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(54) **A PANEL WITH AT LEAST ONE LOCKING DEVICE, AND ALSO A LOCKING DEVICE**

(57) A demountable panel (10) with at least one locking device (20) is described, with a movement mechanism (100) for moving a catch (60) from an unlocked state to a locked state, wherein both the angular position of the catch (60) about a central rotational axis (22) of the drive crank (40), and the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60) are changed. This allows a robust, efficient, flexible and reliable mounting, which has less tendency to faults and allows a greater tolerance margin.

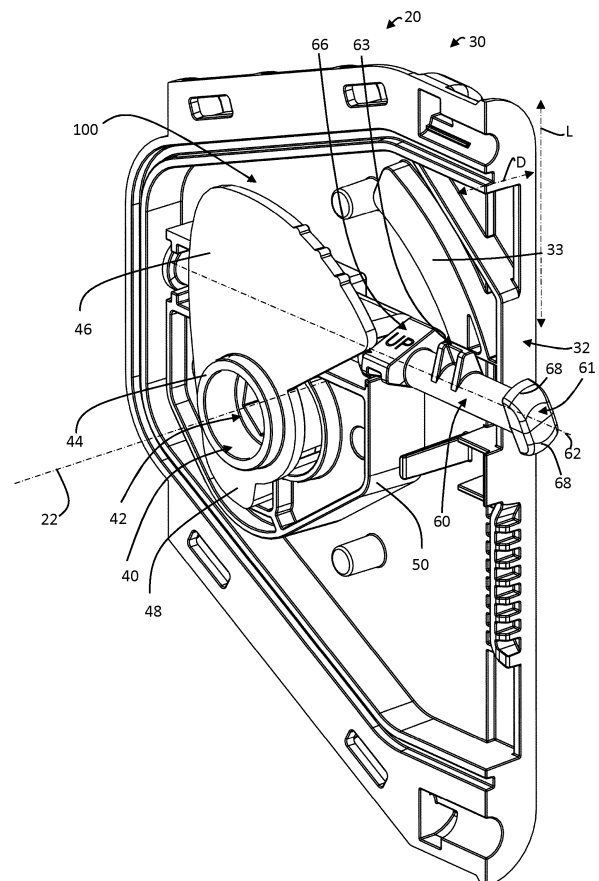


Fig. 6

Description

Technical field

[0001] The invention concerns panels which can be secured by means of locking devices arranged therein. In particular, these panels are used in an assembly which can also be later demounted by unlocking the locking devices. Such panels may be used for example in insulated storage facilities, also in other applications where for example a demountable assembly is desirable. The invention also concerns such a locking device which allows a demountable fixing.

Prior art

[0002] A known locking device for demountable panels for insulated storage facilities is known for example from BE891812. The locking device for demountable panels comprises a hook-shaped catch which is driven by a movement mechanism. This movement mechanism is configured to be driven by means of an angular rotation of a central drive crank in order to move the hook-shaped catch from an unlocked state to a locked state. The movement mechanism is configured to rotate the catch about the rotational axis of the central drive crank during a first angular segment of the angular rotation of the central drive crank, until a hook-shaped end of the catch engages on a pin which is arranged for example in an adjacent panel by means of a counterpart. During a second angular segment of the angular rotation of the central drive crank, the catch is moved such that the distance between the hook-shaped end of the catch and the central drive crank is reduced. In this way, also the distance between a counterpart, on which the hook-shaped end engages, and the central drive crank is reduced, whereby the panel in which such a counterpart is attached is drawn against the panel in which the locking device is attached.

[0003] The disadvantage of such a device is that the locking device and the counterpart, and more particularly the hook-shaped end of the catch and the pin of the counterpart on which the hook-shaped end engages, must be precisely aligned with one another in order to allow a robust and tightly connected locking. This also causes delays and difficulties in construction, for example, of a demountable assembly with panels which comprise such locking devices. This constitutes a particular problem when the tolerances on such panels are taken into account. In particular, the effect of such tolerances is magnified when a series of panels are arranged adjoining one another. In such circumstances, small cumulative differences in the dimensions of the panel or the position of the locking devices can lead to insuperable differences in the mutual positioning of the locking devices of adjacent elements of the demountable assembly. Such problems are manifest in particular, for example, at the corners of such a demountable assembly, where for example two separate walls each comprising several panels

come together, and wherein for example the height differences between the locking devices of the two walls at the corner are so great that the locking devices can only be locked together with great difficulty, or no longer at the same height. This is a problem since, in such a situation, it is no longer possible or takes a great deal of time to reconfigure or adjust the wall panels which have already been mounted in the two walls.

[0004] There is therefore a need for an improved panel with a locking device, and also an improved locking device which eliminates the above-mentioned disadvantages, and the object is to allow a robust, efficient, flexible and reliable mounting of such panels which is less susceptible to faults and allows a greater tolerance margin.

Summary

[0005] In order to eliminate these problems, according to a first aspect, a demountable panel is provided with at least one locking device, wherein the locking device comprises a catch and a movement mechanism, wherein the movement mechanism is configured to be driven by means of an angular rotation of a central drive crank of the movement mechanism in order to move the catch from an unlocked state to a locked state, wherein both the angular position of the catch about a central rotational axis of the drive crank and the angular position of the catch about a central longitudinal axis of the catch are changed.

[0006] By the combined rotation of the catch during movement from the unlocked to the locked state, a demountable panel with such a locking device allows a greater engagement tolerance. Thus the catch need no longer be precisely aligned with an adjacent elongate engagement element, which allows a robust, efficient, flexible and reliable mounting which is less susceptible to fault. If the engagement element is integrated in an elongate profile, the relative positioning of the locking device along the elongate profile may even be selected completely freely. This offers the advantage for example that such a locking device, and consequently the panels, can be attached as desired at any suitable position in the longitudinal direction of suitable elongate profiles, which allows a more efficient locking of the panels to such a profile.

[0007] According to an embodiment, a demountable panel is provided, wherein the movement mechanism is furthermore configured to move the catch from an unlocked state to a locked state such that:

- during a first angular segment of the angular rotation of the central drive crank, the catch is moved such that a rotation about the central rotational axis of the central drive crank is carried out, wherein an outer end of the catch moves past a contact face of the locking device;
- during a second angular segment of the angular rotation of the central drive crank, the catch is moved

such that a rotation of the catch about a central longitudinal axis of the catch is carried out; and

- during a third angular segment of the rotation of the central drive crank, the catch is moved such that the distance between the end of the catch and the central drive crank is reduced.

[0008] According to an embodiment, a demountable panel is provided, wherein the end of the catch has at least one protrusion which extends transversely relative to the central longitudinal axis of the catch, and wherein the movement mechanism is configured so as to control the rotation of the catch about the central longitudinal axis such that in the unlocked state, the at least one protrusion makes a smaller angle relative to a plane transverse to the central rotational axis than in the locked state.

[0009] According to an embodiment, a demountable panel is provided, wherein the outwardly directed end of the elongated catch has two mutually opposing protrusions which lie in one another's extent.

[0010] According to an embodiment, a demountable panel is provided, wherein the movement mechanism comprises:

- a stationary guide track which is arranged on the housing next to the catch; and
- a co-rotating guide track which is arranged on the drive crank,

configured to cooperate with the catch in order to change the angular position of the catch about a central longitudinal axis of the catch.

[0011] According to an embodiment, a demountable panel is provided, wherein the movement mechanism further comprises:

- a first guide face arranged on the catch and configured to cooperate with the stationary guide track during the first angular segment in order to determine the angular position of the catch about the central longitudinal axis of the catch; and
- a second guide face arranged on the catch and configured to cooperate with the co-rotating guide track:
 - during the second angular segment in order to carry out the rotation of the catch about the central longitudinal axis of the catch; and
 - during the third angular segment in order to determine the angular position of the catch about the central longitudinal axis of the catch.

[0012] According to an embodiment, a demountable assembly is provided, wherein the assembly furthermore comprises:

- one or more elongated engagement elements configured to bear against the end of the catch in the locked state;

- two elongated engagement elements which are arranged on either side of the central longitudinal axis of the catch.

[0013] According to an embodiment, a demountable assembly is provided, wherein the one or more elongated engagement elements are arranged in or on:

- an elongated profile;
- a demountable panel;
- a locking device.

[0014] According to a second aspect, a locking device is provided, wherein the locking device comprises a catch and a movement mechanism, wherein the movement mechanism is configured to be driven by means of an angular rotation of a central drive crank of the movement mechanism in order to move the catch from an unlocked state into a locked state, wherein both the angular position of the catch about a central rotational axis of the drive crank, and the angular position of the catch about a central longitudinal axis of the catch are changed.

[0015] Embodiments similar to those of the first aspect are also possible.

[0016] According to an embodiment, a locking device is provided for use in a demountable panel or a demountable assembly according to the first aspect.

[0017] According to a third aspect, a method is provided for locking a locking device according to the first or second aspect, wherein the movement mechanism is driven by means of an angular rotation of a central drive crank of the movement mechanism in order to move the catch from an unlocked state into a locked state, wherein both the angular position of the catch about a central rotational axis of the drive crank, and the angular position of the catch about a central longitudinal axis of the catch are changed.

[0018] According to an embodiment, a method is provided, wherein the movement mechanism moves the catch from an unlocked state to a locked state using the following steps:

- during the first angular segment of the angular rotation of the central drive crank, the catch is rotated about the central rotational axis of the central drive crank, wherein an outer end of the catch moves past a contact face of the locking device;
- during the second angular segment of the angular rotation of the central drive crank, the catch is driven such that a rotation of the catch about a central longitudinal axis of the catch is carried out; and
- during the third angular segment of the rotation of the central drive crank, the catch is moved such that the distance between the end of the catch and the central drive crank is reduced.

[0019] According to a fourth aspect, a method is provided for unlocking a locking device according to the first

or second aspect, wherein the movement mechanism is driven by means of an angular rotation of a central drive crank of the movement mechanism in order to move the catch from a locked state into an unlocked state, wherein both the angular position of the catch about a central rotational axis of the drive crank, and the angular position of the catch about a central longitudinal axis of the catch are changed.

[0020] According to an embodiment, a method is provided, wherein the movement mechanism moves the catch from a locked state to an unlocked state using the following steps:

- during the third angular segment of the rotation of the central drive crank, the catch is moved such that the distance between the end of the catch and the central drive crank is increased;
- during the second angular segment of the angular rotation of the central drive crank, the catch is driven such that a rotation of the catch about a central longitudinal axis of the catch is carried out; and
- during the first angular segment of the angular rotation of the central drive crank, the catch is rotated about the central rotational axis of the central drive crank, wherein an outer end of the catch moves past a contact face of the locking device.

Description of the figures

[0021] Some embodiments will be described below by way of example, with reference to the following figures in which

- Figure 1 shows an embodiment of a panel in which an embodiment of two locking devices is arranged;
- Figure 2 shows an exploded view of the embodiment of figure 1;
- Figure 3A shows an exploded view of the embodiment of the locking device from figures 1 and 2;
- Figure 3B shows a perspective view of the embodiment of the locking device from figure 3A in the direction of arrow 3B, and an embodiment of an associated key;
- Figure 3C shows a perspective view of the embodiment of the catch holder of figure 3A in the direction of arrow 3C;
- Figures 4 to 7 show the embodiment of the locking device from figure 3 in various angular positions of the drive crank;
- Figures 8 to 11 show an embodiment of the locking device similar to that shown in figure 3, with an embodiment of an engagement element in the form of an elongate profile, in similar angular positions of the drive crank to those in figures 4 to 7;
- Figure 12 shows a perspective view of a cross-section of the embodiment of figures 8 to 11; and
- Figure 13 shows an alternative embodiment in which the engagement element is integrated in an adjacent

locking device.

Description

[0022] Figure 1 shows an embodiment of a panel 10 in which an embodiment of two locking devices 20 is arranged. It is clear that the locking devices 20 are arranged in the panel 10 close to a side edge, or in other words at the periphery of the panel 10. As evident, the panel 10 at the level of the locking devices 20 has an opening 12 in the longitudinal face of the panel 10 which offers access to the locking device 20 arranged in the panel for rotation of a central drive crank of the locking device 20, as described in more detail below. It is clear that the opening and the central drive crank have a central rotational axis 22 which is oriented transversely or approximately transversely to the longitudinal face of the panel 10. The locking devices 20 may be arranged in suitable fashion in the panel 10, for example by means of a suitable connection using an adhesion agent, glue, connecting elements etc. The exemplary embodiment illustrated shows a panel for a cooling space, formed for example as a sandwich panel, wherein insulation material such as e.g. foam material is arranged between a front and a rear wall made of sheet metal. It is however clear that alternative embodiments are possible for the panels, wherein the panels may be made from any suitable material such as e.g. metal, wood, plastic etc., and/or any combination thereof. It is clear that according to further embodiments, a different quantity of locking devices 20 may be arranged in a panel, rather than the two locking devices 20 shown in figure 1. For example, one or more, e.g. two or more locking devices 20 may be arranged around the periphery of a rectangular panel 10, for one or more of the side edges of the periphery of the panel 10. Figure 2 shows an exploded view of the embodiment of figure 1 to clarify where the two locking devices 20 are arranged in this embodiment of the panel.

[0023] It is clear, as already known for example from BE891812 which is hereby included in this description by means of reference, and as shown in more detail in figure 3B which shows a perspective view of the embodiment of the locking device 20 from figure 3A in the direction of the arrow 3B, that a key 14 or other suitable element may be introduced through the opening 12 in the panel 10, into a suitable central opening 42 of the central drive crank 40 of the locking device 20, in order thus to rotate the central drive crank 40 about the central rotational axis 22 as described in more detail below. For this, the key 14 comprises an elongate element 16 with a longitudinal axis which extends along the central rotational axis 22 when inserted in the locking device 20. According to the exemplary embodiment shown, it is clear that the elongate element 16 can be introduced through the passage 31 in the housing 30 into the central opening 42 of the central drive crank 40; or in other words, the opening 12 in the panel 10, the passage 31 in the housing 30, and the central opening 42 of the central

drive crank 40 are aligned such that the elongate element 16 of the key 14 can be introduced into the central opening 42 in the direction of the central rotational axis 22. The outer periphery of the elongate element of the key corresponds to and/or matches the inner periphery of the cross-section of the elongate central opening 42 of the central drive crank 40, such that a rotation of the key about the rotational axis 22 can be transferred to the central drive crank. According to the exemplary embodiment shown, as evident for example also in figure 4, this is for example a hexagonal periphery, however it is clear that any other suitable periphery is possible such as for example a square, an ellipse etc., or any other suitable polygon, and/or a periphery with any suitable number of angular and/or curved segments. It is clear that according to alternative embodiments, instead of a removable key or other element, an element may be used which is fixedly connected or integral to the central drive crank and configured to rotate the drive crank in order to switch the locking mechanism between a locked state and an unlocked state.

[0024] Figure 3 shows an exploded view of the embodiment of the locking device from figures 1 and 2. As evident, the locking device 20 comprises a two-piece housing 30 in which openings or recesses 34 are provided on either side of the central drive crank 40 for rotatable mounting of bearing surfaces 44 of the central drive crank 40, for rotation about the central rotational axis 22. According to the exemplary embodiment shown, the housing 30 comprises, at least on one side, a passage 31 for insertion of a key or other suitable element for driving the drive crank 40. According to the exemplary embodiment shown and in the state shown, this passage has a number of elements which can be bent or folded when the key or other suitable element is introduced through the passage 31, in order thus to create access to the central drive crank 40. It is however clear that alternative embodiments are possible in which such elements are not present. Furthermore, on the side which in secured state corresponds to the periphery of the panel 10, the housing 30 has a contact face 32 which, in this secured state as shown in figure 1, adjoins the periphery of the panel 10 and is configured to bear on an adjacent engagement element 70, such as for example a face, e.g. the plate-like element 74 on the periphery of an adjacent panel, a profile or other suitable element in the locked state, as will be clarified further below with reference to figures 8 to 13. In other words, the contact face 32 defines a plane transverse to the central longitudinal face of the panel 10 and aligned with, parallel or approximately parallel to the periphery of the panel 10, when the locking device is introduced therein. As shown in figure 1 and figure 3, this contact face 32 has a longitudinal direction L in the direction of the periphery of the panel 10 and a transverse direction D transverse to this longitudinal direction L, in the depth direction of the panel 10 in an attached state. As evident, the embodiment of the locking device 20 also comprises, in addition to the drive crank 40, a catch hold-

er 50 arranged around the drive crank 40 and also driven by the drive crank 40, as described in more detail below, in order to follow a movement trajectory which is determined by a cam track 36 arranged in the housing 30 which cooperates with pins 56 arranged on the catch holder 50. These pins 56 of the catch holder 50, which in secured state extend in the direction of the cam track 36 and into the cam track 36, are most clearly evident in figure 3C which gives a perspective view of the embodiment of the catch holder 50 from figure 3A in the direction of the arrow 3C. An elongate catch 60 is arranged on this catch holder 50, the central longitudinal axis 62 of which extends transversely or approximately transversely to the central rotational axis 22 of the drive crank 40. As evident and further clarified below, the elongate catch 60 is arranged in the catch holder 50 so as to be rotatable about the central longitudinal axis 62 of the catch 60, for example by means of a suitable click connection 52 or any other suitable connection which also functions as a bearing to allow a rotation of the catch 60 about its central longitudinal axis 62. As will also be explained, the catch 60 cooperates by means of guide faces 63, 66 with a stationary guide track 33 which is arranged next to the catch on the housing 30, and a co-rotating guide track 46 which is arranged on the drive crank 40.

[0025] The drive crank 40, catch holder 50, catch 60 and for example also the associated cam tracks 36, guide tracks 33, 46 etc., thus form a movement mechanism 100 which is configured to be driven by means of an angular rotation of the central drive crank 40 in order to move the catch 60 from an unlocked state, as shown for example in figure 4, to a locked state, as shown for example in figure 7.

[0026] It is clear that in the unlocked state, as shown in figure 4, the outwardly directed end 61 of the elongate catch 60 does not extend past the contact face 32 of the housing 30. In the locked position, as shown in figure 7, this end 61 of the catch 60 extends past the contact face 32 of the housing 30, and this end 61 is configured to lock on an elongate, e.g. plate-like or hook-shaped element 70 lying against the contact face 32, as will be explained in more detail below with reference to figures 9 to 13.

[0027] It is furthermore clear that two mutually opposing protrusions 68 are arranged on an outwardly directed end 61 of the elongate catch 60. These mutually opposing protrusions 68 extend transversely relative to the central longitudinal axis 62 of the catch 60 and, according to the exemplary embodiment illustrated, lie in one another's extent. It is clear that alternative exemplary embodiments are possible, wherein for example the catch 60 has only one such protrusion 68. It is clear that these protrusions 68 extend further in the longitudinal direction, transversely to the central longitudinal axis 62 of the catch 60, than the diameter or cross-section of the catch 60. In other words, the protrusions 68 form hook-like elements which extend away from the central longitudinal axis on either side of the catch 60. In the unlocked position as shown

in figure 4, in the state shown, these hook-like protrusions 68 extend upward and downward, or in other words along or approximately along the central longitudinal face of the panel 10 in a secured state, or in other words transversely or approximately transversely to the central rotational axis 22 of the central drive crank 40. It is here evident that at the level of this end 61, or in other words at the level of the protrusions 68, in this state and in the orientation shown, the end does not or substantially not extend further than the diameter or cross-section of the catch 60 in the direction of the central rotational axis 22. In other words, in this unlocked or released position and in this unlocked or released state, the protrusions 68 have a width in the direction of the central rotational axis 22 which is smaller than their length in the direction transverse to the central rotational axis 22, and also transverse to the central longitudinal face of the panel 10 in a secured state.

[0028] The movement mechanism 100 is configured, during the first angular segment of the angular rotation of the central drive crank, to rotate the catch 60 about the central rotational axis 22 of the central drive crank 40, wherein the outer end 61 of the catch 60 moves past the contact face 32. After the angular rotation through this first angular segment, the embodiment shown reaches the state shown in figure 5. The rotational movement of the catch 60 about the central rotational axis 22 of the drive crank 40 is caused by the rotation of the catch holder 50 about the central rotational axis 22. This movement is similar to that described in BE891812 and is driven firstly by the rotational movement of the drive crank 40 which, with a drive cam 48, engages in a corresponding cam cavity 58 in the catch holder 50, and secondly by a first arcuate part of the cam track 36 in which the pins 56 of the catch holder 50 are guided such that the catch holder 50 executes a rotation about the central rotational axis 22. It is furthermore clear that in this embodiment, the catch 60 and the protrusion 68 are held in this orientation, i.e. in this angular position, by the guide track 33 which is arranged next to the catch 60 in the housing 30 and which, during this first angular segment, cooperates with a first guide face 63 arranged on the catch 60. In other words, during this first angular segment, the first guide face 63 remains in contact with the guide track 33 so that the catch 60 is held in a specific angular position about its central longitudinal axis 62. As is evident, at the end of the first angle segment as shown in figure 5, this guide face 63 reaches the end of the guide track 33, whereby on further angular rotation about the central rotational axis 22, the catch 60 is no longer held in this specific angular position about its central longitudinal axis 62 by the guide track 33 and the guide face 63. It is furthermore clear that, during the angular rotation through this first angular segment, the central longitudinal axis 62 of the catch 60 tilts such that the angle reduces with respect to the direction transverse to the contact face 32, or in other words transverse to the periphery of the panel 10, or in other words transverse to the plane determined

by the directions L and D.

[0029] During a second angular segment of the rotation of the central drive crank 40 which follows the first angular segment, as illustrated by the angular rotation from figure 5 to figure 6, this first guide face 63 of the catch 60 moves past the end of the stationary guide track 33, and this first guide face 63 loses contact with the running surface of the guide track 33, allowing a rotation of the catch 60, which is arranged rotatably about its central longitudinal axis 62 in the catch holder 50, about its central longitudinal axis 62. As furthermore shown in figure 6, during the second angular segment, a second guide face 66 of the catch 60 comes into contact with the starting point of a co-rotating guide track 46 which is attached on the central drive crank 40 on the other side of the longitudinal axis 62 of the catch 60. It is clear that the second guide face 66 of the catch, in the embodiment shown, is oriented transversely or approximately transversely to the first guide face 63. It is clear that in the state shown in figure 6, the second guide face 66 of the catch 60 is configured to come into contact, from a transverse orientation relative to the co-rotating guide track 46, with the starting point of this co-rotating guide track 46, or in other words the head end of this co-rotating guide track 46, so that because of this contact the guide face 66 is tilted about the central longitudinal axis 62 of the catch 60 until the second guide face 66 runs against the running surface of the co-rotating guide track 46. It is clear that this running surface of the co-rotating guide track 46, as shown, is parallel to the running surface of the stationary guide track 33, and is positioned on the opposite side of the central longitudinal axis 62 of the catch 60. In the state shown in figure 6, this rotation of the catch 60 about the central longitudinal axis 62 of the catch 60 is not yet completed. When this rotation is completed, the catch 60 reaches the state shown in figure 7, wherein the second guide face 66 runs against and is held by the running surface of the co-rotating guide track 46, and wherein the first guide face 63 is oriented transversely or approximately transversely to the running surface of the co-rotating guide track 46. It is furthermore clear that here, the first guide face 63 remains in a position past the end of the stationary guide track 33. It is furthermore clear that according to the exemplary embodiment shown, the central longitudinal axis 62 of the catch 60, at the end of the second angular segment, lies in an angular position which is transverse or approximately transverse to the contact face 32 or the periphery of the panel 10. It is however clear that according to alternative embodiments, another suitable angular position of the central longitudinal axis 62 of the catch 60 relative to the contact face 32 or periphery of the panel 10 is possible. Similarly, as known to the person skilled in the art from BE891812, in the state shown in figure 6, the end of the first arcuate part 38 of the cam track 36 is reached, which is best visible in figure 3. This ensures that when the catch 60 and catch holder 50 have reached the angular position shown in figure 6, no further or almost no further rotation

of the central longitudinal axis 62 of the catch 60 takes place about the rotational axis 22 of the drive crank 40. According to the exemplary embodiment shown, this means that the catch 60 is held in this transverse angular position relative to the contact face 32, as shown in figure 6, on further angular rotation of the central drive crank 40 to the state shown in figure 7, as will be described in more detail below. It is clear that during the second angular segment of the angular rotation of the central drive crank 40, the movement mechanism 100 drives the catch 60 such that a rotation of the catch 60 about the central longitudinal axis 62 of the catch 60 is carried out. It is clear that, as stated above, the catch 60 is arranged rotatably in a catch holder 50 for rotation about the central longitudinal axis 62. It is furthermore clear that on this rotation about the central longitudinal axis 62 of the catch 60 by the movement mechanism 100, the angular position of the protrusions 68 about the central longitudinal axis 62 of the catch 60 also changes. These hook-like protrusions 68 are thus tilted about the central longitudinal axis 62 of the catch 60, from an angular position transverse or approximately transverse to the central rotational axis 22 of the drive crank 40, to a position in which the protrusions 68 extend in line or approximately in line with the rotational axis 22 of the drive crank 40. In other words, from a state shown in figure 5 in which these hook-like protrusions 68, in the state shown, extend upward and downward, or in other words along or approximately along the longitudinal direction L, or in other words along or approximately along the central longitudinal face of the panel 10 in the secured state, via the state shown in figure 6 in which the angle relative to the longitudinal direction L or the central longitudinal face of the panel 10 increases, to an angular position of the protrusions as shown in figure 7, wherein the angular position of the protrusions 68 is approximately transverse to the longitudinal direction L or the central longitudinal face of the panel 10 in the secured state, and wherein the hook-like protrusions 68, in the state shown in figure 7, extend sideways, or in other words transversely or approximately transversely to the upward and downward orientation shown in figure 5. It is clear that when the locking device 20 and/or the panel 10 is in an orientation other than the orientation shown, the described orientations must be adapted accordingly.

[0030] During a third angular segment of the rotation of the central drive crank 40, as indicated by the angular rotation from figure 6 to figure 7, and similar to that known to the person skilled in the art from BE891812, the catch 60 is moved such that the distance between the end 61 of the catch 60 and the central drive crank 40 is reduced. In other words, the distance between the hook-like protrusions 68 of the catch 60 and the contact face 32 of the housing 30 is reduced, whereby an elongate, plate-like engagement element 70 can be drawn against the contact face 32 and locked by means of the hook-like protrusions 68 of the catch 60, as will be further clarified with reference to figures 8 to 13. This movement of the catch

60 is achieved by a corresponding movement of the catch holder 50 in which the catch 60 is arranged. For this, the movement mechanism 100 comprises firstly the second linear part 39 of the cam track 36 which adjoins the first part 38, and a track which causes a translation of the catch holder 50 relative to the central rotational axis 22 in a direction away from the contact face 32, or in other words in a direction away from the adjacent periphery of the panel 10. This translational movement of the catch holder 50 is thus implemented firstly by guidance of the pins 56 in the second linear parts 39 of the cam tracks 36 in the housing 30. Secondly, the translational movement of the catch holder 50 is driven and made possible by the drive cam 48 which is present on the drive crank 40. This drive cam 48, during this third angular segment, moves freely out of an adjoining part of the cam cavity 58. It is clear that this adjoining part of the cam cavity 58 is configured such that this lies next to said drive cam 48 during the angular rotation of the drive crank 40 in the first angular segment. In this release of the drive cam 48 during this third angular segment from an adjoining part of the cam cavity 58, the catch holder 50 is driven such that the drive cam 48 cooperates with the cam cavity 58 in order to move the cylindrical part of the drive crank 40 in a corresponding part of the cam cavity 58 which forms a linear track. It is clear that this linear track of the cam cavity 58 is configured such that the movement of the catch holder 50 along the linear part 39 of the cam tracks 36 is caused by the interaction of the drive cam 48 with the cam cavity 58, and also the movement of the drive crank 40 along the linear track in the cam cavity 58 during this third angular segment. As evident and known to the person skilled in the art from BE891812, the drive cam 48 cooperates with the cam cavity 58 such that, during this third angular segment, the drive cam 48 is rotated into a position whereby the distance of its outer end from the contact face 32 is increased, and hence also the distance between the part of the cam cavity 58 lying against the drive cam 48 and the contact face 32 is increased. It is clear that thus the distance between the outer end 61 of the catch 60 attached to the catch holder 50 and the contact face 32 is reduced.

[0031] As will be further clarified with reference to figures 8 to 11, which show a top view of an embodiment wherein two locking devices 20, similarly to the situation described above, are locked on elongate profiles 80, 90, the hook-like protrusions 68 of the catch 60 can be brought past respective elongate engagement elements 70 and then engage on these engagement elements 70 in order to lock them against the contact face 32. The state shown in figures 8 to 11 thus corresponds to the respective state of the locking device 20 shown in figures 4 to 7. In the exemplary embodiment shown, the elongate angular profile 80 is shown together with an inset profile 90 attached to the angular profile 80; it is however clear that alternative embodiments of such elongate profiles 80, 90 are possible, and that further alternative embodiments of these elongate engagement elements 70 are

possible as long as they extend in the longitudinal direction L over a specific distance 78, as will be clarified below with reference to figures 12 and 13. Such elongate profiles 80, 90 and the elongate engagement elements 70 typically extend in the longitudinal direction L over a distance of 0.5 m or more, 1 m or more, preferably 2 m or more, etc., as indicated in figure 12 with arrows 78. It is however clear that alternative embodiments are possible, as shown for example in figure 13, or yet other alternative embodiments wherein this distance 78 over which the elongate engagement elements 70 extend amounts for example to 2 cm or more, preferably 3 cm or more. It is furthermore clear that, as shown in figure 8, in the transverse direction D or depth direction D, or in other words transversely to the longitudinal direction L, the engagement elements 70 extend in the direction of the central longitudinal axis 62 of the catch 60 up to a distance 72 from the central longitudinal axis 62 of the catch 60.

[0032] This distance 72 is designed to be sufficiently great that, in the orientation of the catch 60 during the first angular segment as shown in figures 8 and 9, which corresponds to the state in figures 4 and 5, the end 61 of the catch 60 with the protrusions 68 in the above-described orientation can be moved past the elongate engagement elements 70. In other words, in the orientation of the catch 60 during the first angular segment, the distance over which the end 61 of the catch 60 extends in the transverse direction D relative to the central longitudinal axis 62 of the catch 60 is smaller than the distance 72. Or in other words, in the exemplary embodiment shown, in this orientation and at the level of the elongate engagement elements 70, the width of the catch 60 in the transverse direction D is smaller than the distance between the two mutually opposing engagement elements 70 on either side of the catch 60 in the transverse direction D. In the exemplary embodiment shown, the distance 72 lies in the range of 105% or more, for example 110% or more, for example 120% or more of the distance over which the catch 60 extends relative to the central longitudinal axis 62, in the transverse direction D at the level of the engagement elements 70, as shown for example in figure 9, during the first angular segment. It is clear that further alternative embodiments are possible.

[0033] This distance 72 is furthermore also designed to be sufficiently small that, in the above-described orientation of the catch 60 during the third angular segment, as shown for example in figure 11, the protrusions 68 of the catch 60 extend further in the transverse direction D than the distance 72. In this orientation during the third angular segment, the protrusions extend in the transverse direction D over a distance from the central longitudinal axis 62 of for example 105% or more, e.g. 110% or more, e.g. 120% or more of the distance 72. It is clear that this allows the protrusions 68 at the end 61 of the catch to move towards the side of the engagement element 70 pointing away from the contact face 32, during the third angular segment, until the protrusions 68 bear against this side of the engagement element 70, and

thereby the engagement element 70 is clamped against the contact face 32 by the protrusions 68. It is clear that this state, which is reached as described above at the end of the third angular segment of the rotational movement of the drive crank 40, corresponds to the locked state of the locking device 10. It is furthermore clear that the rotational movement of the drive crank 40 here corresponds to the above-described rotational movement of the drive crank 40 which drives the movement mechanism 100 such that the locking device 20 is moved from the unlocked state to the locked state. It is clear that, according to the exemplary embodiment shown, two elongate engagement elements 70 are arranged one on either side of the longitudinal axis 62 of the catch 60, viewed in the transverse direction D. It is furthermore clear that, according to the exemplary embodiment shown, these two elongate engagement elements 70 are respectively pressed into the locked state by the two protrusions 68 of the catch 60, as shown for example in figure 11. It is however clear that alternative embodiments are possible wherein only one elongate engagement element 70 is present which cooperates with one of the protrusions 68 of the catch 60.

[0034] It is clear that the embodiments of the engagement elements 70 shown illustrate a hook-like cross-section formed for example by two mutually facing hook-like protrusions 70 of the cross-section of the elongate profiles 80, 90. This offers the advantage that the locking device 20 and consequently the panels 10 can be attached as required in any suitable position in the longitudinal direction of these elongate profiles 80, 90, which allows a more efficient locking of the panels 10 on such a profile 80, 90. It is clear that in the exemplary embodiment shown, the elongate engagement elements 70 form part of an elongate slot 76 which is made in the profile 80, 90 in the longitudinal direction L. The elongate engagement elements 70 thus form mutually facing hook-like elements on or near the side of the profile 80, 90 facing the panel 10 and/or the locking device 20. These elongate engagement elements 70 have a cross-section which extends over the width, or in other words in the transverse direction D, in a direction towards the central longitudinal face of the panel 10, or in a direction towards the central longitudinal axis 62 of the catch 60. According to the exemplary embodiment shown, such an embodiment of an elongate slot 76 allows for example the elongate profile 90 to be connected to the elongate profile 80 by means of a suitable click connection in this slot. This is advantageous in embodiments in which the panels 10 comprise a tongue or groove on their periphery, which is configured to engage on the periphery of an adjacent panel. As evident in figures 8 to 12, the cross-section of the profile 80 is designed such that at the level of the slot 76, a panel 10 can be arranged which has a corresponding tongue to cooperate with the groove present in the profile 80. As evident, the arrangement of the elongate profile 90 on a slot 76 of the profile 10 allows this side of the profile 80 to be reconfigured for arrange-

ment of a panel 10 with a corresponding groove, wherein the panel 90 cooperates as a corresponding tongue. It is however clear that countless variant embodiments are possible for such elongate profiles 80, 90 such as for example any suitable elongate profile or angular profile with one or more elongate engagement elements 70.

[0035] It is furthermore clear that alternative embodiments are possible, as shown for example in figure 13, wherein the plate-like engagement elements 70 are integrated in a housing 30 of an opposing locking device 20, for example of an adjoining panel 10. This allows two panels 10 to be locked together without the locking elements having to be precisely aligned in the longitudinal direction L. According to yet further examples, such plate-like engagement elements 70 may be arranged and/or integrated in an adjacent panel and/or any other element of a removable assembly.

[0036] It will be clear that, in addition to the above-described method for locking of a locking device 20, wherein the movement mechanism 100 is driven by means of an angular rotation of a central drive crank 40 of the locking mechanism 100 in order to move the catch 60 from an unlocked state to a locked state, wherein both the angular position of the catch 60 about a central rotational axis 22 of the drive crank 40 and the angular position of the catch 60 about a central longitudinal axis 62 of the catch 60 are changed, a method for unlocking of the locking device 20 is also possible, wherein the movement mechanism 100 is driven by means of an angular rotation of a central drive crank 40 of the locking mechanism 100 in order to move the catch 60 from a locked state to an unlocked state. It is clear that the steps as shown in figures 4 to 11 can be executed in reverse order. In other words, during unlocking, the drive crank 40 is rotated from the locked state, as shown for example in figure 7, to the unlocked state shown in figure 4, and thereby passes in reverse order through the above-described third, second and first angular segments of the angular rotation of the central drive crank 40.

[0037] It is clear that yet further variants and combinations of embodiments are possible without leaving the scope of protection as determined by the claims.

Claims

1. Demountable panel (10) with at least one locking device (20), wherein the locking device (20) comprises a catch (60) and a movement mechanism (100), wherein the movement mechanism (100) is configured to be driven by means of an angular rotation of a central drive crank (40) of the movement mechanism (100) in order to move the catch (60) from an unlocked state to a locked state, wherein both the angular position of the catch (60) about a central rotational axis (22) of the drive crank (40) and the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60) are changed.

2. Demountable panel (10) according to Claim 1, wherein the movement mechanism (100) is further configured to move the catch (60) from an unlocked state to a locked state such that:

- during a first angular segment of the angular rotation of the central drive crank, the catch (60) is moved such that a rotation about the central rotational axis (22) of the central drive crank (40) is carried out, wherein an outer end (61) of the catch (60) moves past a contact face (32) of the locking device (20);
- during a second angular segment of the angular rotation of the central drive crank (40), the catch (60) is moved such that a rotation of the catch (60) about a central longitudinal axis (62) of the catch (60) is carried out; and
- during a third angular segment of the rotation of the central drive crank (40), the catch (60) is moved such that the distance between the end (61) of the catch (60) and the central drive crank (40) is reduced.

3. Demountable panel (10) according to Claim 1 or 2, wherein the end (61) of the catch (60) has at least one protrusion (68) which extends transversely relative to the central longitudinal axis (62) of the catch (60), and wherein the movement mechanism (100) is configured so as to control the rotation of the catch (60) about the central longitudinal axis (62) such that in the unlocked state, the at least one protrusion (68) makes a smaller angle relative to a plane transverse to the central rotational axis (22) than in the locked state.

4. Demountable panel (10) according to one or more of the preceding claims, wherein the outwardly directed end (61) of the elongated catch (60) has two mutually opposing protrusions (68) which lie in one another's extent.

5. Demountable panel (10) according to one or more of the preceding claims, wherein the movement mechanism (100) comprises:

- a stationary guide track (33) which is arranged on the housing (30) next to the catch (60); and
- a co-rotating guide track (46) which is arranged on the drive crank (40),

configured to cooperate with the catch (60) in order to change the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60).

6. Demountable panel (10) according to claim 5 when dependent on claim 2, wherein the movement mechanism (100) further comprises:

- a first guide face (63) arranged on the catch (60) and configured to cooperate with the stationary guide track (33) during the first angular segment in order to determine the angular position of the catch (60) about the central longitudinal axis (62) of the catch (60); and
 - a second guide face (66) arranged on the catch (60) and configured to cooperate with the co-rotating guide track (46):
 - during the second angular segment in order to carry out the rotation of the catch (60) about the central longitudinal axis (62) of the catch (60); and
 - during the third angular segment in order to determine the angular position of the catch (60) about the central longitudinal axis (62) of the catch (60).
7. Demountable assembly comprising at least one demountable panel (10) according to one or more of the preceding claims, wherein the assembly furthermore comprises:
- one or more elongated engagement elements (70) configured to bear against the end (61) of the catch (60) in the locked state;
 - two elongated engagement elements (70) which are arranged on either side of the central longitudinal axis (62) of the catch (60).
8. Demountable assembly according to Claim 7, wherein the one or more elongated engagement elements (70) are arranged in or on:
- an elongated profile (80, 90);
 - a demountable panel (10);
 - a locking device (20).
9. Locking device (20) for use in a demountable panel or demountable assembly according to one or more of the preceding claims, wherein the locking device (20) comprises a catch (60) and a movement mechanism (100), wherein the movement mechanism (100) is configured to be driven by means of an angular rotation of a central drive crank (40) of the movement mechanism (100) in order to move the catch (60) from an unlocked state into a locked state, wherein both the angular position of the catch (60) about a central rotational axis (22) of the drive crank (40), and the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60) are changed.
10. Method for locking a locking device (20) according to one or more of the preceding claims, wherein the movement mechanism (100) is driven by means of an angular rotation of a central drive crank (40) of the movement mechanism (100) in order to move the catch (60) from an unlocked state into a locked state, wherein both the angular position of the catch (60) about a central rotational axis (22) of the drive crank (40), and the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60) are changed.
11. Method according to Claim 10, wherein the movement mechanism (100) moves the catch (60) from an unlocked state to a locked state using the following steps:
- during the first angular segment of the angular rotation of the central drive crank, the catch (60) is rotated about the central rotational axis (22) of the central drive crank (40), wherein an outer end (61) of the catch (60) moves past a contact face (32) of the locking device (20);
 - during the second angular segment of the angular rotation of the central drive crank (40), the catch (60) is driven such that a rotation of the catch (60) about a central longitudinal axis (62) of the catch (60) is carried out; and
 - during the third angular segment of the rotation of the central drive crank (40), the catch (60) is moved such that the distance between the end (61) of the catch (60) and the central drive crank (40) is reduced.
12. Method for unlocking a locking device (20) according to one or more of Claims 1 to 9, wherein the movement mechanism (100) is driven by means of an angular rotation of a central drive crank (40) of the movement mechanism (100) in order to move the catch (60) from a locked state into an unlocked state, wherein both the angular position of the catch (60) about a central rotational axis (22) of the drive crank (40), and the angular position of the catch (60) about a central longitudinal axis (62) of the catch (60) are changed.
13. Method according to Claim 12, wherein the movement mechanism (100) moves the catch (60) from a locked state to an unlocked state using the following steps:
- during the third angular segment of the rotation of the central drive crank (40), the catch (60) is moved such that the distance between the end (61) of the catch (60) and the central drive crank (40) is increased;
 - during the second angular segment of the angular rotation of the central drive crank (40), the catch (60) is driven such that a rotation of the catch (60) about a central longitudinal axis (62) of the catch (60) is carried out; and
 - during the first angular segment of the angular

rotation of the central drive crank, the catch (60) is rotated about the central rotational axis (22) of the central drive crank (40), wherein an outer end (61) of the catch (60) moves past a contact face (32) of the locking device (20).

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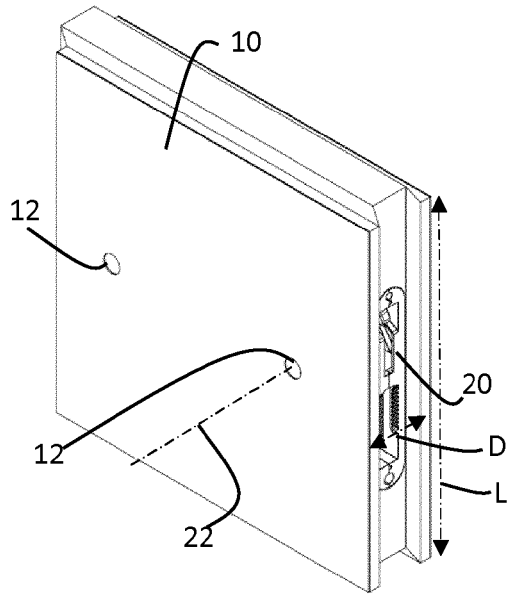


Fig. 1

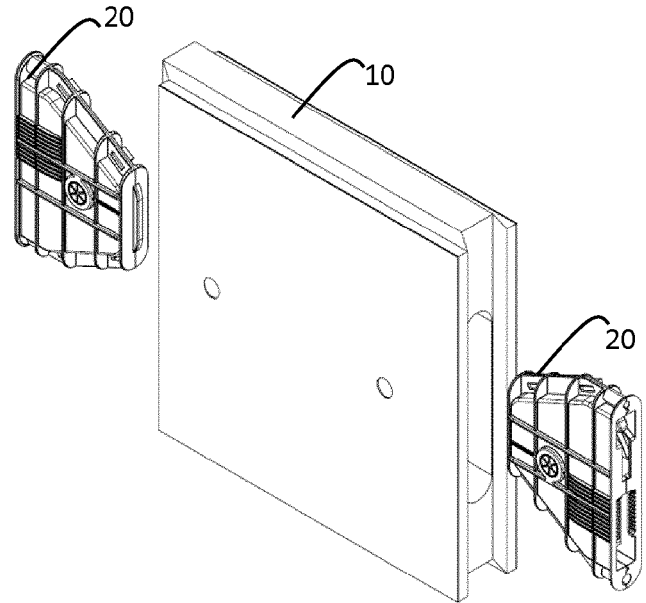


Fig. 2

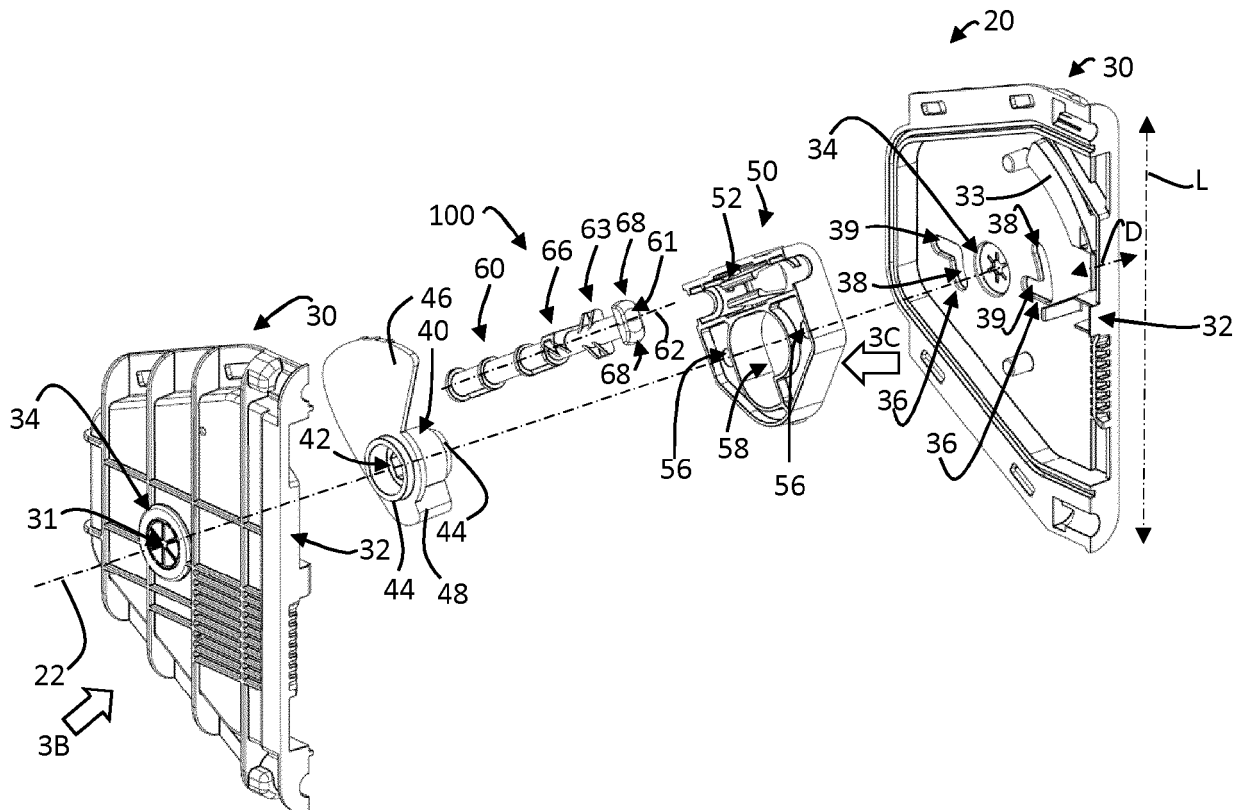


Fig. 3A

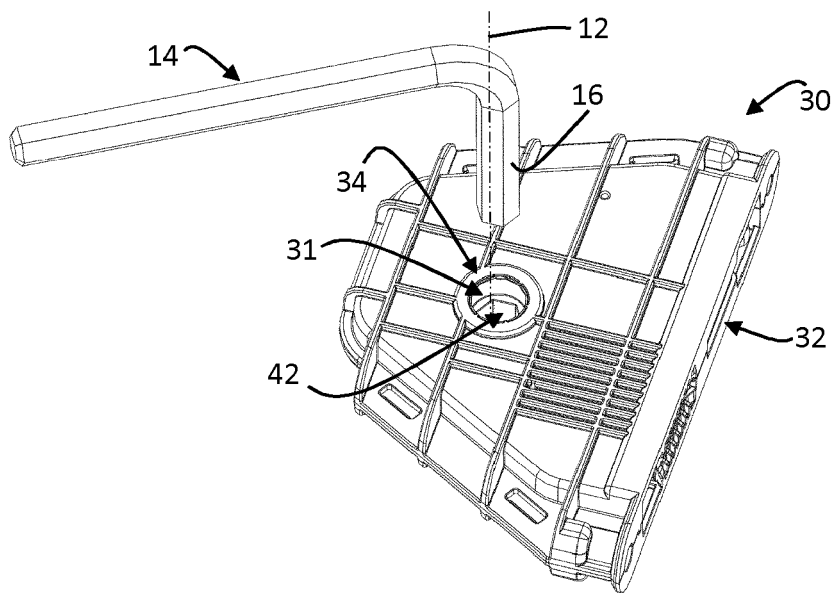


Fig. 3B

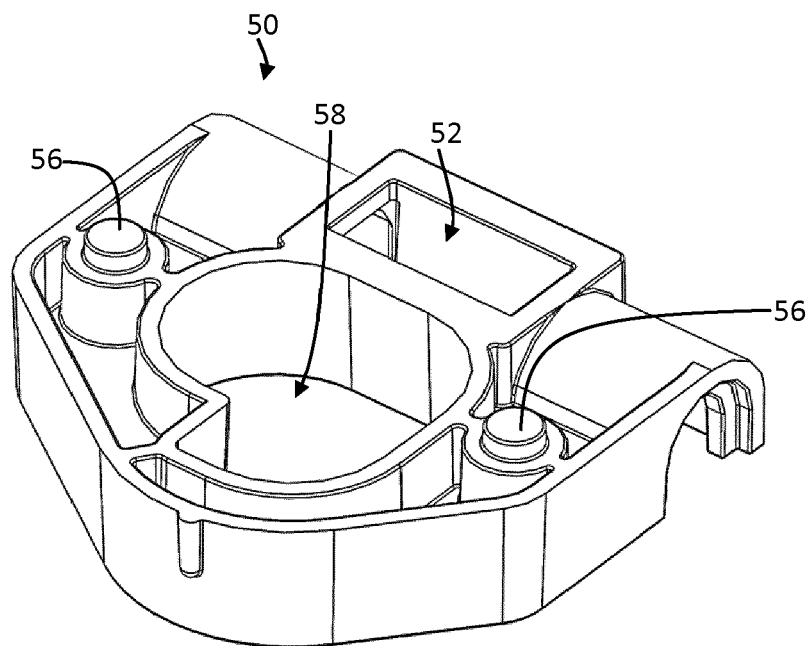


Fig. 3C

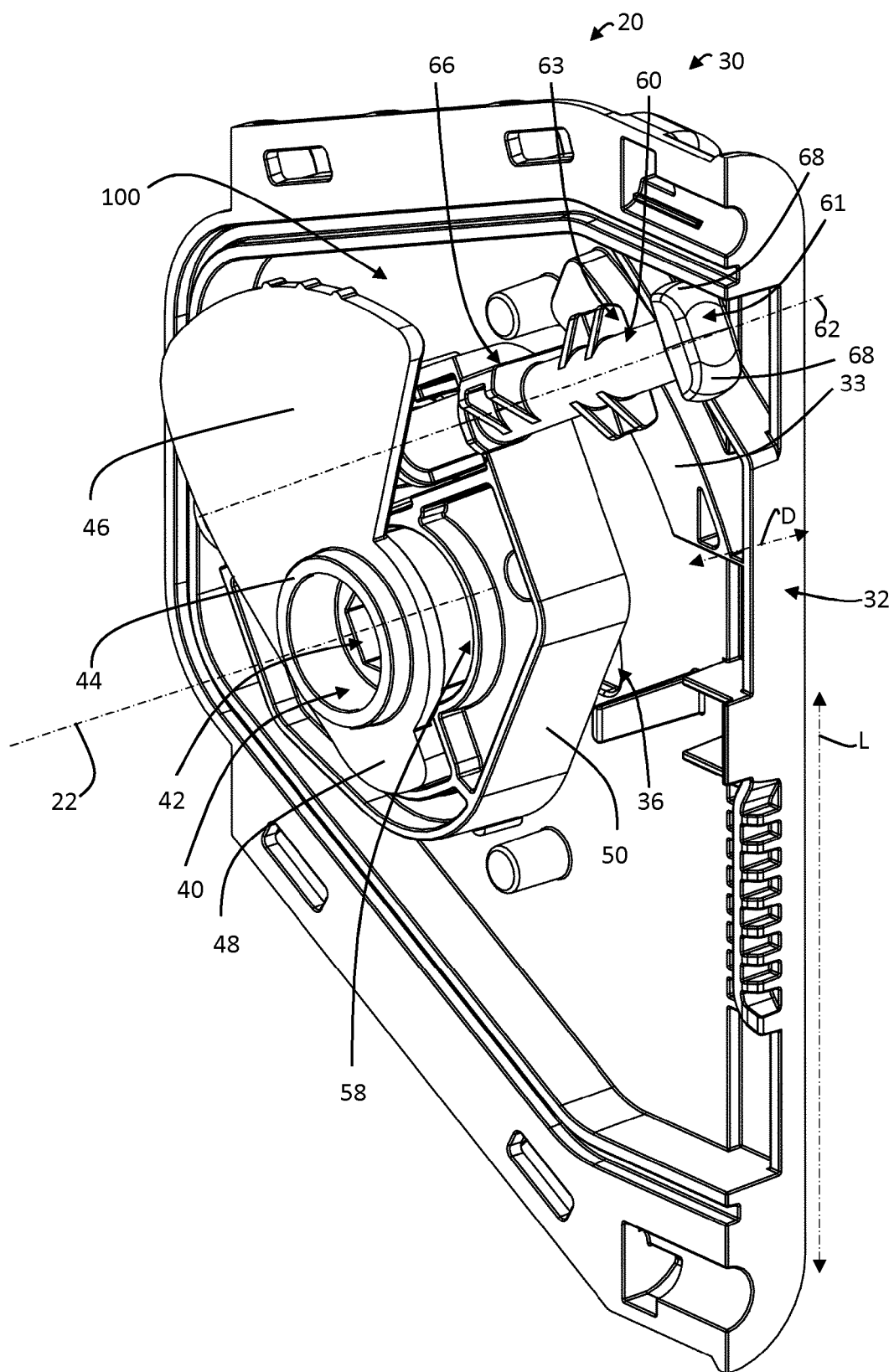


Fig. 4

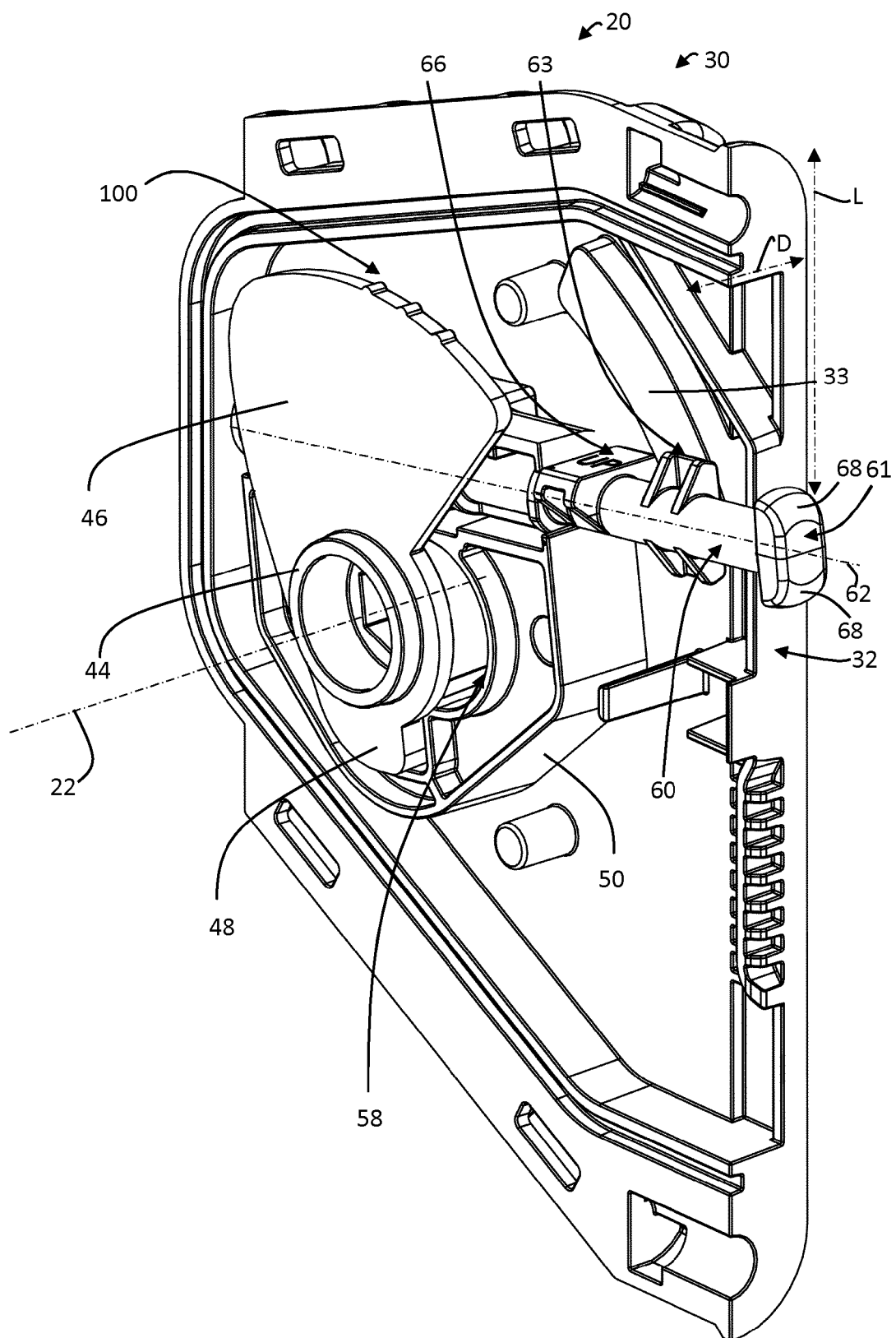


Fig. 5

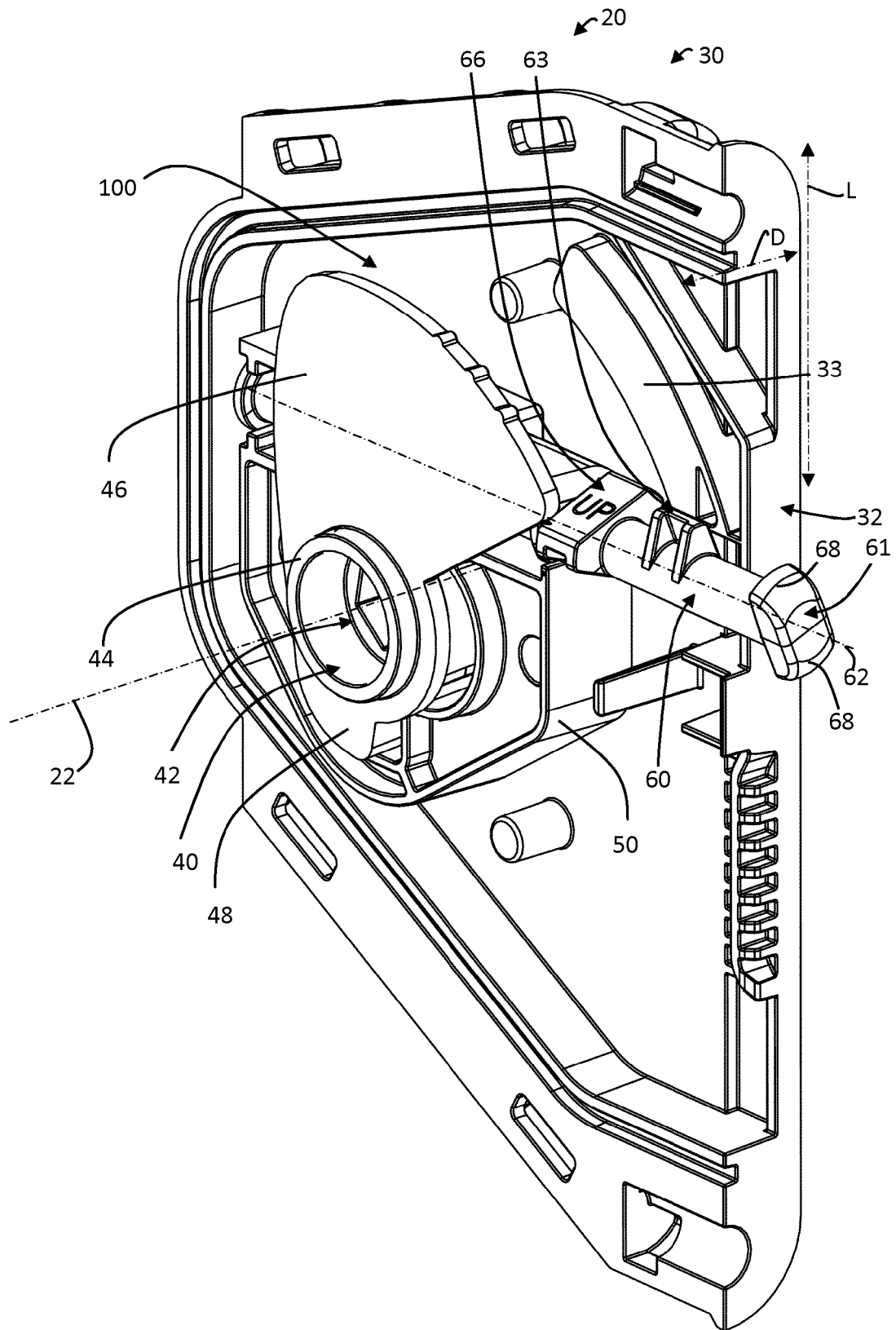


Fig. 6

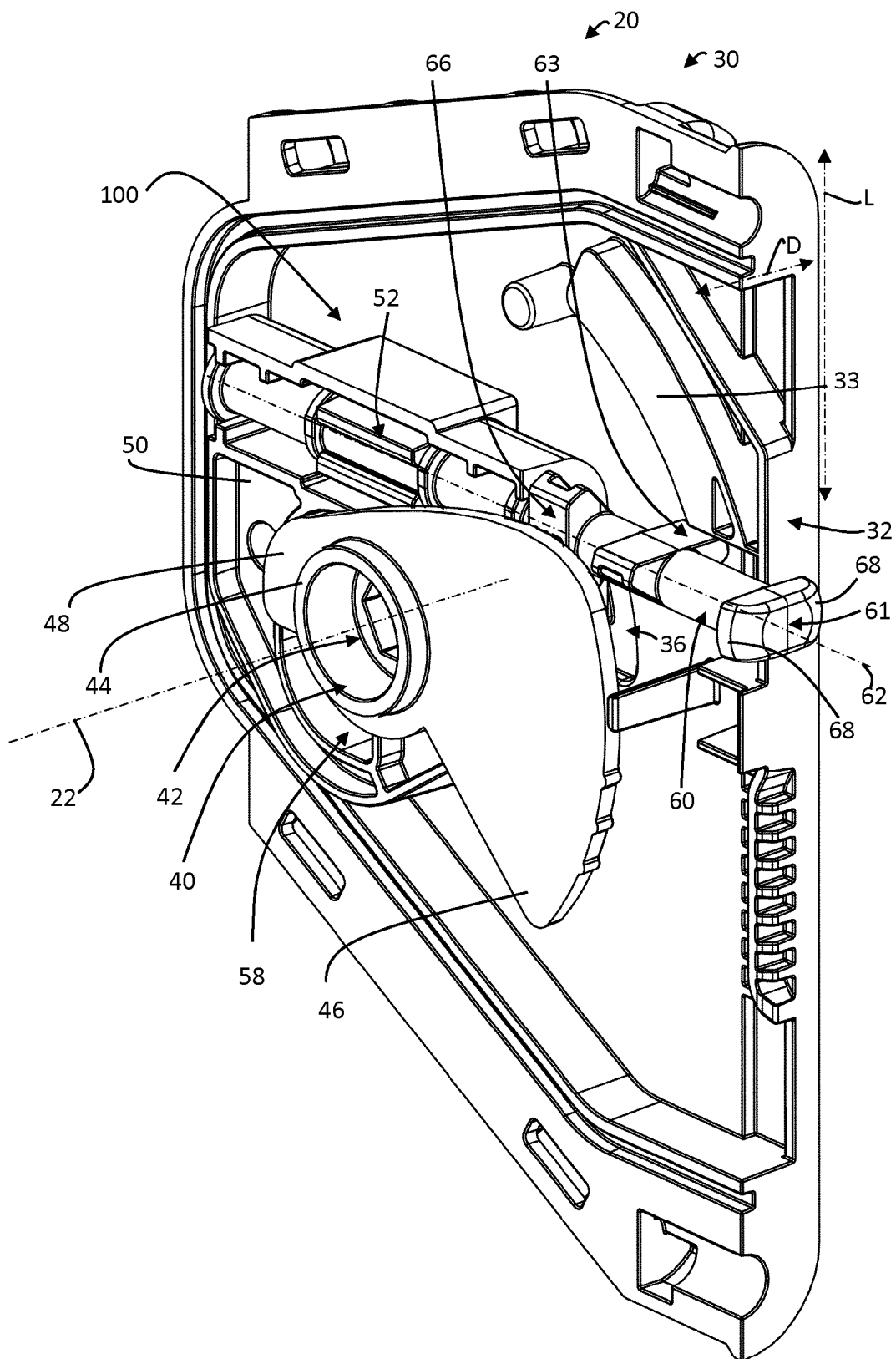
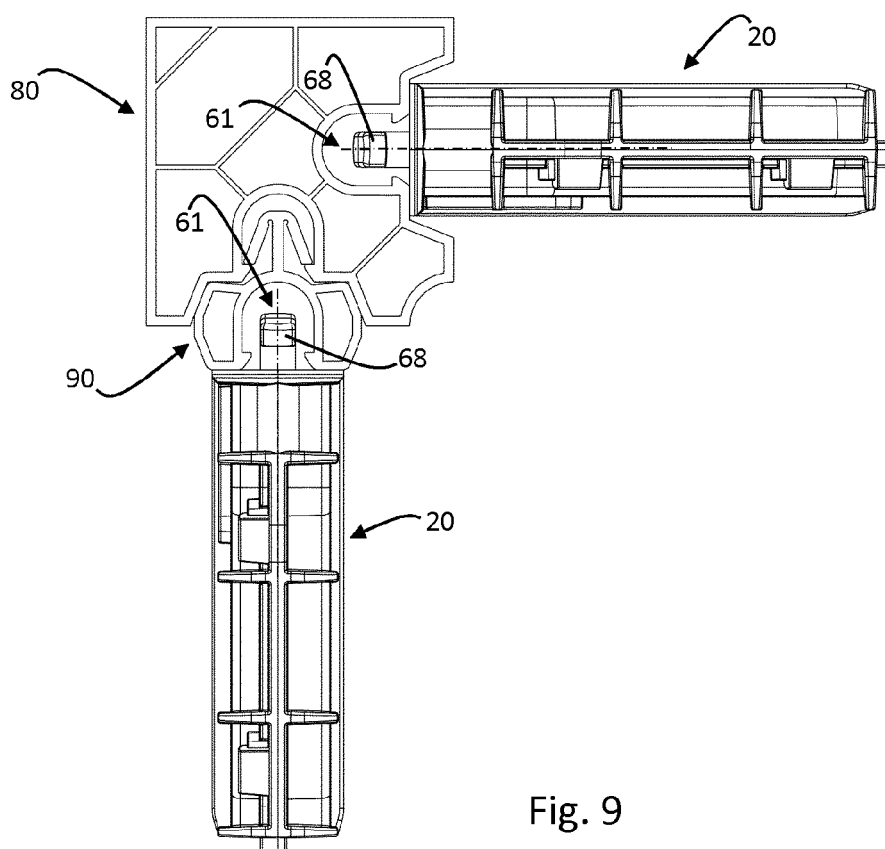
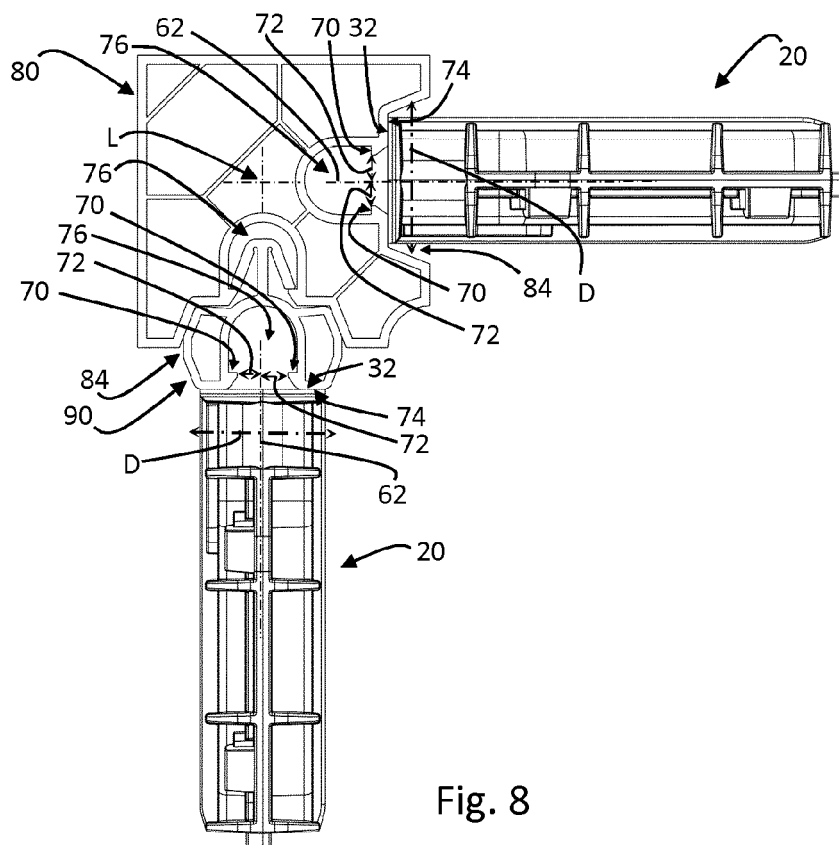


Fig. 7



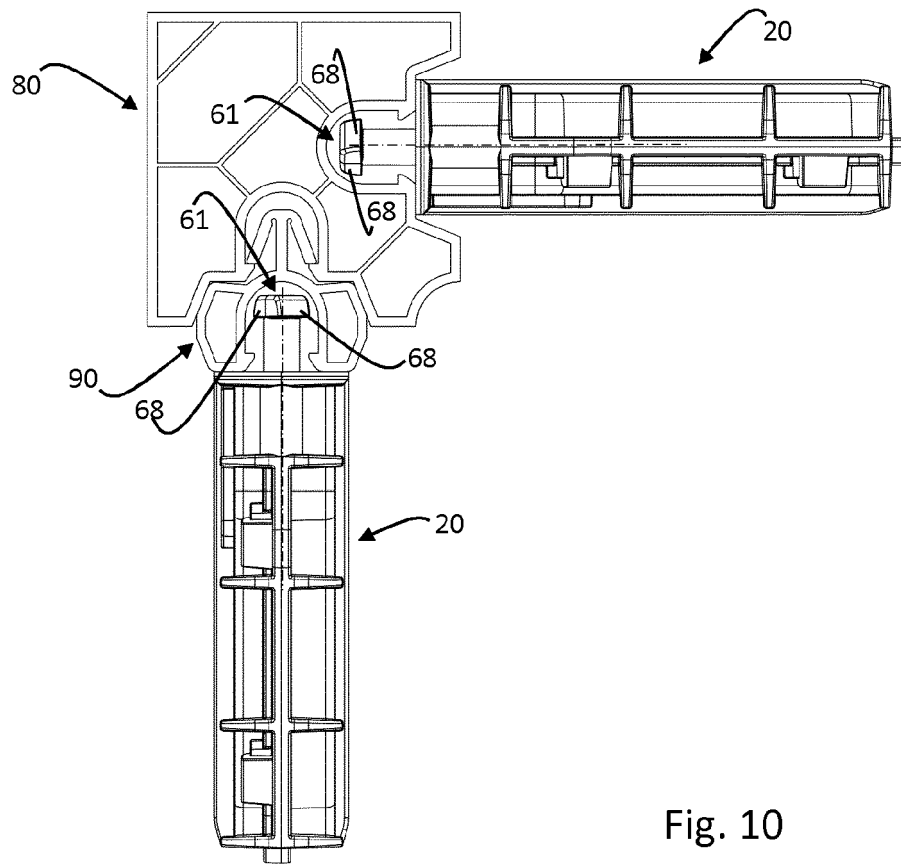


Fig. 10

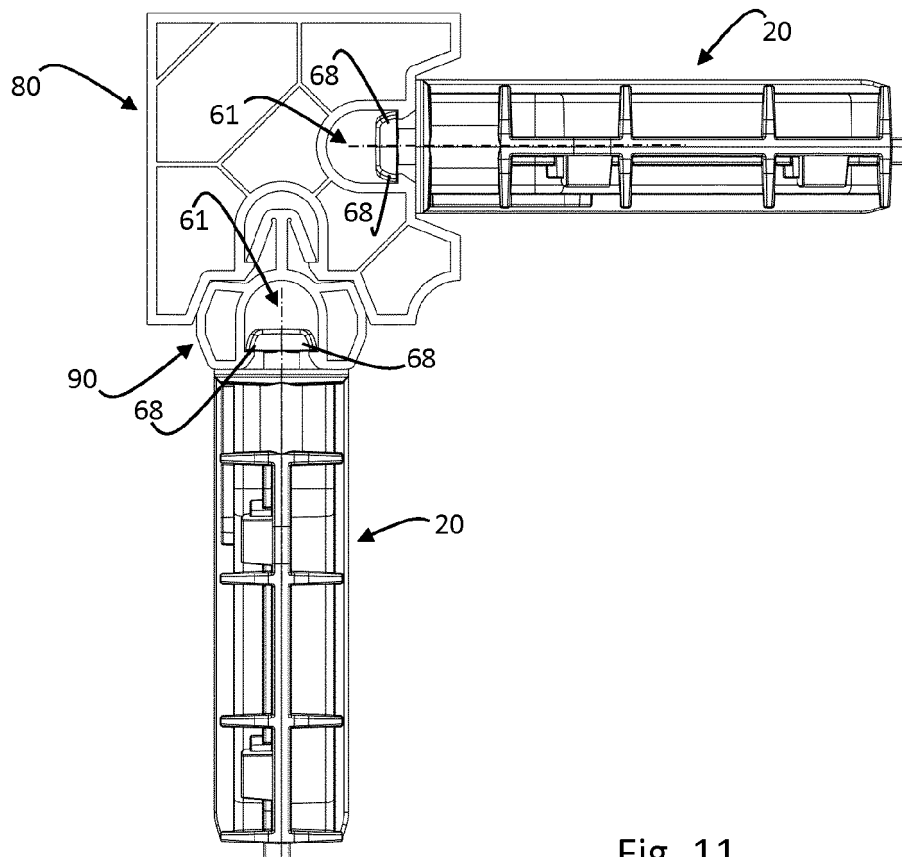


Fig. 11

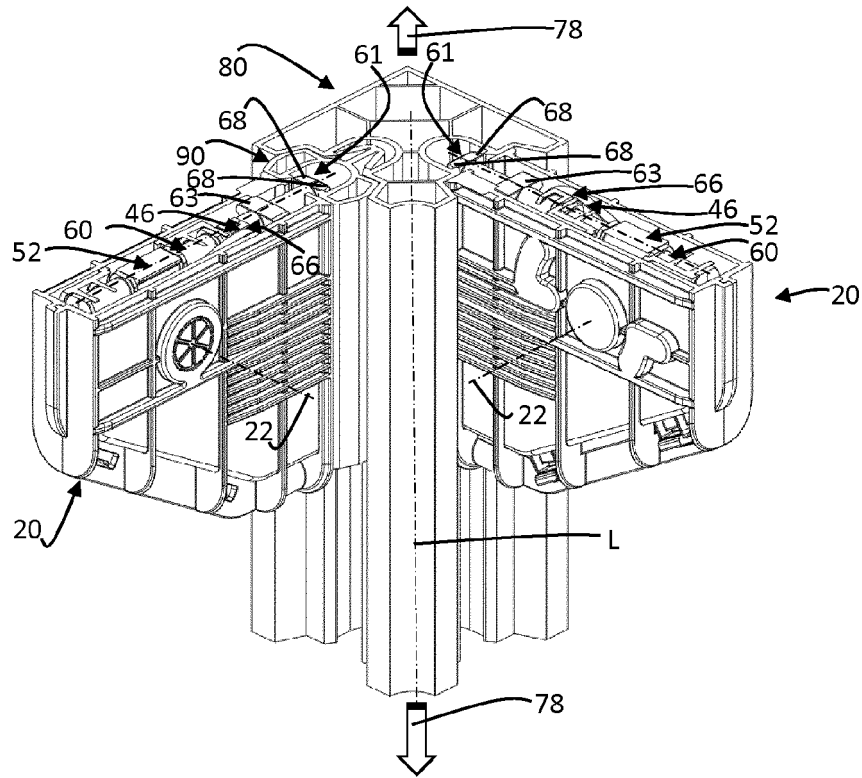


Fig. 12

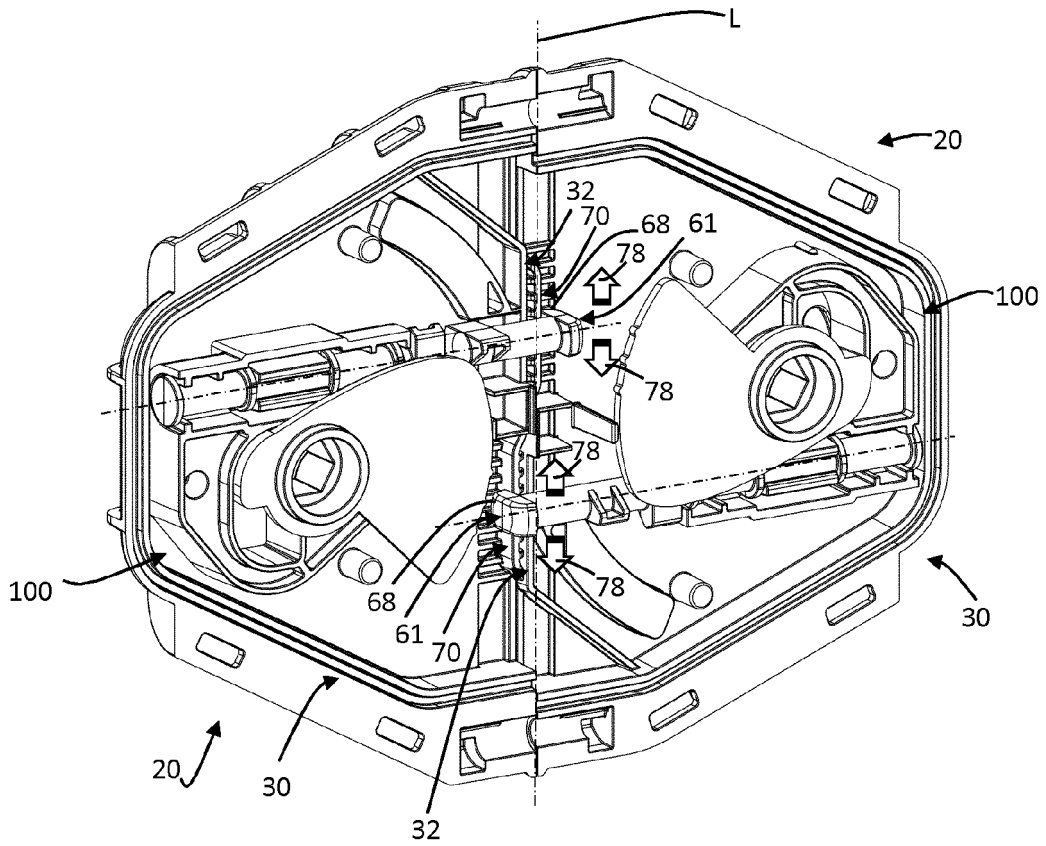


Fig. 13



EUROPEAN SEARCH REPORT

Application Number

EP 22 20 7992

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EPO FORM 1503 03.82 (P04C01)

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A	US 987 287 A (DURYEA GEORGE W [US] ET AL) 21 March 1911 (1911-03-21) * figures 1, 2 *	1-13	INV. E05B63/12 E05B65/00 E04B1/61 E05B17/00
A,D	BE 891 812 A (P V B A ISOCAB S P R L) 17 May 1982 (1982-05-17) * the whole document *	1-13	ADD. E05B65/08
A	DE 200 16 443 U1 (STEINBACH & VOLLMANN [DE]) 30 November 2000 (2000-11-30) * the whole document *	1-13	
A	JP H06 67608 U (-) 22 September 1994 (1994-09-22) * figure 3 *	1-13	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) E05B E04B
Place of search The Hague		Date of completion of the search 16 February 2023	Examiner Cruyplant, Lieve
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 22 20 7992

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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16-02-2023

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BE 891812 A	17-05-1982	NONE	
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JP H0667608 U	22-09-1994	NONE	

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