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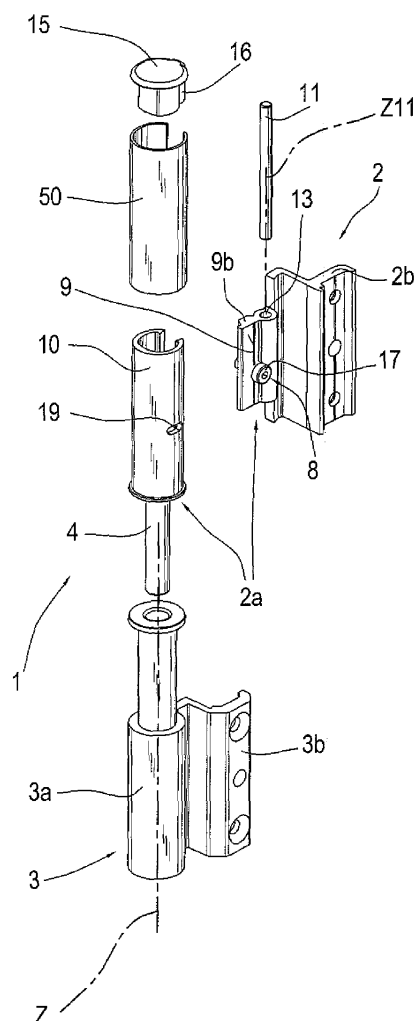
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(54) **An adjustable hinge for doors and windows**

(57) An adjustable door hinge comprises: a first hinge body (2) and a second hinge body (3) having respective outside portions (2a, 3a) for engaging a hinge pin (4) defining a vertical rotation axis (Z) for a mobile frame (5) of the door/window (6); means for adjusting the mobile frame (5) relative to the fixed frame (7) along an axis (X) parallel to the vertical plane of the door/window (6) and being positioned and operative on the hinge body (2) associated with the mobile frame (5), the outside portion (2a) of one of the hinge bodies (2) being divided into an appendage (9) integral with, and projecting from, the portion (2b) or flap to be fastened to the door/window (6) and a tubular bushing or cartridge (10) at least partly encompassing the appendage (9) and stably associated with the hinge pin (4) at one end of it; a cartridge (10) pivoting pin (11) having an axis (Z11) parallel to the rotation axis (Z) and housed in respective coaxial holes (12, 13) in the cartridge (10) and in the appendage (9); means (8) are provided between the cartridge (10) and the appendage (9) and act between the same in such a way as to move the mobile frame (5) in both directions along the axis (X) parallel to the vertical plane of the door/window (6), while keeping the cartridge (10) and the respective cylindrical portion (3a) of the other hinge body (3) coaxially coincident by rotating the cartridge (10) about the axis (Z11) of the pivoting pin (11).

FIG.1



Description

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

[0002] The invention relates, in particular, to hinges of medium - to heavy-duty type, that is to say, strong enough to support door and window units of considerable weight.

[0003] Another important feature of these hinges is that they must permit precise adjustment so as to better adapt the position of the mobile frame of the door/window unit relative to the fixed frame after the unit has been assembled.

[0004] Structurally, these hinges normally consist of:

- two hinge bodies, usually of aluminium or aluminium alloy, attachable to the mobile and fixed frames of the door/window unit; and
- a steel hinge pin that can be inserted into respective through holes in the two hinge bodies with interposed centring bushes (usually made of self-lubricating plastic); at the centre of the hinge pin there is a collar, made as a single piece with the hinge pin itself, and larger in diameter than the through holes in the hinge bodies so as to prevent the pin from coming out of the holes in the hinge bodies (an example of a hinge for a heavy door unit is also described in patent IT-1.221.237 to the same Applicant as this invention).

[0005] Each hinge body comprises a cylindrical tubular portion, or socket, and portions or flaps for fastening to the door/window using any of several well-known kinds of fastening means, such as screws for fastening the hinge flaps to the frame members or plugs housed in suitable grooves to abut the flap portion of the hinge body through drive means (all these solutions being well known).

[0006] The bushes usually consist of a cylindrical element closed at one end and a collar located at the open end which rests against the outer cylindrical surface of the hinge body.

[0007] Starting from a hinge structure of this type, several solutions have been devised to permit the above mentioned adjustments of the mobile frame relative to the fixed frame so as to facilitate door/window assembly and achieve trouble-free door/window operation.

[0008] These adjustments, acting on the mobile frame, 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/window frame (axis X).

[0009] The adjustment in the axis X is performed (as described for example in patent EP 992.647 to this Applicant) using the bush located in the "female" portion of the hinge (that is, on the upper hinge body associated with the mobile frame).

[0010] This bush has an outer radial protrusion that

engages in a matching notch made in the inside surface of the hole in the hinge body so as to form a pivot point that allows a pendular movement of the bush in both directions as one with the pin it accommodates, this pendular movement being produced by an adjustment device actuated from the outside of the hinge body.

[0011] The adjustments in the axes Z and Y, on the other hand, are usually performed at the lower (or "male") portion of the hinge body, that is to say, the portion nearest the ground or floor.

[0012] Although on the one hand these adjustments have greatly improved the operation and durability of the mobile part of the door/window unit, on the other hand, in particular the "lateral" adjustment in the axis parallel to the vertical plane of the door/window (axis X) always creates an offset between the two cylindrical portions or sockets of the hinges (since it involves physically moving the hinge body and the mobile frame) which may often be aesthetically unattractive.

[0013] This invention therefore has for an aim to overcome the above mentioned disadvantages by providing an adjustable hinge for doors and windows that is constructionally simple, while having all the technical adjustment features of prior art hinges and offering the possibility of making adjustments that allow the aesthetic quality of the hinge assembly to be maintained at a high standard, that is to say, reducing and/or eliminating the offset between the two cylindrical portions or sockets of the hinges.

[0014] Another aim of the invention is to provide an adjustable hinge structure suitable for different door/window styles and offering the possibility of maintaining, in particular, the optimum functionality and durability of the hinge assembly. According to this invention, the above aim is achieved by a hinge, in particular an adjustable hinge for doors and windows comprising the technical characteristics set out in one or more of the appended claims.

[0015] 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 non-limiting example embodiment of the invention, 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 exploded view of a second embodiment of the adjustable hinge for doors and windows;
- Figure 3 is a perspective view of the hinge of Figure 1 in an assembled configuration;
- Figure 4 is a perspective view of a detail of the hinge of Figure 1, showing in particular a bush or cartridge and a hinge pin;
- Figures 5, 6 and 7 are all top plan views, with some

parts cut away and others in cross section to better illustrate certain details, showing the hinge of Figure 1 mounted on a door/window and respectively in three different positions that can be adopted by the mobile frame along an axis parallel to the plane of the door/window;

- Figures 8, 9 and 10 are all top plan views, with some parts cut away and others in cross section to better illustrate certain details, showing the hinge of Figure 2 mounted on a door/window and respectively in three different positions that can be adopted by the mobile frame along an axis parallel to the plane of the door/window.

[0016] With reference to the accompanying drawings, in particular Figures 1 to 3, the adjustable hinge according to the invention is used preferably but not exclusively for doors and windows 6 of medium to heavy type (that is to say, exterior doors, doors or windows separating communicating rooms, etc.).

[0017] This hinge, denoted in its entirety by the numeral 1, basically comprises: a first hinge body 2 and a second hinge body 3 having respective outside portions 2a, 3a for engaging a hinge pin 4 defining a vertical rotation axis Z for a mobile frame 5 of the door/window 6.

[0018] Each of the hinge bodies 2 and 3 also has a respective portion 2b, 3b or flap for fastening to the mobile frame 5 and to a fixed frame 7 of the door/window 6, respectively.

[0019] The flap may have any of several different forms, depending on the hinge style, whether for medium or heavy duty, face-mounted or groove-mounted, etc. without thereby limiting the scope of the inventive concept.

[0020] Means are also provided for adjusting the mobile frame 5 relative to the fixed frame 7 along an axis X parallel to the vertical plane of the door/window 6, these means being positioned and operative on the hinge body, labelled 2, associated with the mobile frame 5.

[0021] These adjustment means are described in more detail below.

[0022] Looking more closely at the details, still with reference to Figures 1, 2 and 3, the outside portion 2a of the hinge body 2 associated with the mobile frame 5 is divided into:

- an appendage 9 integral with, and projecting from, the portion 2b or flap to be fastened to the door/window 6;
- a tubular bushing or cartridge 10 at least partly encompassing the appendage 9 and stably associated with the hinge pin 4 at one end of it;
- a cartridge 10 pivoting pin 11 having an axis Z11 parallel to the rotation axis Z and housed in respective coaxial holes 12, 13 in the cartridge 10 and in the appendage 9.

[0023] In addition to the above, means 8 are provided

between the cartridge 10 and the appendage 9 and act between the same (thereby constituting a part of the above mentioned adjustment means) in such a way as to move the mobile frame 5 in both directions along the axis X parallel to the vertical plane of the door/window 6: this adjustment movement does not affect the cartridge 10 (in the translational sense) which continues to coincide axially with the respective cylindrical portion 3a of the other hinge body 3 thanks to the rotation of the cartridge 10 about the axis Z11 of the pivot pin 11.

[0024] In other terms, the cartridge 10, as will become clearer as this description continues, forms part of the above mentioned adjustment means, acting as an abutment for adjusting the hinge body 2 along the axis X (being integral with the hinge pin 4) while, however, continuing to coincide with the tubular part of the other hinge body 3 thanks to its shape and the fact that it is pivotally mounted by the pivoting pin 11.

[0025] Looking more closely at the constructional details, with reference also to Figures 4 to 10, the appendage 9 is composed of: a first part 9a, with the cylindrical hole 13 for housing the pivoting pin 11, close to the zone adjoining the portion or flap 2b, and a second part 9b defining an uninterrupted extension of the first part 9a and tapering towards the free end.

[0026] The cartridge 10 (see Figure 4 in particular) is made of metallic material and has a first, closed end provided with a first, central hole 14 for stably engaging the hinge pin 4, and the above mentioned second hole 12, offset relative to the first hole 14 and designed to house a portion of the pivoting pin 11.

[0027] In turn, the hinge pin 4 cylindrical portion 4a associated with the cartridge 10 has a rough outside surface designed to allow the pin 4 to be made integral with the cartridge 10: that way, the movement of the hinge body 2 and of the mobile frame 5 along the axis X is isolated from the hinge pin 4 by the cartridge 10.

[0028] Still with reference to Figures 4 to 10, the cartridge 10 is open lengthways to form a C section in such a way that, in use, the free ends of the C section are near the projecting appendage 9 to surround the appendage 9 on two sides.

[0029] The spacing D between the two opposite free ends of the cartridge 10 is greater than the thickness S of the appendage 9: that means the cartridge 10 can rotate about the axis Z11 during adjustment in the axis X (see Figures 5 and 8).

[0030] The cartridge 10 also has a cap 15 for closing its second, free end (see Figures 1 and 2). The cap 15 is provided with a slot 16 for accommodating the top end of the pivoting pin 11 protruding from the cylindrical holes 13 made in the appendage 9.

[0031] In a first embodiment illustrated in Figures 1 and from 5 to 7, the drive means 8 comprise a grub screw 17 screwed into a hole 18 passing transversally through the second, extension part 9b of the appendage 9.

[0032] The grub screw 17 is in contact with, and bilaterally abuts, the inside cylindrical surface of the cartridge

10.

[0033] The cartridge 10 in turn has a through slot 19 designed to enable the grub screw 17 to be driven from the outside (using a suitable tool), in such a way as to obtain a movement of the mobile frame 5 along the axis X parallel to the vertical plane of the door/window 6 by pushing the inside abutting surface of the cartridge 10 in both directions in such a way as to shift the appendage 9 and the flap 2b of the hinge body 2, together with the mobile frame 5 (see arrows F5) and simultaneously rotate the cartridge 10 about the rotation axis Z11 of the pivoting pin 11 (see arrows F10).

[0034] In other words, screwing or unscrewing the grub screw 17 in the hole 18 causes a translational movement of the appendage 9 and flap 2b, since the grub screw 17 is in contact with the cartridge 10 on two sides. This movement creates a pushing action on the cartridge 10 which is thus forced to turn thanks to the constraint provided by the pivoting pin 11 (being unable to move translationally in that it is integral with the hinge pin 4), thereby contributing to the translational movement of the appendage 9 (see three different distances X1, X2 and X3 in Figures 5, 6 and 7): that way, the cartridge 10 remains at all times coaxial with the rotation axis Z of the door/window and thus also with the cylindrical portion 3b of the other hinge body 3.

[0035] In view of the presence of a through slot on it, the cartridge 10 may be covered by a cylindrical covering element 50 fitted round the cartridge 10 itself.

[0036] Figures 2 and 8 to 10 illustrate a second embodiment of the adjustment means 8.

[0037] In this embodiment, the adjustment means 8 comprise a rotatable half-bush 20 internally interposed between the cartridge 10 and the free end of the appendage 9 which has a cylindrical enlarged portion 21.

[0038] The half-bush 20 has a V-shaped section whose vertex engages the enlarged end portion 21 of the appendage 9 to define a further pivot for rotating the half-bush 20 and pushing the appendage 9.

[0039] The half-bush 20 has a front surface 20a for contact with an inside surface of the cartridge 10. The front surface 20a is provided with teeth 22 that mesh with matching grooves 23 in the cartridge 10. The grooves 23 are greater in number than the teeth 22 in such a way as to permit the stepwise adjustment along the axis X by moving the half-bush 20 and stably engaging the grooves 23.

[0040] In this embodiment, therefore, adjustment is accomplished in steps in both directions (see distances X4, X5 and X6 in Figures 8 to 10) by inserting a key from the outside into sockets made in the half-bush 20 and forcing the half-bush to turn (arrows F5) so that it disengages from the initial grooves 23 and snaps into the grooves 23 before or after them on the cartridge 10, and turns around the end 21 of the appendage 9.

[0041] The movement of the half-bush 20 creates a thrusting action on the appendage 9 that adjusts the cartridge 10 by turning it (see arrows F10) so that it adapts

to and remains coaxial with the axis Z by turning about the axis Z11 of the pivoting pin 11, which is moved translationally with the appendage 9.

[0042] In short, in both cases, the rotation of the cartridge 10 always adjusts to the translation of the hinge body 2 (comprised of appendage 9 and flap 2b), but keeping the cartridge 10 itself coaxial with the cylindrical portion 3b of the other hinge body 3.

[0043] A hinge made as described above fully achieves the above mentioned aims thanks to the subdivision of the components of the cylindrical part of one of the hinge bodies into a projecting appendage and a cylindrical cartridge pivoted to a pin parallel to the axis of rotation.

[0044] These three components, namely cartridge, appendage and pin, together with the means for their relative motion make it possible to obtain adjustment along the axis X but without offsetting the cartridge relative to the cylindrical portion of the other hinge body, thus improving the aesthetic quality of the hinge as a whole.

[0045] The adjustment is maintained at traditional levels of precision and is easy for door/window installers to implement.

[0046] Moreover, the structuring of the hinge is such as to permit extreme adaptability of the solution provided by the invention to several different types of hinges, since the part used for fastening to the door/window frames can be of any type without altering the constructional architecture of the cylindrical portion.

[0047] The invention described above is susceptible of industrial application 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 at least: a first hinge body (2) and a second hinge body (3) having respective outside portions (2a, 3a) for engaging a hinge pin (4) defining a vertical rotation axis (Z) for a mobile frame (5) of the door/window (6); each first and second hinge body (2, 3) having a respective portion (2b, 3b) or flap for fastening, respectively, to the mobile frame (5) and to a fixed frame (7) of the door/window (6); means for adjusting the mobile frame (5) relative to the fixed frame (7) along an axis (X) parallel to the vertical plane of the door/window (6) being positioned and operative on the hinge body (2) associated with the mobile frame (5), the hinge (1) being **characterized in that** the outside portion (2a) of one of the hinge bodies (2) is divided into:

- an appendage (9) integral with, and projecting from, the portion (2b) or flap to be fastened to

- the door/window (6);
- a tubular bushing or cartridge (10) at least partly encompassing the appendage (9) and stably associated with the hinge pin (4) at one end of it;
 - a cartridge (10) pivoting pin (11) having an axis (Z11) parallel to the rotation axis (Z) and housed in respective coaxial holes (12, 13) in the cartridge (10) and in the appendage (9);
 - drive means (8) being operatively located between the cartridge (10) and the appendage (9) in order to move the mobile frame (5) in both directions along the axis (X) parallel to the vertical plane of the door/window (6) by rotating the cartridge (10) about the pivoting axis (Z11) while keeping the cartridge (10) and the respective outside portion (3a) of the other of the two hinge bodies (3) coaxially coincident.
2. The hinge according to claim 1, **characterized in that** the projecting appendage (9) is composed of a first part (9a), with the cylindrical hole (13) for housing the pivoting pin (11), close to the zone adjoining the portion or flap (2b), and a second part (9b) defining an uninterrupted extension of the first part (9a) and tapering towards the free end.
 3. The hinge according to claim 1, **characterized in that** the cartridge (10) has a first, closed end provided with a first, central hole (14) for stably engaging the hinge pin (4), and a second hole (12), offset relative to the first hole (14) and designed to house a portion of the pivoting pin (11).
 4. The hinge according to claim 1, **characterized in that** the cartridge (10) is open lengthways to form a C section in such a way that, in use, the free ends of the C section are near the projecting appendage (9); the spacing (D) between the two opposite free ends being greater than the thickness (S) of the projecting appendage (9).
 5. The hinge according to claim 3, **characterized in that** the cartridge (10) is equipped with a cap (15) for closing its second, free end; said cap (15) being provided with a slot (16) for accommodating the top end of the pivoting pin (11) protruding from one of the cylindrical holes (13) made in the appendage (9) projecting from the hinge body (2).
 6. The hinge according to claim 1, **characterized in that** the drive means (8) comprise a grub screw (17) screwed into a hole (18) passing transversally through the second, extension part (9b) of the projecting appendage (9); said grub screw (17) being in contact with, and bilaterally abutting, the inside cylindrical surface of the cartridge (10).
 7. The hinge according to claim 6, **characterized in that** the cartridge (10) has a through slot (19) designed to enable the grub screw (17) to be driven from the outside, in such a way as to obtain a movement of the mobile frame (5) along the axis (X) parallel to the vertical plane of the door/window (6) by pushing the inside abutting surface of the cartridge (10) in both directions in such a way as to shift the projecting appendage (9) and the flap (2b) of the hinge body (2), together with the mobile frame (5) and to rotate the cartridge (10) about the rotation axis (Z11) defined by the pivoting pin (11).
 8. The hinge according to claim 7, **characterized in that** the cartridge (10) can have a cylindrical covering element (50), or cap, fitted round it.
 9. The hinge according to claim 3, **characterized in that** the hinge pin (4) cylindrical portion (4a) associated with the cartridge (10) has a rough outside surface designed to allow the pin (4) to be made integral with the cartridge (10).
 10. The hinge according to claim 1, **characterized in that** the drive means (8) comprise a rotatable half-bush (20) internally interposed between the cartridge (10) and the free end of the projecting appendage (9) which has a cylindrical enlarged portion (21); the half-bush (20) having a V-shaped section whose vertex engages the enlarged end portion (21) of the projecting appendage (9) to define a further pivot for rotating the half-bush (20) and pushing the projecting appendage (9).
 11. The hinge according to claim 10, **characterized in that** the half-bush (20) has a front surface (20a) for contact with an inside surface of the cartridge (10); said front surface (20a) being provided with teeth (22) that mesh with matching grooves (23) in the cartridge (10) in such a way as to permit the stepwise adjustment through an engaging/disengaging action created by forcing the half-bush (20) to turn around the end (21) of the projecting appendage (9) in order to produce a thrusting action for adjusting the projecting appendage (9) and bringing the cartridge (10) into alignment.
 12. The hinge according to claim 1, **characterized in that** the cartridge (10) is made of a metallic material.

FIG.1

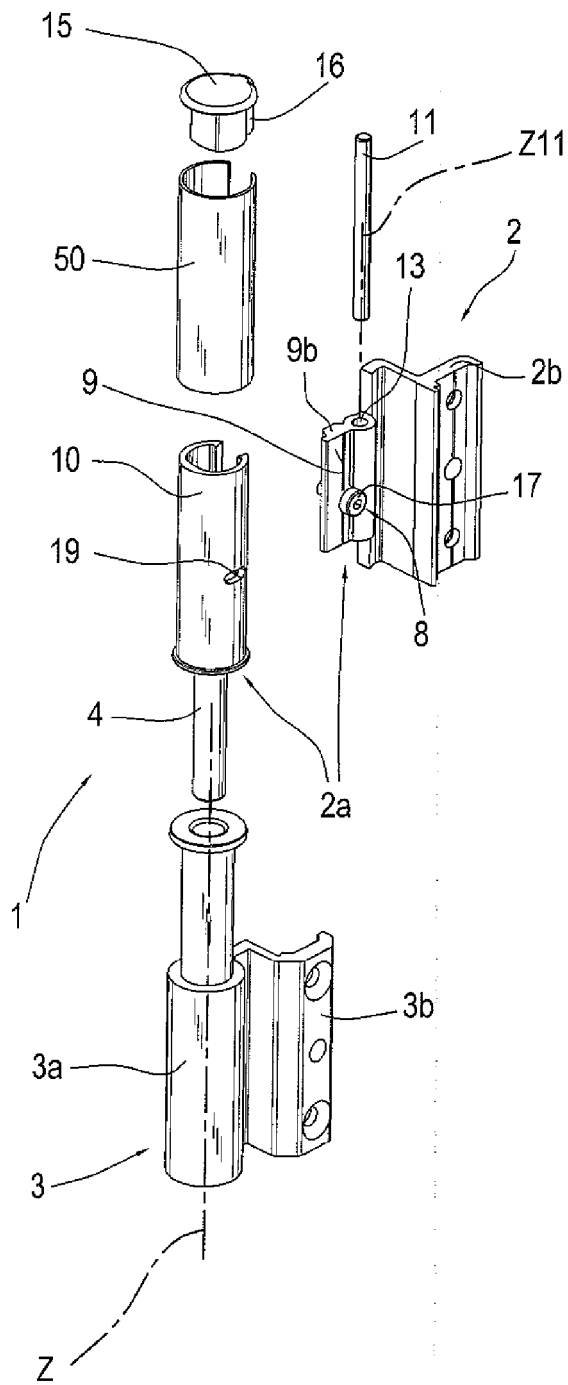


FIG.2

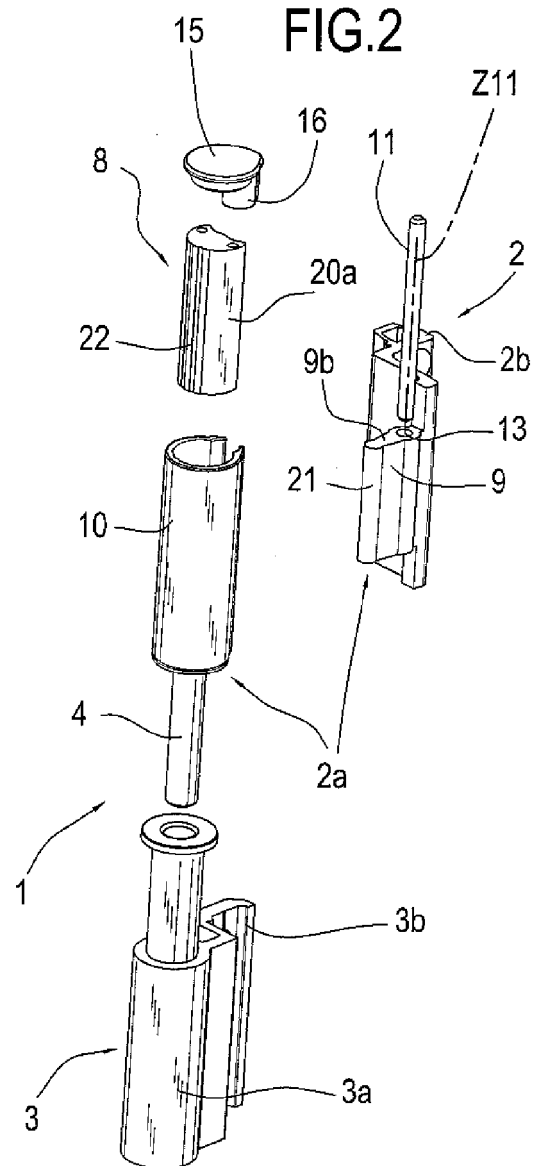


FIG.3

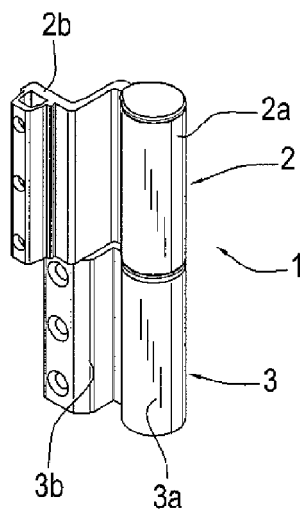


FIG.4

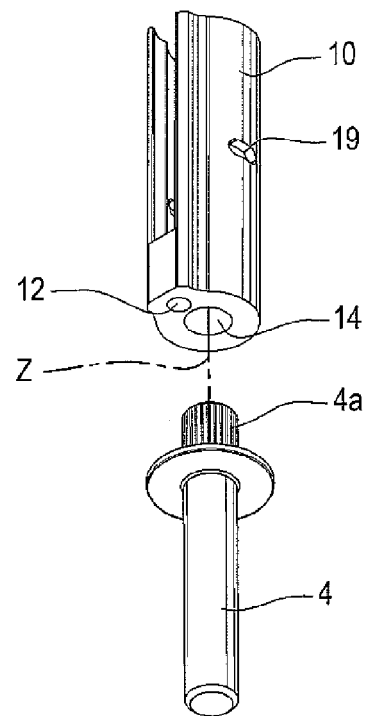


FIG.5

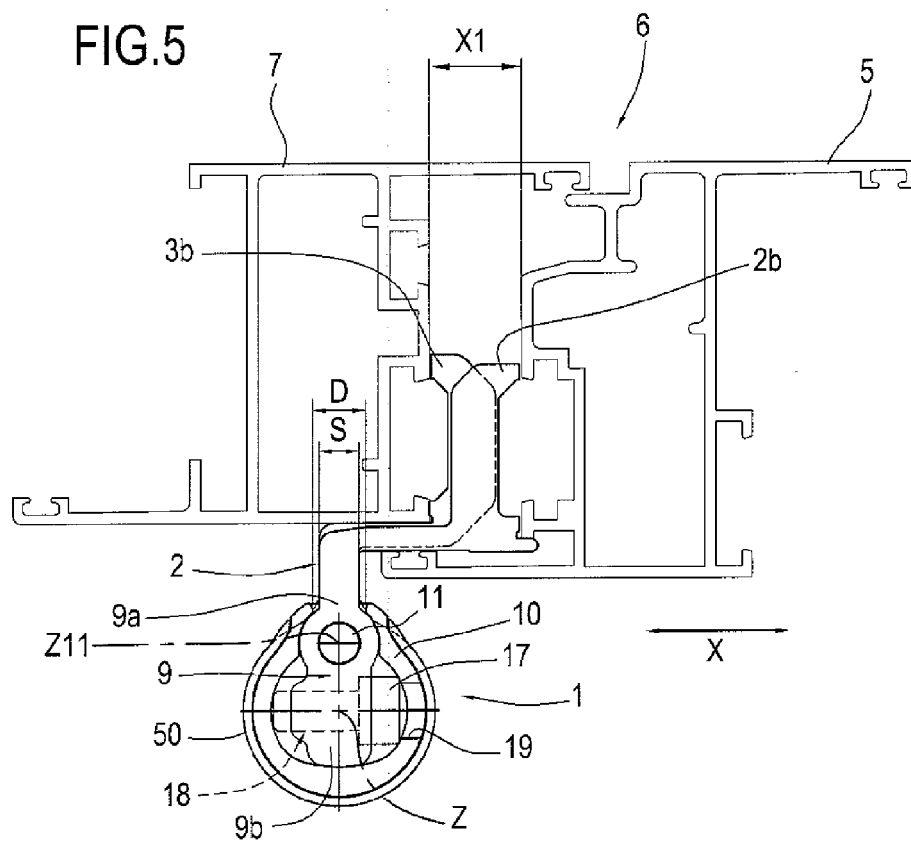


FIG.6

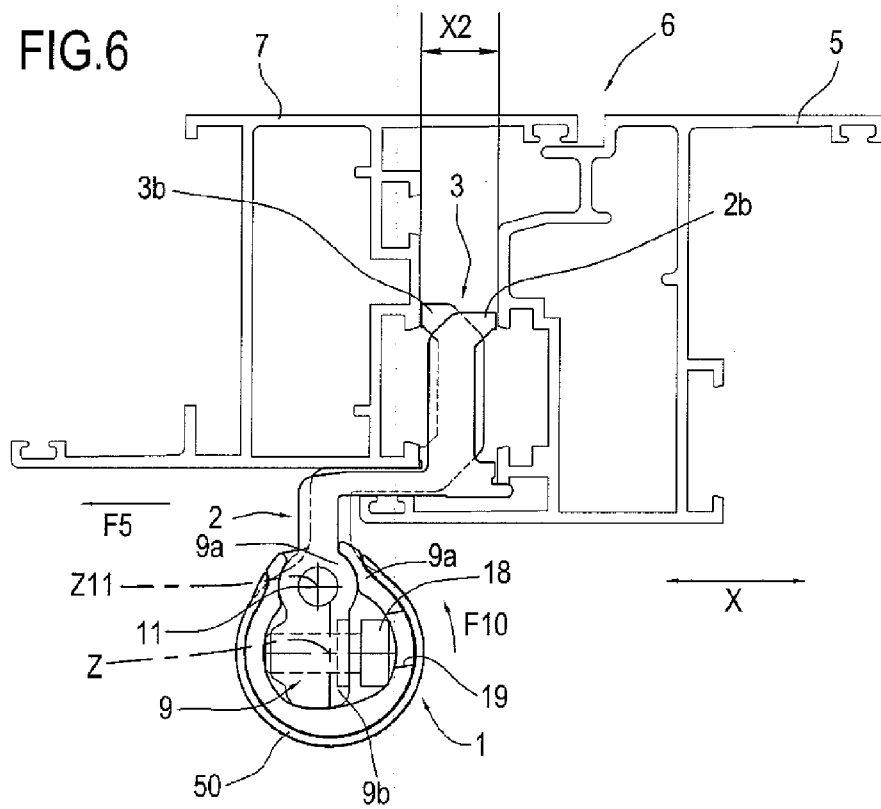


FIG.7

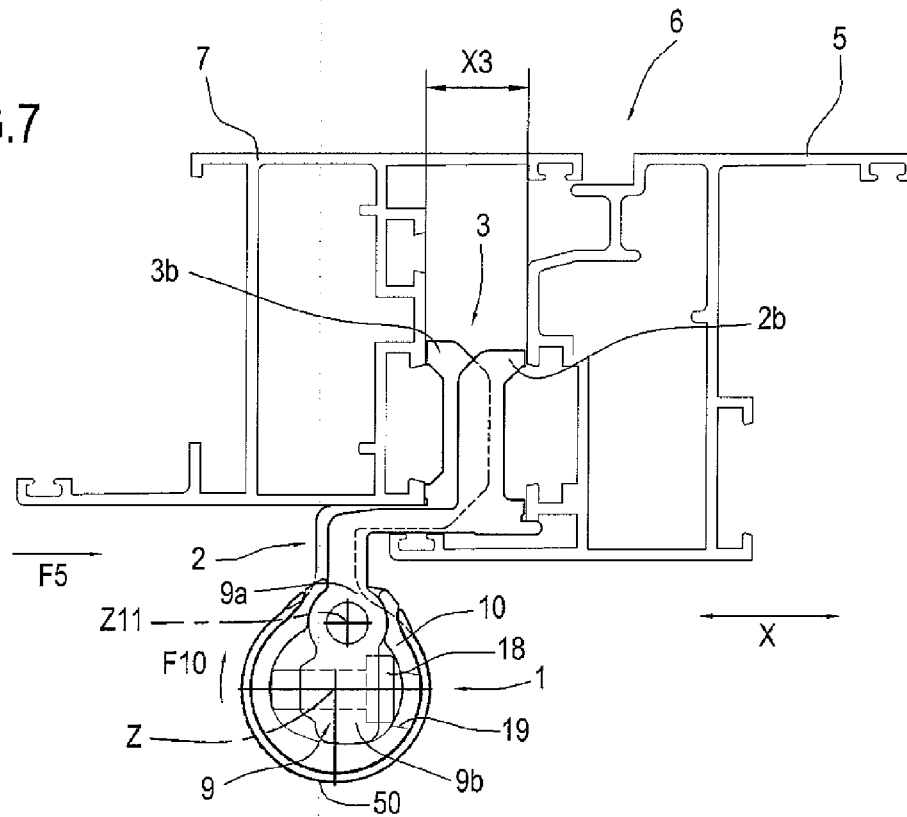


FIG.8

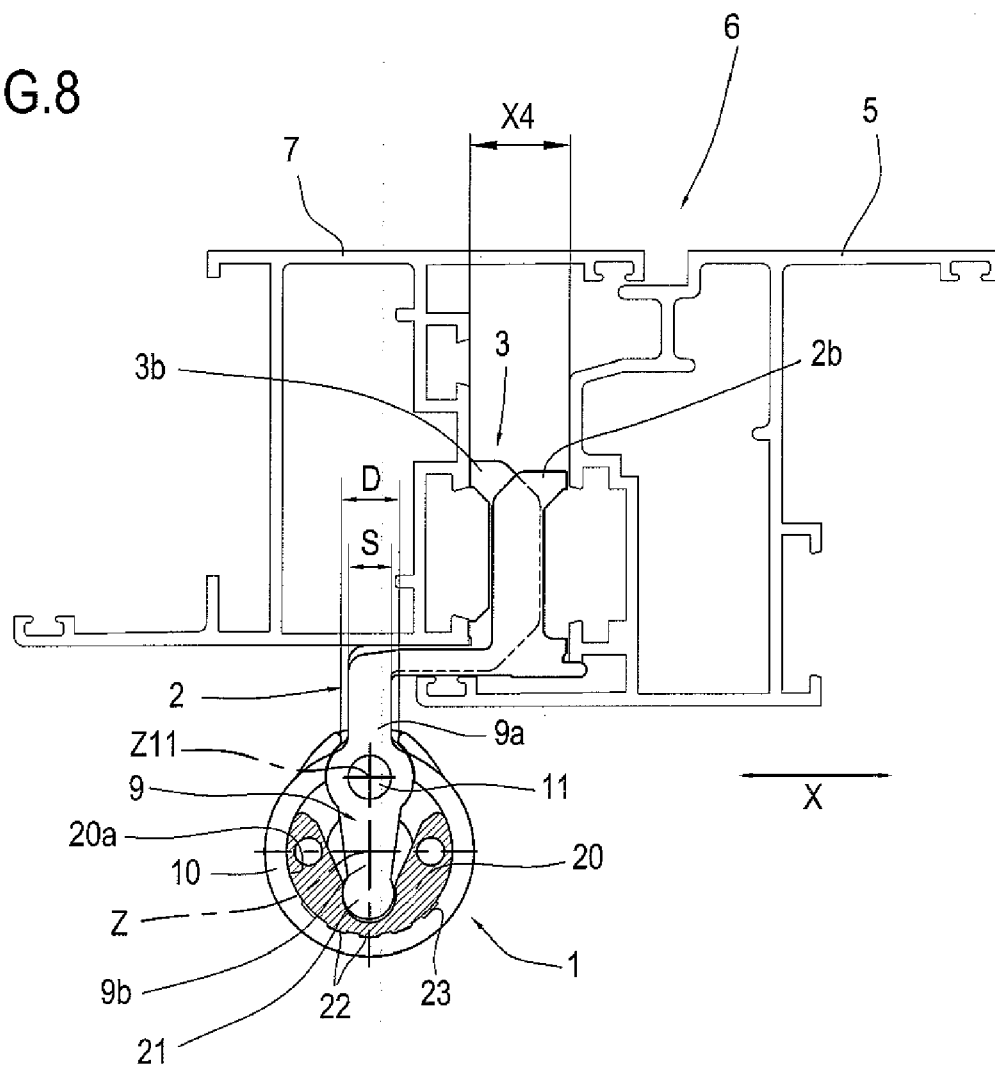


FIG.9

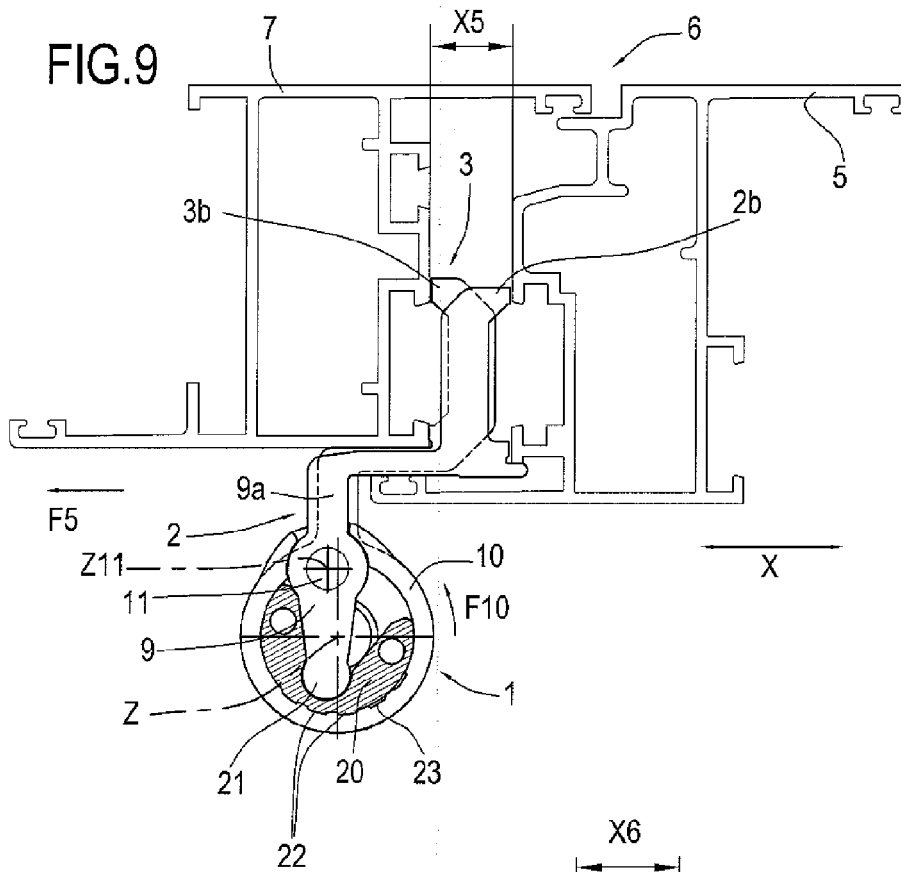
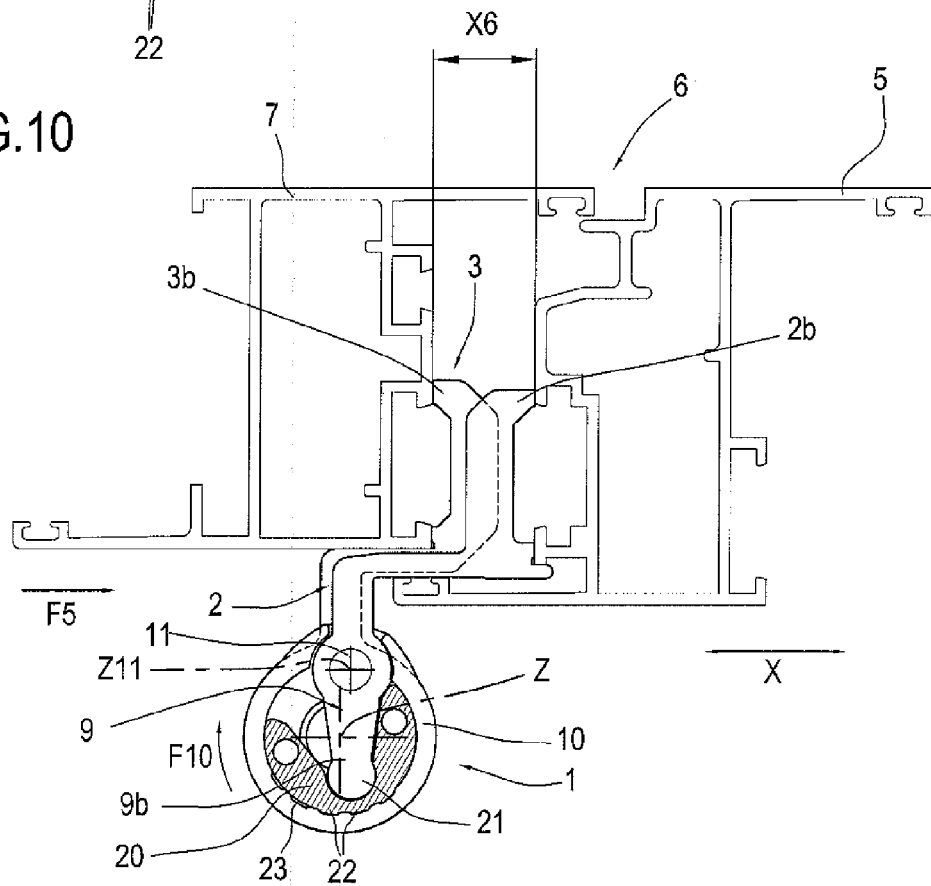


FIG.10





EUROPEAN SEARCH REPORT

Application Number
EP 09 17 5736

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 20 2006 002236 U1 (HAHN GMBH & CO KG DR [DE]) 21 June 2007 (2007-06-21) * paragraphs [0018], [0019]; figures * -----	1-12	INV. E05D7/00
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 December 2009	Examiner Witasse-Moreau, C
CATEGORY OF CITED DOCUMENTS 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 T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 09 17 5736

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