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(54) **LOAD LIGHTENING DEVICE FOR DOORS OR WINDOWS**

(57) Described is a load lightening device for doors or windows comprising: a bracket (4) associated with a fixed frame (1); a containment body (5) associated with a movable frame (2); a unit (6) for transferring the load constrained, at a first end, to the bracket (4) and housed, with the second end, in the containment body (5); an elastic element (7) housed inside the containment body (5) associated with the movable frame (2) and held between a first end of the containment body (5) and the second end of the transfer unit (6) of the load housed in the containment body (5); the load transfer unit (6) has a contact element (8) associated with the second end of the transfer unit (6) housed in the containment body (5) and configured for retaining an end of the elastic element (7) and means (9) for adjusting the tensioning of the load transfer unit (6) positioned between the bracket (4) and the first end of the transfer unit (6) and configured, in use, for modifying the position of the contact element (8) inside the containment body (5), in both directions, in such a way as to compress or decompress the elastic element (7) along the containment body (5) in such a way as to modify the load of the device (100).

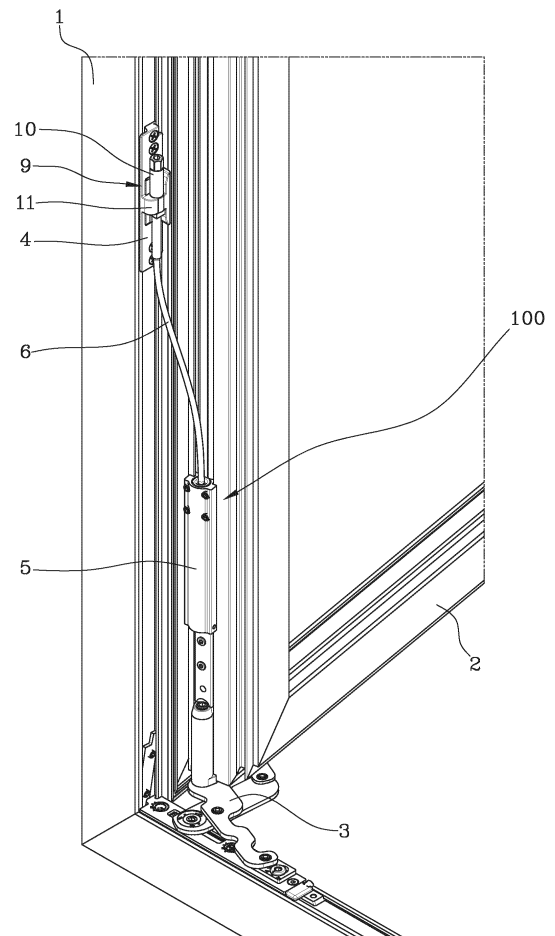


Fig.1

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Description

[0001] This invention relates to a device for lightening the load for doors or windows.

[0002] The device according to the invention is applicable on doors or windows comprising a fixed frame and a movable frame or sash formed with components made of metal, PVC or PVC-wood, having a profile with at least one perimeter channel for fastening the operating and opening/closing accessories of the door or window including at least one lower hinge and an upper hinge which connect, on a relative side, the fixed frame and the movable frame.

[0003] These two hinges allow the mobile frame to rotate about a vertical axis for the traditional "sash" opening, or to incline relative to the vertical axis for a "transom-type" opening.

[0004] Some hinge models for this type of door or window are of the so-called "concealed" type, that is to say, they are hinges which, with the door or window mounted, are not visible on the front of the closed door or window, whilst they are partly visible (the portion of structure fixed to the fixed frame) with the door or window open.

[0005] The hinge applied beneath the door or window basically comprises a first fixed body associated with the fixed frame close to a corner joint and a second movable body connected to the sash and, in particular, in the lower corner zone.

[0006] The lower hinge must therefore support, in a cantilever fashion, a large part of the weight of the movable frame, in particular when the frame is open in the form of a sash.

[0007] This hinge structure may have some mechanical sealing problems if the door or window has, for particular applications, heavy weights both due to their dimensions and the presence of complex glazing.

[0008] Devices are used for this type of situation for lightening or unloading the weight of the sash on the hinge.

[0009] A known unloading device comprises:

- a bracket associated with the fixed frame;
- a containment body associated with the mobile frame or sash;
- a unit for transferring the load constrained, at a first end, to the bracket and housed, with the second end, in the containment body;
- a spring element housed inside the containment body and held between an end of the body and the second end of the load transfer unit.

[0010] The spring element is preloaded before assembly with a predetermined force (compression applied inside the containment body between the fixed end of the containment body and the second end of the load transfer unit) to define a preload suitable for the weight of the mobile frame or sash: in this way, the device, that is,

the load transfer unit, absorbs a part of the vertical load component of the mobile frame or sash removing it, in effect, from the components of the lower hinge.

[0011] However, this device has several drawbacks.

[0012] As already mentioned, the spring element is preloaded inside the body which will be associated with the movable frame or sash as a function of the planned weight of the sash, but once the device is applied to the door or window any load differences present and not provided for cannot be compensated by a different load of the spring and consequently by the load transfer unit.

[0013] Moreover, the spring element may, over time and during use, modify its response to the load, for example due to wear.

[0014] This different response of the spring could increase the load on the components of the hinge with the risk of breakage of the hinge if rapid maintenance (with removal of the device) or a change of the device is not performed.

[0015] The aim of the invention is to provide a load lightening device for doors and windows which overcomes the above-mentioned drawbacks of the prior art.

[0016] More specifically, the aim of this invention is to provide a device for lightening the load for doors or windows which can modify the relative load response as a function of the type of door or window or the wear both of the hinge and of the operating parts of the device.

[0017] A further aim of this invention is to propose a device for lightening the load for doors or windows which can adjust the response of the load of the door or window in a simple and fast manner and without assembly or dismantling of the device itself.

[0018] Said aims are fully achieved by a load lightening device for doors and windows according to the invention as characterised in the appended claims.

[0019] The main features of the invention will become more apparent from the following detailed description of a preferred, non-limiting embodiment, illustrated purely by way of example in the accompanying drawings, in which:

- Figure 1 shows a perspective view of a part of a window on which the load lightening device according to this invention is applied;
- Figure 2 shows a perspective view of the load lightening device of Figure 1;
- Figure 3 shows an exploded perspective view of the load lightening device;
- Figure 4 shows a side view, partly in cross section and with some parts cut away in order to better illustrate others, of the load lightening device.

[0020] With reference to the accompanying drawings, in particular Figure 1, the device for lightening the load according to the invention, labelled 100 in its entirety, is used on doors or windows.

[0021] More specifically, the device 100 is used on doors or windows having a fixed frame 1 and a movable frame 2 which can be opened at least by turning or tilting

and connected together through a lower hinge 3 and an upper hinge (not illustrated).

[0022] As illustrated, the device 100 for lightening the load comprises a bracket 4 associated with the fixed frame 1 (in particular on an upright of the fixed frame 1).

[0023] Again as illustrated, the device 100 comprises a containment body 5 associated with the movable frame 2 (in particular on an upright of the movable frame 2 and close to the lower hinge 3).

[0024] The device 100 also comprises a unit 6 for transferring the load constrained, at a first end, to the bracket 4 and housed, with the second end, in the containment body 5.

[0025] Moreover, the device 100 comprises an elastic element 7 housed inside the containment body 5 associated with the movable frame 2 and held between a first end of the containment body 5 and the second end of the load transfer unit 6 housed in the containment body 5.

[0026] As also illustrated in Figures 2 to 4, the load lightening device 100 also comprises a contact element 8 associated with the second end of the load transfer unit 6 housed in the containment body 5 and designed for retaining an end of the elastic element 7.

[0027] The device 100 also comprises means 9 for adjusting the tensioning of the load transfer unit 6 positioned between the bracket 4 and the first end of the load transfer unit 6 and configured, in use, for modifying the position of the contact element 8 inside the containment body 5, in both directions, in such a way as to compress or decompress the elastic element 7 along the containment body 5 in such a way as to modify the load of the device 100. In other words, once positioned and mounted, the load lightening device can be adjusted with the preloading of the elastic element directly through a simple operation on the part of the external load transfer unit and positioned on the fixed frame without further operations on the containment body or on the elastic element contained in the containment body.

[0028] It should be noted that the load transfer unit 6 comprises a flexible cable (for example, made of metal).

[0029] This solution allows the maximum flexibility of adjustment of the device. As illustrated in Figures 3 and 4, the contact element 8 comprises a (circular) plate associated with the second end of the load transfer unit 6. The plate is positioned in contact with the relative end of the elastic element 7 in such a way as to allow a thrust action or a release on/of the elastic element 7 corresponding to a relative greater or lesser compression inside the containment body 5 under the action of the adjustment means 9.

[0030] In light of this, the adjustment means 9 comprise a threaded adjustment screw 10 which can be screwed on a threaded portion 6a of the first end of the load transfer unit 6 positioned on the bracket 4.

[0031] It should be noted that the bracket 4 is provided with a reference bushing 11 having a through seat 12 which can be engaged at least by the threaded portion 6a of the first end of the load transfer unit 6.

[0032] In light of this, on a first face of the reference bushing 11 from which at least the threaded portion 6a of the first end of the load transfer unit 6 protrudes, in use, is positioned the adjustment screw 10 coupled to the threaded portion 6a of the load transfer unit 6 in such a way as to allow a pulling or releasing action on/of the transfer unit 6 by the contact on the first face of the bushing 11.

[0033] The device 100 also comprises a contact nut 13 constrained on the first end of the load transfer unit 6 and positioned, in use, in contact with a second face of the bushing 11 opposite the first face of the bushing 11 and configured to prevent a rotation of the load transfer unit 6 during the movement of the adjustment screw 10 on the threaded portion 6a of the first end of the load transfer unit 6.

[0034] It should be noted that the contact nut 13 is fitted on the flexible cable defining the load transfer unit 6 and separates the threaded portion 6a of the cable from the remaining cable.

[0035] More in detail, the containment body 5 (tubular in shape) has a semi-cylindrical cross-section for housing, in a non-limiting example illustrated of the solution, a helical spring defining the elastic element 7.

[0036] The elastic element 7 may alternatively consist of a cup-shaped spring or an elastically compliant cylindrical body (not illustrated).

[0037] In the embodiment illustrated, The containment body 5 also comprises a centring bushing 14 fixable on the relative first end in such a way as to retain the end of the elastic element 7 (the spring) and allow the free passage of the load transfer unit 6 from the inside to the outside of the containment body 5.

[0038] In an alternative embodiment, the containment body 5 is without the bushing 14 as the containment body 5 itself is shaped as if the bushing 14 were integrated into it.

[0039] Moreover, associated transversally with the containment body 5 there is a reference pin 15 on the second end of the containment body 5 and forming a limit stop or minimum load contact element for the second end of the load transfer unit 6, that is, of the plate.

[0040] The containment body 5 is associated with the movable frame 2 close to the lower hinge 3. This allows a direct lightening of the weight of the movable frame 2 immediately close to the lower hinge 3 which is the one most subjected to the load during opening of the door or window.

[0041] Thanks to a device for lightening the load structured in this way the preset aims are achieved.

[0042] The possibility of modifying the preloading of the spring through an adjustment positioned on the fixed part of the door or window allows the components to be mounted quickly and then, without the need for tools or reference elements, adjustment of the compression of the spring in a precise and rapid manner as a function of the weight or of the response of the hinge to the opening force.

[0043] Thanks to this device, it is also possible to adjust the load over time and as a function of wear both of the hinge and of the spring without the need to remove the components of the device.

Claims

1. A load lightening device for doors or windows having a fixed frame (1) and a movable frame (2) which can be opened at least by a sash and connected to each other through a lower hinge (3) and an upper hinge; the device (100) comprising at least:

- a bracket (4) associated with the fixed frame (1);
- a containment body (5) associated with the movable frame (2);
- a unit (6) for transferring the load constrained, at a first end, to the bracket (4) and housed, with the second end, in the containment body (5);
- an elastic element (7) housed inside the containment body (5) associated with the movable frame (2) and held between a first end of the containment body (5) and the second end of the transfer unit (6) of the load housed in the containment body (5); the suspension being
- a contact element (8) associated with the second end of the transfer unit (6) of the load housed in the containment body (5) and configured for retaining an end of the elastic element (7);
- means (9) for adjusting the tensioning of the load transfer unit (6) positioned between the bracket (4) and the first end of the transfer unit (6) and configured, in use, for modifying the position of the contact element (8) inside the containment body (5), in both directions, in such a way as to compress or decompress the elastic element (7) along the containment body (5) in such a way as to modify the load of the device (100);

the adjustment means (9) comprise a threaded adjustment screw (10) which can be screwed on a threaded portion (6a) of the first end of the transfer unit (6) positioned on the bracket (4);

characterised in that

the bracket (4) is provided with a reference bushing (11) having a through seat (12) which can be engaged at least by the threaded portion (6a) of the first end of the transfer unit (6); on a first face of the reference bushing (11) from which protrudes at least the threaded portion (6a) of the first end of the transfer unit (6) being positioned, in use, the adjustment screw (10) in such a way as to allow a pulling or

releasing action on/of the transfer unit (6) by the contact on the first face of the bushing (11).

2. The device according to claim 1, wherein the contact element (8) comprises a plate associated with the second end of the transfer unit (6) and positioned in contact with the relative end of the elastic element (7) in such a way as to allow a thrust or a release on the elastic element (7) corresponding to a relative greater or lesser compression inside the containment body (5).
3. The device according to claim 1 or 2, comprising a contact nut (13) constrained on the first end of the transfer unit (6) and positioned, in use, in contact with a second face of the bushing (11) opposite the first face of the bushing (11) and configured to prevent a rotation of the transfer unit (6) during the movement of the adjustment screw (10) on the threaded portion (6a) of the first end of the transfer unit (6).
4. The device according to any one of the preceding claims, wherein the containment body (5) has a semi-cylindrical cross-section to house a helical spring or a cup-shaped spring or a body with an elastically compliant cylindrical shape defining the elastic element (7).
5. The device according to any one of the preceding claims, wherein the containment body (5) comprises a centring bushing (14) fixable on the relative first end in such a way as to retain the end of the elastic element (7) and allow the free passage of the transfer unit (6) from the inside to the outside of the containment body (5).
6. The device according to claim 4 or 5, wherein a reference pin (15) is associated, transversely, on the containment body (5) on the second end of the containment body (5) and forming a limit stop or minimum load contact element for the second end of the transfer unit (6).
7. The device according to any one of the preceding claims, wherein the containment body (5) is associated with the movable frame (2) close to the lower hinge (3).
8. The device according to any one of the preceding claims, wherein the transfer unit (6) comprises a flexible cable.

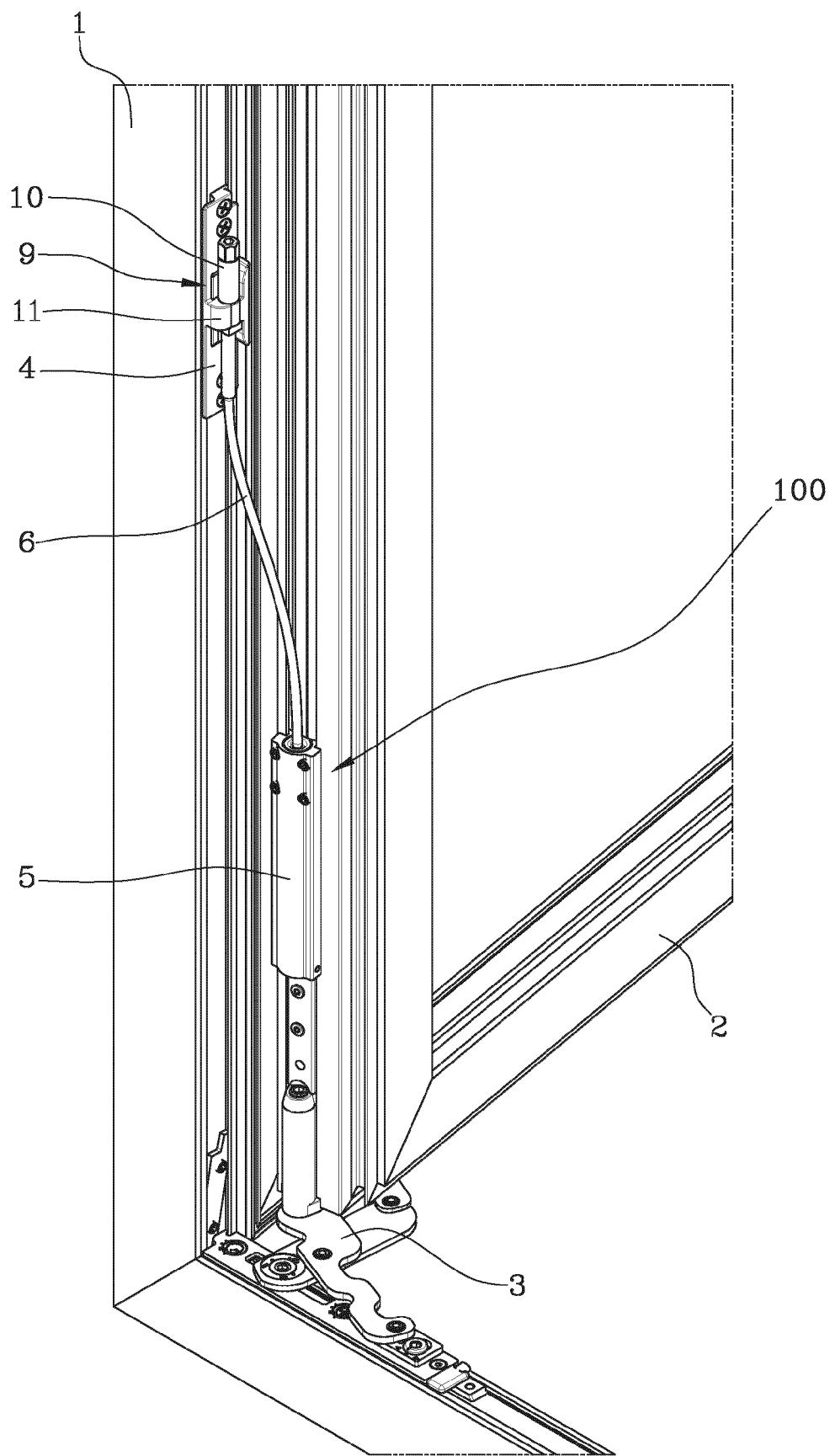


Fig.1

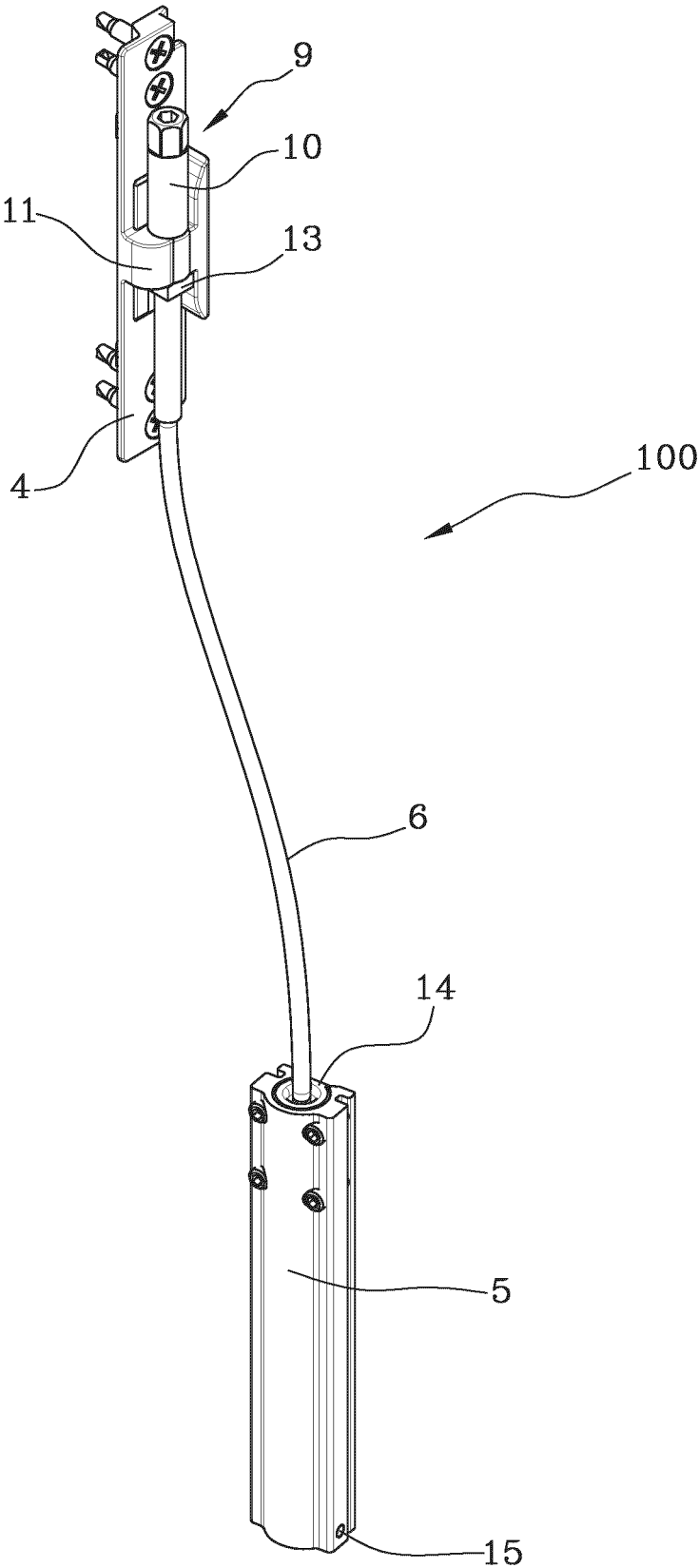


Fig.2

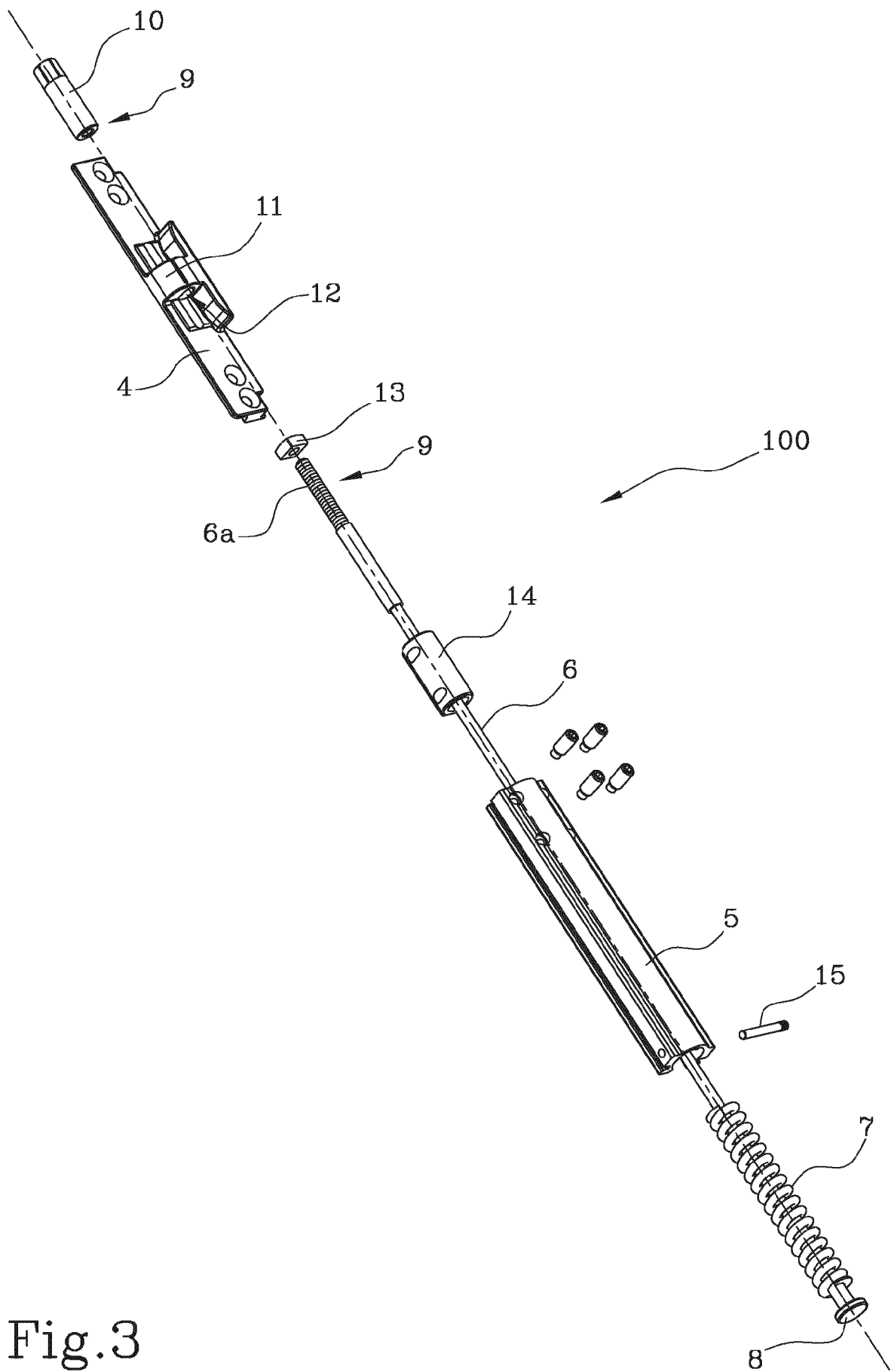


Fig.3

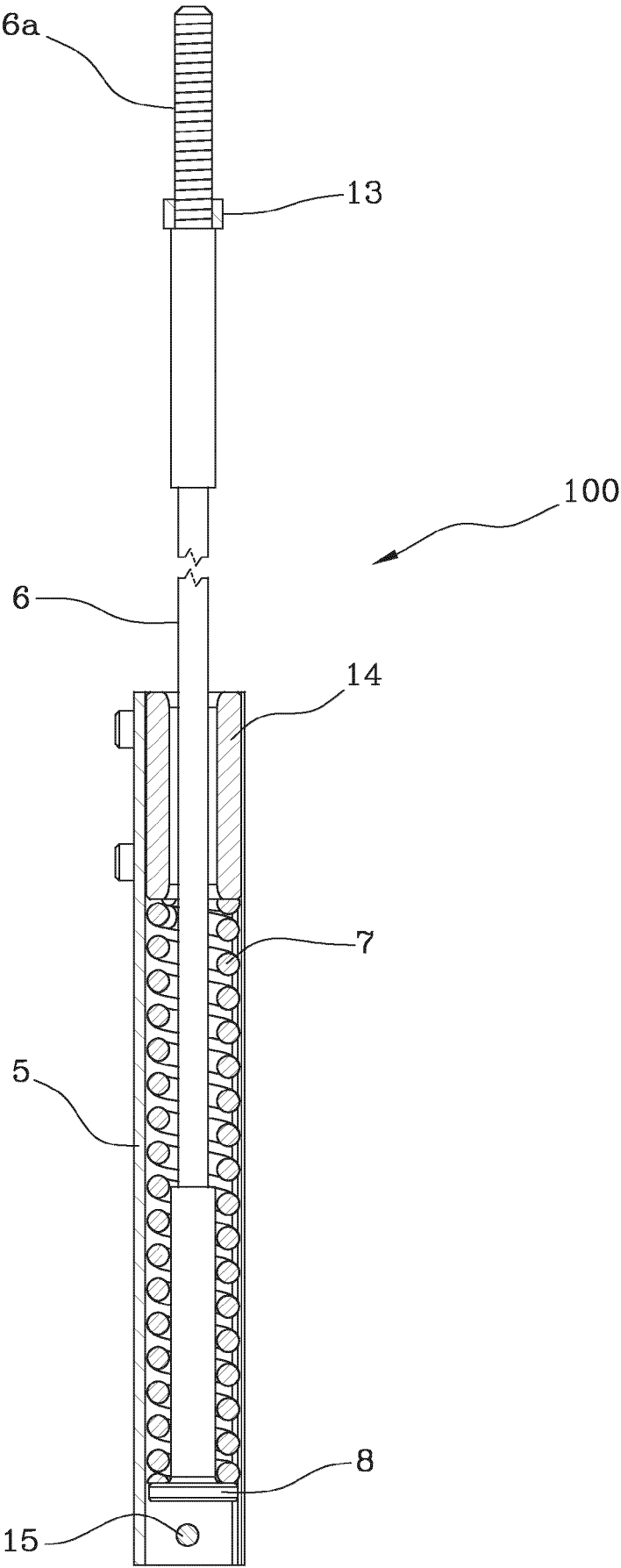


Fig.4



EUROPEAN SEARCH REPORT

Application Number

EP 24 21 4144

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05D E05F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		6 March 2025	Rémondot, Xavier
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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			
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