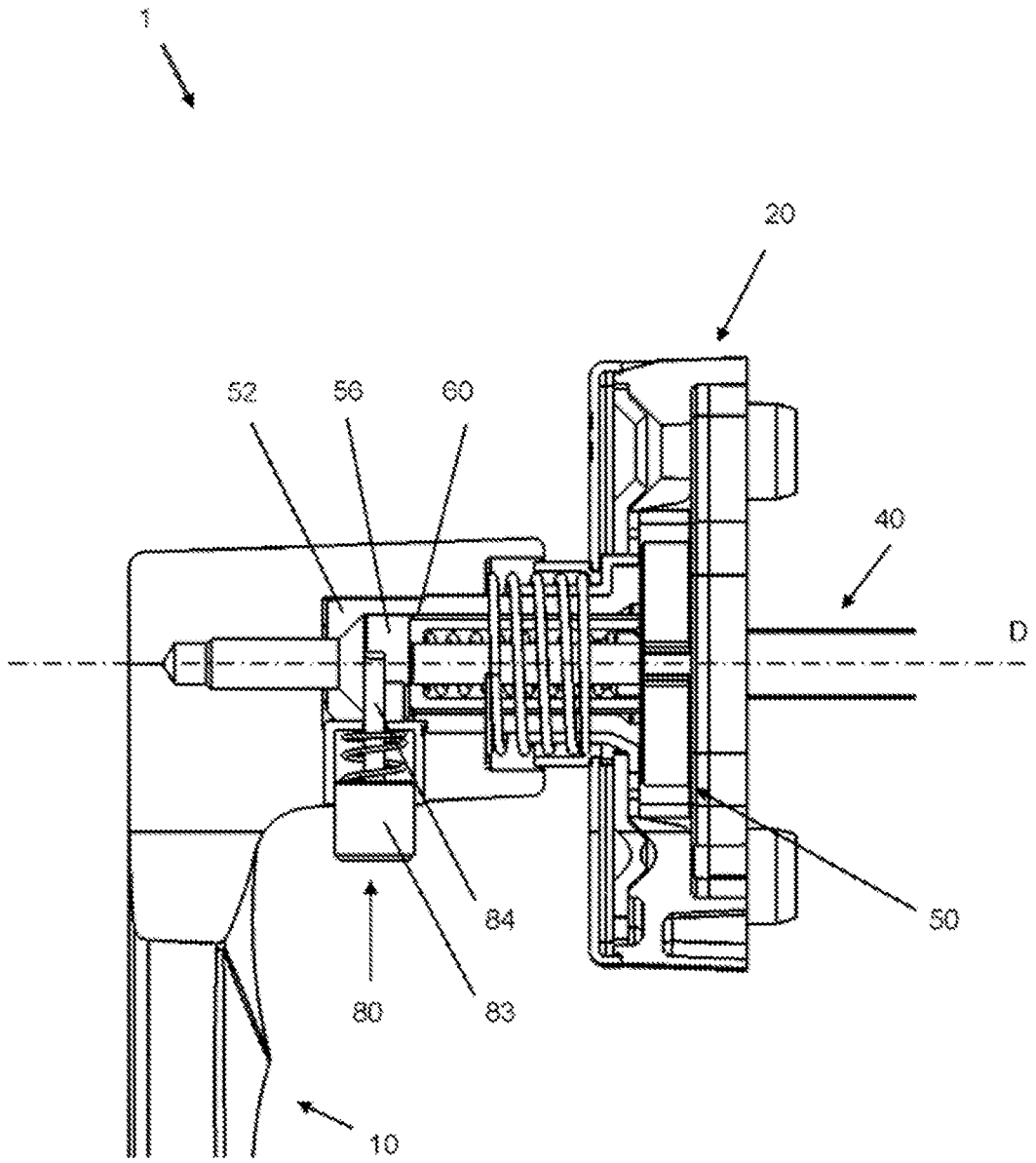

Fig. 9

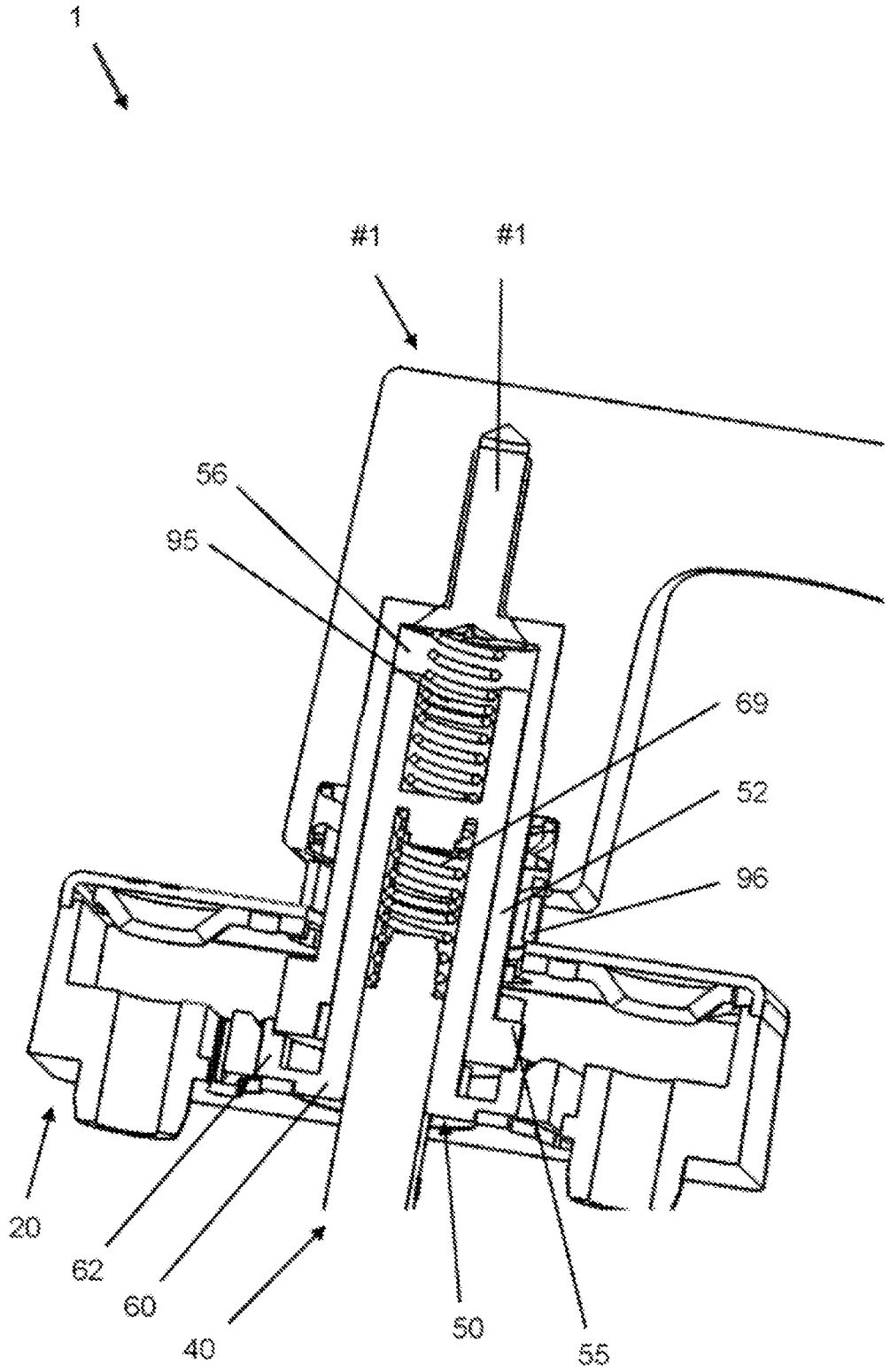

Fig. 10

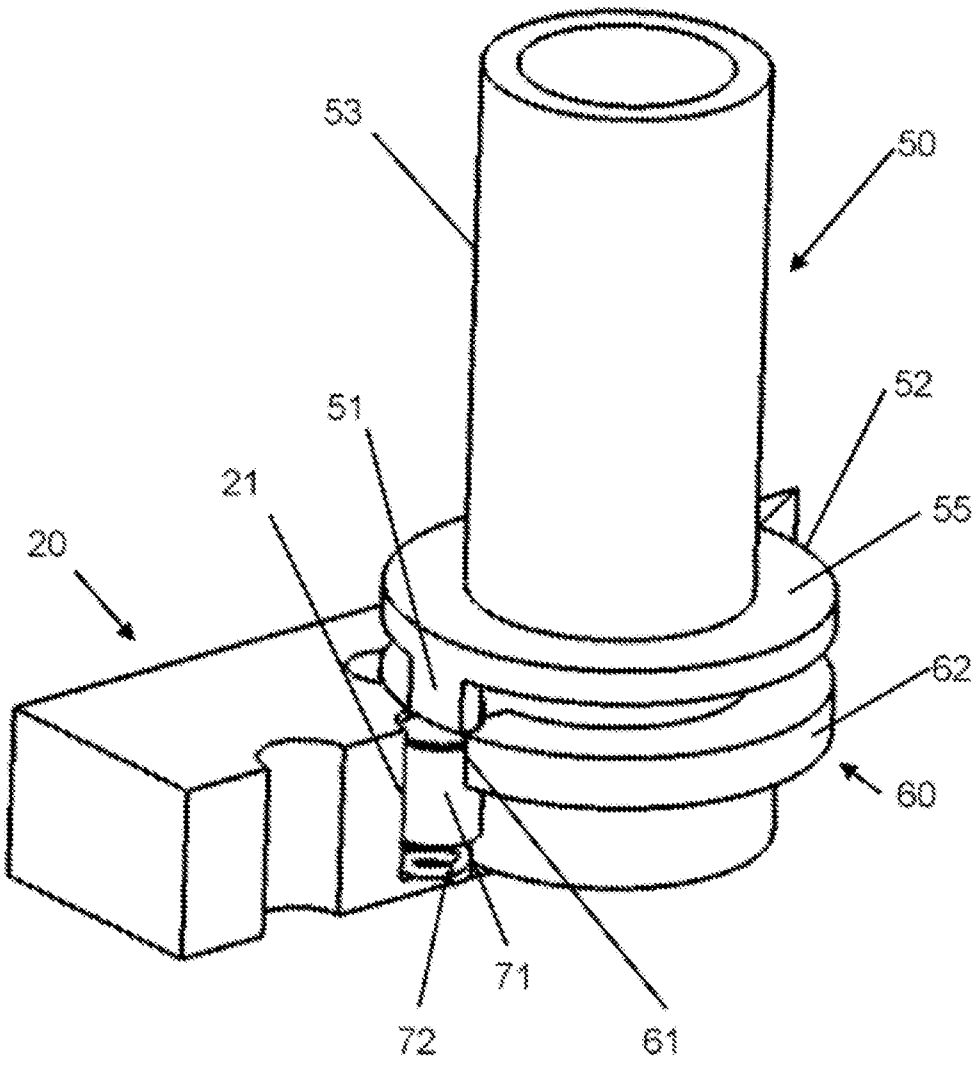

Fig. 11

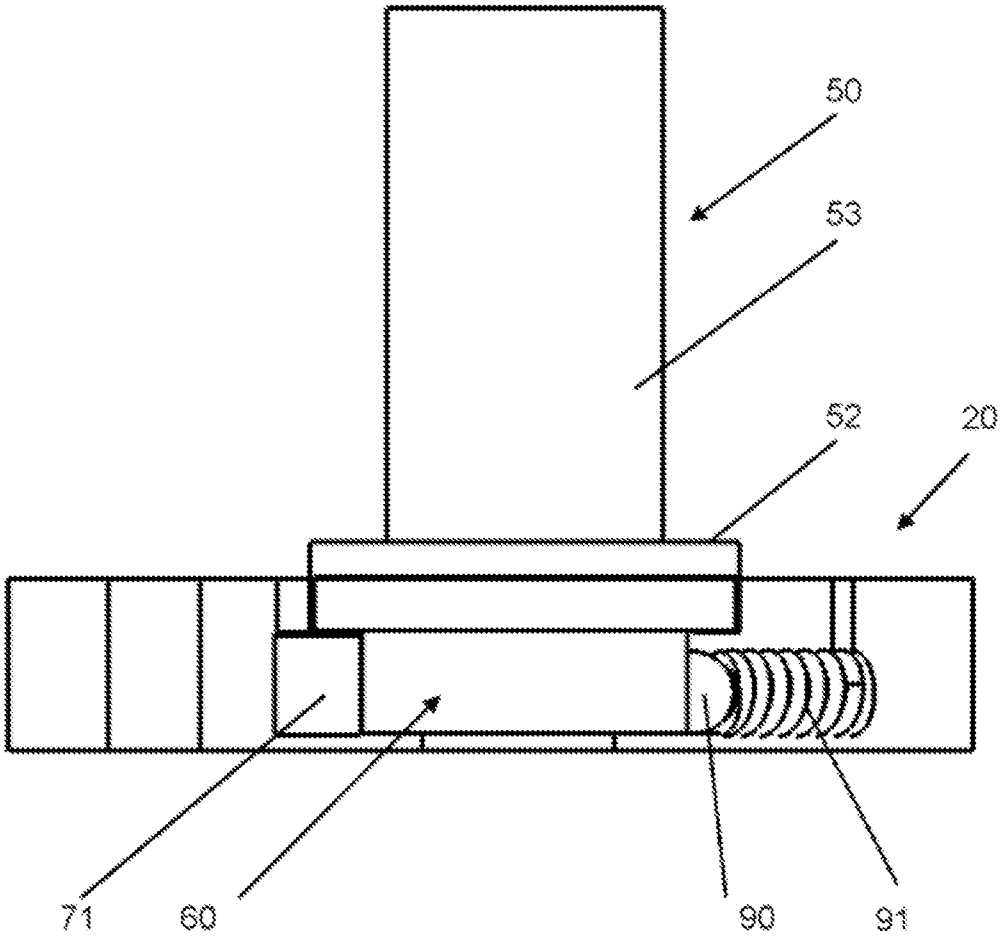

Fig. 12

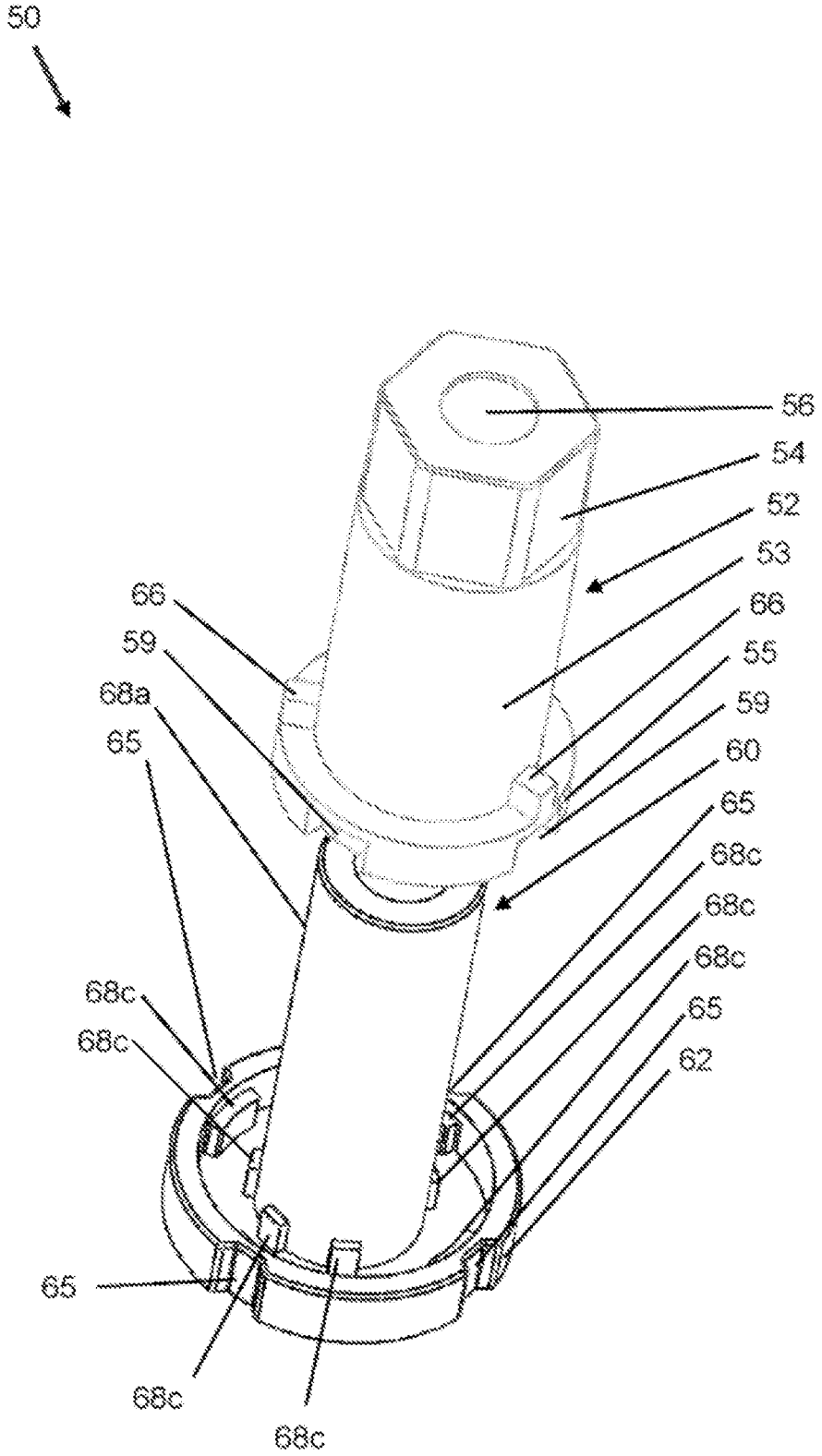
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Fig. 13

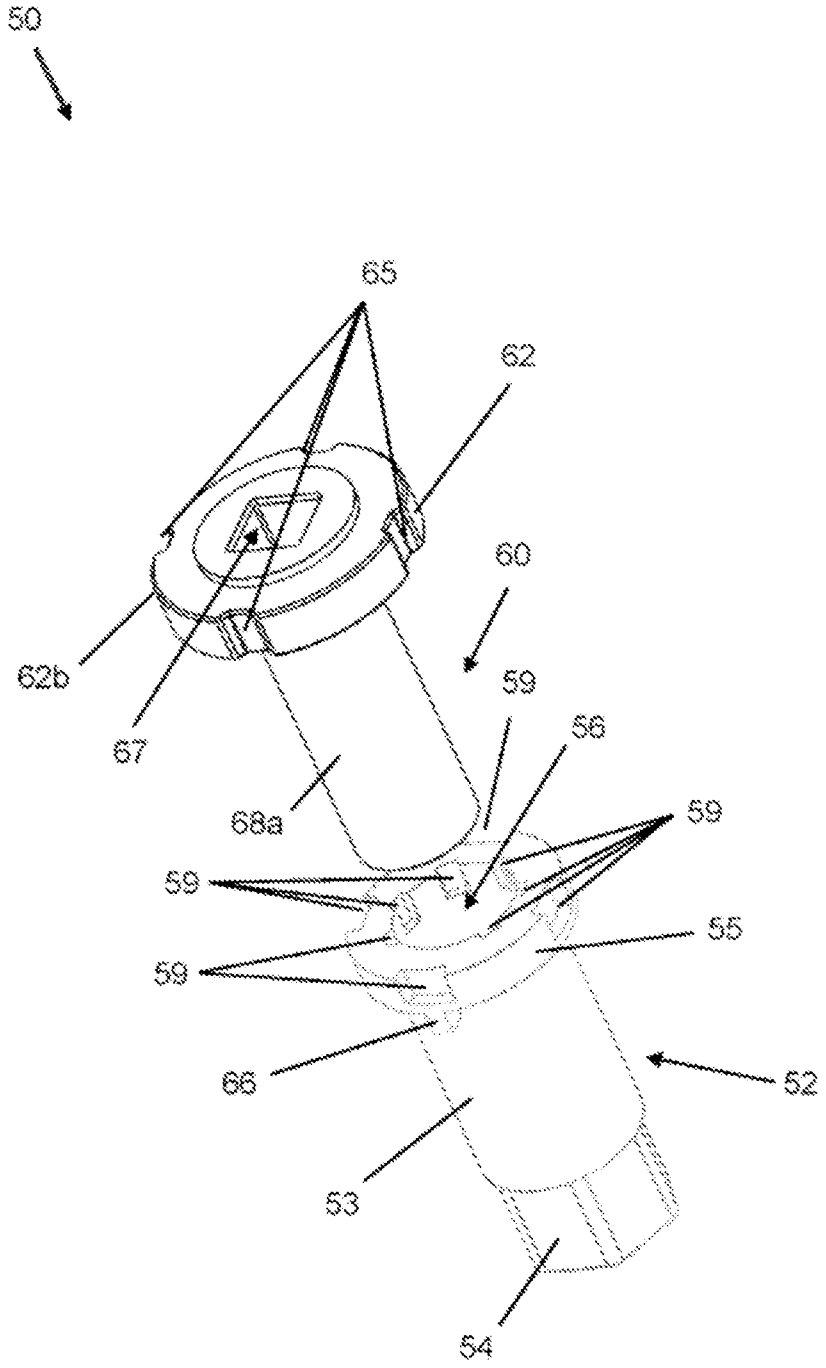

Fig. 14