(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 954 847 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
16.02.2022 Bulletin 2022/07

(21) Application number: **21190746.4**

(22) Date of filing: **11.08.2021**

(51) International Patent Classification (IPC):
E05B 53/00 *(2006.01)* ***E05B 63/00*** *(2006.01)*
E05C 9/00 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E05C 9/00; E05B 53/003; E05B 63/0056

(84) Designated Contracting States:
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
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **11.08.2020 FI 20205790**

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(54) A LATCH APPARATUS AND A LOCKING ARRANGEMENT

(57) A latch apparatus (15), comprising a body (20) and a locking bolt (30) arranged movably in relation to the body (20), the locking bolt being movable via an operating means (14) transmitting pulling tension that can be arranged in connection with the latch apparatus (15). The latch apparatus (15) comprises a tension adjuster (50) arranged to be rotatable in relation to at least one axis for adjusting the tension of the operating means (14).

Additionally the locking arrangement (10) for locking a rotatable element (2) about the rotating movement of the element (2) defined by the axis of rotation (X) of the element (2), the locking arrangement (10) comprising a latch apparatus (15) and operating means (14) for operating the latch apparatus (15) according to at least one of the claims 1 to 11.

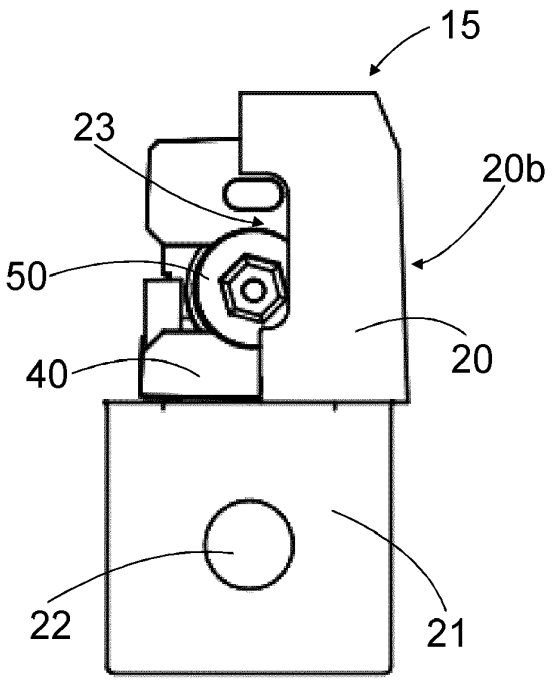

FIG. 5

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Description

Background of the invention

[0001] The present invention relates to a latch apparatus comprising a body and a locking bolt arranged movably in relation to the body, the bolt being movable by means of an operating means transmitting pulling tension, arranged in connection with the latch apparatus.

[0002] The invention further relates to a locking arrangement for locking a rotatable element about a rotating movement defined by the rotation axis of the element.

[0003] Floor to ceiling veranda glazing and balcony glazing above the banister railing of a balcony are some examples of such structures or arrangements that can comprise at least one such element, i.e. a glass pane with any fittings and mouldings that can be opened and closed by rotating an element about its axis of rotation. The structure or arrangement as described above usually also comprises at least one other element, i.e. a second glass pane with any fittings and mouldings attached thereto and being both displaceable in an essentially horizontal direction and rotatable about its axis of rotation when subsequent to being displaced the element is in a defined horizontal position in the said arrangement. The said arrangement typically also comprises a lower guide arranged in connection with the lower part of the elements for supporting said elements and guiding any displacement on the lower part of the elements, and an upper guide arranged in connection with the upper part of said elements for suspending said elements and for guiding any displacement on the upper parts of the elements.

[0004] Conventionally, an at least openable and closable element as described above comprises at least one latch apparatus used for locking the element in place at the desired position in relation to the rotating movement of the element defined by the axis of rotation of the element together with an external connecting part forming a part of the structure or arrangement. In closed position of the element the external connecting part of the latch apparatus is usually formed by some portion of said lower and/or upper guide. In opened position of the element said connecting part can be a part separately arranged to each lower and/or upper guide or the structure of the balcony. Said latch apparatus is usually operated through a yarn, fibre strand or other operating means suitable for transmitting pulling tension, whereby pulling said operating means displaces the locking bolt from connection with the connecting part of the latch apparatus for rotating the element into the desired position. When the operating means is released, the locking bolt returns to locking position in connection with the connecting part of the latch apparatus relating to the position in question.

[0005] As far as safe locking of the elements is concerned it is essential that the tension of the operating means is suitable for allowing sufficient locking of the locking bolt of the latch apparatus into connection with its connecting part. At the same time it must be possible to open the latch apparatus without excessive force. Conventionally the tension of the operating means is adjusted by making several knots to it at a distance from each other and locking the operating means through screw fastening in connection with the latch apparatus. This is, however, a highly workintensive and slow method of adjusting the tension of the operating means.

Brief description of the invention

[0006] The aim of the invention is to provide a novel type of latch apparatus and locking arrangement for locking a rotatable element about the rotation movement of the element defined by the axis of rotation of the element.

[0007] The solution according to the invention is characterized by what is stated in independent claims.

[0008] The invention is based on that the latch apparatus comprises a tension adjuster arranged to be rotatable about at least one axis for adjusting the tension of the operating means.

[0009] The advantage of a solution according to the invention is the simple way of carrying out tension adjustment, providing a reliable and easy to use solution for adjusting the tension of the operating means.

[0010] Some embodiments of the invention are disclosed in the dependent claims.

Brief description of the figures

[0011] In the following the invention is described in more detail, with reference to the appended drawings, in which

figure 1 is a schematic illustration of a glazing arrangement seen from the front,
figure 2 is a schematic illustration of a latch apparatus in a three-dimensional view,
figure 3 is a schematic illustration of the latch apparatus of figure 2 seen essentially perpendicularly from the side,
figure 4 is a schematic illustration of the latch apparatus of figure 2 seen diagonally from above from the left-hand side,
figure 5 is a schematic illustration of the latch apparatus of figure 2 seen essentially perpendicularly from below,
figure 6 is a schematic illustration of the latch apparatus according to figure 2 seen diagonally from above in partial cross-section, with the latch apparatus being turned upside down in relation to figure 3,
figure 7 is a schematic illustration of the latch apparatus according to figure 2 seen diagonally from side in partial cross-section, with the latch apparatus being turned upside down in relation to figure 3,
figure 8 is a schematic illustration of a part of the latch apparatus according to figure 2 in partial cross-section and
figure 9 is a schematic illustration of a tension ad-

juster used in a latch apparatus according figures 2 to 8.

[0012] In the figures, some embodiments of the invention are shown in simplified form for reasons of clarity. Similar parts are denoted with identical reference numbers in the figures.

Detailed description of the invention

[0013] Figure 1 is a schematic illustration of glazing arrangement 1 seen from the front. A glazing arrangement 1 as shown in figure 1 can generally form e.g. a veranda glazing extending from floor to ceiling or a balcony glazing arranged above the rail of the balcony.

[0014] The glazing arrangement 1 according to figure 1 comprises two glass elements arranged side by side on the same line in horizontal direction, i.e. the first glass element 2 and the second glass element 2'. Each glass element 2, 2' comprises a glass pane 3 and a lower moulding 4 at the lower edge of the glass pane 3, in connection with which any fittings necessary for arranging the glass element 2, 2' in connection with the lower guide or rail 8 forming a part of the glazing arrangement 1 can be fastened, with the lower guide or rail 8 participating in supporting the elements 2, 2' and guiding any displacement of the elements 2, 2' on the lower part. The upper edge of each glass pane 3 further comprises an upper moulding 5, in connection with which any fittings necessary for arranging the glass element 2, 2' in connection with the upper guide or rail 9 being a part of the glazing arrangement 1 can be fastened, with the upper guide or rail 9 participating in supporting the elements 2, 2' and guiding any displacement of the elements 2, 2' on the upper part. The said lower mouldings 4 and upper mouldings 5 are not necessary, if the said fittings can be attached directly to the glass pane 3. For reason of clarity the said fittings are not shown in figure 1.

[0015] In a glazing arrangement 1 according to figure 1 the left-hand glass element 2, i.e. the first glass element 2 is arranged to be supported by and/or suspended from the lower and upper guides 8, 9 so that it is locked into place in the longitudinal direction of the lower and upper guides 8, 9 marked with arrow L. In other words, in normal usage scenarios of the glazing arrangement 1 the first glass element 2 is not movable along the longitudinal direction L of the lower and upper guides 8, 9. The first glass element 2 is, however, arranged by its left edge 6, i.e. its rear edge 6 to be in connection with the lower and upper guides 8, 9 so that the first glass element 2 can be rotated into an open position and back to the closed position shown in figure 1 so that the essentially vertical axis of rotation X, shown with a dotted line, of the glass element 2, in relation to which the glass element 2 can be rotated, is positioned essentially at the location of the rear edge 6 of the glass element 2 or in the vicinity thereof. The said axis of rotation X can be carried out by means of, for example, hinge fittings arranged at the rear edge 6 of the glass element 2'or in the vicinity thereof at the lower and upper part of the glass element 2. The said hinge fittings and their attachment to both the glass element 2 and the lower and upper guides 8, 9 are known as such to one skilled in the art, and for reasons of clarity they have not been shown in more detail in figure 1. Typically, an element such as shown here, is hinged by one of its vertical edges or in the vicinity thereof, such as in figure 1, whereby the said hinge arrangement defines an essentially vertical axis of rotation at the said vertical edge of the element or in the vicinity thereof. This does not, however, exclude cases where the hinge arrangement is possible by the horizontal edge of the element or the vicinity thereof.

[0016] In a glazing arrangement 1 according to figure 1 the right-hand glass element 2', i.e. the second glass element 2' is positioned to be supported by and/or suspended from the lower and upper guides 8, 9 so that the glass element 2' can be displaced under the direction of the lower and upper guides 8, 9 in the longitudinal direction L of the lower and upper guides 8, 9 both left, i.e. towards the first glass element 2 and back to the right, i.e. away from the first glass element 2, when the first glass element 2 is rotated into its opened position.

[0017] In a glazing arrangement 1 according to figure 1 the first glass element 2 further comprises a locking arrangement 10 arranged at its right edge 7, i.e. the front edge 7 or in the vicinity thereof, opposite to the left edge 6, i.e. the rear edge 6 of the glass element 2, by means of which the first glass element 2 can be locked in relation to the rotation movement of the glass element 2 defined by the axis of rotation X.

[0018] In the embodiment according to figure 1 the locking arrangement 10 comprises a first locking arrangement part 11 arranged to the first end edge of the element 2 defined by the axis of rotation X of the glass element 2 in the direction of the element 2, in the case of figure 1 the upper edge of the glass element 2, such as the upper moulding 5. The first locking arrangement part 11 comprises a locking bolt, whereby the glass element 2 can be locked by its upper part through the first locking arrangement part 11 to resist unintended rotation of the glass element 2. Further, the locking arrangement 10 according to figure 1 comprises a second locking arrangement part 12 arranged to the second end edge of the of the element 2, opposite the first end edge of the element 2, defined by the axis of rotation X of the glass element 2 in the direction of the element 2, in the case of figure 1 the lower part of the glass element 2, such as the lower moulding 4. The second locking arrangement part 12 comprises a locking bolt, whereby the glass element 2 can be locked by its lower part through the second locking arrangement part 12 to resist unintended rotation of the glass element 2.

[0019] The locking arrangement 10 according to figure 1 further comprises an operating means 14 of the locking arrangement 10 that can be, for example, yarn, fibre string or other means suitable for transmitting pulling ten-

sion. Thus, the locking bolts of the said locking arrangement parts 11, 12 can be moved away from connection with the external connecting parts of the locking arrangement parts 11, 12 for rotating the glass element 2 into the desired position about its axis of rotation by transmitting pulling tension through the operating means 14 to the first locking arrangement part 11 and the second locking arrangement part 12. Correspondingly, the effect of pulling tension on the first locking arrangement part 11 and the second locking arrangement part 12 can be ended by releasing the operating means 14, whereby the locking bolts of the locking arrangement parts 11, 12 can return back to the locking positions in connection with the connecting parts participating in the locking for locking the glass element 2 to the desired position in relation to the axis of rotation X.

[0020] According to one embodiment the locking arrangement 1 according to figure 1 provided with a locking arrangement 10 according to figure 1 is arranged to form a veranda glazing extending from floor to ceiling, whereby the first locking arrangement part 11 and the second locking arrangement part 12 are latch apparatuses 15 as described later in this description in, for example, figures 2 to 9, that transmit the force allowing locking the glass element 2 into the desired position in relation to its axis of rotation X. There can also be a handle or other similar opening device between the first 11 and the second 12 locking arrangement part for providing the pulling tension to the operating means 14.

[0021] According to another embodiment the locking arrangement 1 according to figure 1 provided with a locking arrangement 10 according to figure 1 is arranged to form a balcony glazing above the balcony rail, whereby the first locking arrangement part 11 is a latch apparatus 15 as described later in this description in, for example, figures 2 to 9, that transmit the force allowing locking the glass element 2 into the desired position in relation to its axis of rotation X and the second locking arrangement part 12 is a safety lock to prevent unintended rotation of the glass element 2 by using the operating means 14 of the locking arrangement 10 only. The necessary pulling tension of the operating means 14 can be provided by the said safety lock.

[0022] Figure 2 illustrates as a schematical three-dimensional view a latch apparatus 15 that can be used in glazing arrangements 1 of the type shown in figure 1. Figure 3 illustrates schematically a latch apparatus of figure 2 seen essentially perpendicularly from the side. In figure 3 the latch apparatus 15 is shown in the operation position, in which the connecting piece of the latch apparatus 15, via which the latch apparatus 15 provides the above-mentioned locking in the desired position of the glass element 2 in relation to the rotation movement of the glass element 2 defined by the axis of rotation X of the glass element 2, will be positioned above the latch apparatus 15. Thus, figure 3 can be considered to illustrate the latch apparatus 15 in the operational position corresponding to the first locking arrangement part 11 of figure 1. Figure 4 is a schematic illustration of a latch apparatus 15 of figure 2 seen diagonally from above from the left-hand side and figure 5 is a schematic illustration of a latch apparatus 15 of figure 2 seen essentially perpendicularly from below.

[0023] The main components of the latch apparatus 15 are body 20, locking bolt 30, auxiliary body 40 and tension adjuster 50 for adjusting the tension of the operating means 14. The operating means 14 forms a means via which the latch apparatus 15 can be operated and the auxiliary body 40 forms a means via which the tension adjuster 50 is arranged to be a part of the latch apparatus 15.

[0024] The body 20 of the latch apparatus 15 comprises a first end 20a, designed to be aligned towards the connecting piece of the latch apparatus 15, and a second end 20b, designed to be aligned towards the operating means 14 arranged in connection with the latch apparatus 15. The body 20 further comprises a fastening support 21, via which the latch apparatus 15 can be supported and fastened to the glass element 2, such as to the lower or upper moulding 4, 5 thereof. The fastening support 21 comprises a fastening opening 22, arranged to receive e.g. a screw or a similar fastening means, through which the latch apparatus 15 can be fastened essentially unmovably to the glass element 2. The direction between the first end 20a and the second end 20b of the body 20 defines the direction A parallel with the longitudinal axis of the body 20.

[0025] The body 20 of the latch apparatus 15 is a structure with an essentially U-shaped cross-section in direction perpendicular to the direction A of its longitudinal axis, with one side essentially open, inside which, into a space defined by the structure, the locking bolt 30, auxiliary body 40 and tension adjuster 50 are at least partially arranged. In a latch apparatus 15 illustrated in figures 2 to 9 the operating means 14 is fastened in connection with the tension adjuster 50, while a slot 23 (figure 5) located at the other end of the 20 of the latch apparatus 15 helps in getting a means suitable for operating the tension adjuster 50 into contact with the tension adjuster 50.

[0026] The locking bolt 30, auxiliary body 40 and the tension adjuster 50 are arranged in connection with each other so that by causing a pulling tension into the operating means 14, a simultaneous movement of the locking bolt 30, auxiliary body 40 and the tension adjuster 50 is caused in the direction of the longitudinal axis A of the latch apparatus 15 from the direction of the first end 20a of the frame 20 of the latch apparatus 15 towards the second end 20b of the frame 20, whereby the locking bolt 30 can move away from connection with the connecting piece of the latch apparatus 15 and the glass element 2 can be rotated about its axis of rotation X. An elastic means 24 is arranged between the body 20 of the latch apparatus 15 and the locking bolt 30, providing a spring force against which the locking bolt 30, auxiliary body 40 and the tension adjuster 50 is moved when open-

ing the latch apparatus 15. When the operating means 14 is released, the locking bolt 30, auxiliary body 40 and tension adjuster 50 move, caused by the spring force accumulated in the elastic element 26, essentially parallel with the longitudinal axis A of the latch apparatus 15 back to the direction of the first end 20b of the body 20 of the latch apparatus 15 for bringing the locking bolt 30 back into contact with the connecting piece of the latch apparatus 15 for locking the glass element 2 into the desired position in relation to its axis of rotation X.

[0027] In the latch apparatus 15 illustrated in figures 2 to 9 the elastic means 24 is a helical spring extending essentially in the longitudinal direction A of the body 20 of the latch apparatus 15, but the said helical spring can also be replaced by other solutions accomplishing the corresponding task. The structures and mutual arrangements of the locking bolt 30, auxiliary body 40 and tension adjuster 50 shown in figures 2 to 5 are illustrated in more detail in figures 6 to 9. The supporting method of the elastic means 24 to the body 20 of the latch apparatus 15 and the locking bolt 30 is also disclosed in more detail in, for example, figure 7.

[0028] Figure 6 illustrates schematically a latch apparatus 15 according to figure 2 seen diagonally from above in partial cross-section, with the latch apparatus 15 being turned upside down in relation to figure 3. Figure 7 illustrates schematically a latch apparatus 15 according to figure 2 seen diagonally from the side in partial cross-section, with the latch apparatus 15 being turned upside down in relation to figure 3. In figures 6 and 7 the latch apparatus 15 is shown in the operation position in which the connecting piece of the latch apparatus 15, via which the latch apparatus 15 provides the above-mentioned locking in the desired position of the element in relation to the rotation movement of the element defined by the axis of rotation X of the element, will be positioned above the latch apparatus 15. Thus, figures 6 and 7 can be considered to illustrate the latch apparatus 15 in the operational position corresponding to the second locking arrangement part 12 of figure 1. Figure 8 illustrates schematically a part of the latch apparatus 15 of figure 2 seen diagonally from below in partial cross-section and without the locking bolt 30, and figure 9 illustrates schematically the tension adjuster 50 used in the latch apparatus 15 of figures 2 to 8 seen from the side.

[0029] The locking bolt 30 comprises a body 31, having a first end 31a arranged to point in the direction shown by the first end 20a of the body 20 of the latch apparatus 15, i.e. upwards in the operation position of the latch apparatus 15 shown in figure 3, and downwards in the operation position of the latch apparatus 15 shown in figures 6 and 7. The body 31 of the locking bolt 30 further comprises a second end 31b arranged to point in the direction of the second end 20b of the body 20 of the latch apparatus 15, i.e. towards the second end 20b of the body 20 of the latch apparatus 15 in the operation position of the latch apparatus 15 shown in figure 3, and upwards in the operation position of the latch apparatus 15 shown in figures 6 and 7. The direction between the first end 31a and the second end 31b of the body 31 of the locking bolt 30 defines the direction parallel with the longitudinal axis of the locking bolt 30, the direction being essentially parallel with the direction of the longitudinal axis A of the body 20 of the latch apparatus 15, when the locking bolt 30 is installed in the latch apparatus 15.

[0030] The first end 31a of the body 31 of the locking bolt 30 is provided with a bolt part 32 extending towards the direction of the said first end 31a, the bolt part being an integral structure with the body 31 in the embodiment shown in the figures and via which the locking bolt 30 and consequently the latch apparatus 15 are locked into the connecting piece, thus locking the glass element 2 into place in the desired position in relation to the rotation movement of the glass element 2 defined by the axis of rotation X of the glass element 2.

[0031] The second end 31b of the body 31 of the locking bolt 30 is provided with an adapter shape 33, which together with the mating shape in the auxiliary body 40 of the latch apparatus 15 is arranged to provide a form locking between the locking bolt 30 and the auxiliary body 40 causing the locking bolt 30 and the auxiliary frame 40 to be fastened to each other so that when the latch apparatus 15 is operated, they move together parallel with the longitudinal axis A of the body 20 of the latch apparatus 15.

[0032] The locking bolt 30 further comprises in the first end 31a of the body 31 a support protrusion 34, which is arranged essentially perpendicularly to the direction of the longitudinal axis A of the locking bolt 30 and extending outwards from the body 31 of the locking bolt 30, the protrusion being designed to support the elastic means 24 arranged between body 20 of the latch apparatus 15 and the body 31 of the locking bolt 30 on the portion of the locking bolt 30. The body 20 of the latch apparatus 15 comprises on the portion of the body 20 between the ends 20a, 20b a support protrusion 25 directed essentially perpendicularly to the longitudinal axis A of the body 20 towards the internal space of the body 20 defined by the body 20, the protrusion being designed to support the elastic means 24 on the portion of the body 20 of the latch apparatus 15. When the elastic means 24 is, as shown in figures, a helical spring, the support protrusion 34 in the locking bolt 30 can comprise a support 35 extending towards the second end 31b of the body 31 of the locking bolt 30 and arranged inside the helical spring and the support protrusion 25 located in the body 20 of the latch apparatus 15 can correspondingly comprise a support 26 located inside the helical spring and extending towards the first end 20a of the body 20 of the latch apparatus 15, the said supports 26, 35 supporting the helical springs in lateral direction against displacement and slips.

[0033] The auxiliary body 40 comprises the body structure 41, having a first end 41a arranged to point in the direction of the first end 20a of the body 20 of the latch apparatus 15, i.e. upwards in the operation position of

the latch apparatus 15 shown in figure 3, and downwards in the operation position of the latch apparatus 15 shown in figures 6 and 7. Simultaneously the first end 41a of the body structure 41 of the auxiliary body 40 is directed towards the second end 31b of the body 31 of the locking bolt 30. The body structure 41 of the auxiliary body 40 further comprises a second end 31b arranged to point in the direction of the second end 20b of the body 20 of the latch apparatus 15, i.e. towards the second end 20b of the body 20 of the latch apparatus 15 in the operation position of the latch apparatus 15 shown in figure 3, and upwards in the operation position of the latch apparatus 15 shown in figures 6 and 7. In practice the auxiliary body 40 is thus arranged between the locking bolt 30 and the second end 20b of the body 20 of the latch apparatus 15. The direction between the first end 41a and the second end 41b of the auxiliary body 40 body structure 41 of the auxiliary body40 defines the direction parallel with the longitudinal axis of the auxiliary body 40, the direction being essentially parallel with the direction of the longitudinal axis A of the body 20 of the latch apparatus 15, when the auxiliary body 40 is installed in the latch apparatus 15.

[0034] The first end 41a of the body structure 41 of the auxiliary body 40 is provided with an adapter shape 42 directed towards the said first end 41a, i.e. the first end 20a of the body 20 of the latch apparatus 15 and at the same time towards the locking bolt 30 of the latch apparatus 15 that together with the above-mentioned adapter shape 33 in the locking bolt 30 is designed to form the above-mentioned form locking between the locking bolt 30 and the auxiliary body 40, through which the locking bolt 30 and the auxiliary body 40 are fastened to each other so that when the latch apparatus 15 is operated, they move together in the direction of the longitudinal axis A of the body 20 of the latch apparatus 15. The fastening between the locking bolt 30 and the auxiliary body 40 can additionally be secured by means of a separate locking means, such as am assembly screw, the head of which is located in a countersunk hole in the bolt part 32 and the tip is screwed into the auxiliary body 40. For the sake of clarity the said screw is not shown in the figures.

[0035] The auxiliary body 40 further comprises a mating area compatible with the adjustment area provided in the tension adjuster 50 in the vicinity of the first end 41a of the body structure 41, in connection with which the adjustment area of the tension adjuster 50 can be arranged so that when the tension adjuster 50 is operated, the adjustment area of the tension adjuster 50 can move in relation to the mating area while the said adjustment area and mating area are otherwise locked with each other. In the auxiliary body 40 shown in the figures the said mating area comprises a locking tooth 43, causing a possible locking position of the tension adjuster 50 for locking the tension adjuster 50 to be essentially immovable in relation to its axis of rotation, preventing unintended rotation of the tension adjuster 50 about its axis of rotation. In the solution shown in the figures the locking tooth 43 is an integral part or shape of the body structure 41 of the auxiliary body 40 and it has been arranged, in a way described later in more detail, to mesh with the adjustment toothing 52 forming the adjustment area of the tension adjuster 50 arranged in the first end 51a of the body 51 of the tension adjuster 50.

[0036] The auxiliary body 40 further comprises a pressure claw 44 essentially on the opposite side of the body structure 41 of the auxiliary body 40 in relation to the locking tooth 43 so that a free space 45 is provided between the locking tooth 43 and the pressure claw 44 for receiving the tension adjuster 50 into the auxiliary body 40. The pressure claw 44 comprises a first end 44a facing the first end 41a of the body structure 41 of the auxiliary body 40 and a second end 44b facing the second end 41b of the body structure 41 of the auxiliary body 40. The second end 44b of the pressure claw 44 is essentially permanently connected to the body structure 41 of the auxiliary body 40 and the first end 44a of the locking bolt 44 is essentially free. The pressure claw 44 is curved in the longitudinal direction between the first end 44a and the second end 44b of the pressure claw 44 , the direction being essentially parallel with the direction of the longitudinal axis A of the body 20 of the latch apparatus 15 so that the first end 44a of the pressure claw 44 is directed towards the free space 45 on the centre part of the auxiliary body 40 in a curved way in relation to the second end 44b of the pressure claw 44. The said pressure claw 44 is arranged as a part of the of the body structure 41 of the auxiliary body 40 by its second end 44b so that attachment between the pressure claw 44 and the body structure 41 of the auxiliary body 40 is elastic, forming the axis of rotation of the pressure claw 44 at the junction point of the body structure 41 of the auxiliary body 40 and the second end 44b of the pressure claw 44 and that a spring force is exerted on the pressure claw 44 in relation to the said axis of rotation of the pressure claw 44, pressing the first end 44a of the pressure claw 44 towards the locking tooth 43. In normal operation scenario of the latch element 15 the said spring force presses the first end 51a of the body 51 of the tension adjuster 50 against the locking tooth 43, but allows the first end 44a of the pressure claw 44 to turn away from the locking tooth 43 when necessary for turning the tension adjuster 50 about its axis of rotation for adjusting the tension of the operating means 14. Thus the pressure claw 44 forms the elastic support means according to one embodiment, helping to lock the adjustment area of the tension adjuster 50 essentially in its place in relation to the mating area of the adjustment area of the tension adjuster 50 comprising the locking tooth 43.

[0037] The auxiliary body 40 further comprises at the second of 41b the body structure 41 thereof an opening 46 arranged to receive the tension adjuster 50 and to support it at the second end 41b of the body structure 41 of the auxiliary body 40.

[0038] With reference especially o figure 9, the tension

adjuster 50 disclosed in figures 2 to 9 comprises an elongated body 51 having a first end 51a in the longitudinal direction, designed to be directed in the direction of the first end 21 of the body 20 of the latch apparatus 15 or, in other words, towards the first end 41a of the body structure 41 of the auxiliary frame 40, i.e. upwards in the operation position of the latch apparatus 15 of figure 3 and downwards in the operation position of the latch apparatus 15 of figure 6 and 7. The body 51 of the tension adjuster 50 further comprises a second end 51b designed to point in the direction of the second end 21 of the body 20 of the latch apparatus 15, in other words towards the second end 21 of the body 20 of the latch apparatus 15 or towards the second end 41b of the body structure 41 of the auxiliary body 40 in the operation position of the latch apparatus 15 shown in figure 3, i.e. upwards in the operation position of the latch apparatus 15 shown in figures 6 and 7. The direction between the first end 51a and the second end 51b of the body 51 of the tension adjuster 50 defines the central axis Z of the tension adjuster 50 parallel with the longitudinal direction between the first end 51a and the second end 51b of the tension adjuster 50. When the tension adjuster 50 is installed in the latch apparatus 15 inside the auxiliary body 40 in the free space 45 reserved for the tension adjuster 50, the central axis Z is positioned essentially parallel with the direction of the longitudinal axis A of the body 20 of the latch apparatus 15 and forming an axis of rotation of the tension adjuster 50, about which the tension adjuster 50 can be rotated when operating the tension adjuster 50.

[0039] The outer diameters of the first end 51a and the second end 51b of the body 51 of the tension adjuster 50 are dimensioned larger than the outer diameter of the shank 51c of the body 51 between the first end 51a and the second end 51b, whereby on the part of the shank 51c of the body 51 between the ends 51a, 51b there remains an empty space for receiving the operating means 14 around the shank 51c of the body 51 as described later in more detail. The tension adjuster 50 shown in figure 9 thus forms a tension adjuster 50 with a roll-like structure.

[0040] The first end 51a of the body 51 of the tension adjuster 50 is provided on the outer circumference of the end 51a an adjustment area of the tension adjuster 50 extending in the direction of the outer circumference and comprising adjustment toothing 53 with one or more adjustment teeth 52 in the direction of the outer circumference of the tension adjuster 50. The said adjustment toothing 53 is designed to be arranged in contact with the locking tooth 43 of the tension adjuster 50 in the auxiliary body 40. Simultaneously the pressure claw 44 in the auxiliary body 40 and especially its first end 44a is arranged to press the adjustment toothing 53 located at the first end 51a of the body 51 of the tension adjuster 50 against the locking tooth 43, thus preventing unintended rotation of the tension adjuster 50 and the adjustment toothing 53 therein in relation to the locking tooth 43.

[0041] The second end 51b of the body 51 of the tension adjuster 50, the outer circumference thereof, is provided with a support surface 54, through which the tension adjuster 50 is form-lockingly supported to an opening 46 located at the second end 41b of the body structure 41 of the auxiliary body 40 for thus supporting the tension adjuster 50 to the auxiliary body 40 by its second end 51b. The support surface 54 comprises a conical surface 55 tapering towards the second end 51b of the body 51 of the tension adjuster 50, which allows turning the tension adjuster 50 into an angled position in its longitudinal direction between the first end 51a and the second end 51bso that the adjustment toothing 53 at the first end 51a of the body 51 of the tension adjuster 50 can be removed from meshing with the locking tooth 43.

[0042] The second end 51b of the body 51 of the tension adjuster 50 forms or comprises a head that in the shown embodiments comprises an indentation 56 extending in the direction of the central axis Z of the tension adjuster 50 and being open towards the second end 51b of the second end 51b of the body 51 of the tension adjuster 50, via which the tension adjuster 50 can be rotated about its axis of rotation Z for adjusting the tension of the operating means 14. The indentation 56 can be formed with a predefined cross-section so that it can only receive an object having a corresponding form, such as a conventional tool, for operating the tension adjuster 50. In the embodiment shown in the figures the indentation has the shape of an Allen key, whereby the tension adjuster 50 can be operated by means of a conventional Allen key of a suitable diameter. The shape of the indentation 56 can, however, be selected as desired. Instead of the indentation 56 the head of the tension adjuster 50 can comprise a protrusion arranged to extend from the opening 46 at the second end 41b of the body structure 41 of the auxiliary body 40 to outside the auxiliary body 40, where by the tension adjuster 50 can be operated by means of a conventional tool or a tool designed for this particular use.

[0043] The tension adjuster 56 further comprises an open slot 57 extending essentially in the direction between the first end 51a and the second end 51b of the body 51 and comprising at the side of the shank 51c of the body 51 of the tension adjuster 50 an opening forming the said slot 57, while the first end 57a of the said slot 57 thus passes through the wall of the body 51 at the shank 51c thereof. The said slot 57 further comprises a second opening at the bottom of the indentation 56, forming the other end 57b of the said slot 57, the slot 57 thus passing through the second end 51b of the body 51 of the tension adjuster 50 at the bottom of the indentation 56.

[0044] The tension adjuster 50 can also be, for example, an essentially open through hole 58 between the slot 57 at the shank 51c of the body 51 and the first end 51a of the body 51 of the tension adjuster 50, extending through the body 51 of the tension adjuster 50 essentially perpendicularly in relation to the longitudinal direction or centre axis Z of the tension adjuster 50.

[0045] Figure 8 illustrates schematically two different

embodiments for arranging the operating means 14 in connection with the tension adjuster 50 provided in the latch apparatus 15. According to the first embodiment the operating means 14 is pushed through an opening 47 at the second end 41b of the body structure 41 of the auxiliary body 40 to the inside of the auxiliary body 40. Inside the auxiliary body 40 the operating means 14 is arranged to run via control shelf 48 further to the slot 57 of the tension adjuster 50 at the first end 57a thereof and further through the slot 57 so that the operating means 14 exits from the second end 57b of the slot 57. The shown direction of movement of the operating means 14 in the latch apparatus 15 has been schematically clarified by arrow symbols arranged in connection with the operating means 14. After this, the operating means 14 is pulled away from the indentation 56 and pre-tensioned, subsequent to which the tension adjuster 50 is rotated about its axis of rotation Z, until the tension of the operating means 14 correct. After this, the operating means 14 is cut as close to the indentation of the tension adjuster 50 as possible. This embodiment for arranging the operating means 14 into connection with the latch apparatus 15 can primarily be used, with reference to figure 1, at the upper part of balcony glazing or veranda glazing in connection with the latch apparatus 15 forming the first locking arrangement part 11, while the pre-tensioning and tension adjustment of the operating means 14 during installation as well as possible later tension adjustment during use being usually accomplished in these glazings by means of the latch apparatus 15 and the tension adjuster 50 arranged therein forming the first locking arrangement part 11 and being located at the upper part of the glazing. As the thickness of a typical operating means, such as yarn, fibre strand or the like is typically about 1mm, such as 0.5 to 1,5mm, this does not in practice prevent installing the tool 56 into the indentation as necessary.

[0046] In another embodiment, instead of using the slot 57 for arranging the operating means 14 in connection with the tension adjuster 50, the operating means 14 is arranged to run through the through hole 58, as schematically shown with a dotted line in figure 8, and tied around the shank 51c of the body 51 of the tension adjuster 50. Subsequent to this, the tension adjuster 50 is rotated a couple of turns around its axis of rotation Z for fastening the operating means 14 tightly around the shank 51cof the tension adjuster 50. This embodiment for arranging the operating means 14 into connection with the latch apparatus 15 can primarily be used, with reference to figure 1, at the lower part of veranda glazing in connection with the latch apparatus 15 forming the second locking arrangement part 12, because the pre-tensioning and tension adjustment of the operating means 14 during installation as well as possible later tension adjustment during use is usually accomplished in these glazings by means of the latch apparatus 15 and the tension adjuster 50 arranged therein forming the first locking arrangement part 11 and being located at the upper part of the glazing.

[0047] In its basic position the locking bolt 30 of the latch apparatus 15 as well as the auxiliary body 40 and the tension adjuster 50 is set against the first end 20a of the body 20 of the latch apparatus 15 due to spring tension accumulated in the elastic means 24, in other words the first end 31a of the body 31 of the locking bolt 30 is against the first end 21 of the body 20 of the latch apparatus 15. Thereby the bolt part 32 of the locking bolt 30 extends at the first end 20a of the body 20 of the latch apparatus 15 outside the body 20 so that it can mesh with the connecting piece of the latch apparatus 15, thereby locking the glass element 2 into the desired position in relation to the axis of rotation X of the glass element 2. At the same time there is a free distance between the auxiliary body 40 and the second end 20b of the body 20 of the latch apparatus 15 allowing opening the latch means 15 as described in the following paragraph.

[0048] To rotate the glass element 2 about its axis of rotation X pulling tension is exerted on the operating means 14 for opening the locking caused by the latch apparatus 15. The said pulling tension is transmitted by the control shelf 48 to the auxiliary body 40 as well as the shank 51c of the body 51 of the tension adjuster 50, causing the locking bolt 30, auxiliary body 40 and the tension adjuster 50 to move essentially simultaneously towards the second end 20b of the body 20 of the latch apparatus 15 as a consequence of the interconnections between the locking bolt 30, auxiliary frame 40 and the tension adjuster 50 to the extent that the bolt part 32 of the locking bolt 30 moves to inside of the body structure 20 of the latch apparatus 15, i.e. away from meshing with the connecting piece of the latch apparatus 15. Thereby the glass element 2 can be rotated to the desired position about its axis of rotation X.

[0049] When the glass element 2 is rotated about its axis of rotation X to the desired position, the operating means 14 is released, whereby the locking bolt 30, auxiliary body 40 and the tension adjuster 50 are moved back towards first end 20a of the body 20 of the latch apparatus 15 by the spring force accumulated into the elastic means 24 so that the first end 31a of the body 31 of the locking bolt 30 is set against the first end 20a of the body 20 of the latch apparatus 15, whereby the bolt part 32 of the locking bolt 30 again extends at the first end 20a of the body 20 of the latch apparatus 15 outside the body 20 of the latch apparatus 20 so that it can mesh with the connecting piece of the latch apparatus 15 corresponding to the position of the glass element 2. Thus, the locking bolt 30 can be moved to the position providing the opening of the latch apparatus 15 via a force effect exerted on the operating means 14 transmitting pulling tension and arrangeable to be in connection with the latch apparatus 15 and back to the position providing the locking of the latch apparatus 15 as a response to a termination of the force effect exerted on the operating means 14.

[0050] As far as safe locking of the glass element 2 is concerned, it is essential that the tension of the operating

means 14 is suitable for allowing sufficient locking of the locking bolt 30 of the latch apparatus 15 into connection with its connecting part. At the same time, it must be possible to open the latch apparatus 15 without excessive force. Thereby the simple and easy to use solution disclosed in this description for adjusting the tension 14 facilitates achieving the above-mentioned effects.

[0051] The tension of the operating means 14 can be increased by rotating the tension adjuster 50 about its axis of rotation Z in the first direction, a clockwise direction schematically marked by reference CW in figure 8, when the user is viewing the tension adjuster 50 from below with the latch apparatus 15 of figure 8 in operating position. When the tension of the operating means 14 is increased, a suitable tool is placed in the indentation 56 for rotating the tension adjuster 50, by means of which the tension adjuster 50 can be rotated about its axis of rotation Z so that the operating means 14 is wrapped around the shank 51c of the body 51 of the tension adjuster 50, whereby the proportion of length of the operating means 14 outside the latch apparatus 15 decreases in relation to the total length of the operating means 14. Thereby, when rotating the tension adjuster 50, due to its elastic structure the pressure claw 44 moves away from the locking tooth 43 and allows the adjustment toothing 53 to move away past the locking tooth 43, while the locking tooth 43 at the same time prevents unintended rotation of the tension adjuster 50 to the opposite direction in relation to its axis of rotation Z, i.e. counterclockwise CCW in figure 8. The tension of the operating means 14 is set so that the operating means 14 reacts well to the pulling tension exerted on it, but at the same time allows the bolt port 32 of the locking bolt 30 to sufficiently lock into its connecting piece.

[0052] The tension of the operating means 14 can then be reduced by rotating the tension adjuster 50 into a second direction, opposite the first direction, in relation to its axis of rotation Z, counterclockwise with reference to figure 8. When the tension of the operating means 14 is reduced, a suitable tool is placed into the indentation 56 of the tension adjuster 50, by means of which the tension adjuster 50 is rotated into a slanted position in relation to the direction of the first end 51a and the second end 51b so that the first end 51a of the body 51 of the tension adjuster 50 is pressed against the pressure claw 44. Thereby the elastic structure of the pressure claw 44 causes the adjustment toothing of the tension adjuster 50 to move away from meshing with the locking tooth 43, whereby the tension adjuster 50 can be freely rotated counterclockwise, whereby the operating means 14 is allowed to rotate away from around the shank 51c of the body 51 of the tension adjuster 50, whereby the proportion of length of the operating means 14 outside the latch apparatus 15 in relation to the total length of the operating means 14 increases and the tension of operating means 14 decreases. When the tension of the operating means 14 is correct, the tool can be removed from the indentation 56, whereby the adjustment toothing 53 of the tension adjuster 50 is again brought to mesh with the locking tooth 43.

[0053] In a latch apparatus 15 according to the description the tension of the operating means 14 can be adjusted by means of a reliable and easy to use solution.

[0054] The locking bolt 30, auxiliary body 40 and the tension adjuster 50 can be made of a number of materials. Typically, the locking bolt 30 is made of metal or plastic and the auxiliary body 40 and the tension adjuster 50 are made of plastic, whereby the said parts can easily be manufactured by using mould casting technique.

[0055] In addition to balcony and veranda glazing, the latch apparatus 15 and the locking arrangement 10 as described above can be used, for example, for glazings forming at least a part of the outer wall as well as intermediate wall and door structures comprising a number of adjacent elements. Instead of being glass elements, the elements of these intermediate wall or door structures can also be elements made of non-transparent materials.

[0056] It is obvious to one skilled in the art that the basic idea of the invention can be realized in many ways. Thus, the invention and its embodiments are not limited by the examples described above, but they can vary within the scope of the claims. Thus, for example, the locking tooth 43 located on the auxiliary body 40, pressure claw 44 and the space 45 therebetween for receiving the tension adjuster 50 or features providing corresponding functions can also be arranged as a part of the locking bolt 30, for example into its body 31, whereby a separate auxiliary body 40 is not necessary.

Claims

1. A latch apparatus (15), comprising

   a body (20),
   characterized in that
   the latch apparatus (15) comprises a locking bolt (30) arranged movably in relation to the body (20), the locking bolt (30) being movable via an operating means (14) transmitting pulling tension that can be arranged in connection with the latch apparatus (15), which locking bolt (30) is movable to a position providing an opening of the latch apparatus (15) via a force effect exerted on the operating means (14) transmitting pulling tension, and back to a position providing a locking of the latch apparatus (15) as a response to a termination of the force effect exerted on the operating means (14), and
   the latch apparatus (15) comprises a tension adjuster (50) arranged to be rotatable in relation to at least one axis for adjusting the tension of the operating means (14).

2. A latch apparatus according to claim 1, **characterized in that** the tension adjuster (50) comprises a

body (51), having a first end (51a) and a second end (51b) and a central axis (Z) parallel with the direction between the first end (51a) and the second end (51b), forming an axis of rotation (Z) of the tension adjuster (50), about which the tension adjuster (50) is rotatable in the first rotation direction for increasing the tension of the operating means (14) and the opposite direction for decreasing the tension of the operating means (14).

3. A latch apparatus according to claim 2, **characterized in that** the first end (51a) of the body (51) of the tension adjuster (50) comprises on its outer circumference an adjustment area of the tension adjuster (50) parallel with the outer circumference and that the second end (51b) of the body (51) of the tension adjuster (50) is provided with a head, via which the tension adjuster (50) is rotatable in relation to its axis of rotation (Z) for adjusting the tension of the operating means (14) and that
the latch apparatus (15) further comprises a mating area compatible with the tension adjuster (50, the adjustment area of the tension adjuster (50) being arranged in connection with the mating area so that when the tension adjuster (50) is rotated in the first rotation direction, the adjustment area of the tension adjuster (50) is arranged to move into the first rotation direction in relation to the mating area, the mating area simultaneously preventing the rotation of the tension adjuster (50) into the opposite, second rotation direction.

4. A latch apparatus according to claim 3, **characterized in that** the latch apparatus (15) comprises an elastic support means arranged to support the first end (51b) of the body(51) of the tension adjuster (50) for supporting the adjustment area of the tension adjuster (50) into the mating area and to move away from the mating area allowing the adjustment area of the tension adjuster (50) to move in relation to the mating area when the tension adjuster (50) is rotated in the first rotation direction and that
the tension adjuster (50) is turnable into an angled position in its longitudinal direction between the first end (51a) and the second end (51b) of the body of the tension adjuster (50) for pressing the first end (51a) of the body (51) of the tension adjuster (50) against the elastic support means for moving the adjustment area of the tension adjuster (50) away from connection with the mating area, whereby the tension adjuster (50) is rotatable into the second rotation direction for reducing the tension of the operating means (14).

5. A latch apparatus according to claim 3 or 4, **characterized in that** the adjustment area of the tension adjuster (50) comprises an adjustment toothing (53) having at least one adjustment tooth (52) and that the head of the tension adjuster (50) comprises an indentation (56) essentially parallel with the axis of rotation (Z) of the tension adjuster (50).

6. A latch apparatus according to claim 5, **characterized in that** the adjustment area of the tension adjuster (50) comprises a locking tooth (43) compatible with the adjustment toothing (53) of the tension adjuster (50) so that when the tension adjuster (50) is rotated into the first rotation direction, the adjustment toothing (53) of the tension adjuster (50) is arranged to move past the locking tooth (43) while the locking tooth (43) prevents the rotation of the tension adjuster (50) in the opposite, second rotation direction due to the form-locking between the locking tooth (43) and the adjustment toothing (53) of the tension adjuster (50).

7. A latch apparatus according to claim 6, **characterized in that** the elastic support means is a pressure claw (44) arranged to support the adjustment toothing (53) against the locking tooth (43) and to move away from the lockingtooth (43) when the adjustmenttoothing (53) moves past the locking tooth (43) when rotating the tension adjuster (50) into the first rotation direction for increasing the tension of the operating means (14), and that
the tension adjuster (50) is turnable into an angled position in its longitudinal direction between the first end (51a) and the second end (51b) of the body of the tension adjuster (50) for pressing the first end (51a) of the body (51) of the tension adjuster (50) against the pressure claw (44) for moving the adjustment toothing (53) away from connection with the locking tooth (43), whereby the tension adjuster (50) is rotatable into the second rotation direction for decreasing the tension of the operating means (14).

8. A latch apparatus according to any of the previous claims, **characterized in that** the latch apparatus (15) comprises an auxiliary body (40), the auxiliary body (40) being connected to the locking bolt (30) so that the auxiliary body (40) and the locking bolt (30) are arranged to move in relation to the body (20) of the latch apparatus (15) when connected to each other when using the operating means (14), and that the tension adjuster (50) is located in the auxiliary body (40).

9. A latch apparatus according to claim 8, **characterized in that** the auxiliary body (40) comprises a mating area and pressure claw (44) compatible with the adjustment area of the tension adjuster (50).

10. A latch apparatus according to any of claims 2 to 9, **characterized in that** the tension adjuster (50) comprises a slot (57) extending essentially in the direction between the first end (51a) and the second end

(51b) of the body (51) via the second end (51b) of the body (51) of the tension adjuster (50) for receiving and fastening the operating means (14) in connection with the body (51) of the tension adjuster (50).

11. A latch apparatus according to any of the previous claims, **characterized in that** the operating means (14) is yarn, fibre string or the like means suitable for transmitting pulling tension that is fastenable to the tension adjuster (50) and arranged to be rolled around the body (51) of the tension adjuster (50) when increasing the tension of the operating means (14) and unrolled away from around the body (51) of the tension adjuster (50) when decreasing the tension of the operating means (14).

12. A locking arrangement (10) for locking a rotatable element (2) about the rotating movement of the element (2) defined by the axis of rotation (X) of the element (2), the locking arrangement (10) comprising a latch apparatus (15) and operating means (14) for operating the latch apparatus (15) according to at least one of the claims 1 to 11.

13. A locking arrangement according to claim 12, **characterized in that** the locking arrangement (10) comprises, in the direction of the element (2) defined by the axis of rotation (X) of the element (2), a latch apparatus (15) according to any of claims 1 to 11 arranged on the first edge of the element (2) and an interlock arranged on the edge of the element (2) opposite the first edge of the element (2) for preventing rotation the element (2) by operating only the operating means (14), with the said operating means (14) extending between the latch apparatus (15) and the interlock.

14. A locking arrangement according to claim 12, **characterized in that** the locking arrangement (10) comprises, in the direction of the element (2) defined by the axis of rotation (X) of the element (2), a first latch apparatus (15) according to any of claims 1 to 11 arranged on the first edge of the element (2) and a second latch apparatus (15) according to any of the claims 1 to 11 arranged on the edge of the element (2) opposite the first edge of the element (2) and that the operating means (14) is arranged to extend between the first latch apparatus (15) and the second latch apparatus (15).

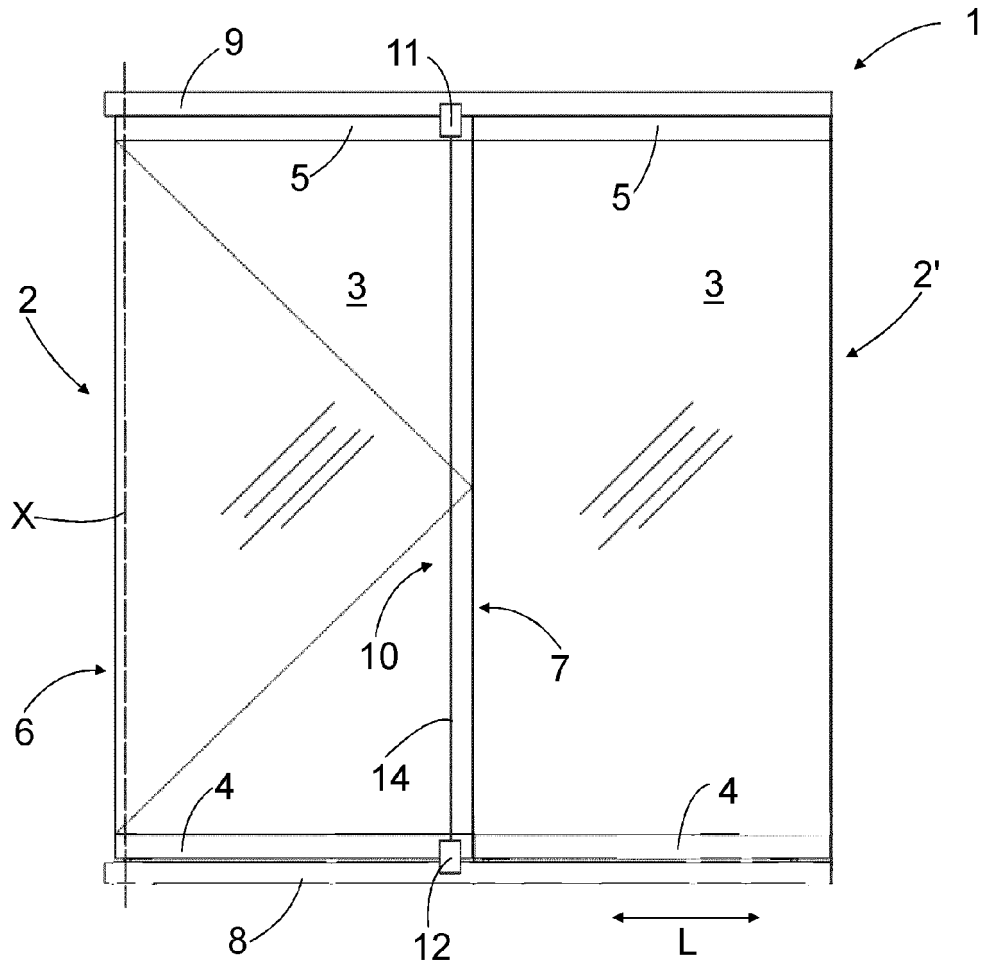


FIG. 1

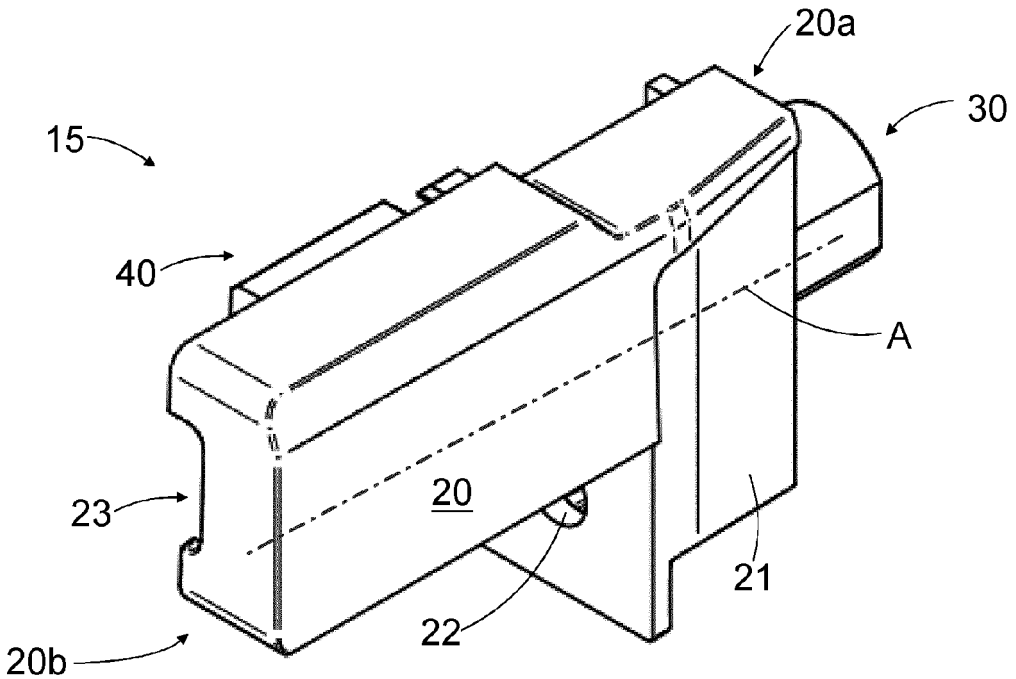


FIG. 2

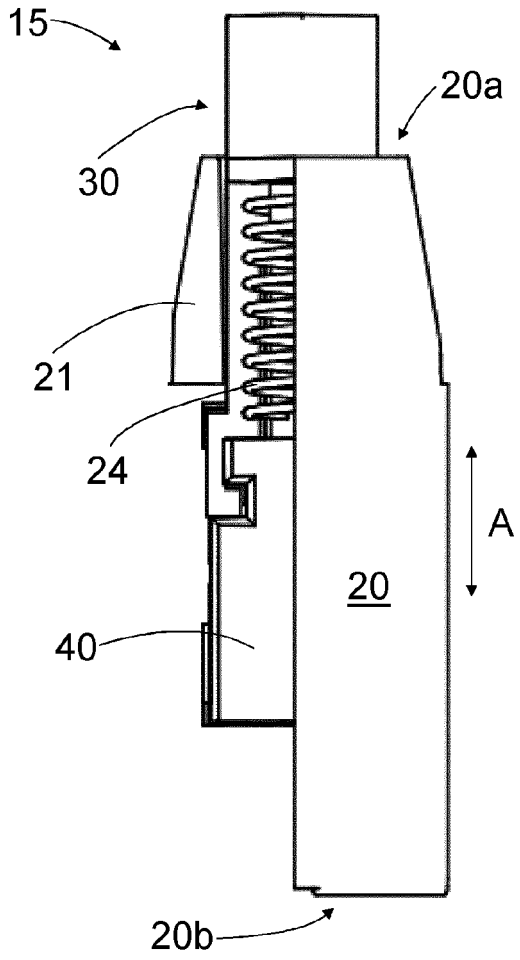


FIG. 3

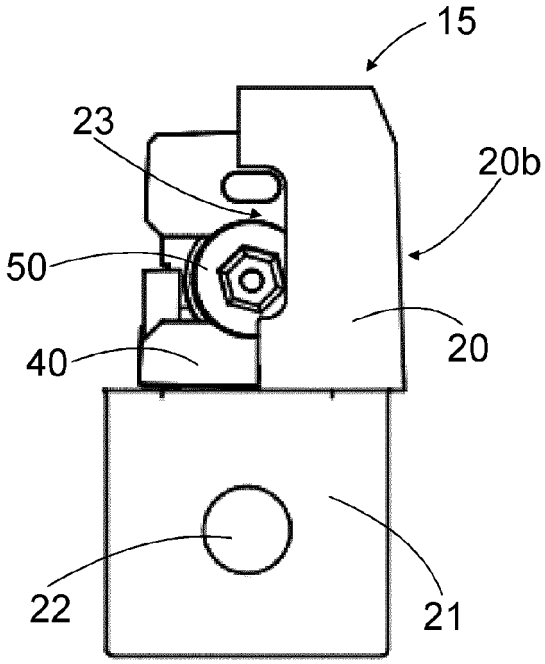


FIG. 5

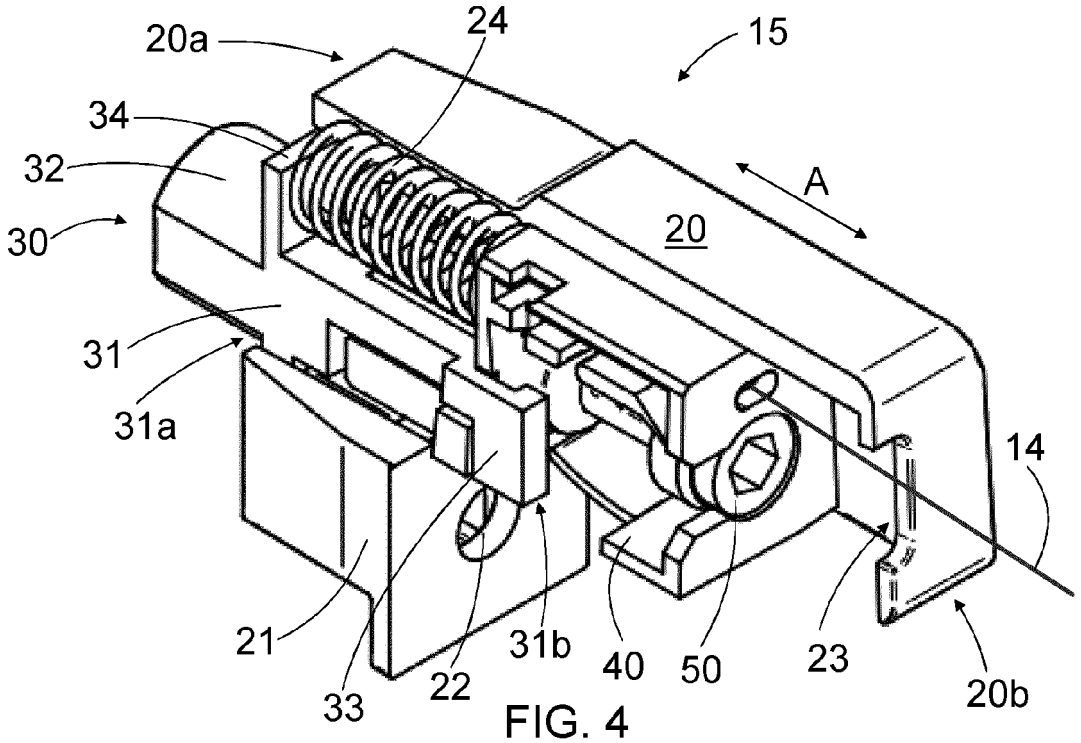
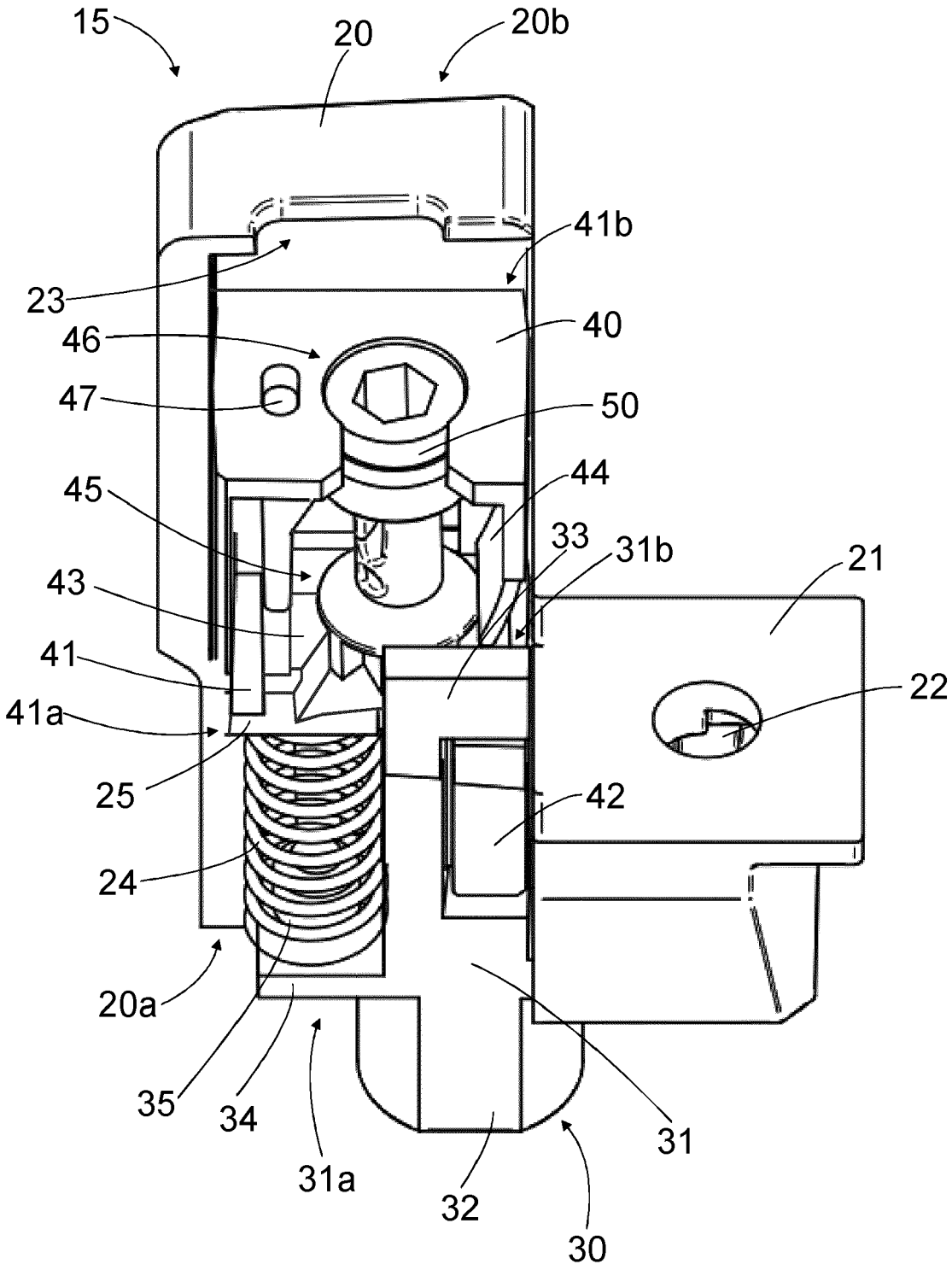


FIG. 4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44
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31b
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20a
35
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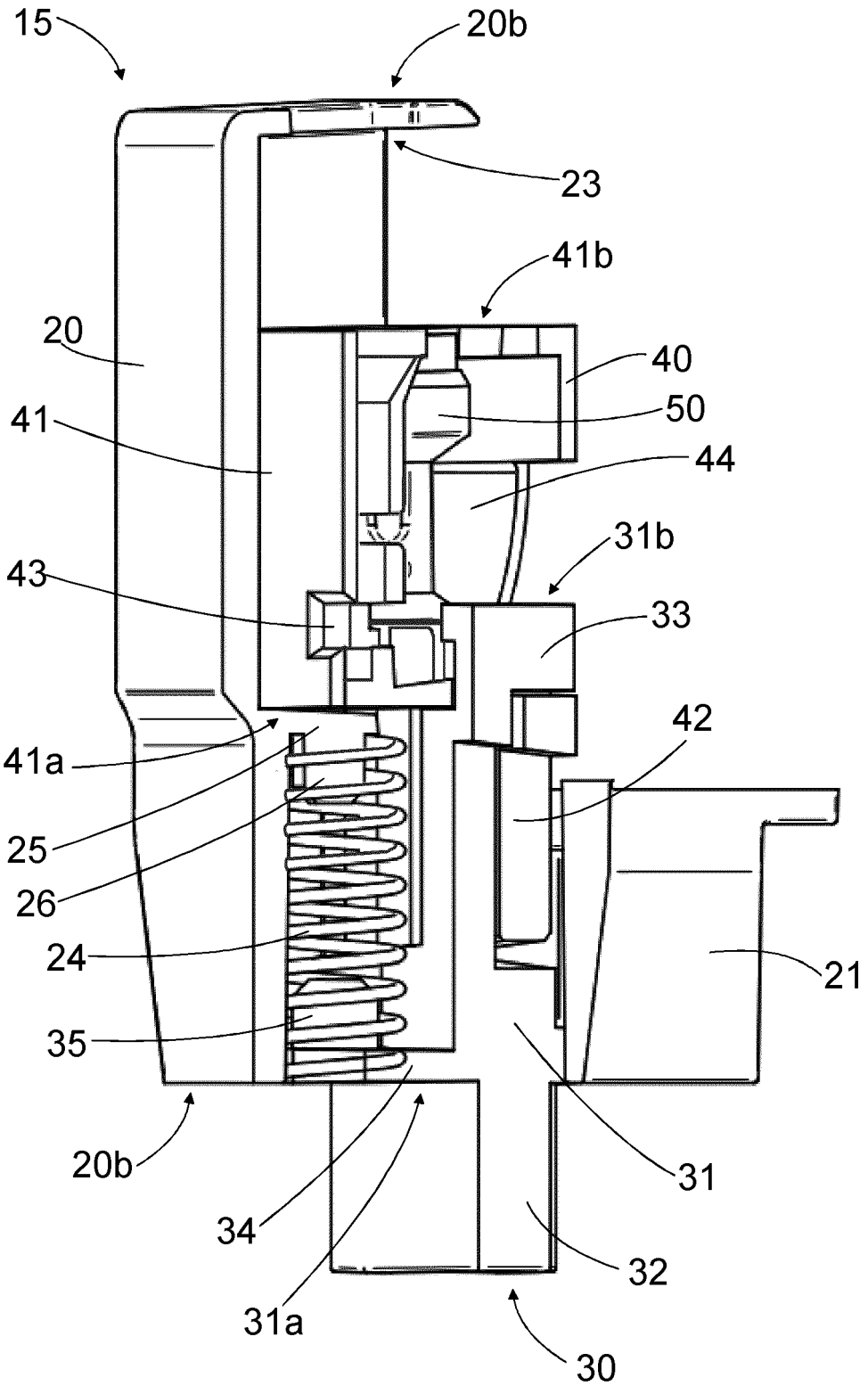
31a
32
31
30

FIG. 6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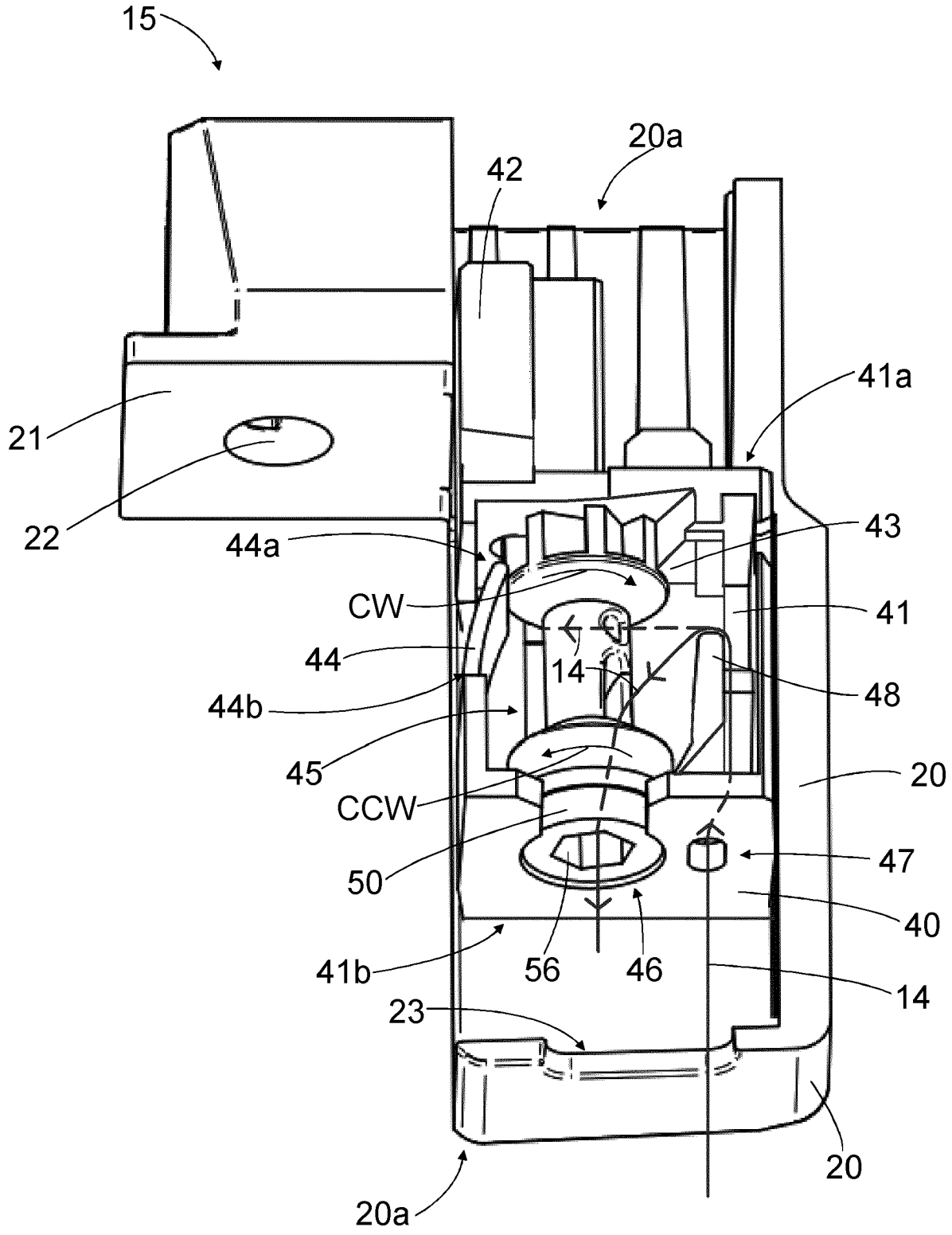
30

FIG. 7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41b
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20
20a

FIG. 8

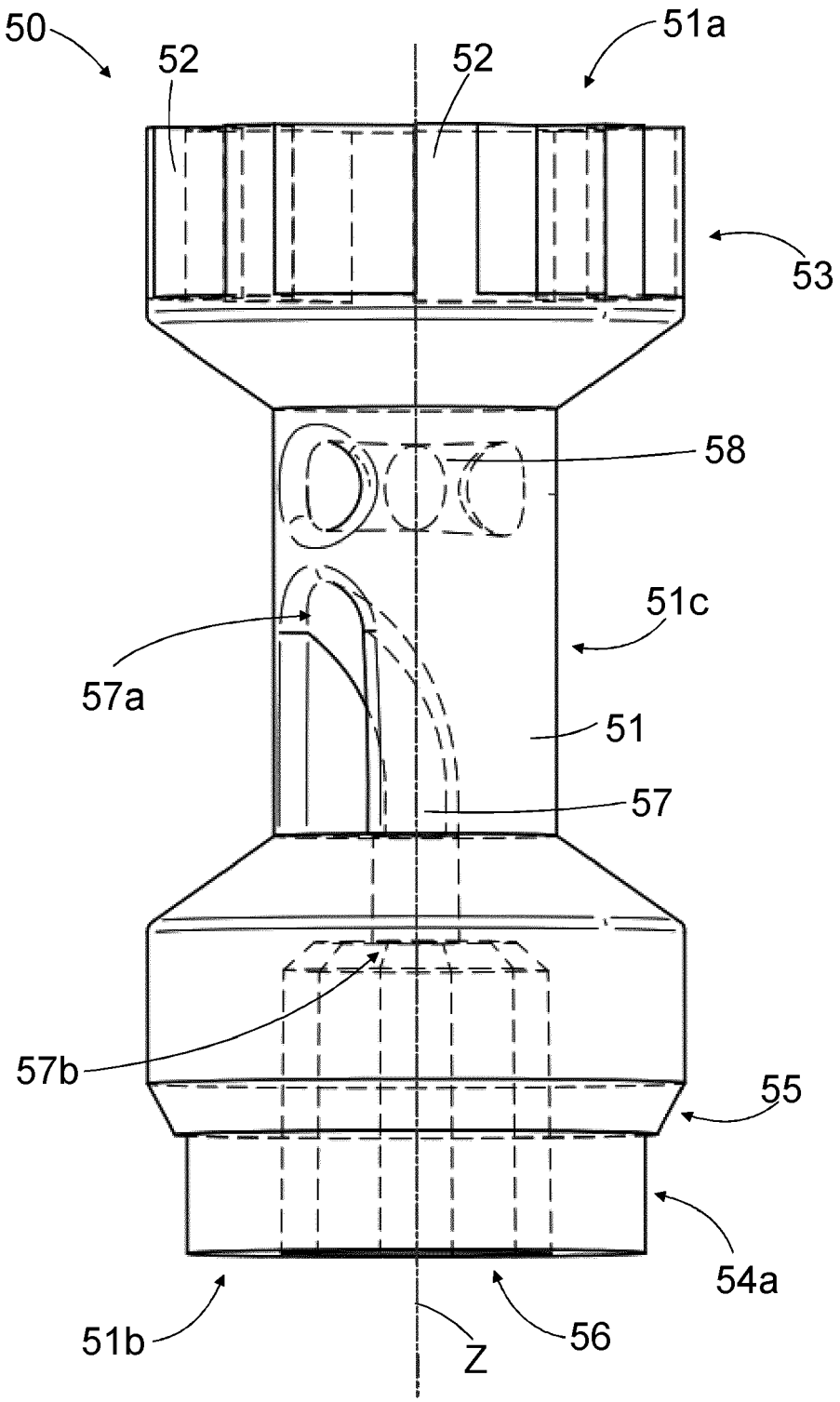

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 0746

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X	JP H10 252331 A (NEC CORP) 22 September 1998 (1998-09-22) * figures 1-5 *	1,2, 12-14	
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E05C E05B

2 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 January 2022	Robelin, Fabrice

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