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

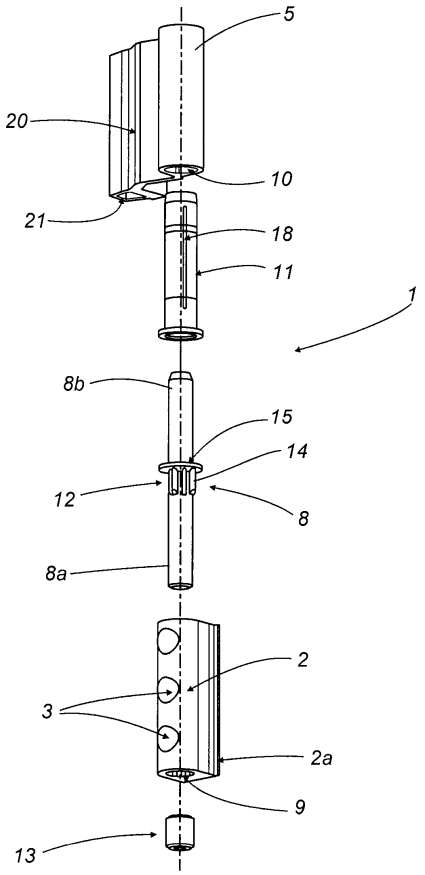
(72) Inventor: **LAMBERTINI, Marco**
40068, San Lazzaro di Savena (Bologna) (IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via Goito, 18
40126 Bologna (IT)

(54) An adjustable hinge for doors and windows.

(57) An adjustable hinge for doors and windows comprises a first hinge body (2) with first housings (3) for accommodating first means (4) for fastening to a fixed door or window frame; a second hinge body (5) with second housings (6) for accommodating second means (7) for fastening to a mobile door or window frame; and a hinge pin (8) that can be inserted into respective holes (9, 10) made in the two hinge bodies (2, 5). The hinge (1) is also characterised by: the pin (8) having a second portion (8b), housed in the second, upper hinge body (5), that is offset from a first portion (8a) housed in the first hinge body (2); a bush (11) positioned between the hole (10) in the second hinge body (5) and the respective second portion (8b) of the pin (8) housed in it; means (12) formed on the pin (8) and acting between the second portion (8b) and the second hinge body (5) in such a way as to adjust the second hinge body (5) relative to the first hinge body (2) in a first axis (X) and a second axis (Y); actuating means (13) positioned on the first hinge body (2), acting on the first portion (8a) of the pin (8), and designed to release the adjustment means (12) so that the pin (8) can be moved and thus adjusted and to lock the adjustment means (12) so that the pin (8) is held in the new position it has been adjusted to.

FIG.1



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Description

[0001] The present invention relates to an adjustable hinge for doors and windows, in particular doors and windows with frames made of metal, PVC, wood, wood and metal, etc.

[0002] At present, in the field of hardware for doors and windows, certain types of light-weight doors and windows are mounted on the upright or fixed frame and to the mobile frame by hinges of the type known as "face-mounted hinges".

[0003] These hinges consist of two hinge bodies joined by a hinge pin inserted in respective cylindrical housings in the hinge bodies.

[0004] The difference between hinges of this kind and traditional hinges lies in the shape of the two hinge bodies and the fact that the hinge bodies are mounted on the "face" of the respective parts of the fixed and mobile door or window frames.

[0005] Thus, one hinge body, designed to be applied to the fixed frame, consists of a hollow element without a flap (and preferably forming a U-shaped section) and has a flat outer surface designed to abut against the face of the fixed frame and to be fastened to the latter by one or more screws. The screws pass through the element transversally in respective housings made in the element itself.

[0006] The screws remain housed in the first hinge body thanks to countersunk recesses made on the inside surface of the cylindrical housing in such a way that the screws do not interfere with the pin when it is inserted into the housing.

[0007] The second hinge body, on the other hand, has a bush positioned between pin and housing and a shaped flap with a free end that defines a tubular portion that matches and couples with a profile of a tubular chamber in the mobile frame (of the door or window).

[0008] This tubular portion is also engaged by screws that pass through it transversally in respective housings made in the portion itself in such a way as to fasten it securely to (the face of) the door or window frame profile on the inside of the frame itself.

[0009] Up to the present time and to the best of the Applicant's knowledge, hinges of this kind cannot be adjusted in a vertical axis (axis of rotation Z), an axis perpendicular to the vertical plane of the fixed door or window 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] The absence of this feature on products of this kind has prompted the Applicant to design and manufacture a full-featured, adjustable hinge of the highest quality that can be adapted, during and after assembly, to the requirements of the door or window it is fitted to, without changing the architectural characteristics, size and final cost of the hinge.

[0011] In accordance with the invention, the above aim is achieved by an adjustable hinge for doors and windows, comprising a first hinge body with first housings for accommodating first means for fastening to a fixed door or window frame; a second hinge body with second housings for accommodating second means for fastening to a mobile door or window frame; and a hinge pin that can be inserted into respective holes made in the two bodies. The hinge is also characterised by: the pin having a second portion, housed in the second, upper hinge body, that is offset from a first portion housed in the first hinge body; a bush positioned between the hole in the second hinge body and the respective second portion of the pin housed in it; means formed on the pin and acting between the second portion and the second hinge body in such a way as to adjust the second hinge body relative to the first hinge body in a first and a second axis; actuating means positioned on the first hinge body, acting on the first portion of the pin, and designed to release the adjustment means so that the pin can e moved and thus adjusted and to lock the adjustment means so that the pin is held in the new position it has adopted.

[0012] 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 exploded view of an adjustable hinge for doors and windows according to the invention;
- Figure 2 is a perspective view from the front, showing the hinge of Figure 1 in an assembled configuration;
- Figure 3 is a perspective view from the back, showing the hinge of Figure 1 in an assembled configuration;
- Figure 4 is a cross section in a longitudinal plane, and with some parts cut away in order to better illustrate others, showing the first, bottom hinge body of the hinge of Figures 1 to 3;
- Figure 5 is a top plan view of the hinge of Figures 1 to 3, with the first, bottom hinge body illustrated in cross section;
- Figure 6 is a top plan view of the hinge of Figures 1 to 3, with the second, upper hinge body illustrated in cross section;
- Figure 7 is a front view of the hinge pin forming part of the hinge shown in the illustrations listed above;
- Figure 8 illustrates a scaled-up detail A of the hinge pin of Figure 7;
- Figure 9 is a plan view from below of the hinge pin of Figure 7.

[0013] With reference to the accompanying drawings, in particular Figures 1 to 3, the hinge according to the invention, labelled 1 in its entirety, is used in particular for doors and windows with frames made of metal, PVC, wood, wood and metal, etc.

[0014] In the embodiment illustrated in the drawings, the hinge 1 is applied to light-weight doors and windows that can be mounted on the upright or fixed frame and to the sash or mobile frame using hinges of the type known as "face-mounted hinges".

[0015] The solution described herein may, however, be extended to other types of hinges without thereby limiting the scope of the inventive concept.

[0016] Thus, the hinge 1 may essentially comprise:

- a first hinge body 2, herein referred to as bottom hinge body, having first housings 3 for accommodating first means 4 for fastening the first hinge body 2 to a fixed door or window frame (not illustrated);
- a second hinge body 5, herein referred to as upper hinge body, having second housings 6 for accommodating second means 7 for fastening the second hinge body 5 to a mobile door or window frame (also not illustrated); and
- a hinge pin 8 that can be inserted into respective holes 9, 10 made in the two hinge bodies 2 and 5.

[0017] Besides these three basic parts, the hinge 1 is also characterised at least by:

- the pin 8 having a second portion 8b, housed in the second, upper hinge body 5, that is offset (see axis Z1 in Figures 7 and 8) from a first portion 8a housed in the first hinge body 2;
- means 12 formed on the pin 8 and acting between the second portion 8b of the pin 8 and the second hinge body 5 in such a way as to adjust the second hinge body 5 relative to the first hinge body 2 in a first axis X and in a second axis Y, respectively parallel and perpendicular to the plane P of the door or window (see broken line in Figures 2 and 3);
- actuating means 13 positioned on the first hinge body 2, acting on the first portion 8a of the pin 8, and designed to release the adjustment means 12 so that the pin 8 can be moved and thus adjusted and to lock the adjustment means 12 so that the pin 8 is held in the new position it has adopted.

[0018] In particular, these actuating means 13 also constitute means for adjusting the hinge 1 in a vertical axis Z, that is to say, lengthways along the pin 8, so as to vary the relative axial distance D between the first hinge body 2 and the second hinge body 5.

[0019] In addition to the above, the hinge 1 also comprises a bush 11, defining anti-friction means, positioned between the hole 10 in the second hinge body 5 and the respective second portion 8b of the pin 8 housed in it.

[0020] In practice, therefore, the hinge 1 can be adjusted in all three axes X, Y, Z without having to remove any of the hinge components.

[0021] In the non-restricting embodiment illustrated in the drawings purely by way of example, the first hinge body consists of a prismatic element 2, with a substantially U-shaped cross section, having a flat outside surface 2a abutting against the fixed frame.

[0022] The first, transversal through housings 3 are made in this prismatic element 2 and are designed to accommodate the first means 4 for fastening the prismatic element 2 itself to the face of the fixed frame.

[0023] The first fastening means 4 may be screws (drawn in dashed line style), that are positioned partly inside the element 2, are attached to the fixed frame, and do not interfere with the hole, 9 which accommodates the pin 8 thanks to countersunk recesses 2v made in the element 2 itself (as clearly shown in Figure 4).

[0024] The prismatic element 2 is also fitted with the means 13 for actuating the adjustment means 12.

[0025] As illustrated also in Figures 5 and 6, the second hinge body consists of cylindrical element 5 having the through hole 10 and a flap 20 designed to be coupled to the mobile frame by a free end of it 21. The free end 21 is formed into a tubular shape (the shape depending on the shape of the frame profile) for slidably coupling with a matching profile inside the mobile frame. The free end 21 also has the second housings 6 for accommodating the second fastening means 7 (consisting of screws, drawn in dashed line style in Figure 6).

[0026] The cylindrical element 5, too, is fastened by screwing the screws 7, from the front and transversally of the shaped free end 21, these screws remaining flush with the surface of the free end 21 itself thanks to the outside countersunk recesses 21v.

[0027] The hole 10 in the cylindrical element 5 accommodates the bush 11 and the second portion 8b of the pin 8 that is offset from the first portion 8a.

[0028] Looking more closely at the technical details of the innovative aspects of the solution, the adjustment means 12 comprise a plurality of notches 14 or radial protrusions uniformly distributed around the first portion 8a of the pin 8 (see Figures 7 to 9) in the vicinity of a circular plate 15 separating the two portions 8a and 8b of the pin 8.

[0029] These radial protrusions 14 can be accommodated in respective radial grooves 16 made at the top end of the first hinge body 8a, inside the hole 9 that houses the pin 8, in such a way that, during use, the pin 8 itself can be turned so that the second portion 8b of the pin 8 moves from one to another of two or more separate, firm adjustment positions: the eccentricity of the second portion 8b of the pin 8 thus makes it possible to vary the position of the second hinge body 5 relative to the first hinge body 2 in the two axes X and Y.

[0030] As shown in Figure 4, the radial grooves 14 in the first hinge body 2 extend for the full length of the hole 9 in the first hinge body 2, giving the cross-section of the hole 9 itself the shape of a "star".

[0031] The detail in Figure 8 shows how the radial protrusions 14 extend along the first portion 8a of the pin 8, starting from the circular separating plate 15, for a length at least equal to the maximum variation of the axial distance D between the first and the second hinge bodies

2 and 5 that can be imparted by lifting to adjust the first portion 8a of the pin 8 using the actuating means 13 (described below): thus, the connection between protrusions 14 and grooves 16 is maintained irrespective of variations in the distance D.

[0032] As illustrated in Figure 9, each radial protrusion 14 is positioned, relative to the protrusion 14 before or after it, at an angle α which, in the non-restricting embodiment illustrated by way of example, is equal to 45°: this enables adjustment to the aforementioned separate positions simultaneously in the axes X and Y by turning the pin 8 at least through the angle α.

[0033] At the hinge 1 production stage, the angular interval between two radial protrusions 14 may be more or less than 45° depending on the specific adjustment features to be implemented. Figures 8 and 9 also show that each of the radial protrusions 14 has an arc-shaped cross section and is bevelled at its free end 14a, opposite the circular plate 15, so that the protrusions 14 match the shape of the first portion 8a of the pin 8 and slide smoothly and securely into place once adjusted.

[0034] As a quick visual reference showing the position adopted by the pin 8 at any stage, one of the radial protrusions, labelled 14b in the drawing, has a quadrangular cross section allowing the position of the second portion 8b of the pin 8 to be quickly identified.

[0035] The above mentioned means 13 for actuating the adjustment means 12 comprise a grub screw 13g that is screwed into the hole 9 of the first hinge body 2 at the bottom end of the first hinge body 2.

[0036] In practice, the grub screw 13g is inserted from the bottom end of the first hinge body 2 so as to thread the bottom part of the hole 9 (see Figure 4) with the star-shaped cross section.

[0037] The grub screw 13g is thus positioned in contact with the bottom end of the first portion 8a of the pin 8 and can be screwed in/out of the hole 9 (see arrows F, Figures 2 and 4) in order to:

- lift the pin 8 (arrow F1) along the vertical axis Z, Z1 to release the radial protrusions 14 from the grooves 16 in such a way that the second portion 8b can be turned (arrow F2) to adjust it in the two axes X and Y; and
- lower the pin 8 (arrow F3) to lock it in the new position it has been adjusted to.

[0038] As illustrated in Figure 7, the bottom end of the first portion 8a of the pin 8 has a recess 17 for contact with the grub screw 13g: this avoids excessive friction during adjustment of the pin 8.

[0039] Lastly, the bush 11 has a tooth 18 that protrudes radially from the outside surface of the bush 11, extends for the full length of the bush 11 and can be slotted into a matching radial groove 19 made in the hole 10 in the second hinge body 5 so as to hold the bush 11 firmly inside the hole 10: the bush 11 thus constitutes an anti friction element between the pin 8 and the second hinge body 5 to further facilitate adjustment by the turning of the pin 8.

[0040] A hinge made in this way is applied, in pairs, to the door or window by fastening the first and second hinge bodies 2 and 5 to the fixed frame and to the mobile frame which can then turn relative to each other on the hinge pin 8.

[0041] Once fitted, the installer can check that the mobile frame or sash is correctly positioned relative to the fixed frame, adjusting as necessary in the three axes X, Y and Z by turning the grub screw 13g.

[0042] Lifting the pin 8 by turning the grub screw 13g releases the protrusions 14 from the grooves 16 and allows the installer to turn the pin 8 in either direction in such a way as to adjust the second hinge body 5 relative to the first hinge body 2 in the two axes X and Y by moving it into one of the defined adjustment positions.

[0043] Once the required position has been found, the installer turns the grub screw 13g once again to snap the protrusions 14 back into the grooves 16, thereby locking the pin 8 in the new position.

[0044] If necessary, the pin 8 may be lowered only partly so as to adapt the position of the mobile frame in height, too; in other words, turning the grub screw 13g also makes it possible to vary the axial distance D between the two hinge bodies 2 and 5.

[0045] A hinge made as described above achieves the aforementioned aims thanks to a combination of extremely simple, easy to use components, that do not require major structural changes to the basic components of the hinge: the solution according to the invention can thus be applied to different types of hinges.

[0046] Adjustment is accurate and sure and can be performed quickly after installing the door or window and saves time and effort because there is no need to remove and refit the door or window.

[0047] 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. An adjustable hinge for doors and windows, the hinge (1) being of the type comprising:

   - a first, bottom hinge body (2) having first housings (3) for accommodating first means (4) for fastening the first hinge body (2) to a fixed door or window frame;
   - a second, upper hinge body (5) having second housings (6) for accommodating second means (7) for fastening the second hinge body (5) to a mobile door or window frame;
   - a hinge pin (8) that can be inserted into respec-

tive holes (9, 10) made in the first hinge body (2) and second hinge body (5); the hinge (1) being characterised at least by:

- the pin (8) having a second portion (8b), housed in the second, upper hinge body (5), that is offset from a first portion (8a) housed in the first hinge body (2);
- means (12) formed on the pin (8) and acting at least between the second portion (8b) of the pin (8) and the second hinge body (5) in such a way as to adjust the second hinge body (5) relative to the first hinge body (2) in a first axis (X) and in a second axis (Y), respectively parallel and perpendicular to the plane of the door or window;
- actuating means (13) positioned on the first hinge body (2), acting on the first portion (8a) of the pin (8), and designed to release the adjustment means (12) so that the pin (8) can be moved and thus adjusted, and to lock the adjustment means (12) so that the pin (8) is held in the new position it has been adjusted to.

2. The hinge according to claim 1, **characterised in that** it further comprises a bush (11) positioned between the hole (10) in the second hinge body (5) and the respective second portion (8b) of the pin (8) housed in it.

3. The hinge according to claim 1, **characterised in that** the actuating means (13) also constitute means for adjusting the hinge (1) in a vertical axis (Z), that is to say, lengthways along the pin (8), so as to vary the relative axial distance (D) between the first hinge body (2) and the second hinge body (5).

4. The hinge according to claim 1, **characterised in that** the adjustment means (12) comprise a plurality of notches or radial protrusions (14) uniformly distributed around the first portion (8a) of the pin (8) in the vicinity of a circular plate (15) separating the two portions (8a, 8b); these radial protrusions (14) being able to slot into respective radial grooves (16) made at least at the top end of the first hinge body (8a), inside the hole (9) that houses the pin (8), so as to define two or more separate, firm adjustment positions of the second portion (8b) of the pin (8).

5. The hinge according to claim 4, **characterised in that** the radial grooves (14) in the first hinge body (2) extend for the full length of the hole (9) in the first hinge body (2), giving the cross-section of the hole (9) itself the shape of a "star".

6. The hinge according to claim 1 to 4, **characterised in that** the actuating means (13) comprise a grub screw (13g) that is screwed into the hole (9) in the first hinge body (2) at the bottom end of the first hinge body (2); the grub screw (13g) being positioned in contact with the bottom end of the first portion (8a) of the pin (8) so that it can be screwed in/out of the hole (9) in order to: lift the pin (8) along the vertical axis (Z) to release the radial protrusions (14) from the grooves (16) in such a way that the second portion (8b) can be turned to adjust it in the two axes (X, Y); and lower the pin (8) to lock it in the new position it has been adjusted to.

7. The hinge according to claim 6, **characterised in that** the bottom end of the first portion (8a) of the pin (8) has a recess (17) for contact with the grub screw (13g).

8. The hinge according to claims 4 to 6, **characterised in that** the radial protrusions (14) extend along the first portion (8a) of the pin (8), starting from the circular separating plate (15), for a length at least equal to the maximum variation of the axial distance (D) between the first hinge body (2) and the second hinge body (5) that can be defined by lifting to adjust the first portion (8a) of the pin (8) using the grub screw (13g).

9. The hinge according to claims 4 to 8, **characterised in that** each radial protrusion (14) is positioned at an angle (α) relative to the protrusion (14) before or after it.

10. The hinge according to claims 4 to 9, **characterised in that** each radial protrusion (14) has an arc-shaped cross section and is bevelled at its free end (14a), opposite the circular plate (15), so as to match the shape of the first portion (8a) of the pin (8).

11. The hinge according to claims 4 to 10, **characterised in that** one of the radial protrusions (14b) has a quadrangular cross section to provide a reference indicating the position of the second portion (8b) of the pin (8).

12. The hinge according to claim 2, **characterised in that** the bush (11) has a tooth (18) that protrudes radially from the outside surface of the bush (11), extends for the full length of the bush (11) and can be slotted into a matching radial groove (19) made in the hole (10) in the second hinge body (5) so as to hold the bush (11) firmly inside the hole (10) to stop it from turning.

13. The hinge according to claim 1, where the first hinge body consists of a prismatic element (2) having a flat outside surface (2a) abutting against the fixed door or window frame and has formed in it the first, transversal through housings (3) that accommodate the first means (4) for fastening the prismatic element (2) itself to the face of the fixed door or window frame,

the hinge being **characterised in that** the actuating means (13) are positioned on the prismatic element (2).

14. The hinge according to claims 1 and 2, where the second hinge body consists of cylindrical element (5) having the through hole (10) and a flap (20) designed to be coupled to the mobile door or window frame by a free end of it (21), the latter being formed into a tubular shape for slidably coupling with a matching profile inside the mobile door or window frame; the shaped end (21) having formed in it the second housings (6) that accommodate the second fastening means (7), the hinge being **characterised in that** the bush (11) and the second pin (8) portion (8b), which is offset from the first portion (8a), are housed in the cylindrical element (5).

FIG.1

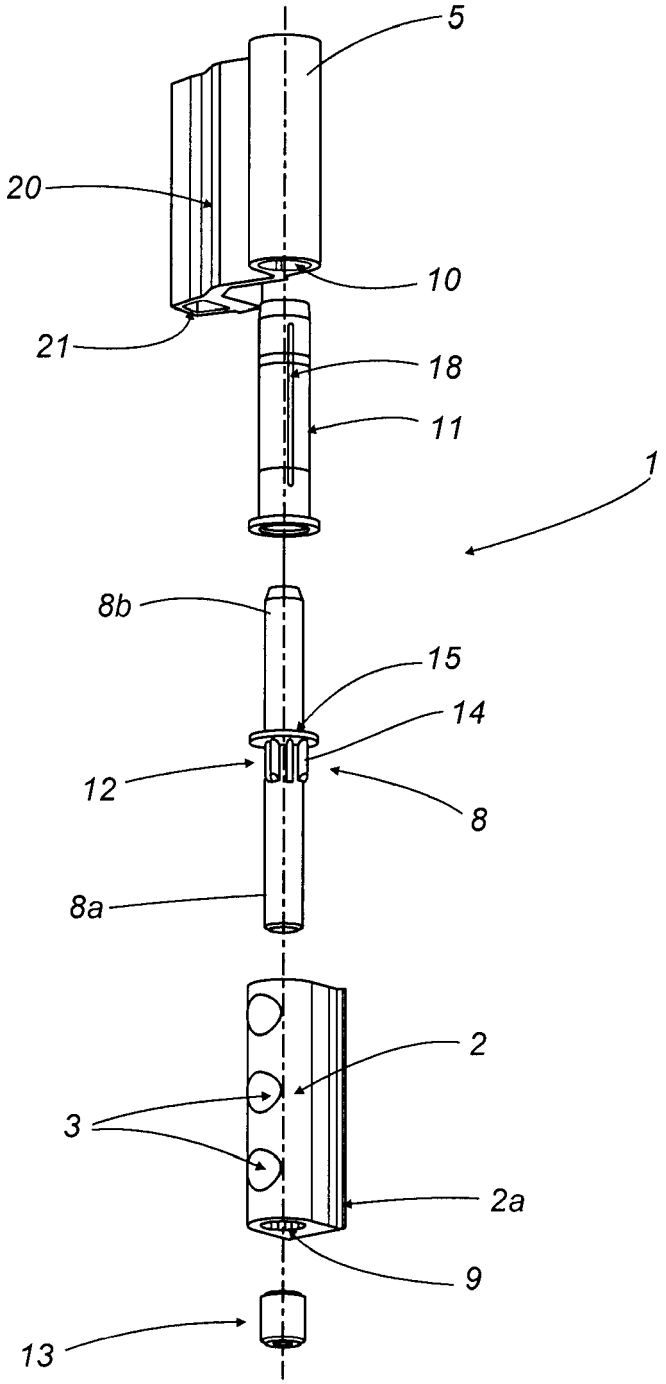


FIG.2

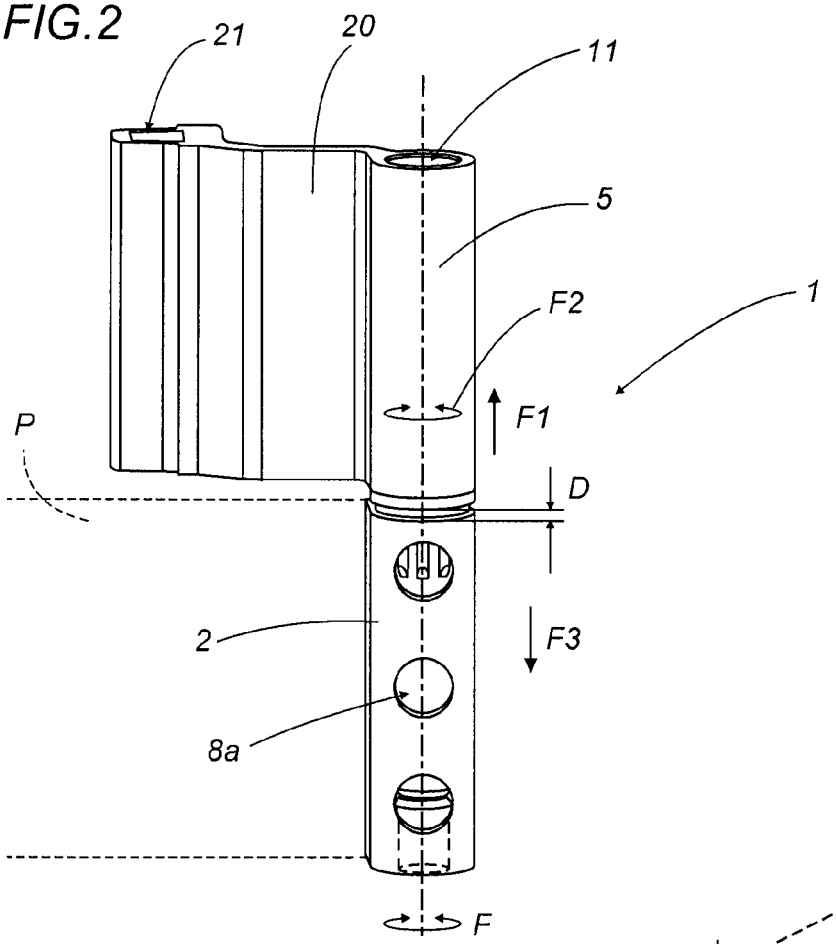


FIG.3

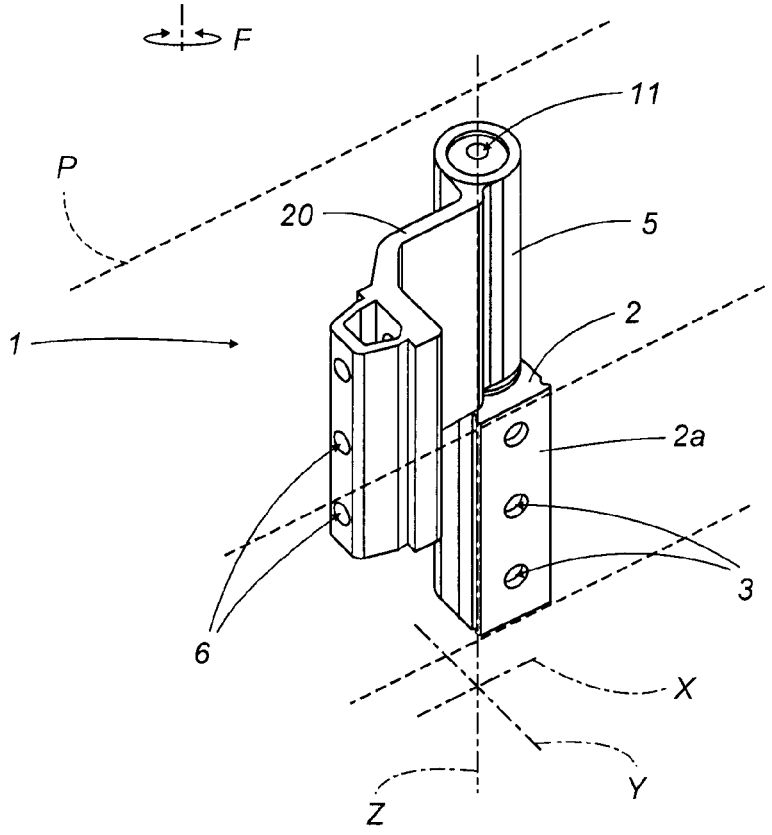


FIG.4

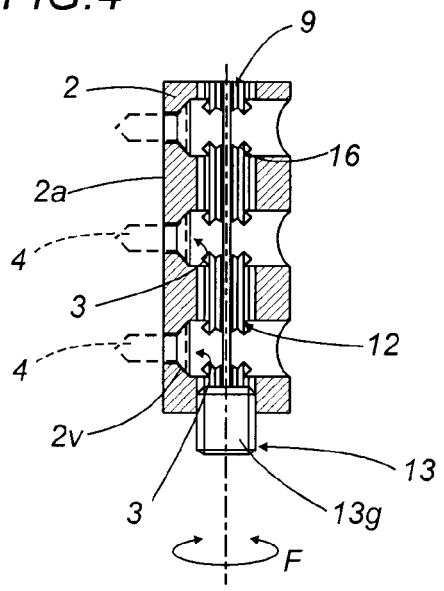


FIG.5

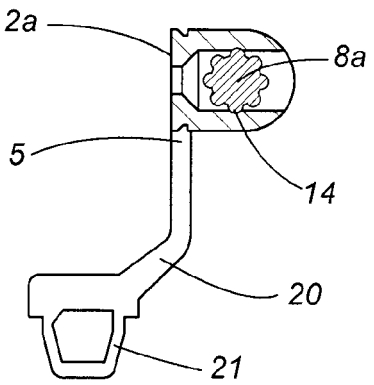


FIG.6

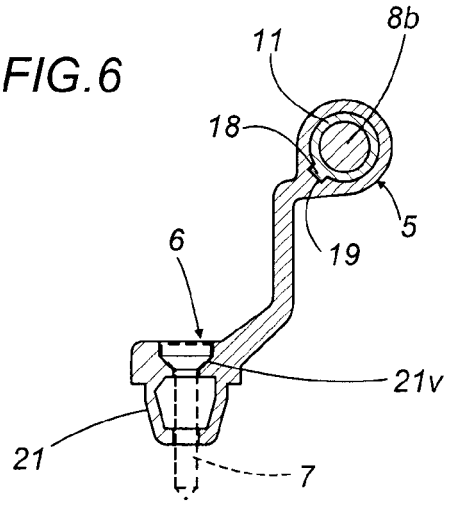


FIG.7

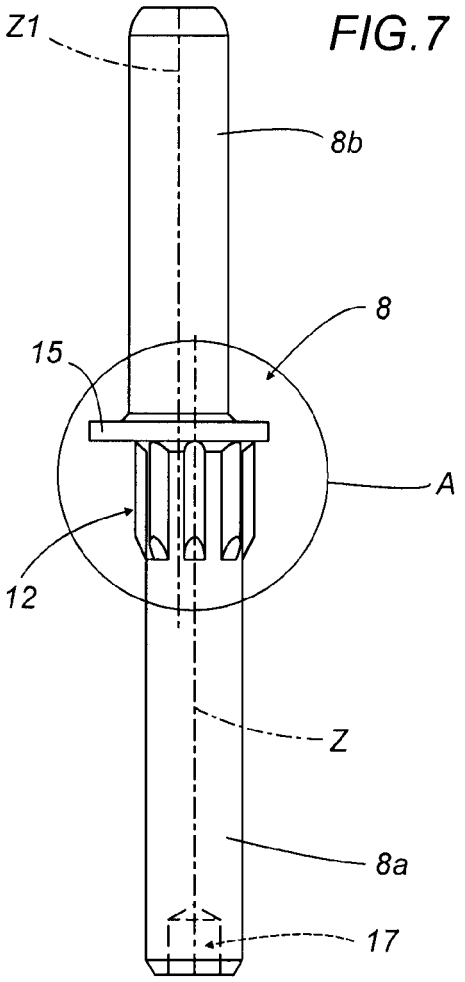


FIG.8

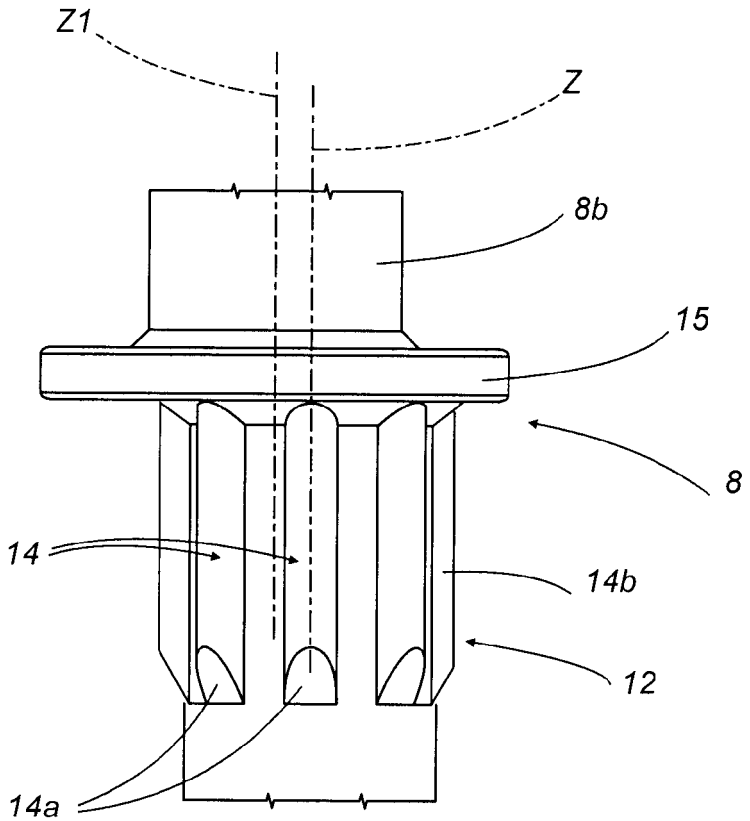
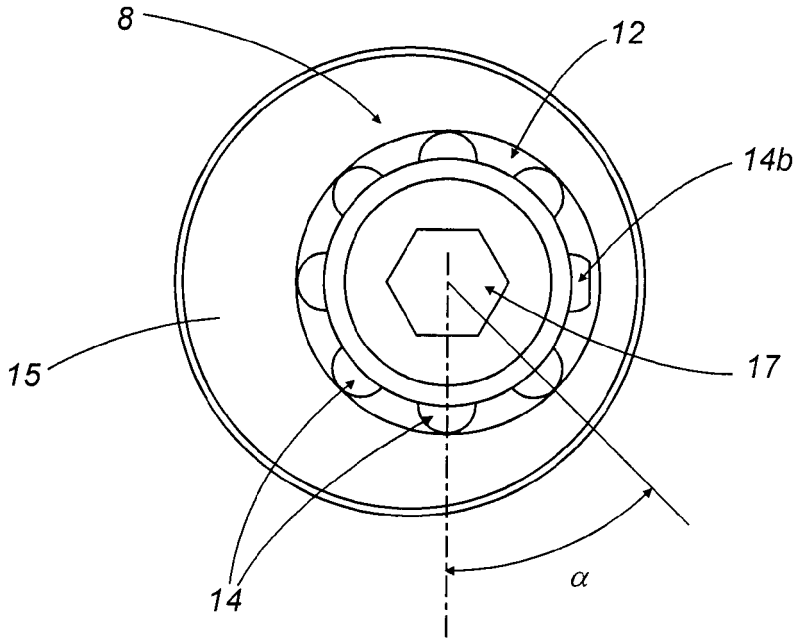


FIG.9



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EUROPEAN SEARCH REPORT

Application Number
EP 05 11 1804

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 393 480 A (* WINDOW FABRICATION & FIXING SUPPLIES LIMITED) 31 March 2004 (2004-03-31)	1,3-5	INV. E05D7/00
Y	* page 3, line 13 - page 5, line 12; claims 1-14; figures 1-7 *	2	
A	* figures 1-7 *	6-14	

X	FR 2 031 722 A (MENUISERIE METAL MODERNE) 20 November 1970 (1970-11-20)	1-5	
Y	* page 3, line 6 - page 5, line 34; claim 1; figures 1-6 *	2	

X	EP 1 405 975 A (STEINBACH & VOLLMANN GMBH & CO. KG) 7 April 2004 (2004-04-07)	1-3	
A	* paragraph [0023] - paragraph [0028]; figures 1-4 *	4-14	

X	GB 720 959 A (CARL LUDVIG CARLSTROEM; BROR LENNART JONSSON) 29 December 1954 (1954-12-29)	1	
A	* the whole document *	2-14	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
Munich	22 March 2006	Balice, M

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82