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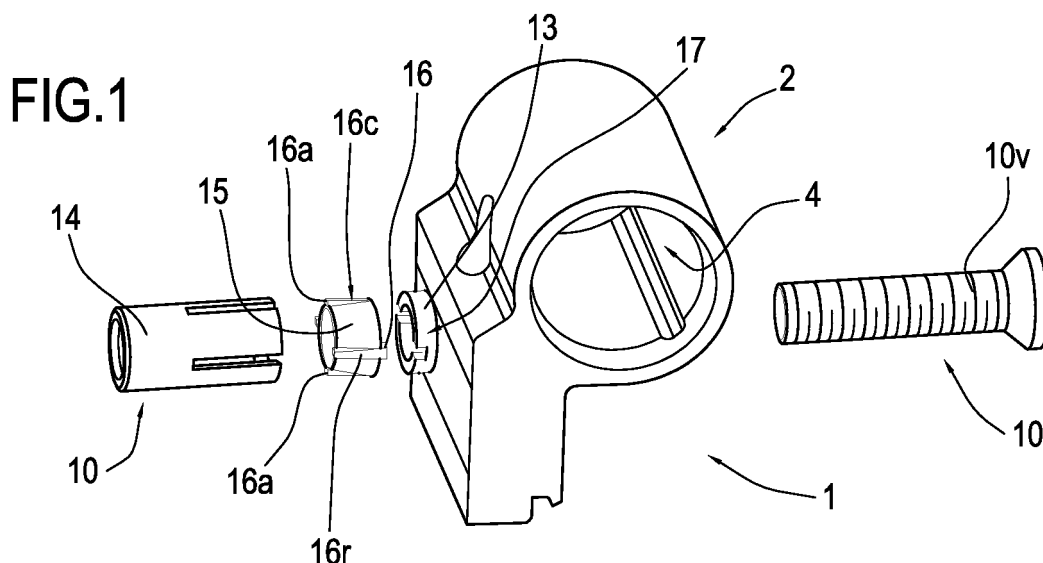
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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Face-mounted hinge for doors and windows**

(57) A face-mounted hinge for doors and windows comprises: two hinge bodies (2), each comprising a tubular portion (3) having a first central through hole (4) and a flap (5) for fastening to a respective mobile frame or fixed frame (6, 7); a hinge pin (8) inserted coaxially into the first holes (4) to enable the hinge bodies (2) to rotate relative to each other about an axis defined by the pin (8); each flap (5) extends laterally from the respective tubular portion (3) and has at least one second through hole (9) designed to be engaged by a part of means (10) for fastening the flap (5) to the respective mobile frame or fixed frame (6, 7); the frames (6, 7) each have a first surface for contact with the flap (5) and are provided with

at least one third through hole (11) that leads into a tubular chamber (12); the fastening means (10) comprise a first bush (13) protruding from the second hole (9), an expansion plug (14) that can be pre-fitted on the first bush (13) and designed to be accommodated in the tubular chamber (12), a screw fastening member (10v) and an extension element (15) that can be interposed between the first bush (13) and the plug (14); the extension element (15) has at least one pair of teeth (16, 16a) protruding from the ends of it and, in use, designed to engage respective grooves (17, 18) formed on the first bush (13) and on the plug (14) in such a way as to create an anti-rotation constraint at least on the plug (14).



Description

[0001] This invention relates to a face-mounted hinge for doors and window, in particular, but without restricting the scope of the invention, for doors and windows with frames made of metal, PVC or the like.

[0002] At present, in the field of hardware for doors and windows, certain types of medium to heavy doors and windows (for example, in particular security doors and windows, such as outside doors, gates and the like) which are mounted on the fixed frame and on the mobile frame using 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 differences 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, while traditional hinges are mounted on an extension of the hinge body which is shaped to match the inside profile of the vertical member of the door/window frame.

[0005] The two hinge bodies, one of which is fastened to the mobile frame and the other to the mobile frame each comprise a flap for fastening to the respective door/window frame and a cylindrical portion in which the hole for the passage of the hinge pin is made, the hinge pin being in practice housed in suitable adjustment bushes.

[0006] The flap of each hinge body, unlike traditional hinges, generally has a flat shape, where the through holes (usually two) are made and where the flap is crossed, perpendicularly to the hinge pin, by respective screws for fastening the hinge body to the respective door/window frame member (whether fixed or mobile).

[0007] The hinge flap can be fastened to the frame member in several different ways. The two most frequently adopted methods use: the first method, a contact block inside the frame member profile; and the second method, expansion plugs.

[0008] The first method uses a contact block, which has threaded holes made in it for respective fastening screws. The block is inserted into the tubular chamber of the vertical member of the fixed or mobile frame and positioned at a pair of through holes made in the wall of the frame member in such a way as to align these holes with those in the contact block.

[0009] The hinge flap is in turn provided with specific bushes which protrude from the surface that comes into contact with the frame member and which are designed firstly to centre the holes in the frame member correctly and secondly, to fasten the hinge body more securely.

[0010] Once the contact block and the hinge flap have been positioned on opposite sides, with the hinge flap bushes aligned with the two holes in the frame member, fastening is possible by simply inserting and tightening the two screws.

[0011] The second method, on the other hand, uses expansion plugs. The plugs are pre-fitted on the hinge flap surface that comes into contact with the frame member and are inserted directly into the holes in the frame member.

[0012] The hinge flap is also provided with suitable bushes which protrude from the holes in the flap and which, unlike the previous ones, have a partly conical shape in order to guarantee correct expansion of the plug during fastening.

[0013] In addition to the above, each expansion bush has at least one rib or spline made by trimming the free end of the conical bush and protruding radially from the bush itself.

[0014] This spline fits into a groove made in the plug and is designed to prevent the plug from turning while the screw is being fastened.

[0015] This method, however, which is of particular relevance to this invention, has revealed a disadvantage due to the particular structure of the expansion bush: the anti-rotation spline or splines, being small in size and made directly on the bush (which has a small thickness) are relatively weak compared to the forces in play during fastening and often tends to bend or break during fastening, thereby losing the anti-rotation function and making it difficult, if not impossible, to remove the hinge body.

[0016] It must also be remembered that the length of the conical part (protrusion) of the expansion bush enables expansion plugs to be used only with door/window frames whose thickness falls within a certain range, which in practice limits the use of this method: if the frame member is very thick, the bush does not protrude from the inside surface of the frame member by an amount sufficient to allow the plug to expand correctly.

[0017] In a solution known from document DE 27 00 100, a face-mounted hinge has a fastening system composed of:

- a bush supported partly, by a protuberance, on the through hole in the hinge flap and designed to be received by the hole in the profile;
- a hollow spacer screwed into the bush and having a head with a truncated cone shaped section protruding at the free end of the bush;
- a plug which is placed in contact with the spacer and able to expand as it is moved closer to the spacer by means of a screw driven from outside the hinge flap.

[0018] This solution, however, involves a complex assembly procedure, since it requires screwing two items (bush and spacer) together to prevent the spacer from turning while the plug is being fastened, and also evidently increases the cost of the product. Besides that, the main bush does not have specific anti-rotation constraints in the event of the plug or the spacer being forced out of place when inside, with the risk of its moving.

[0019] Document DE 35 02 607 discloses an expan-

sion plug provided with a threaded end portion able to be housed on the non-deformable end of the plug. The end portion is then engaged by the screw during the step of expanding and locking the plug from the end furthest away from the position of the end portion. The end portion is locked to the plug (also to prevent relative rotation) by projections formed on the end portion and coupled to matching slots formed on the plug, which also has a securing ring that, on assembly, prevents the end portion from moving away axially when engaged by the screw.

[0020] This solution, however, only teaches the possibility of obtaining an anti-rotation lock of an element inserted directly into the plug (and what is more, of a type connectable to the screw) and in the innermost zone away from the zone where, instead, it would be desirable to have an anti-rotation lock, that is to say, to have a further bush for connection to the hinge flap, and possibly also a spacer for expanding the plug.

[0021] Moreover, in the above solution, the anti-rotation lock is linked to an axial securing ring which could not in any case be applied to the system described up to now.

[0022] This invention therefore has for an aim to overcome the above mentioned disadvantages by providing a face-mounted hinge offering a high level of fastening security, in particular using preassembled expansion plugs, and structured in such a way that it can be applied to a wide range of door/window frames and profiles, independently of their size.

[0023] Accordingly, the present invention achieves this aim with a face-mounted hinge, in particular a face-mounted hinge for doors and windows comprising the technical characteristics set out in one or more of the appended claims.

[0024] In the face-mounted hinge according to the invention, one part of the hinge is composed of a tubular portion and a flap with at least one hole designed to be engaged by a part of fastening means by which the hinge is fastened to a profile by inserting a part of the fastening means into a hole made in a profile that forms a tubular chamber. Further, according to the invention, the fastening means 10 also comprise a centring bush permanently associated with the inside of the hole in the flap and protruding from the hole, an expansion plug which can be pre-fitted on the first bush to be accommodated in the tubular chamber, and a screw fastening member designed to be screwed into the hole in the hinge flap and into the first bush in such a way as to be held within the plug.

[0025] Also according to the invention, there is an extension element operatively interposed between the bush and the plug. The extension element is provided with teeth protruding bilaterally from the ends of it and, in use, designed to engage respective grooves formed, respectively, on the first bush and on the plug in such a way as to create a concatenated anti-rotation constraint for both the plug and the extension element.

[0026] This configuration of the extension element al-

lows the hinge to be fitted rapidly and adapted to profiles of different kinds and thicknesses.

[0027] The presence of the anti-rotation teeth allows the extension element of the selected type to be quickly inserted between bush and plug by a simple face contact between the three elements, thus avoiding tricky and time-consuming screw fastening operations. All this is achieved while maintaining a high level of security during the fastening process thanks precisely to the concatenated connections of the three elements.

[0028] 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:

- Figures 1, 2 and 3 are perspective views of a face-mounted hinge for doors/windows according to the invention, Figures 1 and 2 being, in particular, exploded perspective views;
- Figures 4, 5 and 6 are schematic top plan views showing three different steps of fastening the hinge part illustrated in the above-mentioned figures.

[0029] With reference to the accompanying drawings, in particular Figures 1 to 3, the hinge according to the invention, labelled 1 in its entirety, is known as a face-mounted hinge and is used for medium heavy doors and windows with frames made of metal, PVC or the like.

[0030] The hinge 1, only one part of which is illustrated by way of an example since the other part is structurally identical, is fastened to the front face of the mobile and fixed frames of the door/window (see also Figures 5 and 6).

[0031] Thus, the hinge 1 essentially comprises: two bodies 2; a pin 8; and means 10 for fastening each body 2 to the fixed or mobile frame 6, 7.

[0032] Each body 2 of the hinge 1 comprises a tubular portion 3 having a first central through hole 4 and a flap 5 for fastening to a respective mobile frame or fixed frame 6, 7.

[0033] The hinge pin 8 (illustrated only with a broken line in Figures 5 and 6 since it is outside the scope of the invention) is inserted coaxially into the first holes 4 to enable the hinge bodies 2 to rotate relative to each other about an axis defined by the pin 8 itself.

[0034] Each flap 5 extends laterally from the respective tubular portion 3 and has at least one second through hole 9 (there are usually two holes 9 side by side) designed to be engaged by a part of the means 10 for fastening the flap 5 to the respective mobile frame or fixed frame 6, 7.

[0035] Each of the frames 6, 7 has a first surface for contact with the flap 5 and is provided with at least one third through hole 11 that leads into a tubular chamber

12 forming part of the profile constituting the fixed or mobile frame 6, 7. Obviously, in the more common case of two second holes 9, there are two third holes 11 on the first surface of the frames 6 and 7.

[0036] The fastening means 10 - see Figures 1 to 6 - comprise a first bush 13 protruding from the second hole 9 in the flap 5 and permanently associated with the inside of the hole.

[0037] Besides the above, the fastening means 10 also comprises an expansion plug 14 which can be pre-fitted on the first bush 13 and which is designed to be accommodated in the tubular chamber 12, and a screw fastening member 10v which is designed to be screwed into the second hole 11 and into the first bush 13 in such a way as to be held within the plug 14 (which is internally threaded).

[0038] In addition to these items, the fastening means 10 further comprise an extension element 15 operatively interposed between the first bush 13 and the plug 14.

[0039] The extension element 15 is provided with teeth 16, 16a protruding from the ends of it and, in use, designed to engage respective grooves 17 and 18 formed on the first bush 13 and on the plug 14 in such a way as to create a concatenated anti-rotation constraint for both the plug 14 and the extension element.

[0040] More in detail, and in a minimum configuration, the extension element comprises a second bush 15 that may be provided with a single spline 16r joining the protruding teeth 16, 16a.

[0041] The spline 16r protrudes radially from the cylindrical body of the second bush 15.

[0042] Further, the second bush 15 has the shape of a truncated cone, whose small diameter D is, in use, positioned at the rear end of the plug 14: that way, when the screw 10v is tightened, the plug 14 is expanded, thereby locking the hinge body 2 to the frame 6 or 7.

[0043] The end of the second bush 15 with the large diameter D1 is almost the same as the diameter D2 of the first bush 13, the second end of said second bush 15 being, in use, positioned in contact with the first bush 13 itself in order to operatively obtain a face contact between them.

[0044] The first bush 13 is cylindrical in shape, protrudes from the second hole 9 and is provided with a pair of grooves 17, diametrically opposite each other, which are engaged by the respective teeth 16 protruding from the second bush 15 so that, once contact has been made, an anti-rotation constraint is obtained for the second bush 15.

[0045] The first bush 13 is designed to correctly centre the screw 10v in the third hole 11, together with the second bush 15 and with the plug 14.

[0046] The second bush 15, in its most complete form, has a total of six protruding teeth 16, 16a and four splines 16r and 16c protruding radially from the surface of the second bush 15.

[0047] The teeth 16, 16a are substantially divided into two types: a first pair of teeth, labelled 16, protrudes from

the large diameter end of the second bush 15 in such a way as to engage the respective grooves 17 of the first bush 13; the other four teeth 16a, on the other hand, protrude from the small diameter end of the second bush 15, in such a way as to engage respective grooves 18 of the plug 14.

[0048] This allows the plug 14 to expand correctly and uniformly during fastening (see Figures 5 and 6 and the arrows F14).

[0049] In this configuration, the first two splines 16r bilaterally join the respective teeth 16 and 16a, while the second two splines 16c are joined by the two teeth 16a that engage only the grooves 18 of the plug 14.

[0050] The first and second splines 16r and 16c are positioned alternately along the second bush 15.

[0051] As a further characteristic, the extension element 15 might have an axial extension that is variable according to the thickness of the contact surface of the mobile or fixed frame 6, 7 of the door/window: in other words, depending on the type of door/window and, hence, of the thicknesses present, it would be possible to also decide the length of the extension element 15 to be used to optimize hinge fastenings.

[0052] A hinge made in this way thus achieves the above mentioned aims thanks to the presence of the truncated cone shaped extension element interposed between the centring bush and the expansion plug. The extension element, thanks to its truncated cone shape and the teeth on it, allows the hinges to be fastened to the frames securely and precisely. Being an independent element, the extension can be made in sets of different sizes so that the same type of hinge body and expansion plug can be used on frame profiles having different thicknesses.

[0053] A further indirect advantage is the fact that the hinge body and centring bush thus obtained can also be used for fastening with a contact block without in any way modifying the structure of the hinge bodies, thus reducing warehouse costs.

[0054] 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. A face-mounted hinge for doors and windows, the hinge being of the type comprising at least: two hinge bodies (2), each comprising a tubular portion (3) having a first central through hole (4) and a flap (5) for fastening to a respective mobile frame or fixed frame (6, 7); a hinge pin (8) inserted coaxially into the first holes (4) to enable the hinge bodies (2) to rotate relative to each other about an axis defined by the pin (8); each flap (5) extending laterally from the re-

- spective tubular portion (3) and having at least one second through hole (9) designed to be engaged by a part of means (10) for fastening the flap (5) to the respective mobile frame or fixed frame (6, 7); the frames (6, 7) each having a first surface for contact with the flap (5) and being provided with at least one third through hole (11) that leads into a tubular chamber (12) forming part of the mobile or fixed frame (6, 7); the fastening means (10) comprising at least one first centring bush (13) integral with, and protruding from, the second hole (9), an expansion plug (14) that can be pre-fitted on the first bush (13) and designed to be accommodated in the tubular chamber (12), and a screw fastening member (10v) designed to be screwed into the second hole (9) and into the first bush (13) in such a way as to be held within the plug (14); the hinge (1) being **characterized in that** it further comprises an extension element (15) operatively interposed between the first bush (13) and the plug (14); the extension element (15) being provided with teeth (16, 16a) protruding bilaterally from the ends of it and, in use, designed to engage respective grooves (17, 18) formed on the first bush (13) and on the plug (14) in such a way as to create a concatenated anti-rotation constraint for both the plug (14) and the extension element (15).
2. The hinge according to claim 1, **characterized in that** the extension element comprises a second bush (15) provided with a spline (16r) which joins the teeth (16, 16a) and which protrudes radially from the circumference of the second bush (15).
 3. The hinge according to claim 1, **characterized in that** the extension element comprises a second bush (15) provided with at least two protruding teeth (16, 16a) on its circumference; each pair of teeth (16, 16a) being joined by a respective radial spline (16r) protruding from the second bush (15).
 4. The hinge according to claim 2 or 3, **characterized in that** the second bush (15) has the shape of a truncated cone whose small diameter (D) is, in use, positioned at the plug (14) in such a way as to allow the latter to expand.
 5. The hinge according to claim 2 or 3, **characterized in that** the second bush (15) has the shape of a truncated cone, where the end with the large diameter (D1) is almost the same as the diameter (D2) of a first bush (13), the second end of said second bush (15) being, in use, positioned in face contact with the first bush (13) itself.
 6. The hinge according to claim 1, **characterized in that** the first bush (13) is provided with a pair of grooves (17) diametrically opposite each other, and which are engaged by the respective teeth (16) protruding from the second bush (15).
 7. The hinge according to claim 2 or 3, **characterized in that** it comprises six teeth (16, 16a) protruding from the circumference of the second bush (15) and four radial splines (16r, 16c) protruding from the surface of the bush (15); two of the teeth (16) protruding from the second bush (15) in such a way as to engage the respective grooves (17) of the first bush (13), on one side; the other four teeth (16a) engaging respective grooves (18) in the plug (14), on the other side; one pair of the splines (16r) joining the first two teeth (16) to the respective two teeth (16a) on the opposite side, while the further pair of second splines (16c) are joined to the two teeth (16a) that fit into the grooves (18) in the plug (14).
 8. The hinge according to claim 7, **characterized in that** the first splines (16r) that bilaterally join the teeth (16, 16a) and the second splines (16c) are positioned alternately along the second bush (15).
 9. The hinge according to claim 1, **characterized in that** the extension element (15) has an axial extension that is variable according to the size or thickness of the contact surface of the mobile or fixed frame (6, 7).
 10. The hinge according to claim 1, **characterized in that** the first bush (13) is cylindrical in shape.
- Amended claims in accordance with Rule 137(2) EPC.**
1. A face-mounted hinge for doors and windows, the doors and windows having a mobile frame and a fixed frame (6, 7) each having a first surface provided with at least one third through hole (11) that leads into a tubular chamber (12) forming part of the mobile or fixed frame (6, 7), the hinge being of the type comprising at least: two hinge bodies (2), each comprising a tubular portion (3) having a first central through hole (4) and a flap (5) for fastening to the respective mobile frame or fixed frame (6, 7); a hinge pin (8) inserted coaxially into the first holes (4) to enable the hinge bodies (2) to rotate relative to each other about an axis defined by the pin (8); each flap (5) extending laterally from the respective tubular portion (3) and having at least one second through hole (9) designed to be engaged by a part of means (10) for fastening the flap (5) to the first surface of the respective mobile frame or fixed frame (6, 7); the fastening means (10) comprising at least one first centring bush (13) and protruding from the second hole (9), an expansion plug (14) that can be pre-fitted on the first bush (13) and designed to be accommodated in the tubular chamber (12), and a screw fastening member

(10v) designed to be screwed into the second hole (9) and into the first bush (13) in such a way as to be held within the plug (14); the hinge (1) being **characterized in that** the first centering bush (13) is integral with the second hole (9), and **in that** it further comprises an extension element (15) operatively interposed between the first bush (13) and the plug (14); the extension element (15) being provided with teeth (16, 16a) protruding bilaterally from the ends of it and, in use, designed to engage respective grooves (17, 18) formed on the first bush (13) and on the plug (14) in such a way as to create a concatenated anti-rotation constraint for both the plug (14) and the extension element (15).

2. The hinge according to claim 1, **characterized in that** the extension element comprises a second bush (15) provided with a spline (16r) which joins the teeth (16, 16a) and which protrudes radially from the circumference of the second bush (15).

3. The hinge according to claim 1, **characterized in that** the extension element comprises a second bush (15) provided with at least two protruding teeth (16, 16a) on its circumference; each pair of teeth (16, 16a) being joined by a respective radial spline (16r) protruding from the second bush (15).

4. The hinge according to claim 2 or 3, **characterized in that** the second bush (15) has the shape of a truncated cone whose small diameter (D) is, in use, positioned at the plug (14) in such a way as to allow the latter to expand.

5. The hinge according to claim 2 or 3, **characterized in that** the second bush (15) has the shape of a truncated cone, where the end with the large diameter (D1) is almost the same as the diameter (D2) of a first bush (13), the second end of said second bush (15) being, in use, positioned in face contact with the first bush (13) itself.

6. The hinge according to claim 1, **characterized in that** the first bush (13) is provided with a pair of grooves (17) diametrically opposite each other, and which are engaged by the respective teeth (16) protruding from the second bush (15).

7. The hinge according to claim 2 or 3, **characterized in that** it comprises six teeth (16, 16a) protruding from the circumference of the second bush (15) and four radial splines (16r, 16c) protruding from the surface of the bush (15); two of the teeth (16) protruding from the second bush (15) in such a way as to engage the respective grooves (17) of the first bush (13), on one side; the other four teeth (16a) engaging respective grooves (18) in the plug (14), on the other side; one pair of the splines (16r) joining

the first two teeth (16) to the respective two teeth (16a) on the opposite side, while the further pair of second splines (16c) are joined to the two teeth (16a) that fit into the grooves (18) in the plug (14).

8. The hinge according to claim 7, **characterized in that** the first splines (16r) that bilaterally join the teeth (16, 16a) and the second splines (16c) are positioned alternately along the second bush (15).

9. The hinge according to claim 1, **characterized in that** the extension element (15) has an axial extension that is variable according to the size or thickness of the contact surface of the mobile or fixed frame (6, 7) .

10. The hinge according to claim 1, **characterized in that** the first bush (13) is cylindrical in shape.

FIG.1

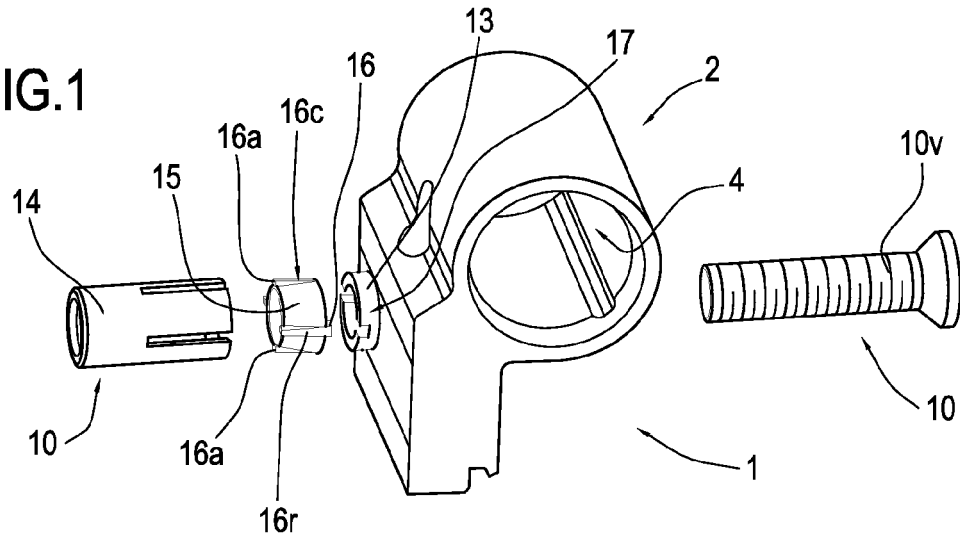


FIG.2

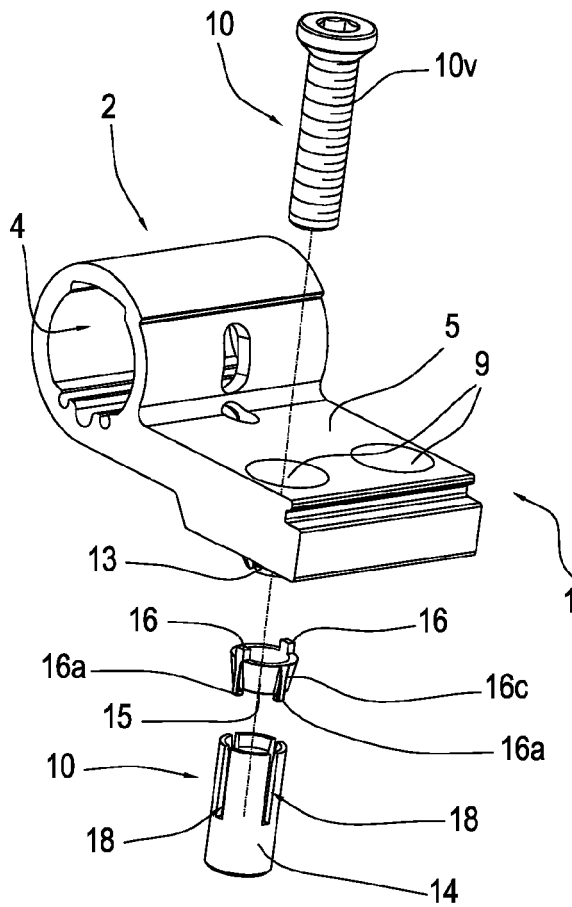


FIG.3

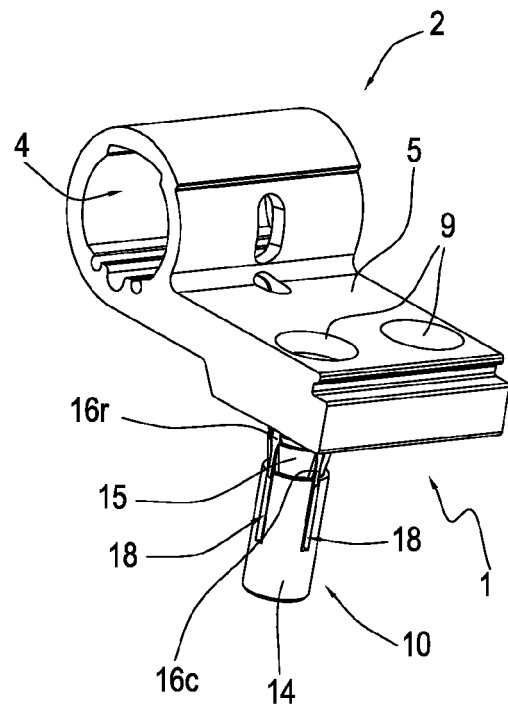


FIG.4

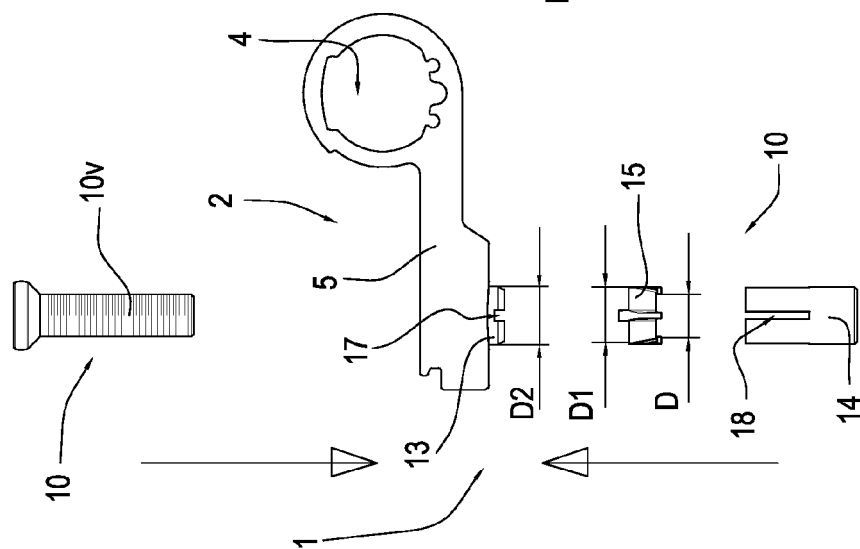


FIG.5

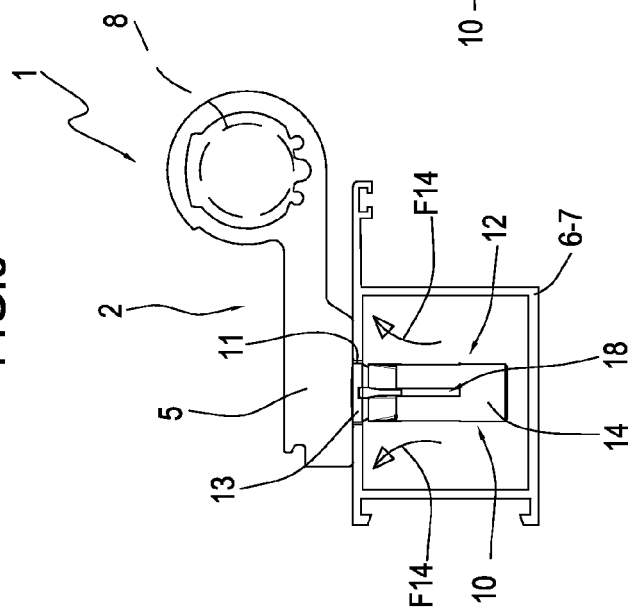
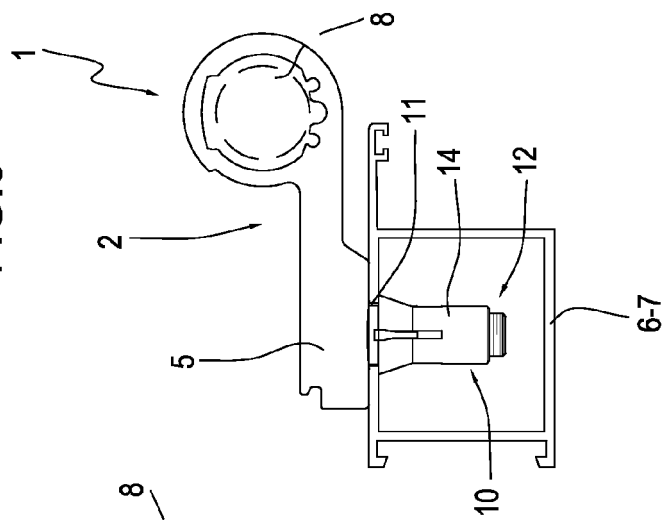


FIG.6





EUROPEAN SEARCH REPORT

Application Number
EP 10 17 6762

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05D
Place of search		Date of completion of the search	Examiner
The Hague		4 November 2010	Klemke, Beate
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 17 6762

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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