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

(11) **EP 1 793 071 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.06.2007 Bulletin 2007/23

(51) Int Cl.:
E05D 15/52 *(2006.01)* ***E05D 5/02*** *(2006.01)*

(21) Application number: **06124614.6**

(22) Date of filing: **23.11.2006**

(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: **30.11.2005 IT BO20050727**

(71) Applicant: **GSG INTERNATIONAL S.p.A.**
40054 Budrio (Bologna) (IT)

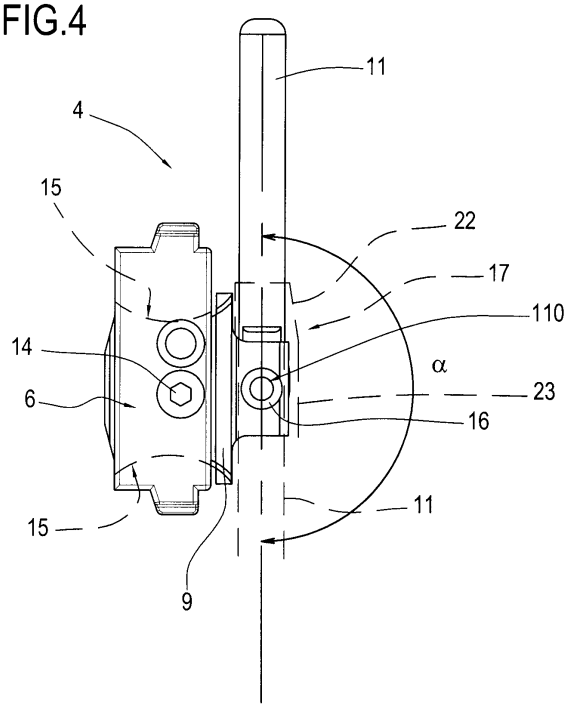
(72) Inventor: **LAMBERTINI, Marco**
40068, SAN LAZZARO DI SAVENA (BOLOGNA) (IT)

(74) Representative: **Lanzoni, Luciano**
Bugnion S.p.A.
Via Goito 18
I-40126 Bologna (IT)

(54) **A hinge for tilt and turn doors and windows**

(57) A hinge for tilt and turn doors and windows (1) comprises a first, lower male hinge body (5) consisting of: a box element (6) that slots into a longitudinal groove (7) in the fixed frame (2) and has a longitudinal housing (8) for loosely accommodating a plate (9) rigidly attached to a bracket element (10) with a hinge pin (11) on which the bottom of the sash (3) pivots; the plate (9) and the box element (6) are coupled with each other in such a way as to allow the plate (9) to rock between a non-operative position in which the plate (9) is parallel to the box element (6) and an operative position in which the plate (9) is tilted outwards at an angle to the box element (6); the hinge pin (11) is rotatably linked, at (110) and at one end of it (11a), to the bracket element (10) by respective means (16) acting between the pin (11) itself and the bracket element (10) in such a way as to allow the pin (11) to be rotated between two operating limit positions through an ancle (α) equal to 180°; means (17) act between the hinge pin (11) and the bracket element (10) to stabilise the hinge pin (11) itself in one or the other of the operating limit positions.

FIG.4



EP 1 793 071 A2

Description

[0001] This invention relates to a hinge for tilt and turn doors and windows, in particular for doors and windows with frames made of metal, PVC or the like, aluminium and wood, and so on.

[0002] The hinges used on doors and windows of this kind differ from those used on traditional side-hung doors and windows that open and close only by turning.

[0003] Thus, a hinge for a traditional, side-hung door or window consists of:

- a first male, or lower, hinge body having a socket or cylindrical portion and a flap for fastening it to the fixed frame of the door or window;
- a second female, or upper, hinge body having a respective socket or cylindrical portion and a flap for fastening it to the sash of the door or window;
- a hinge pin which can be housed in the two sockets, which may, if necessary, be fitted with interposed bushes, and which defines the axis of rotation of the mobile frame.

[0004] If the door or window is of the tilt and turn type, the hinges must be structured differently from those for traditional doors and windows.

[0005] More specifically, the lower hinge, which this specification refers to in particular, must be able to turn about an axis parallel to the axis of the fixed frame so as to enable the door or window to be opened by tilting.

[0006] In a prior art solution (see patent EP 478.519 to the same Applicant as this invention) the lower hinge comprises, as its first, male hinge body: a vertical box element that is slotted in the fixed frame; the face of the element directed toward the sash has a longitudinal housing that loosely accommodates a plate whose ends are concavely arched and which is rigidly attached at right angles to a bracket element; the latter forms the socket of the first hinge body usually associated with the hinge pin that is coupled with the second, upper female hinge body; the central part of the plate has a through aperture which affords passage to means by which the plate and the box element are coupled one to another, and whose shape is such as to allow the plate to rock between a position parallel to the box element and a position angled in relation to the box element; the ends of the box element are convexly arched to act on the lower arched profile of the plate according to the position of the plate and so as to allow the plate to tilt between the non-operative and the operative position.

[0007] This type of hinge has, over time, proved to be extremely reliable and practical both in terms of ease of use and security of the door or window.

[0008] It is also possible to carry out micro adjustments on the door or window by acting directly on the hinge.

[0009] These adjustments are applied to the sash and can be performed in three axes: a vertical axis (axis of rotation Z), an axis perpendicular to the vertical plane of the fixed frame (axis Y, and also known as "compression" in the jargon of the trade) and an axis parallel to the vertical plane of the door or window (axis X).

[0010] At present, the door or window can be adjusted by acting on two different parts of the hinge:

- the first allows the sash to be adjusted in height (axis Z) relative to the fixed frame and is located at the position where the second, female hinge body is attached to the sash;
- the second allows the sash to be adjusted in the axes X and Y by turning a bush which is located in the female hinge body and whose inside diameter is eccentric relative to the outside diameter.

[0011] Thus, turning the bush enables the sash to be adjusted in the axes X and Y simultaneously.

[0012] A hinge of the kind described above is not, however, free of disadvantages due mainly to the reversible fitting system and to the limited range of combined adjustment in the axes X and Y.

[0013] At present, the procedure by which the hinge, in particular the first, lower male hinge body, is fitted to the door or window includes the following steps:

- determining the handing of the sash (right- or left-hand swing);
- seating and fixing the pin to the bracket element by slotting and deformation (using a vice and a hammer) in a first position or in a second position (turned through 180°) according to the handing;
- inserting and fixing the plate-bracket-hinge pin assembly in the box element.

[0014] At this point, the entire hinge assembly can be positioned at the housing (right or left) and fixed in the position decided.

[0015] This hinge structure consists of several parts to be assembled on site by the installer depending on the handing of the door or window: this involves high warehousing costs and time-consuming assembly procedures requiring a certain number of tools.

[0016] Another disadvantage is the fact that the simultaneous adjustment in the axes X and Y is combined in the single bush located in the second hinge body, thus greatly limiting the range of possible movement along each of the two axes.

[0017] This invention therefore has for an aim to overcome the above mentioned disadvantages by providing a tilt and turn door/window hinge whose reversibility is faster and more practical and which provides a more extended adjustment range in the sash axes, while maintaining the same essential constructional features, practical design and security of the prior art hinge.

[0018] Accordingly, the present invention achieves this aim with a hinge for tilt and turn doors and windows, in particular a hinge comprising the technical characteristics set out in one or more of the appended claims.

[0019] The technical characteristics of the invention, with reference to the above aims, are clearly described in the claims below and its advantages are 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 perspective view of a hinge according to the invention applied to the bottom part of a tilt and turn door or window;
- Figure 2 is a top plan view, with some parts cut away to better illustrate others, of the hinge of Figure 1;
- Figure 3 is a perspective exploded view of the lower hinge assembly illustrated in the drawings listed above;
- Figure 4 is a side view, with some parts cut away, of a part of the hinge illustrated in the drawings listed above;
- Figure 5 is a front view, with some parts in cross section, of a part of the hinge illustrated in the drawings listed above.

[0020] With reference to the accompanying drawings, in particular Figures 1 and 2, the hinge according to the invention, labelled 4 in its entirety, is used in particular for doors and windows 1 with frames made of metal, PVC or the like, aluminium and wood, and so on.

[0021] These doors or windows 1 can be opened both by turning (see arrow A, Figure 1) and by tilting (see arrow R, Figure 1) and comprise a fixed frame 2 and a sash 3 hinged to each other along a respective stile, only the part of them relevant to this invention, namely the lower hinged part, being illustrated in the drawings.

[0022] The hinge 4 according to the invention comprises at least a first lower male hinge body 5 consisting essentially of: a box element 6, a vertical plate 9, a bracket element 10 having a hinge pin 11, fastening means 14 by which the plate 9 and the box element 6 are coupled to each other and supporting guide means 15 also acting between the plate 9 and the box element 6.

[0023] These parts are described in detail only insofar as is relevant to this invention since many of them form the subject matter of European patent EP 478.519 to the same Applicant as this invention.

[0024] The box element 6 can be slotted into a longitudinal groove 7 in the fixed frame 2 and the part of it that faces the sash 3 has a longitudinal housing 8 for loosely accommodating the plate 9.

[0025] The latter extends vertically and has concavely arched ends 9a and 9b (to allow reversibility of assembly on the box element 6).

[0026] The plate 9 is rigidly attached at right angles to the bracket element 10 with the lower hinge pin 11 of the sash 3.

[0027] The hinge pin 11 can be associated with a second, upper female hinge body 12 with an interposed bush 12b housed in the second body 12.

[0028] The plate 9 has an aperture 13 affording passage for fastening means 14 (a screw) by which the plate is coupled with the box element 6 which also has through apertures for the same purpose).

[0029] The profile of the aperture 13 (three-lobed) is such as to enable the plate 9 to rock between a non-operative position (see Figure 1, continuous line) in which the plate 9 is parallel to the box element 6, and an operative position (see Figure 1, dashed line) in which the plate 9 is tilted outwards at an angle to the box element 6.

[0030] The shape of the aperture 13 in the plate 9 and the presence of two holes 6a and 6b in the box element 6 permit reversible fitting of the plate 9 on the box element 6 according to the handing of the sash 3.

[0031] The convexly arched, mutually supporting guide means 15 are located at the two ends (top and bottom) of the box element 6 (again to permit reversibility) and act on the matchingly shaped bottom end of the plate 9 in such a way that the two arched surfaces can slide relative to each other to allow the plate to turn between the non-operative and operative positions.

[0032] These means 15 consist of at least one pair of arched profiles located inside the box element 6 (see Figure 4).

[0033] The hinge 4 also allows the sash 3 to be adjusted in three axes: a vertical axis (axis of rotation Z), an axis perpendicular to the vertical plane of the fixed frame 2 (axis Y, and also known as "compression" in the jargon of the trade) and an axis parallel to the vertical plane of the door or window (axis X).

[0034] As also illustrated in Figures 3 to 5, the hinge pin 11 of the hinge 4 is rotatably linked, at 110 and at one end of it 11a, to the bracket element 10 by respective means 16 acting between the pin (11) itself and the bracket element 10 in such a way as to allow the pin 11 to be rotated between two operating limit positions, according to the handing of the sash 3, through an angle α equal to 180° (see Figure 4) .

[0035] Means 17 are also provided between the hinge pin 11 and the bracket element 10 to stabilise the hinge pin 11 itself in one or the other of the operating limit positions.

[0036] More specifically, the bracket element 10 comprises a pair of parallel protruding tabs 18 and 19 each having a first through hole 20 made in it, the two holes being coaxial with each other.

[0037] The aforementioned end 11a of the hinge pin 11, having a second through hole 21 made in it, fits into the space S between the two tabs 18 and 19.

[0038] The first holes 20 and the second hole 21 can be engaged by a respective second pin 16, which is securely and rotatably fitted in the first and second holes 20 and 21 and which constitutes the aforementioned means for rotatably linking the hinge pin 11.

[0039] The rotatable linking means 16 between the bracket element 10 and the hinge pin 11 also constitute means for adjusting the hinge pin 11 in the axis X parallel

to the fixed frame 2 and the sash 3 (see also Figure 2).

[0040] For this purpose, the second hole 21 in the hinge pin 11 and the second pin 16 are threaded and can be screwed to each other in such a way that, in use, the hinge pin 11 can be moved in both directions within the space S defined by the pair of tabs 18 and 19 (see arrow F11), after rotating the second pin 16 (in either direction) in order to enable the hinge pin 11 to be adjusted in the axis X.

[0041] The second pin 16 is rotatably linked in the first holes 20 by plastic deformation, that is to say, by upsetting one end 16a of the second pin 16 close to one of the first holes 20.

[0042] The above mentioned stabilising means 17 also constitute means for covering a part of the hinge pin 11 and of the bracket element 10.

[0043] Looking in more detail, the stabilising means 17 comprise a bush 22 that can be coaxially coupled with the hinge pin 11 and encompassing a part of it close to the tabs 18 and 19 of the bracket element 10: thus, the bush 22 is interposed between the tabs 18 and 19 and the second, female hinge body 12.

[0044] In fact, during use, the bush 22 abuts against the tabs 18 and 19 of the bracket element 10.

[0045] Further, the bush 22 has a second, vertical tab 23 which, in use, covers the front portion of the tabs 18 and 19 where the tabs 18 and 19 are linked to the end 11a of the hinge pin 11: the shape of the bush 22 with the backwardly extending second tab 23 thus enables the hinge pin 11 to be kept in one of the above mentioned operating limit positions.

[0046] Thus, to fit the hinge 4, the pin 11 must be positioned in one of the operating limit positions according to the right or left handing of the door or window 1 and the covering and stabilising bush 22 must then be fitted.

[0047] At this point, the plate 9 can be attached to the box element 9 and the entire assembly placed in the longitudinal groove 7 in the fixed frame 2.

[0048] Before fitting the sash 3, micro adjustments can be carried out in the axes Y and Z by means of the female bush 12b and in the axis X by acting on the second pin 16.

[0049] A hinge made as described above achieves the aforementioned aims thanks to the special way the hinge pin is linked to the bracket, enabling the pin itself to be fitted beforehand, without affecting the on-site reversibility of the hinge.

[0050] This structure makes assembly quick and easy, does not require the installer to use any tools and does not reduce the reliability and security of the door or window, thanks also to the interposed bush.

[0051] Furthermore, the rotatable link makes it possible to adjust the door or window separately in the axes X (by acting on the female bush) and Y (by turning a threaded pin using an ordinary spanner).

[0052] This separation appreciably increases the adjustment range both sideways (axis X) and by compressing the seals (axis Y), thereby improving the possibility of optimising the assembly of the door or window unit.

[0053] It will be understood that the invention described may be useful in 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 hinge for tilt and turn doors and windows (1) comprising a fixed frame (2) and a sash (3) hinged to each other along a respective stile; the hinge (4) comprising at least a first, lower male hinge body (5) consisting of:

   - a box element (6) that can be slotted into a longitudinal groove (7) in the fixed frame (2); the element (6) having, on the part of it that faces the sash (3), a longitudinal housing (8) for loosely accommodating;
   - a vertical plate (9) having at least one concavely arched end and rigidly attached at right angles to a bracket element (10) with a lower hinge pin (11) on which the bottom of the sash (3) pivots, the pin (11) able to be associated with a second, upper female hinge body (12); the plate (9) having an aperture (13) which affords passage to fastening means (14) acting on the plate and on the box element (6) and shaped in such a way as to allow the plate (9) to rock between a non-operative position in which the plate (9) is parallel to the box element (6) and an operative position in which the plate (9) is tilted outwards at an angle to the box element (6);
   - convexly arched, mutually supporting guide means (15) located at least at the bottom end of the box element (6) and acting on the matchingly shaped bottom end of the plate (9) in such a way that the arched surfaces can slide relative to each other to allow the plate to turn between the non-operative and operative positions; the hinge (4) being **characterised in that** the hinge pin (11) is rotatably linked, at (110) and at one end of it (11a), to the bracket element (10) by respective means (16) acting between the pin (11) itself and the bracket element (10) in such a way as to allow the pin (11) to be rotated, according to the handing of the sash (3), between two operating limit positions through an angle (α) equal to 180°; means (17) acting between the hinge pin (11) and the bracket element (10) being provided for stabilising the hinge pin (11) itself in one or the other of the operating limit positions.

2. The hinge according to claim 1, **characterised in that** the bracket element (10) comprises a pair of

parallel protruding tabs (18, 19) each having a first through hole (20) made in it, the two holes being coaxial with each other; the end (11a) of the hinge pin (11) having a second through hole (21) made in it and fitting into the space (S) between the two tabs (18, 19); the first holes (20) and the second hole (21) being able to be engaged by a respective second pin (16), which is securely and rotatably fitted in the first holes (20) and second hole (21) and which constitutes the means for rotatably linking the hinge pin (11).

3. The hinge according to claim 1, **characterised in that** the rotatable linking means (16)) between the bracket element (10) and the hinge pin (11) also constitute means for adjusting the hinge pin (11) in an axis (X) parallel to the fixed frame (2) and to the sash (3).

4. The hinge according to claims 1 to 3, **characterised in that** the second hole (21) in the hinge pin (11) and the second pin (16) are threaded and can be screwed to each other in such a way that, in use, the hinge pin (11) can be moved in both directions within the space (S) defined by the pair of tabs (18, 19) after rotating the second pin (16) in order to enable the hinge pin (11) to be adjusted in the axis (X) parallel to the fixed frame (2) and to the sash (3).

5. The hinge according to claims 2 to 4, **characterised in that** the second pin (16) is rotatably linked in the first holes (20) by plastic deformation, that is to say, by upsetting one end (16a) of the second pin (16) itself, close to one of the first holes (20).

6. The hinge according to claim 1, **characterised in that** the stabilising means (17) also constitute means for covering a part of the hinge pin (11) and of the bracket element (10).

7. The hinge according to claims 1 to 6, **characterised in that** the stabilising means (17) comprise a bush (22) that can be coaxially coupled with the hinge pin (11), encompassing at least a part of the latter close to the tabs (18, 19) of the bracket element (10) in such a way as to be interposed between the tabs (18, 19) and the second, female hinge body (12); the bush (22) also having a second, vertical tab (23) which, in use, covers the front portion of the tabs (18, 19) where the tabs (18, 19) are linked to the end (11a) of the hinge pin (11), the second tab (23) acting in conjunction with the bush (22) to keep the hinge pin (11) in one of the operating limit positions.

8. The hinge according to claim 7, **characterised in that**, during use, the bush (22) abuts against the tabs (18, 19) of the bracket element (10).

FIG.1

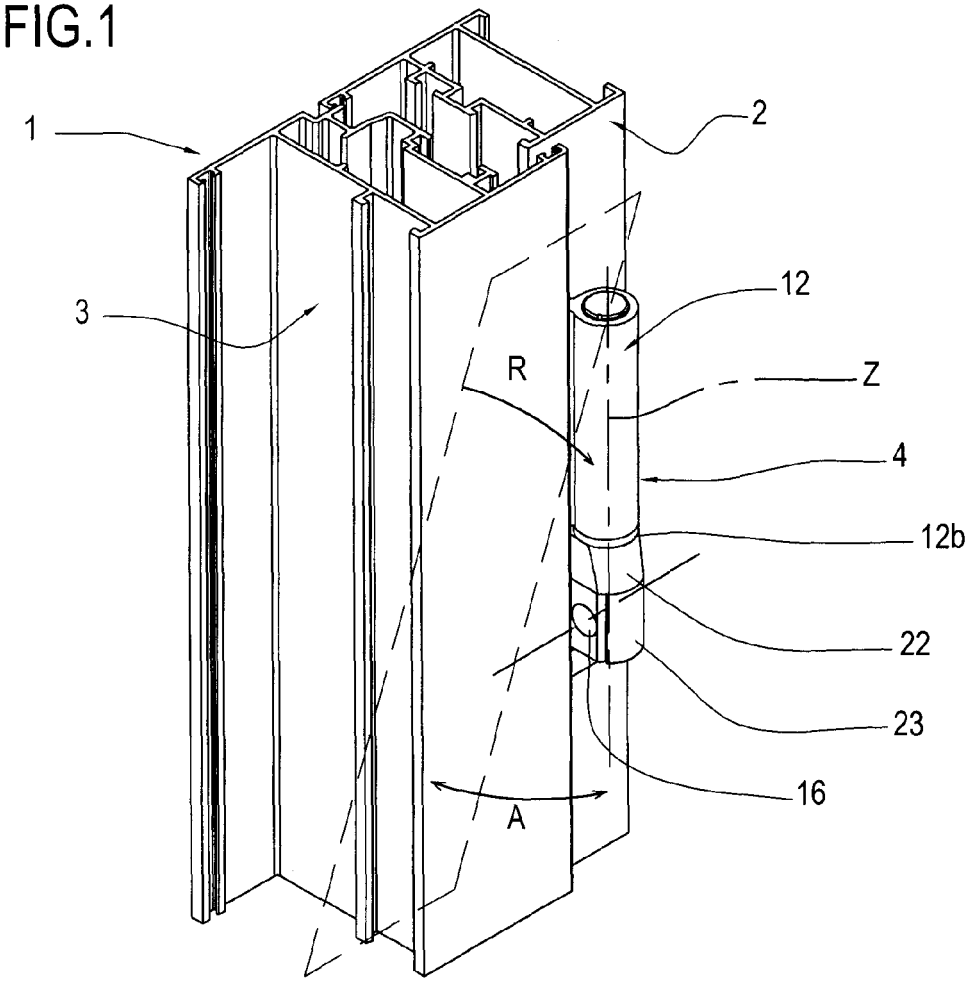


FIG.2

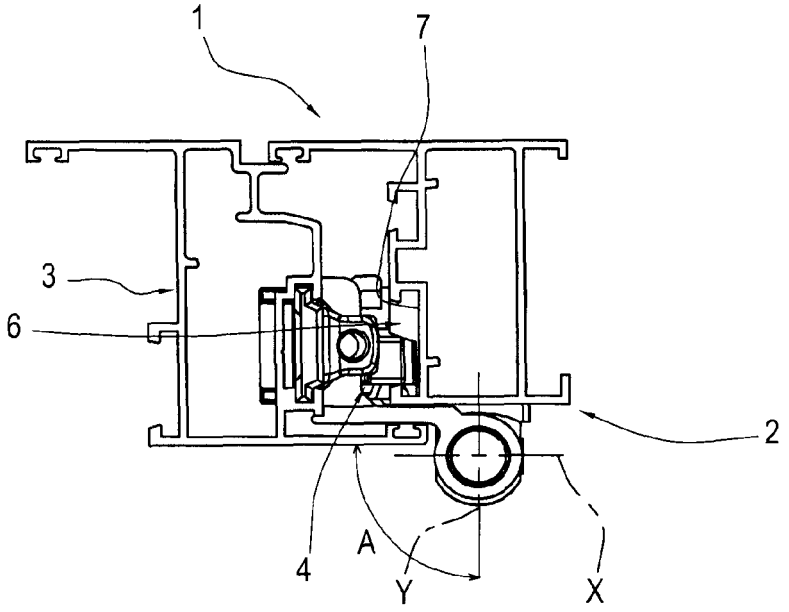


FIG.3

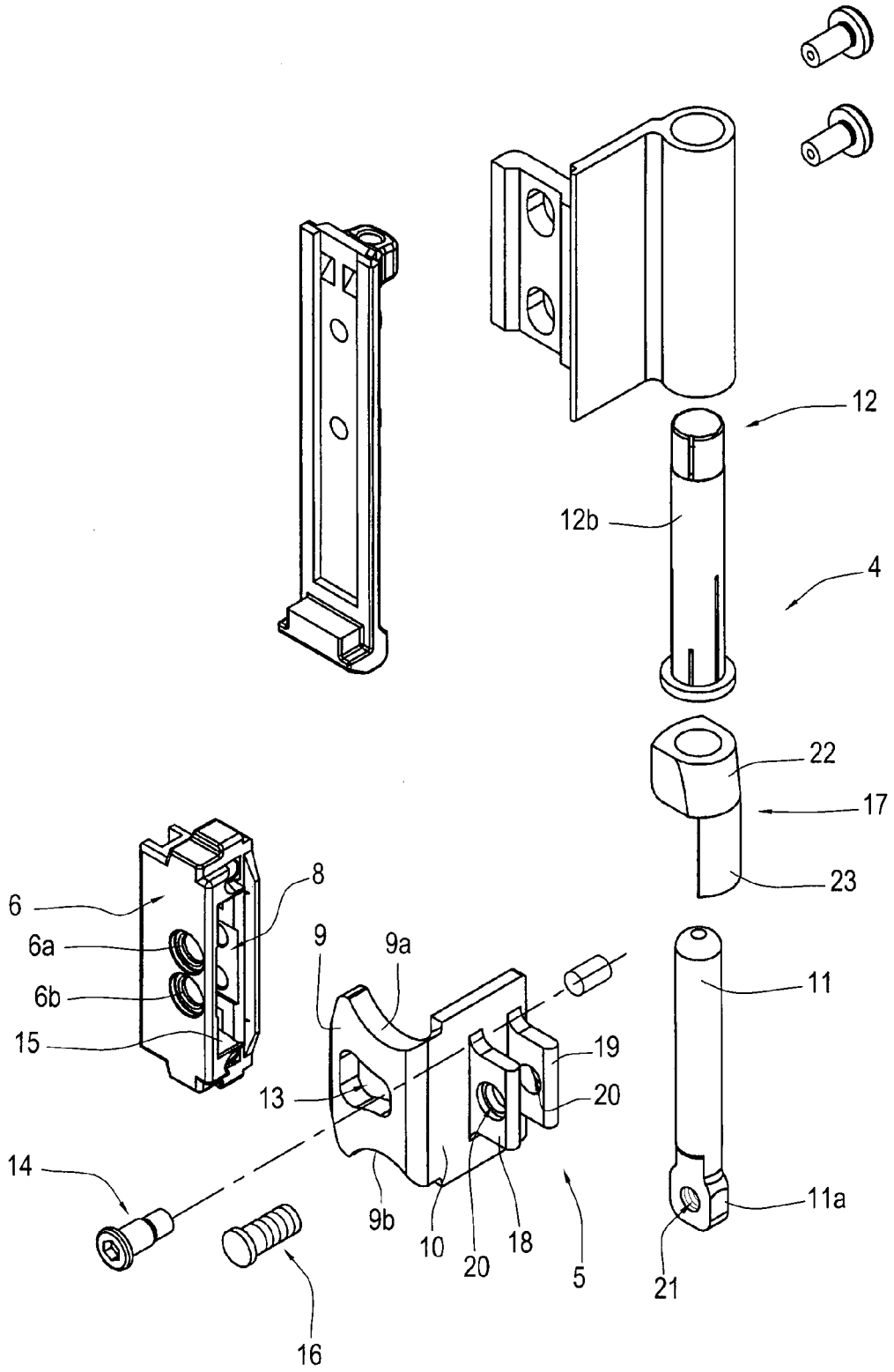


FIG.4

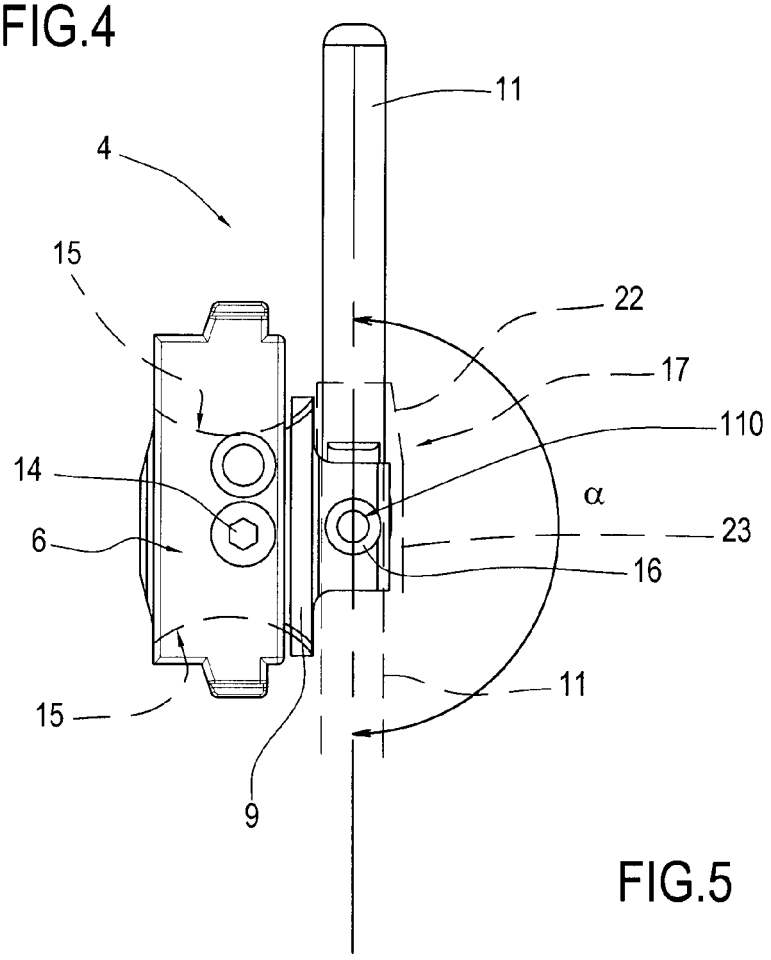
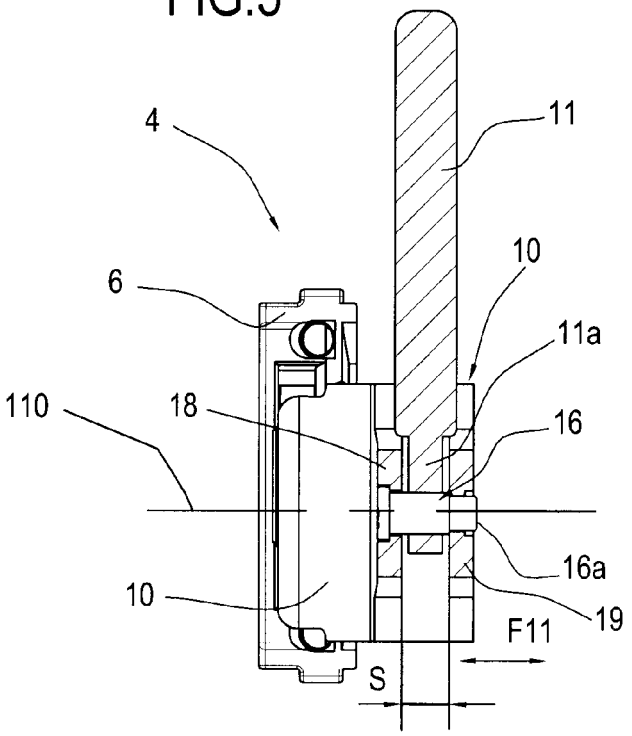

11
4
15
22
17
110
14
α
6
23
16
11
15
9

FIG.5


4
11
10
6
11a
110
18
16
16a
10
19
F11
S

REFERENCES CITED IN THE DESCRIPTION

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

- EP 478519 A **[0006] [0023]**