(19) DANMARK

(10) **DK/EP 3489444 T3**

Patent- og Varemærkestyrelsen

(12) Oversættelse af europæisk patentskrift

(51) Int.Cl.: ***E 05 F 1/06 (2006.01)*** ***E 05 D 11/10 (2006.01)*** *A 47 K 3/36 (2006.01)*

(45) Oversættelsen bekendtgjort den: **2022-05-02**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2022-02-09**

(86) Europæisk ansøgning nr.: **17203319.3**

(86) Europæisk indleveringsdag: **2017-11-23**

(87) Den europæiske ansøgnings publiceringsdag: **2019-05-29**

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

(73) Patenthaver: **Hafa Bathroom Group AB, Box 525, 301 80 Halmstad, Sverige**

(72) Opfinder: **UPPMAN, Linda, Eldsbergavägen 57, 305 97 ELDSBERGA, Sverige**

(74) Fuldmægtig i Danmark: **AWA Denmark A/S, Strandgade 56, 1401 København K, Danmark**

(54) Benævnelse: **LØFTEHÆNGSEL TIL BRUSEDØR**

(56) Fremdragne publikationer:
DE-U1-202013 009 757
DE-U1-202014 003 095
JP-A- 2000 080 853

DESCRIPTION

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a lifting hinge for e.g. a door leaf, a window or the like, a shower door assembly and a method for configuring a zero position for a shower door mounted to a lifting hinge. More specifically, the present invention relates to a lifting hinge which has a re-configurable zero position.

BACKGROUND

[0002] Modern domestic shower enclosures are often provided with various types of walls or doors in order to prevent water from splashing outside the dedicated shower space. Particularly, many shower enclosures have one or more turnable doors which are turnable inwards or outwards in order to free floor space in the bathroom when the shower is not in use.

[0003] A specific challenge associated with these turnable doors is that it is desirable to have a proper seal against the floor surface when the door is "closed" by means of a sealing strip arranged along a bottom edge of the door, and at the same time easy to open and close without having the sealing strip scraping against the floor surface. This challenge or problem is even worsened due to the fact that the floor surface in shower spaces often have a slope to help the floor drain water to a specific point, rendering the floor surface uneven.

[0004] In order to alleviate the above lifting hinges were introduced, these hinges cause the shower doors to rise (vertical displacement) from the floor surface as they are being opened. However, standard solutions are generally used in which the hinge has a predefined angle range (e.g. 90°, 135° or 180°) and furthermore has a pre-set zero position (i.e. the position in which the door is intended to be in its "lowest" position and the sealing strip seals against the floor surface).

[0005] These standard solutions are not applicable in some bathrooms since it may be impossible to mount the shower doors in predefined angles, e.g. due to imperfect angular relationships between walls and/or floor surfaces or due to the lacks of a suitable space in the bathroom. Moreover, these standard solutions require that the person mounting the shower door performs his task accurately and that the door is mounted more or less perfectly in relation to the zero position and a reference point (e.g. a second door or partition wall that the door is intended to close against).

[0006] As a remedy to this, adjustable lifting hinges were introduced. These adjustable lifting hinges are conventionally arranged such that the zero position can be set once the door has been mounted by means of a screw. More specifically, these solutions are configured such that

the hinge, upon mounting, is in a disengaged position and the lifting function is inactive, until the door is aligned in a desired zero positon after which a screw is inserted (radially) into the hinge in order to lock two components to each other whereby the lifting function is activated.

[0007] However, solutions utilizing screws to engage and disengage the lifting function are prone to some general drawbacks. For example, many of these the screw solutions destroy material inside the hinge wherefore small reconfigurations of the zero positions become impossible since the screw, once inserted, makes a permanent hole in the inner components of the hinge and a slight adjustment is impossible (since there needs to be sufficient space between the first hole and any subsequent hole). Moreover, these solutions in which the screw is inserted radially introduce an additional wear and tear factor during repeated use and whereby the locking effect introduced by the screw loosens over time, requiring repeated re-adjustments which after a while may become impossible as mentioned in the foregoing. In other solutions the screw is introduced from the bottom side of the hinge, which requires a work intensive dismounting of the whole system in order to perform a reconfiguration.

[0008] DE202014003095 describes a shower door with a on a rotary column fixed door leaf, wherein the rotary column by means of an upper bearing is rotatably mounted on its upper end side and by means of a lower bearing on its lower end side. The lower bearing has a mechanism in order to lift the rotary column together with the door leaf fixed thereto during pivoting thereof from a closed position into an open position and during pivoting from an open position into a closed position. JP2000080853 describes a hinge comprising a lower pivot placed on a mounting member and a cam receiver secured thereto. Further, the hinge comprises a bearing cylinder having its lower end face formed into a cam abutting face which is secured to a door mounting member and a cam cylinder having its upper end face formed into a cam face is placed on the door mounting member.

[0009] Thus, there is a need in the art of an adjustable lifting hinge which is not only robust and durable but also easy to install and re-configure.

SUMMARY OF THE INVENTION

[0010] It is therefore an object of the present invention to provide a lifting hinge for pivotally securing a door leaf to a support structure which alleviates all or at least some of the above-discussed drawbacks of presently known solutions.

[0011] This object is at least partly achieved by means of a lifting hinge, a shower door assembly and a method as defined in the appended independent claims.

[0012] The term exemplary is in the present context to be interpreted as serving as an instance, example or illustration.

[0013] According to a first aspect of the present invention, there is provided a lifting hinge for

pivotally securing a door leaf to a support structure. The lifting hinge comprises a first part having a cam surface. The first part is mechanically connectable to the door leaf such that a movement of the door leaf results in a movement of the first part when the door leaf is connected to the lifting hinge. Moreover, the lifting hinge comprises a second part having a cam follower. The second part is arranged such that the cam follower faces the cam surface along a rotational axis, the second part further having a first engagement surface. Further, the lifting hinge comprises a locking part having a second engagement surface facing the first engagement surface. The locking part is rotationally fixed about the rotational axis. The second part is axially displaceable along the rotational axis such that the lifting hinge is arrangeable in two modes:

a configurational mode in which the first engagement surface is disengaged from the second engagement surface such that a rotation of the first part about the rotational axis results in a rotation of the second part about the rotational axis in order to set a zero position for the lifting hinge; and

an operational mode in which the first engagement surface is engaged with the second engagement surface and the second part is rotationally fixed about the rotational axis such that a rotation of the first part about the rotational axis results in an axial movement of the first part along the rotational axis by means of a relative rotation of the cam surface and the cam follower.

[0014] Hereby presenting a lifting hinge which is cost effective and user friendly, and whose zero position can be installed and reconfigured quickly by a single user in a repeatable manner. In more detail, the inventive hinge alleviates the need for using a screw or any other means which makes permanent damage to the inner components in order to rotationally lock one of the cam surface or the cam follower, wherefore the lifespan of the hinge can be drastically increased as compared to such type of prior known solutions. Moreover, the whole installation or reconfiguration procedure can be done by a single user which by merely providing an axial lifting force to the second part in order to detach it from the locking part, e.g. by means of a suitable tool, which makes the hinge user friendly and cost effective.

[0015] The term "to face" is in the present context to be understood as that a surface is arranged such that it has its front or face towards something, or stated differently, the direction of a normal vector of a surface (if approximated as a plane) is the same direction towards which the surface faces.

[0016] The present invention is based on the realization that by constructing a hinge having two inner components with mutually engaging surfaces that can be used to rotationally lock and unlock one of the cam surface or the cam follower a robust, simple and cost effective solution to the zero position configuration of a lifting hinge can be achieved. In more detail, the inventive hinge uses relatively simple mechanical means (axial displacement of a component) in order to be able to repeatedly set in a configuration mode and an operational mode. Thus,

according to the invention, the second part further comprises an engaging portion which is externally accessible in order to axially displace the second part and disengage the first engagement surface from the second engagement surface. The displacement may be achieved by using a wedge shaped object or a lever of some sort to axially displace the second part relative to the locking part and thereby set the lifting hinge in the configurational mode.

[0017] In more detail, the lifting hinge is set in the configurational mode by exerting an axial lifting force along the rotational axis in order to disengage the first engagement surface from the second engagement surface. The second part is then pushed up against the first part which is accordingly axially displaced as well. Since the door leaf is mechanically connected to the first part, the door leaf is displaced in the same direction by a corresponding distance. Due to the weight of the door leaf, the first part exerts a downwardly directed force towards the second part such that the frictional forces between the cam follower and cam surface are large enough to prevent any relative rotation between the first part and second part while the lifting hinge is in the configurational mode in order to properly adjust the zero position for the hinge. The zero position is to be understood as the position in which the first part (and accordingly the door leaf) is in its lowest vertical position during the rotational travel of the hinge.

[0018] Further, in accordance with another exemplary embodiment of the present invention, the first engagement surface comprises at least one protrusion and/or at least one recess and wherein the second engagement surface comprises at least one matching recess and/or at least one matching protrusion, such that said at least one protrusion is arranged in said at least one matching recess and/or said at least one matching protrusion is arranged in said at least one recess when said second part is in the operational mode. Stated differently, the engagement surfaces are arranged to rotationally come into locking engagement with each other which will consequently rotationally fix the second part about the rotational axis due to the locking part being rotationally fixed. For example, the first and the second engagement surfaces may in the form of crown gears having a plurality of protrusions/recess arranged along a circumference thereof.

[0019] Further, in accordance with yet another exemplary embodiment of the present invention, the locking part is arranged below the second part along the rotational axis such that the lifting hinge is in the operational mode when no external displacement force is applied to the second part. In more detail, the first part (which is mechanically connected to the door leaf) will execute a downwardly directed force onto the second part due to the weight of the door, thus when the second part is not lifted and disengaged from the underlying locking part, the weight of the door forces the second part down into and in engagement with the locking part.

[0020] Still further, in accordance with an exemplary embodiment of the present invention, wherein the configurational mode and the operational mode correspond to two different spatial positions of the second part along the rotational axis. This further elucidates how simple and user friendly the solution is, and requires minimal prerequisites in order to be able to install and reconfigure the hinge. In more detail, the lifting of the second part will force it up against the first part and accordingly may be used to lift the first part as well. Thus, in accordance with yet

another exemplary embodiment of the present invention, the first part is arranged such that it is simultaneously axially displaced along the rotational axis when the second part is axially displaced along the rotational axis. As mentioned above, the frictional force between the cam follower and the cam surface will then prevent any relative rotation between the first part and the second part.

[0021] Further, in accordance with another aspect of the present invention, there is provided a shower door assembly comprising a shower door, a support structure, and two lifting hinges according to any one of the above discussed embodiments with respect to the first aspect of the present invention, where the lifting hinges are mountable to the support structure and arranged to pivotally connect the shower door to the support structure.

[0022] With this aspect of the invention, similar advantages and preferred features are present as in the previously discussed first aspect of the invention and vice versa.

[0023] Further, in accordance with an exemplary embodiment of the present invention, the two lifting hinges, when mounted to the support structure, are arranged at spatially separate positions along the rotational axis and mirrored with respect to a horizontal plane extending between the two lifting hinges, and wherein the two lifting hinges are configured such that a required displacement distance to set a lower lifting hinge in the configurational mode is smaller than a distance between the first engagement surface and the second engagement surface of an upper lifting hinge when the lower lifting hinge is in the operational mode. This embodiment serves to make the shower door assembly installable on either side (symmetricity) and to ensure that the lifting of the second part in the lower hinge pushes the second part of the upper hinge into locking engagement with the locking part of the upper hinge.

[0024] Yet further, in accordance with yet another exemplary embodiment of the present invention the two lifting hinges, when mounted to the support structure, are arranged at spatially separate positions along the rotational axis, and wherein the second part of a lower lifting hinge further comprises an engaging portion which is externally accessible in order to axially displace the second part and disengage the first engagement surface from the second engagement surface, the shower door assembly further comprising:

an adjustment tool configured to engage the engaging portion of the lower lifting hinge, in order to axially displace the second part along the rotational axis and thereby set the second part in the configurational mode;

wherein the adjustment tool comprises an adjustment surface onto which the engaging portion abuts against in the configurational mode, the adjustment surface being adapted to have a lower frictional coefficient against the engaging portion than a frictional coefficient between the cam surface and the cam follower. By having an adjustment tool with an adjustment surface that has been adapted to have a low frictional coefficient against the engaging portion of the second part, the risk of causing a relative rotation between the first part and the second part during a configuration procedure is reduced or even completely mitigated. In order to be able to reconfigure and set a desired zero position for the door hinge, the first and second parts

must not rotate relative to each other or otherwise a rotation of the door (in order to set the appropriate zero position) will activate the lift mechanism and thus the hinge will go back to the operational mode.

[0025] Further, in accordance with another aspect of the present invention, there is provided a method for configuring a zero position for a shower door mounted to a lifting hinge in a shower door assembly according to any one of the previously discussed embodiments. The method comprises:

applying a vertical lifting force onto the second part so that the first engagement surface disengages from the second engagement surface;

moving the shower door to a desired zero position;

removing the vertical lifting force and allowing the first engagement surface to engage the second engagement surface such that the second part is rotationally locked to the locking part. With this aspect of the invention, similar advantages and preferred features are present as in the previously discussed aspects of the invention.

[0026] These and other features of the present invention will in the following be further clarified with reference to the embodiments described hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] For exemplifying purposes, the invention will be described in closer detail in the following with reference to embodiments thereof illustrated in the attached drawings, wherein:

Fig. 1A is a cross-sectional view of a lifting higne in an operational mode in accordance with an embodiment of the present invention;

Fig. 1B is a cross-sectional view of the lifting hinge from Fig. 1A in a configurational mode;

Fig. 2 is an exploded perspective view of a shower door assembly in accordance with an embodiment of the present invention;

Fig. 3 is an exploded perspective view of the shower door assembly in Fig. 2 shown from a different perspective;

Figs. 4A - 4E are partical cut-out perspective views of a lifting hinge, illustrating a method for configuring a zero position for a shower door mounted to a lifting hinge in accordance with an embodiment of the invention;

Fig. 5 is a cross-sectional view of two lifting hinges of a shower door assembly arranged in a configurational mode and in an operational mode in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

[0028] In the following detailed description, preferred embodiments of the present invention will be described. However, it is to be understood that features of the different embodiments are exchangeable between the embodiments and may be combined in different ways, unless anything else is specifically indicated. Even though in the following description, numerous specific details are set forth to provide a more thorough understanding of the present invention, it will be apparent to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well known constructions or functions are not described in detail, so as not to obscure the present invention.

[0029] Fig. 1A and Fig. 1B illustrate two cross-sectional views of a lifting hinge 1 taken along its rotational axis 101 in accordance with an embodiment of the invention. The following description will be in reference to both figures as they show the same embodiment of a lifting hinge but where Fig. 1A shows the lifting hinge in an operational position while Fig. 1B shows the lifting hinge in a configurational position. The lifting hinge 1 is particularly suitable in bathroom applications, such as e.g. for pivotally securing a door leaf (such as e.g. a shower door) to a support structure. The lifting hinge 1 has a first part 2 with a cam surface 3 facing downwards in this illustrated embodiment. The first part is arranged to be mechanically connected to the door leaf (not illustrated in this figure) such that a rotation or pivoting of the door causes a corresponding movement of the first part 2 about the rotational axis 101 when the door is connected to the hinge 1. The lifting hinge 1 further has a second part 4 having a cam follower 5 facing upwards towards the cam surface 3 in this illustrated embodiment. Stated differently, the cam follower 5 faces the cam surface 3 along the rotational axis 101. Moreover, the second part 4 further has an engaging portion 9 which is externally accessible in order to axially displace 40 the second part.

[0030] Further, the lifting hinge 1 has a locking part 7 having a second engagement surface 8 which faces the first engagement surface 6. The locking part 7 is rotationally fixed about the rotational axis 101, i.e. the locking part 7 is arranged such that it isn't rotatable about the rotational axis 101 of the lifting hinge 1. The second part 4 is axially displaceable along the rotational axis 101, as indicated by the double headed arrow 40 in Fig. 1B, such that the lifting hinge 1 can be arranged in two modes, namely a configurational mode (Fig. 1B) and an operational mode (Fig. 1A).

[0031] In reference to Fig. 1B, in the configurational mode, the second part 4 is axially displaced away from the locking part 7 in order to disengage the first engagement surface 6

from the second engagement surface 8. Here, this is achieved by means of an adjustment tool 10 which is configured to work as a wedge and engage the engaging portion 9 of the second part 4 and thereby axially displace the second part 4. The adjustment tool 10 has a tapered shape such that when it is pushed into an intermediate space between the engagement portion 9 and a static part of the lifting hinge 1 (here in the form of a distance used to lift the hinge 1 from a floor surface), it forces the second part 4 upwards. In the configurational mode, the first engagement surface 6 is no longer in locking engagement with the second engagement surface 8. Here, a rotation of the first part 2 results in a rotation of the second part 4 since the weight of the door leaf (which is mechanically connected to the first part) results in that the frictional force between the cam surface 3 and the cam follower 5 is greater than the frictional force between the engagement portion 9 and the adjustment tool 10. It should be noted that it is the relative rotation between the first part 2 and the second part 4, or more specifically, between the cam surface 3 and the cam follower 5, that causes the "lift" when the associated door leaf is turned/pivoted. Thus, by preventing any relative rotation between the first part 2 and the second part 4 in the configurational mode, the zero position can easily be set by moving the door leaf into the desired position and removing the adjustment tool (will be further elucidated in reference to Figs. 4A - 4D. The zero position may be understood as the position in which the associated door leaf is the least displaced from the floor surface, or equivalently, the position in which a center point of the first part 2 is the closest to a center point of the second part 4.

[0032] Further, in reference to Fig. 1A, the lifting hinge 1 is in an operational mode in which the first engagement surface 6 is engaged with the second engagement surface 8 and the second part 4 is rotationally fixed about the rotational axis 101. Stated differently, the lifting hinge 1 is arranged such that it is in the operational mode when no external displacement force (upwardly directed) is applied to the second part 4. More specifically, the weight of the door leaf (which is to be mechanically connected to the first part) will push the first part 2 and accordingly the second part 4 downwards. Thus, in this mode, a rotation of the first part 2 about the rotational axis will result in an axial movement of the first part along the rotational axis due to the relative rotation of the cam surface 3 and the cam follower 5. The rotational fixation of the second part 4 is here achieved by means of the mutual engagement of the first engagement surface 6 and the second engagement surface 8 whereby the locking part 7 is used to prevent any rotation of the second part 4 about the rotational axis 101. Thus, the configurational mode and the operational mode can be said to correspond two different spatial positons (as indicated by arrow 40) of the second part 4.

[0033] Further, in reference to Fig. 2 and Fig. 3, which show two different partly exploded perspective views of a shower door assembly comprising a lifting hinge 1 in accordance with an embodiment of the present invention. In Fig. 2 the lifting hinge 1 is shown from a "frog perspective" thereby elucidating the downwardly facing surfaces of different parts of the lifting hinge 1. The lifting hinge 1 is here used to secure the door leaf 20 to a supporting structure 30, here in the form of a metallic profile.

[0034] For example, the cam surface 3 of the first part 2 is shown as two bulges or

protrusions, here generally defined as a cam surface 3. The bulges or rounded protrusions are to engage corresponding rounded depressions or recesses in the second part 4, here generally defined as a cam follower 5 (see e.g. Fig. 3). In more detail, it is when these bulges or protrusions of the first part 2 are in engagement with the corresponding depressions or recess of the second part 4, that the door 20 (or the hinge 1) is in its zero position. Moreover, due to the weight of the door or door leaf 20 it cannot swing out of position when the bulges are engaged with the depressions without exerting a considerable amount of force on it. Stated differently, the door cannot swing by itself or by subjecting it to minor torque. Thus, when the lifting hinge 1 is in its configurational mode, the zero position can be set to be when the door 20 is in its "closed" position.

[0035] Further, the first and the second engagement surfaces 6, 8 are shown in Fig. 2 and Fig. 3 respectively. Here, the engagement surfaces 6, 8 are in the form of crown gears. Stated differently, the first engagement surface 6 has a plurality of protrusions/recesses which are configured to engage the corresponding and matching recesses/protrusions of the second engagement surface 8, when the lifting hinge 1 is in the operational mode. The resolution (i.e. number of angular positions in which the zero position may be set) may accordingly be effectively controlled by controlling the number of cogs or teeth in the crown gears.

[0036] Further, Fig. 4A - 4E show a series of perspective views with a partial cutout of the lifting hinge in order to elucidate a method for configuring a zero position for a shower door mounted to a lifting hinge 1 in a shower door assembly. In Fig. 4A the lifting hinge is in an operational position where the zero position is when the door 20 is in a partly open position as indicated by line 201. Figs. 4B - 4E will serve to show a reconfiguration of the zero position to the closed state, i.e. the position in which the door aligns with line 202. Thus, in order to reconfigure the shower door assembly, an adjustment tool 10 is to be brought into engagement with an engaging portion 9 of the second part 4 to apply a vertical lifting force to the second part 4 and thereby disengage it from the locking part 7, as shown in Fig. 4B. In other words, the method includes a step of applying a vertical lifting force onto the second part so that the second part 4 disengages from the second engagement surface 8.

[0037] Further, in Fig. 4B the lifting hinge 1 has been set in the configurational mode by means of an axial displacement of the second part 4 along the rotational axis 101, as indicated by the double headed arrow 41. This displacement translates into a corresponding "lift" of the door as indicated by double headed arrow 41'. The adjustment tool 10 is provided with an adjustment surface 11 onto which the engaging portion 9 abuts against in the configurational mode. The adjustment surface 11 is adapted to have a lower frictional coefficient against the engaging portion 9 than a frictional coefficient between the cam surface 3 and the cam follower 5. This may be necessary to avoid any relative rotation between the first part 2 and the second part 4 during configuration of the zero position.

[0038] In Fig. 4C the door 20 has been moved to the desired position while the lifting hinge 1 is kept in the configurational mode. The first part 2 and the second part 4 are correspondingly rotated about the rotational axis 101. Thus, the method further includes moving the door 20 to

a desired zero position.

[0039] Moving on, in Fig. 4D the lifting hinge 1 has been returned to its operational mode by the removal of the adjustment tool 10. The zero position is now set such that the door is in its closed position as indicated by line 202. Accordingly, the method further includes removing the vertical lifting force and allowing the first engagement surface 6 to engage the second engagement surface 8 such that the second part 4 is rotationally locked to said locking part 7. Accordingly, opening the door 20, as shown in Fig. 4E, will lift the door 20 off the floor surface as indicated by the double headed arrow 42 by means of the relative rotation of the cam surface of the first part 2 and the cam follower of the second part 4.

[0040] Fig. 5 is a cross-sectional view of a pair of lifting hinges 1, 1' in e.g. a shower door assembly arranged in a configurational mode (leftmost illustration) and in an operational mode (rightmost illustration). The basic principles of the functions and components of the lifting hinges 1, 1' have already been discussed in detail with reference to the previous drawings, and will for the sake of brevity not be repeated.

[0041] The two lifting hinges 1, 1' are mounted to a support structure (not shown) and arranged at spatially separate positions along the rotational axis 101. In other words, one of the lifting hinges can be considered to represent an upper lifting hinge 1' and the other one can be considered to represent a lower lifting hinge 1. The lifting hinges 1, 1' are mirrored with respect to a horizontal plane (imaginary) extending between the two lifting hinges 1, 1' so that the whole assembly can be installed with either side up. As illustrated in the leftmost assembly, the required displacement distance 51 to set the lower lifting hinge 1 in the configurational mode, is less than a distance 52 between the first and second engagement surfaces 6', 8' of the upper lifting hinge when the lower lifting hinge 1 is in the operational mode (rightmost assembly). Stated differently, the upper lifting hinge 1' is arranged such that the displacement 51 of the second part 4 in the lower lifting hinge 1 in order to set the lower lifting hinge 1 in the configurational mode, does not push the first and second engagement surfaces 6', 8' into mutual engagement of the upper lifting hinge 1. If this tolerance distance 52 of the upper hinge 1' would be less than the required displacement distance 51, the second part 4' of the upper hinge 1' would lock against the locking part 7' of the upper hinge and accordingly activate the "lifting function" of the upper hinge, which would prevent the configuration of the lower hinge 1. The lifting function of the lower hinge 1 is the primary lifting function in the mounted door assembly, in general the upper hinge will work as a regular hinge during operation. However, both hinges 1, 1' are provided with the lifting function to improve the versatility of the assembly and to not limit the installation to a specific configuration but instead allow the assembly to be installed with either hinge up or down.

[0042] The invention has now been described with reference to specific embodiments. However, several variations of the inner components are feasible. For example, the engagement surface of the second part may be arranged on an enveloping surface of its cylindrical body, and the locking part may be arranged as a locking ring configured to engage the engagement surface of the second part. Further, the lifting hinge and its inner components

may be made out of a plurality of suitable materials such as e.g. polymers, metals, ceramics, etc. or any mix thereof, as known in the art. Such and other obvious modifications must be considered to be within the scope of the present invention, as it is defined by the appended claims. It should be noted that the above-mentioned embodiments illustrate rather than limit the invention, and that those skilled in the art will be able to design many alternative embodiments without departing from the scope of the appended claims. In the claims, any reference signs placed between parentheses shall not be construed as limiting to the claim. The word "comprising" does not exclude the presence of other elements or steps than those listed in the claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE202014003095 **[0008]**
- JP2000080853B **[0008]**

P A T E N T K R A V

1. Løftehængsel (1) til drejelig fastgørelse af et dørblad (20) til en bærende konstruktion (30), hvilket løftehængsel omfatter:

en første del (2) med en kamflade (3), hvilken første del kan forbindes mekanisk til dørbladet, således at en bevægelse af dørbladet resulterer i en bevægelse af den første del, når dørbladet er forbundet til løftehængslet;

en anden del (4) med en kamfølger (5), hvilken anden del er anbragt således, at kamfølgeren vender mod kamfladen langs en rotationsakse (101), hvor den anden del yderligere har en første indgrebsflade (6);

en låsedel (7) med en anden indgrebsflade (8), der vender mod den første indgrebsflade, hvilken låsedel er roterbart fastgjort omkring rotationsaksen (101);

hvor den anden del (4) er aksialt forskydelig langs rotationsaksen således at løftehængslet er anbringeligt i:

en driftstilstand, hvor den første indgrebsflade (6) er i indgreb med den anden indgrebsflade (8) og den anden del (4) er roterbart fastgjort omkring rotationsaksen (101), således at en rotation af den første del (2) omkring rotationsaksen resulterer i en aksial bevægelse af den første del langs rotationsaksen ved hjælp af en relativ rotation af kamfladen og kamfølgeren,

yderligere er løftehængslet yderligere anbringeligt i en konfigurationstilstand i hvilken den første indgrebsflade (6) er frigjort fra den anden indgrebsflade (8), således at en rotation af den første del (2) omkring rotationsaksen (101) resulterer i en rotation af den anden del (4) omkring rotationsaksen for at indstille en nulposition for løftehængselet, k e n d e t e g n e t ved,

at den anden del (4) yderligere omfatter et indgrebsafsnit (9), som er udvendigt tilgængelig for aksialt at forskyde (40) den anden del og frigøre den første indgrebsflade (6) fra den anden indgrebsflade (8).

2. Løftehængsel (1) ifølge krav 1, hvor den første indgrebsflade (6) omfatter mindst ét fremspring og/eller mindst én udsparing, og hvor den anden indgrebsflade (8) omfatter mindst én matchende udsparing og/eller mindst ét matchende fremspring, således at det mindst ene fremspring er anbragt i den mindst ene matchende udsparing og/eller det mindst ene matchende fremspring er anbragt i den mindst ene udsparing, når den anden del er i driftstilstanden.

3. Løftehængslet (1) ifølge et hvilket som helst af de foregående krav, hvor låsedelen (7) er anbragt under den anden del (4) langs rotationsaksen (101), således at løftehængslet er i driftstilstanden, når der ikke påføres nogen ekstern forskydningskraft på den anden del.

4. Løftehængslet (1) ifølge et hvilket som helst af de foregående krav, hvor konfigurationstilstanden og driftstilstanden svarer til to forskellige rumlige positioner af den anden del (4) langs rotationsakse (101).

5. Løftehængslet (1) ifølge et hvilket som helst af de foregående krav, hvor den første del (2) er arrangeret således, at den forskydes simultant langs rotationsaksen (101), når den anden del (4) forskydes langs rotationsaksen.

6. Løftehængslet (1) ifølge et hvilket som helst af de foregående krav, hvor den første indgrebsflade (6) og den anden indgrebsflade (8) er i form af kronhjul.

7. Brusedørsaggregat omfattende:

en brusedør;

en bærende konstruktion; og

to løftehængsler (1) ifølge et hvilket som helst af de foregående krav, hvor løftehængslerne kan monteres på den bærende konstruktion og er indrettede til drejeligt at forbinde brusedøren til den bærende konstruktion.

8. Brusedørsaggregat ifølge krav 7, hvor de to løftehængsler (1), når de er monterede på den bærende konstruktion, er anbragt ved rumligt adskilte positioner langs rotationsaksen (101) og spejlet i forhold til et vandret plan, der udstrækker sig mellem de to løftehængsler (1), og hvor de to løftehængsler (1) er konfigureret således, at en påkrævet forskydningsafstand (51) for at indstille et nedre løftehængsel i konfigurationstilstanden er mindre end en afstand (52) mellem den første indgrebsflade (6) og den anden indgrebsflade (8) af et øvre løftehængsel, når det nedre løftehængsel er i driftstilstand.

9. Brusedørsaggregat ifølge krav 7 eller 8, hvor de to løftehængsler, når de er monteret på den bærende konstruktion, er anbragt ved rumligt adskilte positioner langs rotationsaksen, og hvor den anden del (4) af et nedre løftehængsel yderligere omfatter et indgrebsafsnit (9), som er udvendigt tilgængelig for aksialt at forskyde (40) den anden del og frigøre den første indgrebsflade (6) fra den anden indgrebsflade (8), hvilket brusedørsaggregat yderligere omfatter:

et justeringsværktøj (10), som er konfigureret til at gå i indgreb med indgrebsafsnittet af det nedre løftehængsel, for aksialt at forskyde den anden del (4) langs rotationsaksen (101) og derved indstille den anden del i konfigurationstilstanden;

hvor justeringsværktøjet omfatter en justeringsflade (11), som indgrebsafsnittet ligger an mod i konfigurationstilstanden, hvor justeringsfladen er indrettet til at have en lavere friktionskoefficient mod indgrebsafsnittet (9) end en friktionskoefficient mellem kamfladen (3) og kamfølgeren (5).

10. Fremgangsmåde til at konfigurere en nulposition for en brusedør monteret på et løftehængsel (1) i et brusedørsaggregat ifølge et hvilket som helst af krav 7-9, hvilken fremgangsmåde er k e n d e t e g n e t ved:

at påføre en lodret løftekraft på den anden del (4), så den første indgrebsflade (6) frigøres fra den anden indgrebsflade (8);

at flytte brusedøren til en ønsket nulstilling; og

at fjerne den lodrette løftekraft og tillade den første indgrebsflade (6) at gå i indgreb med den anden indgrebsflade (8), således at den anden del (4) er roterbart fastlåst til låsedelen (7).

DRAWINGS

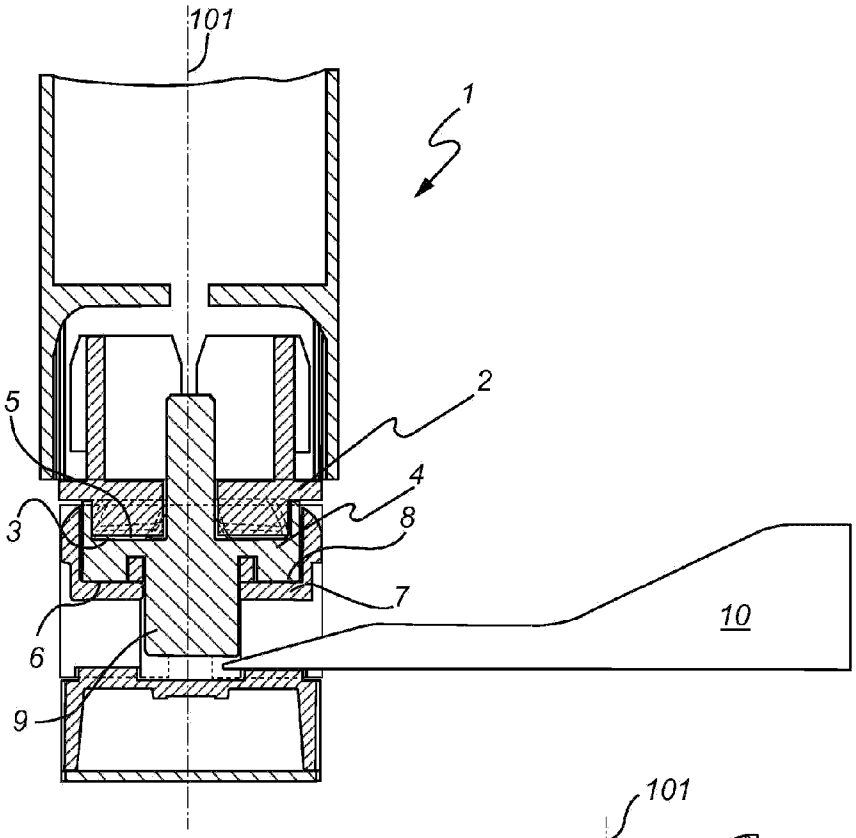


Fig. 1A

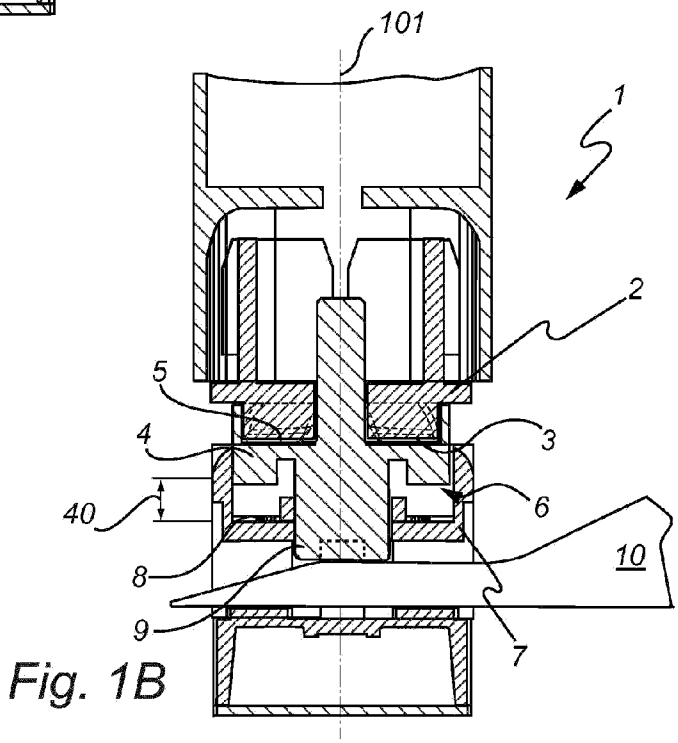


Fig. 1B

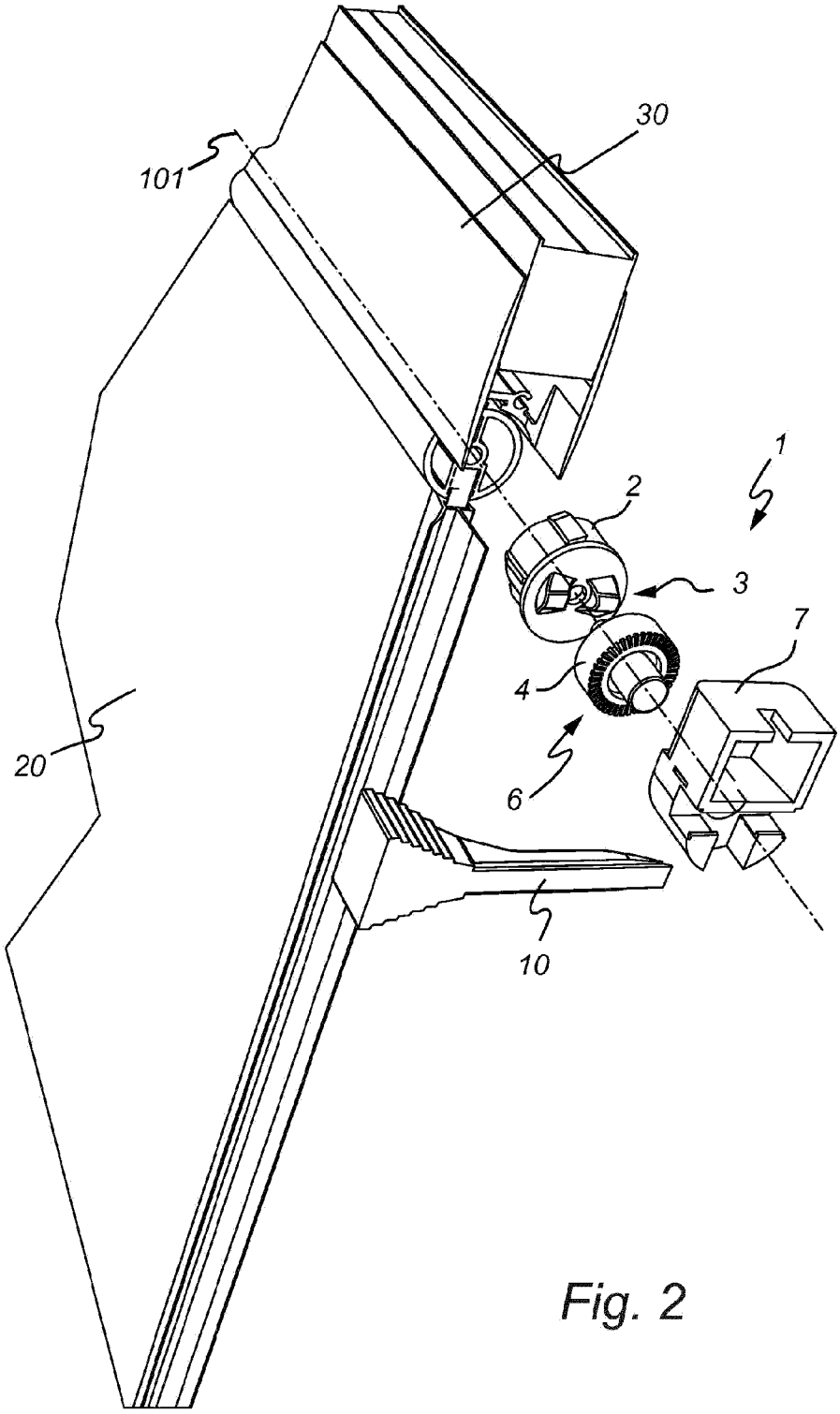


Fig. 2

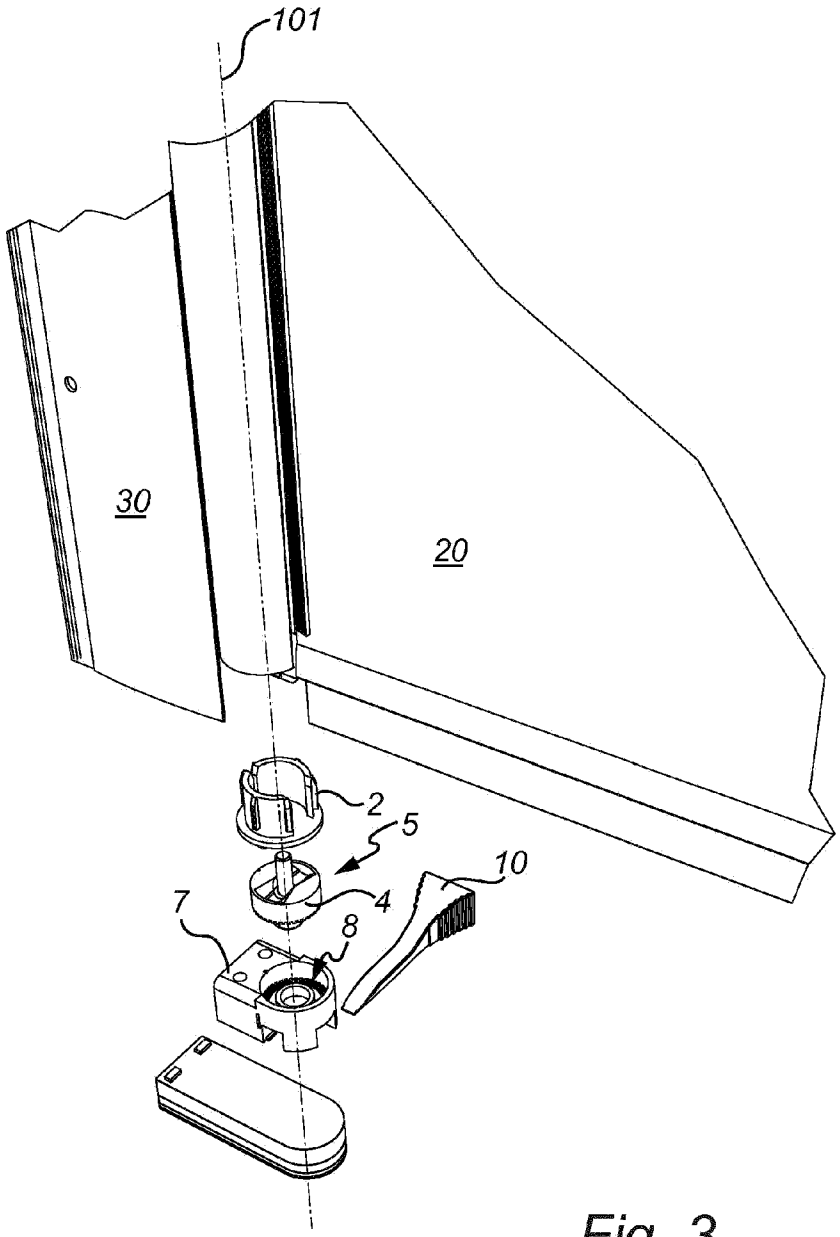


Fig. 3

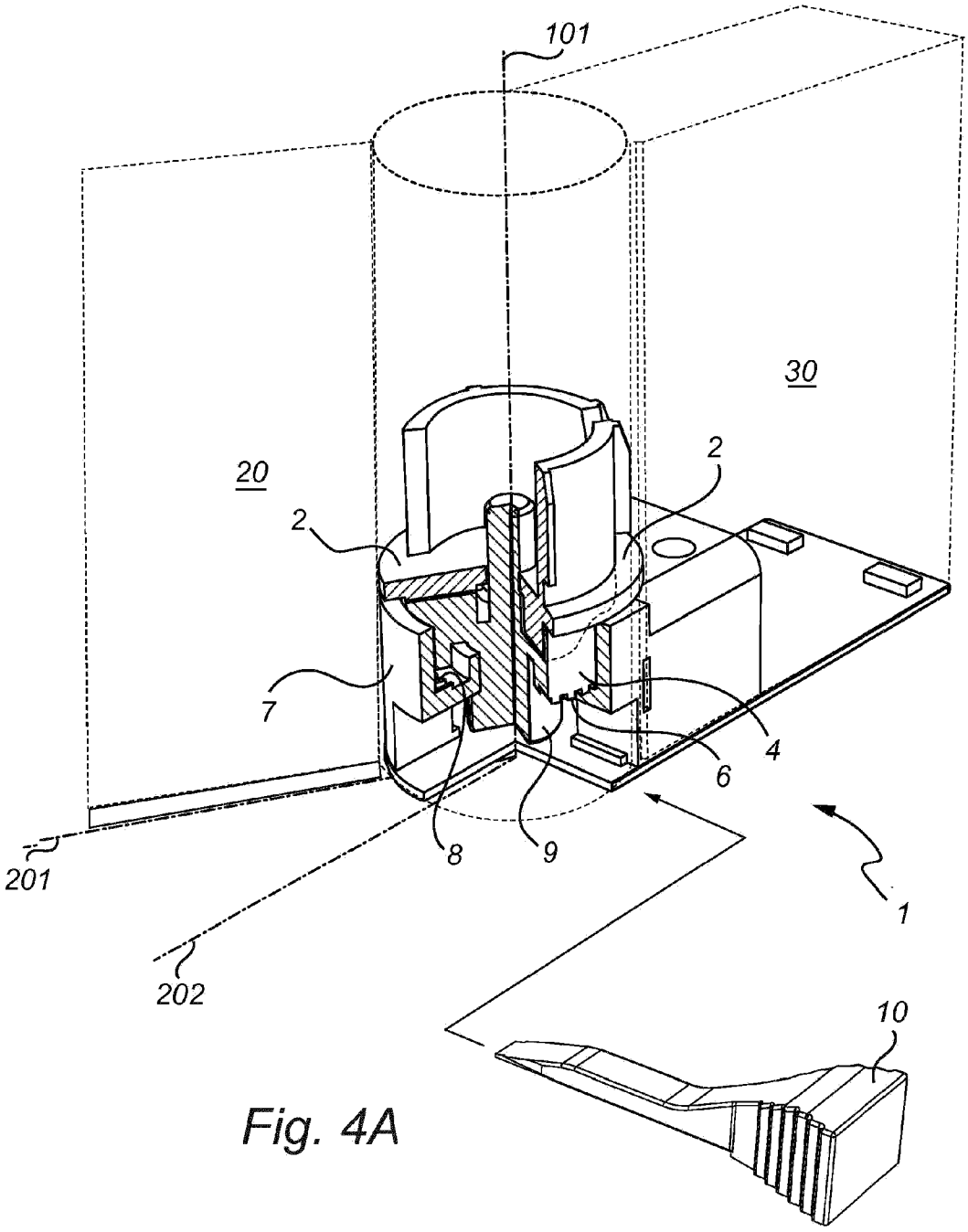


Fig. 4A

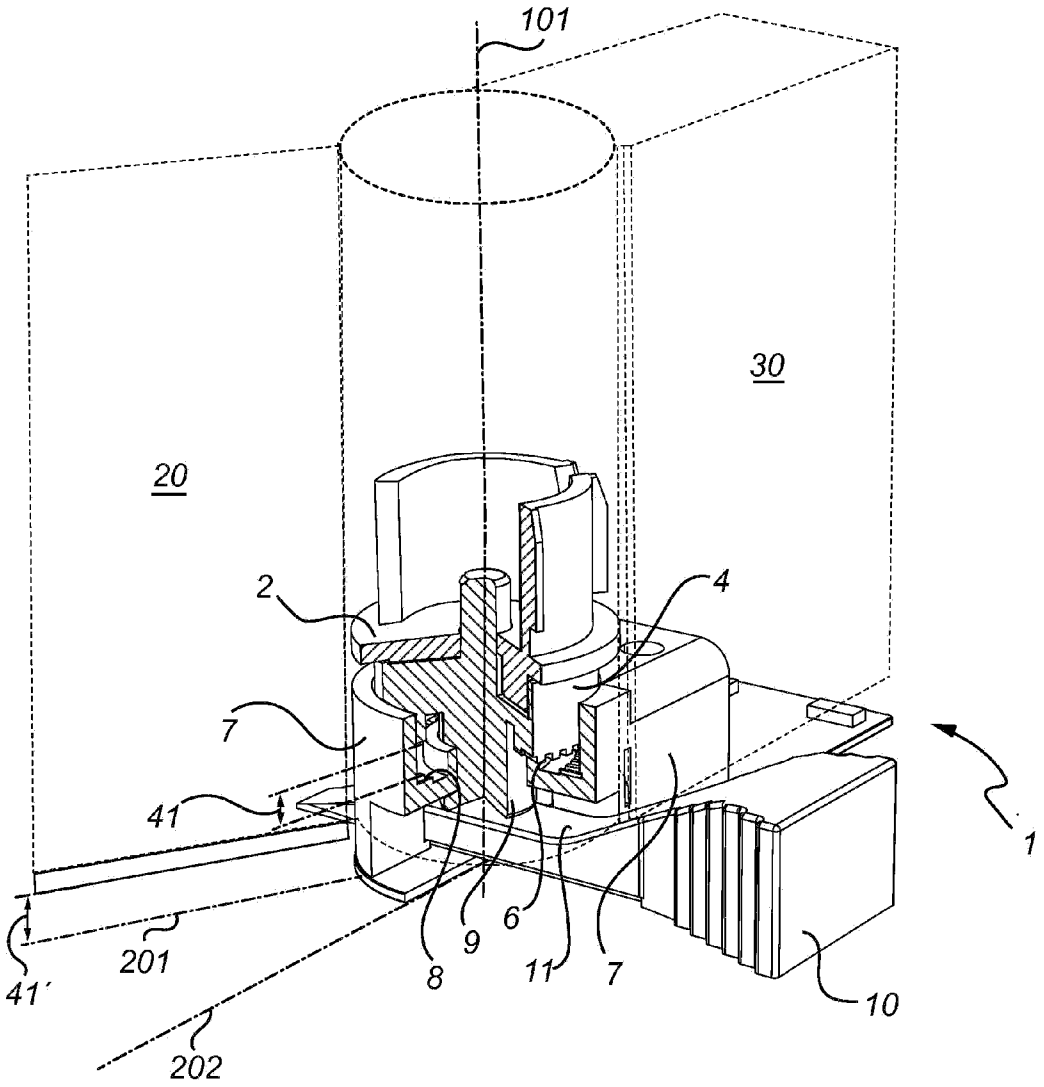


Fig. 4B

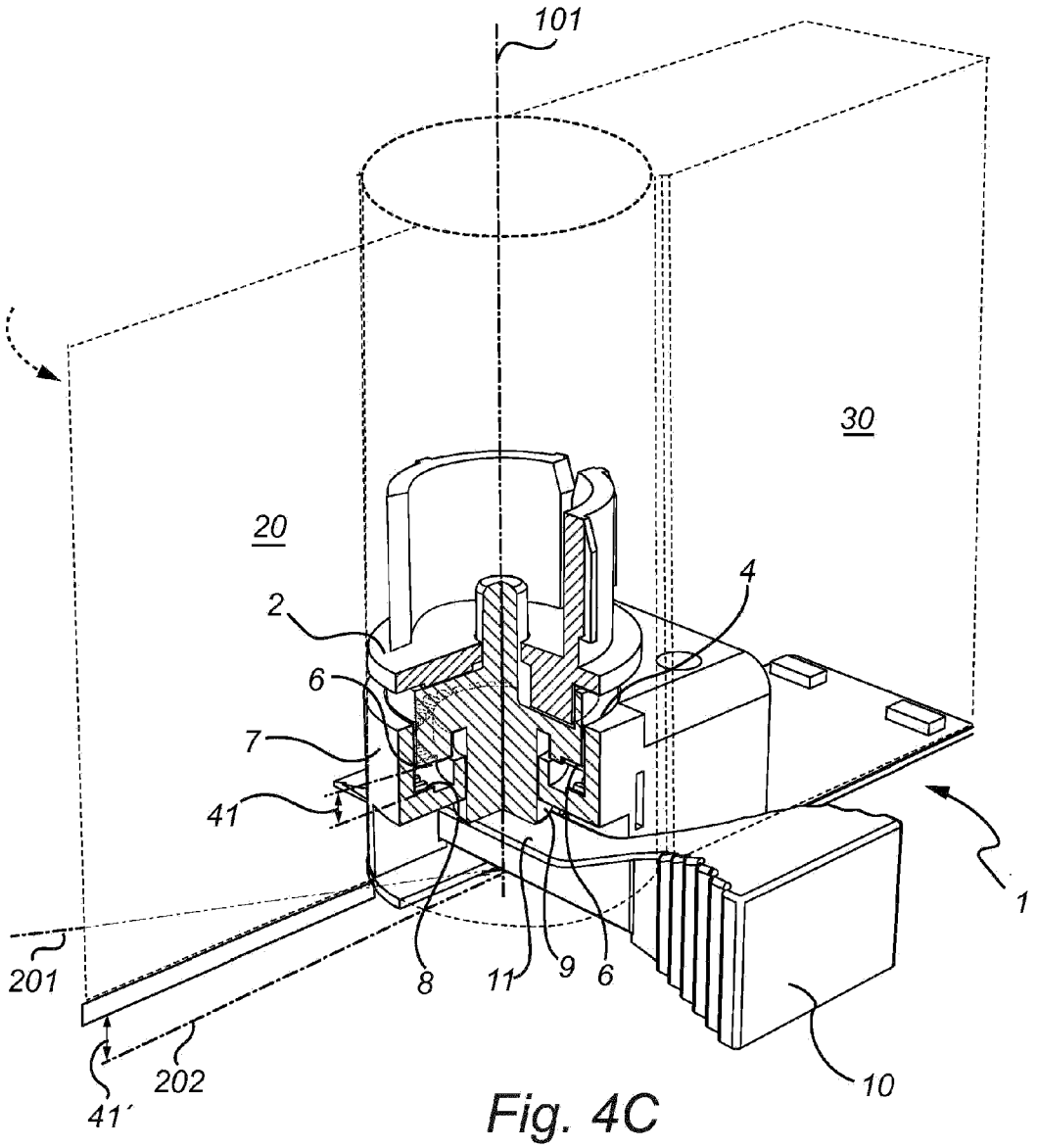


Fig. 4C

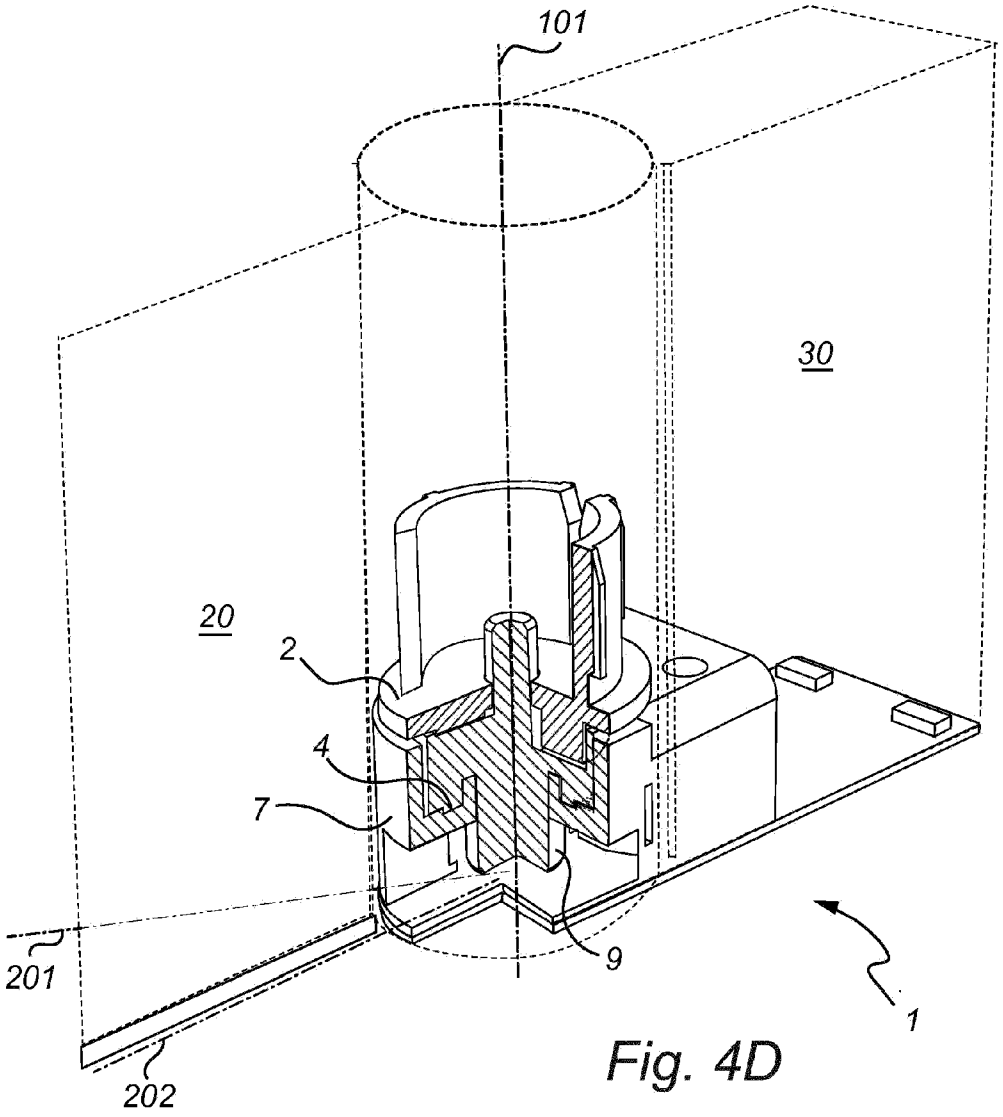


Fig. 4D

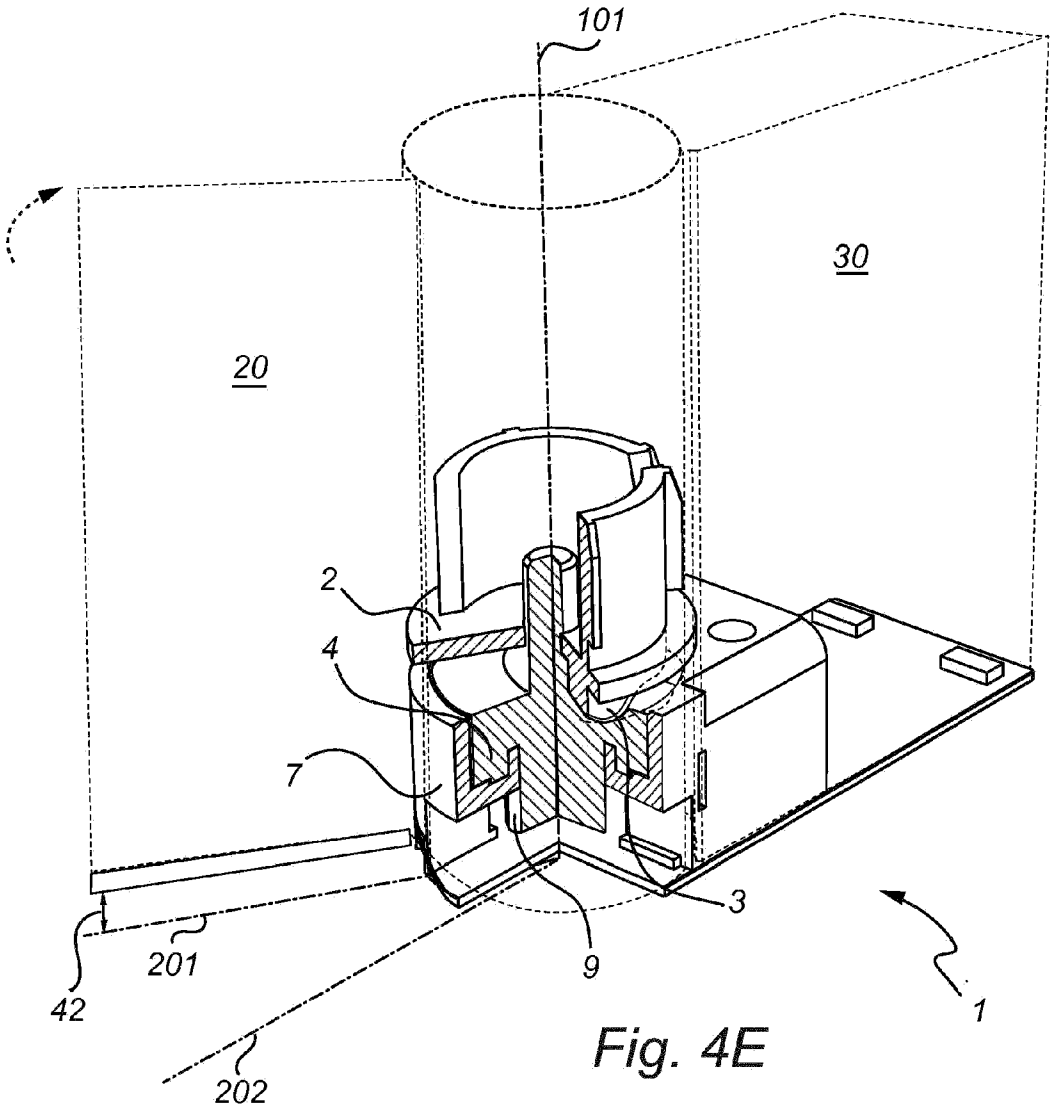


Fig. 4E

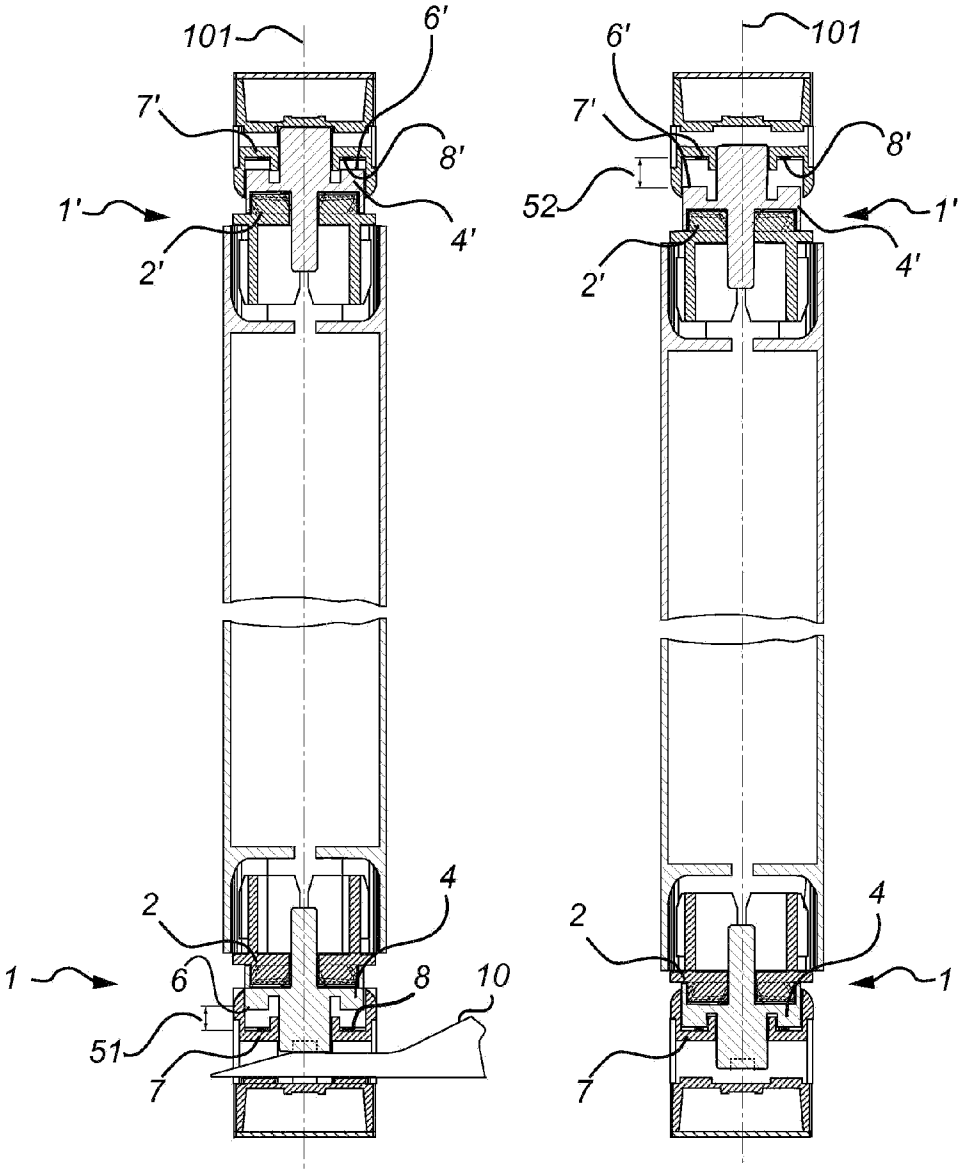


Fig. 5