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

(11) EP 1 703 056 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.09.2006 Bulletin 2006/38

(51) Int Cl.:
E05D 7/00 *(2006.01)*

(21) Application number: **06110839.5**

(22) Date of filing: **08.03.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **15.03.2005 IT BO20050157**

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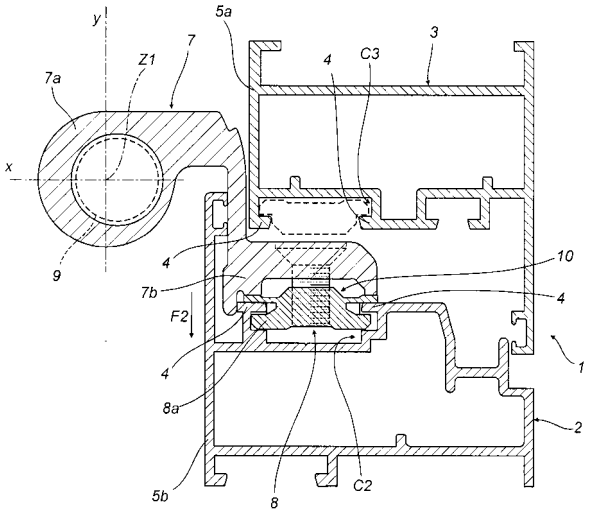
(54) Hinge for doors or windows.

(57) Described is a positioning device for heavy doors or windows with a fixed frame (3) and a sash (2), each having a profile which forms a longitudinal groove (C3, C2) consisting of a pair of opposite "L"-shaped protrusions (4); the fixed frame and the sash (3, 2) are fastened to one another by two hinge units (GCI, GCS), lower and upper. Each hinge unit (GCI, GCS) comprises: a first, lower hinge body (6), having a first cylindrical socket (6a) and a first flap (6b); a second, upper hinge body (7), having a second cylindrical socket (7a) and a second flap (7b); means (8) for fixing the first and second hinge bodies (6, 7) respectively to the fixed frame and the sash (3, 2), comprising a block (8a), housed inside the corresponding groove (C3, C2), and which can be connected to the respective flap (6b, 7b) in such a way as to lock it in place; a hinge pin (9) which can be housed inside the sockets (6a, 7a) and defining a vertical axis of rotation (ZI, Z2) for each hinge unit (GCI, GCS); on the first or the second hinge body (6, 7) of the lower hinge unit (CGI) there being a spacer component (10) inserted between the respective flap (6b, 7b) and the pair of protrusions (4) in such a way that it modifies the position, that is to say, moves the hinge body (6, 7) away from the fixed frame or sash (3, 2), so that in practice it makes the position of the vertical axis of rotation (Z1) of the lower hinge unit (GCI) and the vertical axis of rotation (z2) of the upper hinge unit (GCS) coaxial.

FIG. 4



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Description

[0001] The present invention relates to a positioning device for doors or windows, in particular for heavy, side-hung doors or windows made of metal, PVC or similar materials, PVC - wood, etc.

[0002] The heavy doors or windows referred to are used to make large and very heavy door or window units, having a sash and a fixed frame fastened to one another, on a vertical member, by at least one pair of hinges designed to allow the sash opening and closing movement.

[0003] The doors or windows in question have a conventional profile in which there is an inside groove - on both the sash and the fixed frame - for positioning and fixing a hinge body flap directly inside the sash or the fixed frame.

[0004] This type of door or window is used to separate large indoor areas (for example, shopping centres). Hinges of this type, apart from differences in size, consist basically of components present in hinges used for doors or windows that are smaller and lighter. The components are essentially the following:

- a first male, or lower, hinge body having a socket and a flap for fastening it to the fixed frame;
- a second female, or upper, hinge body having a respective socket and a flap for fastening it to the sash;
- a hinge pin that can be housed inside the two sockets and defining the axis of rotation of the sash.

[0005] In the preferred embodiments, the hinge flaps are fastened to the sash and fixed frame by fixing screws which pass through the flaps and act on a segment (or block) of profile housed in the groove of the sash or fixed frame (usually consisting of a pair of L-shaped protrusions) and pressing against the inside surface of the protrusions, whilst the hinge flap rests on the flat part of the L-shaped protrusions.

[0006] In addition to these basic load-bearing components, there may also be components or means for adjustment of the sash in: a vertical axis (axis of rotation Z); an axis perpendicular to the vertical plane of the fixed frame (axis Y, with adjustment known as "compression" in the jargon of the trade) and an axis parallel with the vertical plane of the door or window (axis X).

[0007] Usually, the adjustment in the axis Z is accomplished by a pushing action on the male hinge body to permit lifting or lowering of the sash together with the male and female hinge body assembly (by means of operating elements located in the groove of the fixed frame and acting on the flap of the respective male hinge body).

[0008] The adjustment in the axes Y and X is usually performed with an offset bush inserted into the socket of the female hinge body and which can be rotated to vary, normally in fixed steps, the position of the sash relative to the fixed frame.

[0009] On each door or window of this type there are usually at least two groups of these hinges, which are made, for obvious reasons of practical construction and warehouse requirements, as symmetrical units, and therefore can be used as either a lower hinge unit or an upper hinge unit on the door or window.

[0010] However, it has been noticed that when assembling said doors or windows, by the effect of gravity the sash forces the fixing structure, between the inside profile of the sash and the hinge units, to be positioned in such a way that it is not perfectly parallel with the fixed frame, moving the vertical axis Z between the upper and lower hinges. In other words (see also Figure 1, in which this behaviour is represented in an enlarged view to better clarify the problem) the weight of the sash 2 causes a movement defined by the sash 2 leaning forwards (see arrow F2) through a slight deformation of the upper hinge unit GCS: therefore, this generates a relative movement of the door or window axis of rotation Z between the upper hinge unit GCS and the lower hinge unit GCI, with the sash 2 further away from the fixed frame 3 at the upper part of the door or window.

[0011] This limits the possibility of making an adjustment, above all as regards the lateral adjustment in the axis Y, to the two hinge units according to the theoretical parameters indicated.

[0012] Therefore, in practice, in order to be able to recover a suitable parallelism between the fixed frame 3 and the sash 2, the upper hinge GCS must be adjusted from a starting point towards the fixed frame (only "negative" adjustment pulling the sash 2 towards the fixed frame 3, see arrow FN), and the lower hinge unit GCI must be adjusted from a starting position so that it moves away from the fixed frame 3 (only "positive" adjustment pushing the fixed frame 2, see arrow FP).

[0013] In other words, this initial deformation drastically halves the theoretical adjustment "range" of the hinge units on the door or window. These adjustments, such as the parallelism between the sash and the fixed frame, are always necessary both for correct door or window operation and to avoid imperfections between the sash and the fixed frame.

[0014] Therefore, for this purpose the Applicant designed and built a positioning device for hinges which can be applied to heavy doors or windows. The device allows a correct axis of rotation to be maintained after assembly of the sash, re-establishing the theoretical adjustment range on the hinges and at the same time avoiding variations in the structure of the conventional hinges used.

[0015] Accordingly, the present invention achieves this aim with a positioning device for heavy doors or windows comprising a fixed frame and a sash, each having a profile which forms a longitudinal groove consisting of a pair of

opposite "L"-shaped protrusions. The fixed frame and the sash are fastened to one another by two hinge units, lower and upper. Each hinge unit comprises: a first, lower hinge body, having a first cylindrical socket and a first flap; a second, upper hinge body, having a second cylindrical socket and a second flap; means for fixing the first and second hinge bodies respectively to the fixed frame and the sash, comprising a block, housed inside the corresponding groove, and which can be connected to the respective flap in such a way as to secure it; a hinge pin that can be housed in the two sockets and defining a vertical axis of rotation for each hinge unit; on the first or the second hinge body of the lower hinge unit there being a spacer component inserted between the respective flap and the pair of protrusions in such a way that it modifies the position, that is to say, moves the hinge body away from the fixed frame or sash, so that in practice it makes the position of the vertical axis of rotation of the lower hinge unit and the vertical axis of rotation of the upper hinge unit coaxial.

[0016] The technical features of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are more apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate a preferred embodiment of the invention provided merely by way of example without restricting the scope of the inventive concept, and in which:

- Figure 1 is a schematic side view of a heavy door or window equipped with a pair of hinges in accordance with the prior art;
- Figure 2 is a schematic front view of a heavy door or window equipped with the hinge positioning device in accordance with the present invention;
- Figure 3 is a front view, with some parts in cross-section in order to better illustrate others, of a lower hinge unit with reference to the door or window in Figure 2;
- Figure 4 is a cross-section IV - IV with reference to Figure 3 with the hinge positioning device in accordance with the present invention;
- Figure 5 is a perspective exploded view, with some parts cut away to better illustrated others, of a male hinge body of the lower hinge unit with reference to Figure 3, equipped with the positioning device in accordance with the present invention.
- Figure 6 is a front view with some parts in cross-section of a fixing block with a spacer component forming the positioning device in accordance with the present invention;
- Figure 7 is a front view with some parts in cross-section of an alternative embodiment of a spacer component forming the positioning device in accordance with the present invention.

[0017] With reference to the accompanying drawings, and in particular with reference to Figures 2 to 4, the positioning device for doors or windows in accordance with the present invention is used for heavy doors or windows 1, that is to say, those used to make large and very heavy door or window units.

[0018] Figures 2 to 4 also show how the door or window 1 has: a fixed frame 3 and a sash 2 whose profiles form respective longitudinal grooves C3 and C2, each formed by a pair of opposite "L"-shaped protrusions 4, for fastening operating accessories. Connected to a relative vertical member 5a and 5b of the fixed frame 3 and the sash 2 there are at least two hinge units, lower GCI and upper GCS, for fastening the fixed frame 3 and sash 2 to one another and for rotation of the sash 2 about a vertical axis Z.

[0019] Each of the two hinge units GCI, GCS comprises at least:

- a first, male or lower hinge body 6, having a first cylindrical socket 6a and a first flap 6b;
- a second, female or upper hinge body 7, having a second cylindrical socket 7a and a second flap 7b;
- means 8 for fixing the first and second hinge bodies 6 and 7 respectively to the fixed frame 3 and the sash 2, comprising at least a block 8a, housed inside the corresponding groove C3 and C2 in the fixed frame 3 and the sash 2. This block 8a can be connected to the respective flap 6b, 7b of each of the first and second hinge bodies 6 and 7 so as to lock them in place, pressing against the inside surfaces of the protrusions 4;
- a hinge pin 9, which can be housed inside the two sockets 6a, 7a, and forming a vertical axis of rotation Z1 and Z2 for each of the hinge units GCI and GCS.

[0020] For reasons relating to the embodiment disclosed, the accompanying drawings only illustrate the lower hinge unit GCI, since the upper hinge unit GCS is structurally similar to it, except for the positioning device disclosed.

[0021] In addition to this, each hinge unit GCI and GCS may be equipped with adjusting means 100, of the known type, to allow variation of the position of the sash 2 relative to the fixed frame 3 in three axes, labelled Z, Y and X.

[0022] The first axis, labelled Z is the above-mentioned vertical axis of rotation, whilst the axis Y is an axis perpendicular to the vertical plane of the fixed frame (with adjustment known as "compression" in the jargon of the trade); and finally, the axis X is an axis parallel with the vertical plane of the door or window (see Figures 2 to 5).

[0023] Usually, the adjustment in the axis Z is accomplished by a pushing action on one of the hinge bodies 6 or 7 to

permit lifting or lowering of the sash (by means of operating elements, not illustrated, located in the groove of the fixed frame 3 or sash 2 and acting on the flap 6b or 7b of the respective hinge body 6 or 7).

[0024] The adjustment in the axes Y and X is usually performed with an offset bush 100 (see Figure 3) inserted in the socket 7a of the female hinge body 7, and which can be rotated for a combined and fixed step variation in the position of the sash 2 relative to the fixed frame 3 in these two axes X and Y and in both directions, starting from a theoretical starting point given by the vertical axis Z.

[0025] In addition, the lower hinge unit GCI comprises, on at least one of the first and second hinge bodies 6 and 7, a spacer component 10 inserted between the flap 6b or 7b and the pair of protrusions 4. This allows modification, by moving it away, of the position of the hinge body 6, 7 relative to the corresponding fixed frame 3 or sash 2, so that in practice the vertical axis of rotation Z1 of the lower hinge unit GCI and the vertical axis of rotation Z2 of the upper hinge unit GCS are coaxial, that is to say, parallelism between the fixed frame 3 and the sash 2 is restored.

[0026] In other words, the presence of the spacer component 10 can compensate for a previous offset of the vertical axis Z2 of the upper hinge unit GCS, caused by partial deformation of the sash 2 due to its weight, with a movement of the sash 2 in the direction indicated by the arrow F2 in Figure 1, so that the two vertical axes Z1 and Z2 are made coaxial again.

[0027] Figure 4 shows how this spacer component 10 can preferably be inserted between the flap 7b of the second, female hinge body 7 and the pair of protrusions 4 forming the groove C2 in the sash 2.

[0028] In contrast, Figure 5 shows how the spacer component 10 can alternatively be inserted between the flap 6b of the first, male hinge body 6 and the pair of protrusions 4 forming the groove C3 in the fixed frame 3.

[0029] As illustrated in Figures 6 and 7, the spacer component 10 can be made in a single body with the fixing block 8a for the flap 6b or 7b, or, alternatively, the spacer component 10 may be formed by a second block 11 which can be inserted between the protrusions 4 and the flap 6b or 7b and can be connected between the latter and the block 8a.

[0030] As can be clearly seen in Figures 6 and 7, each fixing block consists of a segment 8a of profile that has a central body 8b and two lateral protrusions 8c for fastening inside the respective groove C2, C3.

[0031] On each central body 8b there is a plurality of through-seats 13 in which screw means 14 for fixing to the respective flap 6b, 7b can engage.

[0032] In the embodiment illustrated in Figure 6, the block 8a which can be connected to the first or second hinge body 6 or 7 of the lower hinge unit GCI may comprise an extension 15 of the central body 8b, protruding the groove C2, C3, and having, on either side, a pair of second flaps 16a and 16b, which form a single body with the extension 15 of the central body 8b. These second flaps 16a and 16b are inserted between the pair of protrusions 4 and the respective contact zones of the flap 6b and 7b belonging to the first or second hinge body 6 or 7. In the latter case, illustrated in Figure 7, the second, independent block 11 may comprise a central body 11a from which there extend on either side a pair of second flaps 12a and 12b, forming a single body with the central body 11a, inserted between the pair of protrusions 4 and the respective contact zones of the flap 6b, 7b belonging to the first or second hinge body 6 or 7.

[0033] In both of the above-mentioned embodiments, the extension 15 and the central body 11a have corresponding through-seats 15a and 11b forming an extension of the seats 13 and coaxial with them, for the screw means 14 used to fix the flap 6b or 7b to the fixing block 8a.

[0034] In both embodiments, each second flap 12a, 12b, 16a, 16b in cross-section has a profile divided into two sections T1, T2, joined without interruption, of which the first T1, for connection to the central extension 15 or the central body 11a, is thinner, and the second section T2, for insertion between the contact zone of the flap 6b or 7b and the corresponding protrusion 4, has a thickness S greater than that of the first section T1.

[0035] For example, it may be said that the thickness S of the second section T2 of each second flap 12a, 12b, 16a, 16b may be decided according to the weight of the sash 2. In other words, a predetermined sash 2 weight could cause a deformation of the axis Z3 of the upper hinge unit GCS away from the sash 2 (arrow F2 in Figure 4) by a predetermined quantity which would be compensated by the spacer 10 with a predetermined thickness S equivalent to the movement S1 away from the sash 2 or fixed frame 3, thus restoring parallelism between the sash 2 and fixed frame 3 in the direction of the previous movement away F2. As the weight of the sash 2 increases, with a consequent, theoretical, increase in the angle by which the axis Z3 moves away, a spacer 10 with increased second section T2 thickness can be used, consequently increasing the distance between the hinge body and the sash or fixed frame to compensate for the offset generated. A positioning device made in this way therefore achieves the preset aims, thanks to a simple spacer component designed so that the two hinge bodies can remain coaxial even if the position of the sash is deformed. By keeping the vertical axes coaxial in this way, correct parallelism is maintained between the fixed frame and the sash and, therefore, additional adjustments are possible, above all in the axes Y and X, using the full extent of adjustment of which the adjusting means are capable. Moreover, all of this can be done without having to make excessive changes to the basic structure of the hinges used until now.

[0036] The invention described is suitable for many industrial applications and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A device for positioning doors or windows, in particular for heavy doors or windows (1) having: a fixed frame (3) and a sash (2), each with a profile forming a longitudinal groove (C3, C2), each groove being formed by a pair of opposite "L"-shaped protrusions (4) for connecting operating accessories; there being connected to a vertical member (5a, 5b) of the fixed frame (3) and the sash (2) at least two hinge units (GCI, GCS), lower and upper, for fastening the sash (2) and the fixed frame (3) to one another and for rotation of the sash (2) about a vertical axis (Z); each hinge unit (GCI, GCS) comprising at least:

   - a first, male or lower hinge body (6), having a first cylindrical socket (6a) and a first flap (6b);
   - a second, female or upper hinge body (7), having a second cylindrical socket (7a) and a second flap (7b);
   - means (8) for fixing the first and second hinge bodies (6, 7) respectively to the fixed frame (3) and the sash (2), comprising at least a block (8a), housed inside the corresponding groove (C3, C2) in the fixed frame (3) and the sash (2); it being possible to connect the block to the respective flap (6b, 7b) of each of the first and second hinge bodies (6, 7) so as to lock them in place, pressing against the inside surfaces of the protrusions (4);
   - a hinge pin (9) that can be housed inside the two sockets (6a, 7a) and forming a vertical axis of rotation (Z1, Z2) of each hinge unit (GCI, GCS); the device being **characterised in that** it comprises, on at least one of the first and second hinge bodies (6, 7) of the lower hinge unit (GCI), a spacer component (10) inserted between the flap (6b, 7b) and the pair of protrusions (4), so as to modify, by moving it away, the position of the hinge body (6, 7) relative to the fixed frame or sash (3, 2), so that in practice the vertical axis of rotation (Z1) of the lower hinge unit (GCI) and the vertical axis of rotation (Z2) of the upper hinge unit (GCS) are coaxial.

2. The device according to claim 1, **characterised in that** the spacer component (10) is inserted between the flap (7b) of the second, female hinge body (7) and the pair of protrusions (4) forming the groove (C2) in the sash (2).

3. The device according to claim 1, **characterised in that** the spacer component (10) is inserted between the flap (6b) of the first, male hinge body (6) and the pair of protrusions (4) forming the groove (C3) in the fixed frame (3).

4. The device according to claim 1, **characterised in that** the spacer component (10) is made in a single body with the block (8a) for fixing the flap (6b, 7b).

5. The device according to claim 1, **characterised in that** the spacer component (10) is a second, independent block (11), which can be inserted between the flaps (6b, 7b) and the respective pair of protrusions (4) and can be connected to the block (8a).

6. The device according to claim 5, **characterised in that** the second block (11) comprises a central body (11a) from which there extend on either side a pair of second flaps (12a, 12b), forming a single body with the central body (11a), inserted between the pair of protrusions (4) and the respective contact zones of the flap (6b, 7b) belonging to the first or second hinge body (6, 7).

7. The device according to claims 1 and 4, where each block consists of a segment (8a) of profile with a central body (8b) and two lateral protrusions (8c) for fastening inside the respective groove (C2, C3); there being on the central body (8b) a plurality of through-seats (13) in which screw means (14) for fixing the flap (6b, 7b) can engage, the device being **characterised in that** the block (8a) which can be connected to the first or second hinge body (6, 7) of the lower hinge unit (GCI) comprises an extension (15) of the central body (8b), protruding the groove (C2, C3), and having, on either side, a pair of second flaps (16a, 16b), forming a single body with the extension (15) of the central body (8b), these second flaps being inserted between the pair of protrusions (4) and the contact zones of the flap (6b, 7b) belonging to the first or second hinge body (6, 7).

8. The device according to claim 7, **characterised in that** the extension (15) has corresponding through-seats (15a) extending the seats (13) and coaxial with them, for the screw means (14).

9. The device according to claims 5 and 6, **characterised in that** the central body (11a) has a plurality of through-seats (11b) in which screw means (14) for fixing the flap (6b, 7b) to a fixing block (8a) can engage.

10. The device according to claim 6 or 7, **characterised in that** each second flap (12a, 12b, 16a, 16b) in cross-section has a profile divided into two sections (T1, T2) joined without interruption, the first section (T1), for connection to the central body (11a) or extension (15), being thinner, and the second section (T2), for insertion between the contact

zone of the flap (6b, 7b) and the corresponding protrusion (4), having a thickness (S) greater than that of the first section (T1).

11. The device according to claims 1 and 11,
characterised in that the thickness (S) of the second section (T2) of each second flap (12a, 12b, 16a, 16b) depends on the weight of the sash (2).

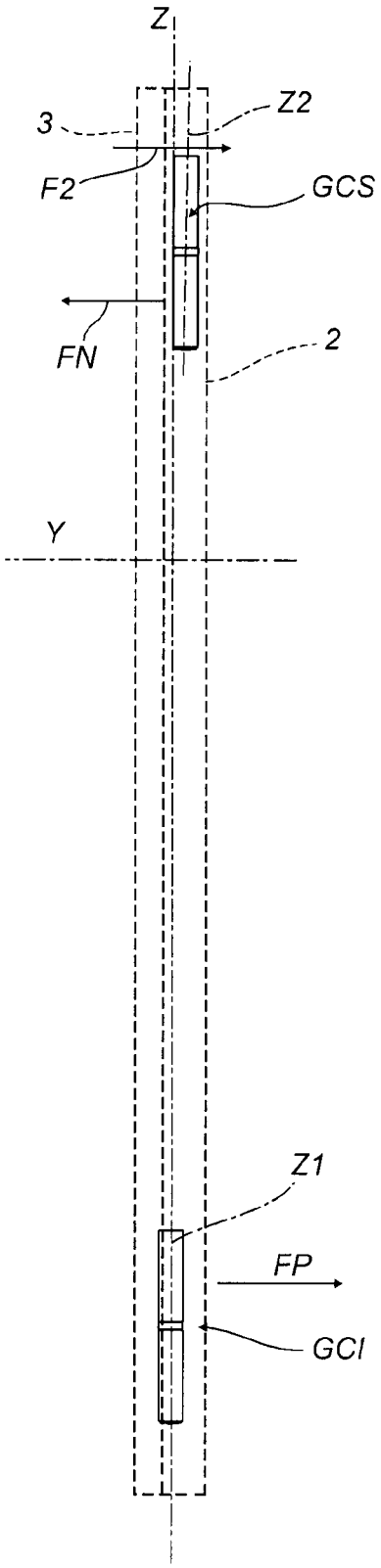


FIG. 1

FIG. 2

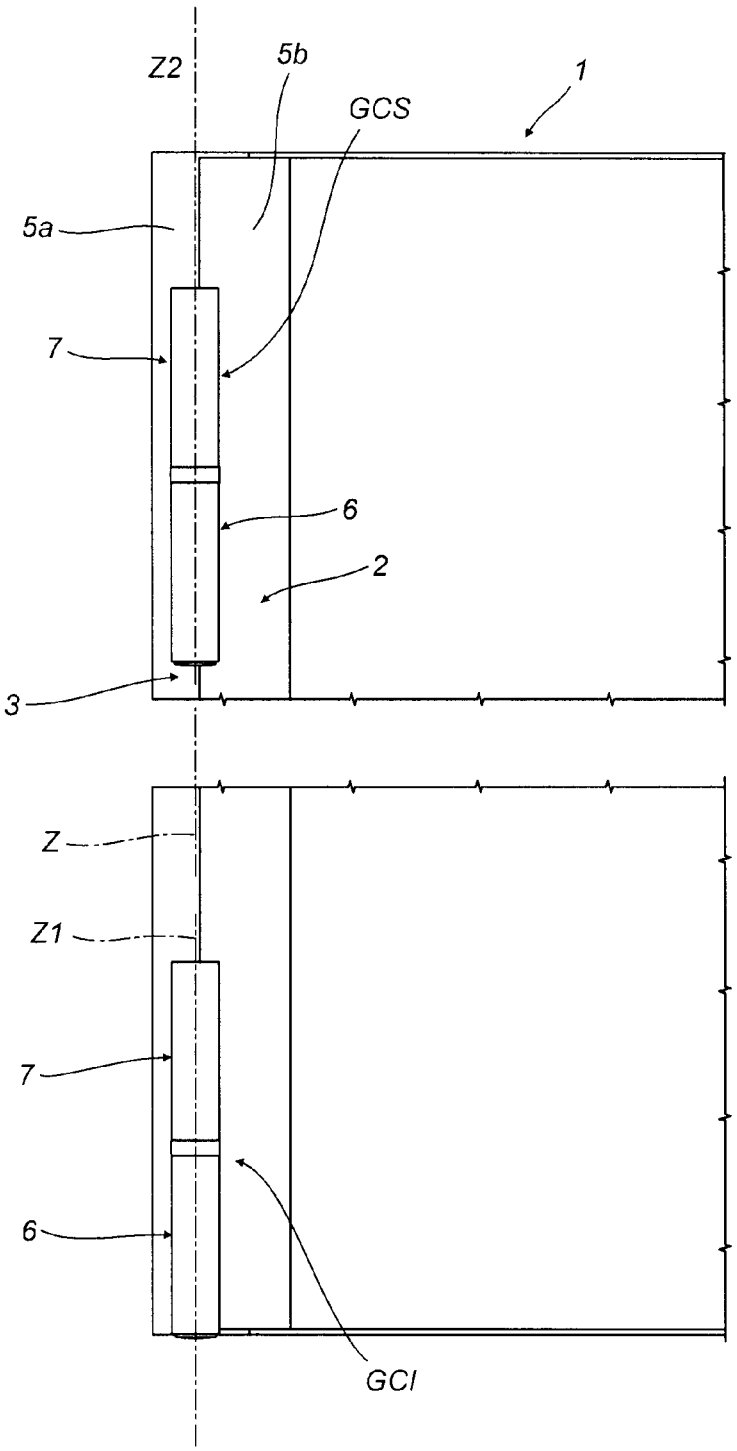


FIG.3

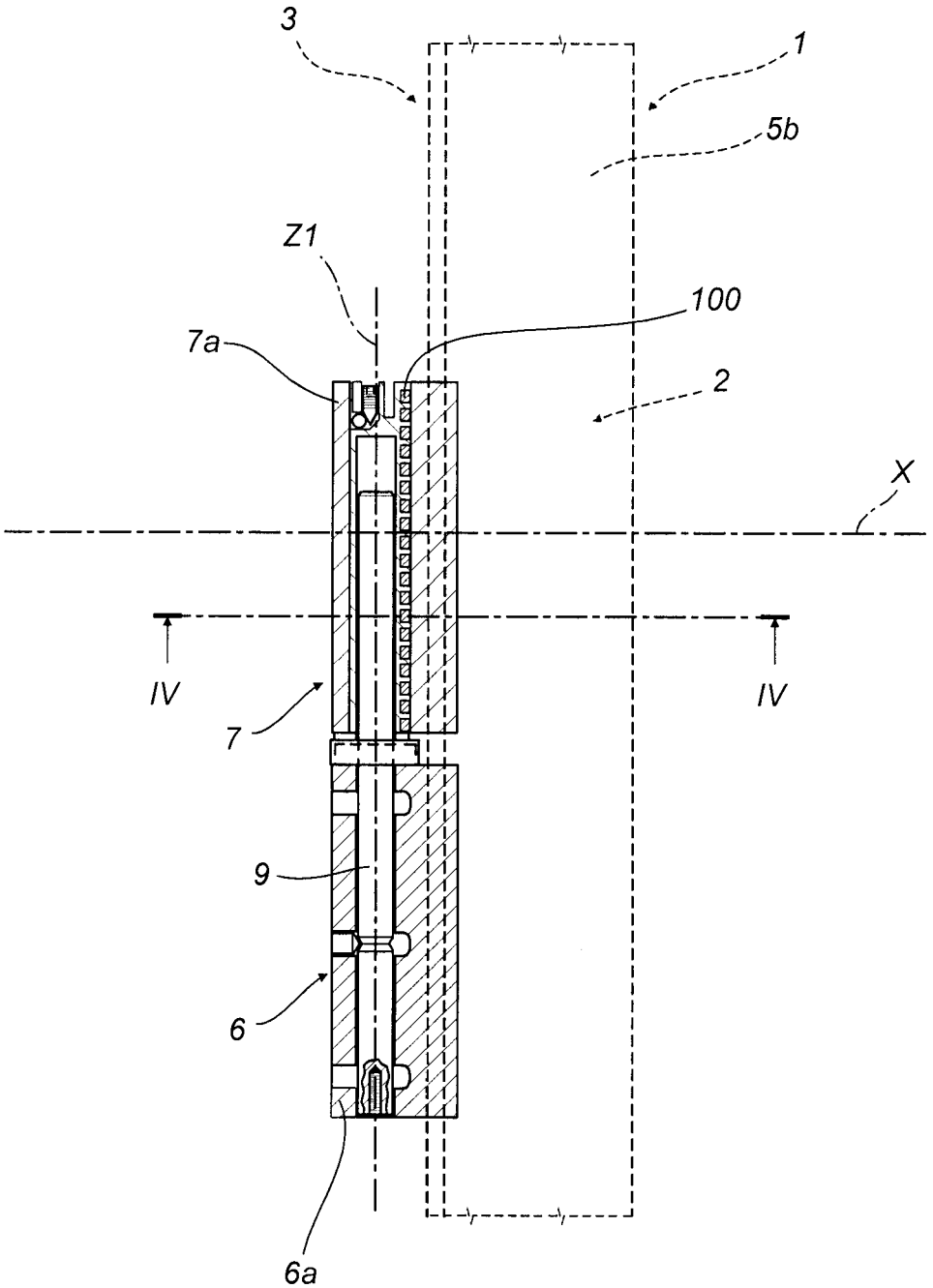


FIG. 4

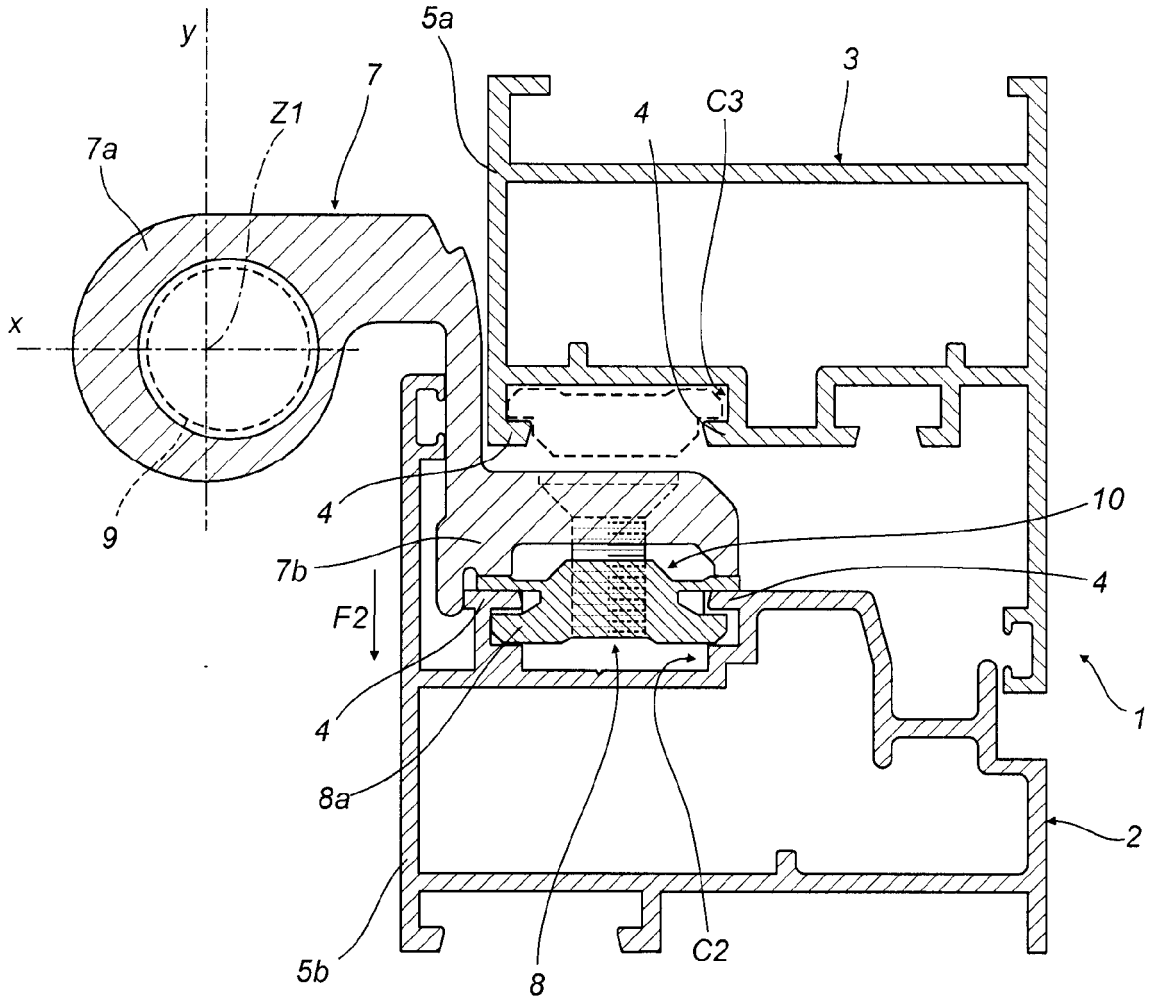


FIG. 5

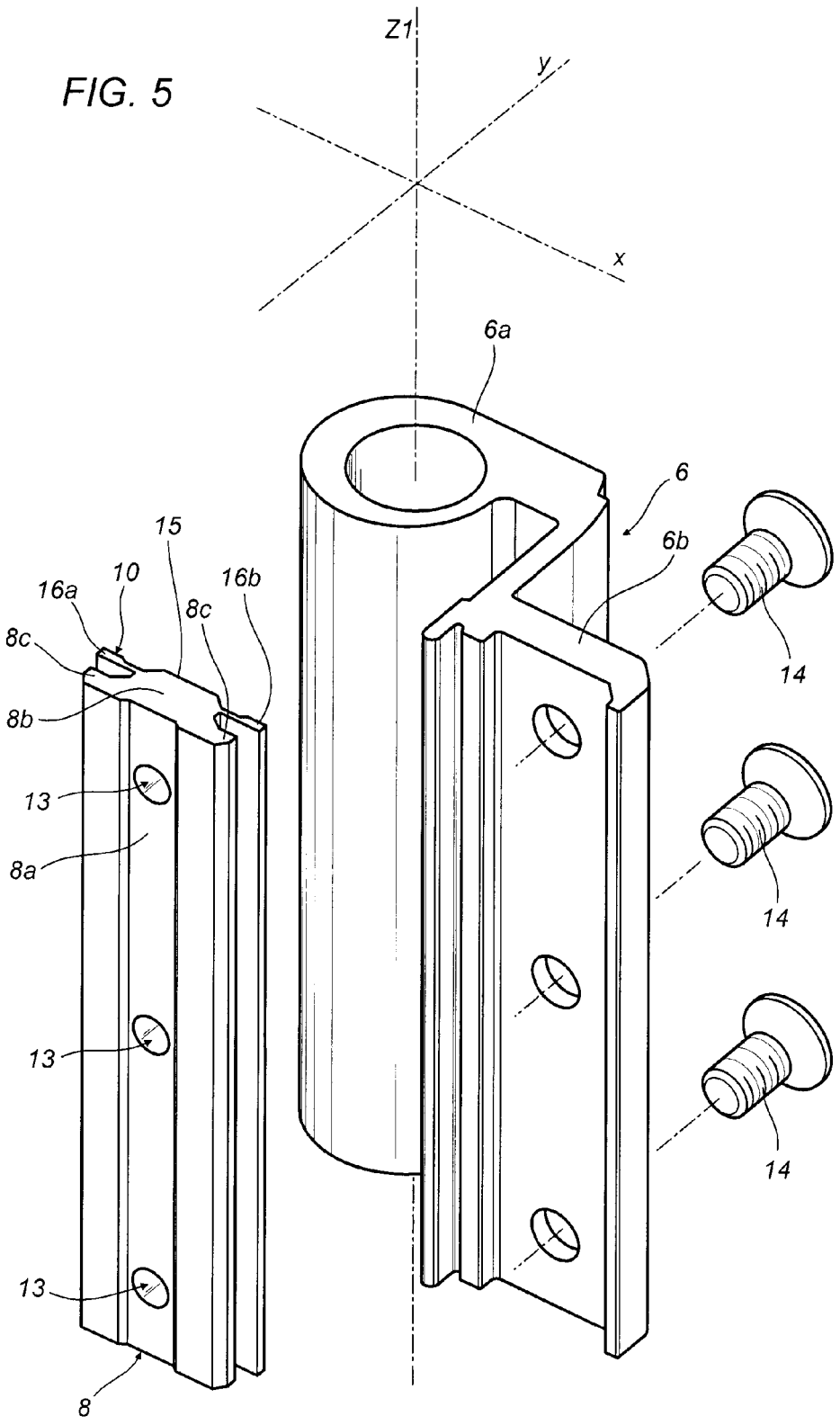


FIG. 6

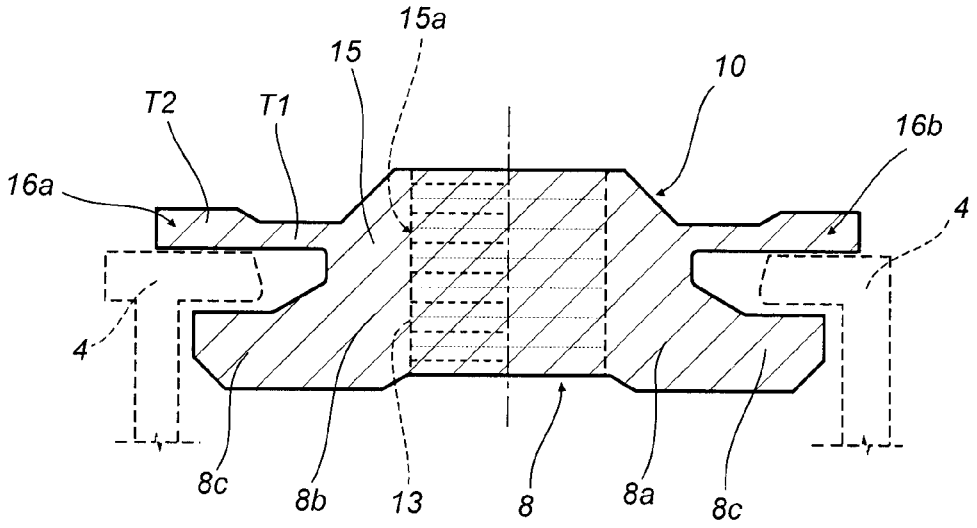
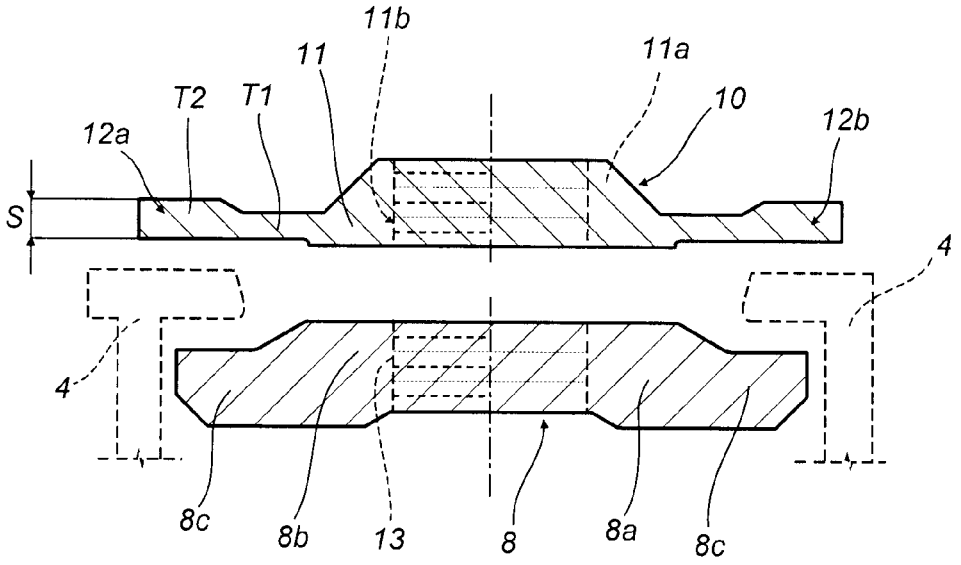

15a
15
10
T2
T1
16b
16a
4
4
8c
8b
13
8
8a
8c

FIG. 7


11b
11
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T2
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