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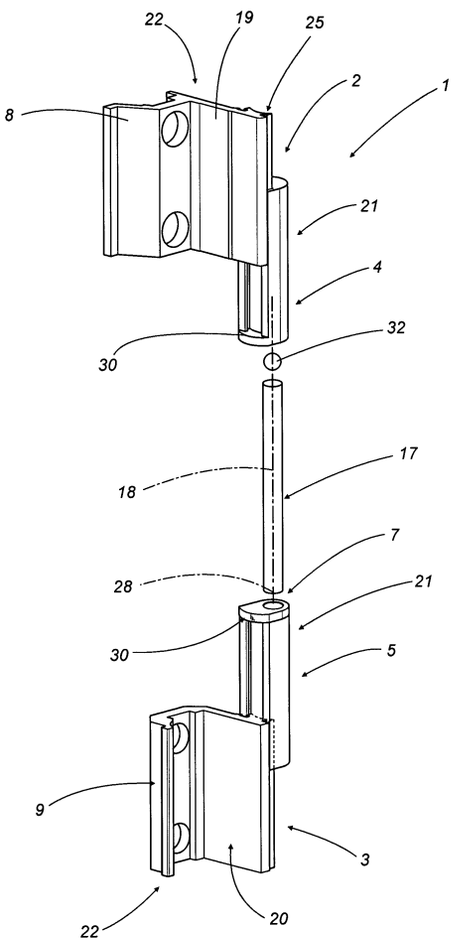
(54) A hinge for metal door or window units.

(57) A hinge for metal door and window units comprises: two hinge bodies (2, 3) each presenting a cylindrical hole (6, 7) and a flap (8, 9) by which it is secured to the respective frame of a door or window unit (10); a hinge pin (17) that can be inserted coaxially into the holes (6, 7) to allow the bodies (2, 3) to turn relative to each other about a central axis (18) of the pin (17) itself; and fastening elements (11) to fix the flaps (8, 9) to the respective frames of the door or window unit. Each of the hinge bodies (2, 3) is made in a first and a second part (21, 22) which can be fitted together, the first part (21) constituting a first element presenting the respective hole (6, 7) and the second part (22) constituting a second element presenting the respective securing flap (8, 9) .

FIG.1



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Description

[0001] The present invention relates to a hinge for metal frames forming part of door units, window units, etc.

[0002] A hinge made according to the present invention is particularly suited to relatively light door and window units, such as, for example, those for interiors, which this specification specifically refers to but without thereby restricting the scope of the invention.

[0003] Prior art hinges for metal door and window units normally consist of two hinge bodies, usually made of extruded aluminium, and a steel hinge pin inserted into respective cylindrical holes in the two hinge bodies.

[0004] One of the hinge bodies is designed to be attached to the mobile frame, or sash, of the door or window unit, and the other to the fixed frame, and each of them has a shaped flap by which it is secured to the respective frame of the door or window unit. Both of the flaps are crossed, perpendicularly to the hinge pin, by securing screws whose heads are normally accommodated in respective recesses made in the hinge flaps themselves and which, on assembly, engage with a retaining element in a suitable channel made in the door or window unit.

[0005] The hinge bodies usually undergo a painting process so that they match the colour of the door or window unit when the latter has a finish other than aluminium.

[0006] The structure of these hinges has several disadvantages due to:

- the generally complex shape of the hinge bodies, which makes the extrusion process and, when necessary, the painting process unduly complicated and expensive; and
- the need to keep a large stock of hinges in a wide range of colours so as to readily meet customer's installation requirements.

[0007] These two factors raise the overall cost of the hinge which has a negative effect on the total cost of the door or window unit.

[0008] This invention has for an aim to provide a hinge for metal door and window units that is simple and economical to produce.

[0009] Another aim of this invention is to provide a hinge for metal door and window units that is quick, easy and practical to fit.

[0010] In accordance with the invention, these aims are achieved by a hinge for metal door and window units comprising: two hinge bodies, each presenting a cylindrical hole and a flap by which it is secured to the respective frame of a door or window unit; a hinge pin that can be inserted coaxially into the holes to allow the bodies to turn relative to each other about a central axis of the pin itself; and fastening elements to fix the flaps to the respective frames of the door or window unit; each of the hinge bodies is made in a first and a second part which can be fitted together, the first part constituting a first element presenting the respective hole and the second part constituting a second element presenting the respective securing flap.

[0011] Further, the advantages of the invention are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate preferred embodiments of the invention provided merely by way of example without restricting the scope of the inventive concept. In these drawings:

- Figure 1 is an exploded view of the hinge according to the present invention;
- Figure 2 is a perspective view of one of the two bodies forming part of the hinge of Figure 1, and, more specifically, the one designed to be attached to the mobile frame of the door or window unit;
- Figure 3 is a perspective view of the other of the two bodies forming part of the hinge of Figure 1, and, more specifically, the one designed to be attached to the fixed frame of the door or window unit;
- Figure 4 illustrates the hinge body of Figure 3, again in a perspective view, in the position in which it is assembled to the fixed frame of the door or window unit;
- Figure 4a illustrates another embodiment of a detail from Figure 4, in a partial perspective view;
- Figure 5 is a perspective view of a part of the hinge body of Figure 2.

[0012] With reference to Figure 1, the numeral 1 denotes in its entirety a hinge for metal door and window units.

[0013] The hinge 1 is designed in particular for relatively light door or window units, such as, for example, those for interiors, and comprises two hinge bodies 2 and 3 both made of aluminium and each presenting a substantially cylindrical, tubular portion 4, 5 with a respective central cylindrical hole 6, 7 and a shaped flap 8, 9 by which it is secured to a respective frame of a customary door or window unit 10 (Figure 4).

[0014] The hinge bodies 2 and 3 can be fixed in customary manner to the mobile frame and to the fixed frame of the door or window unit 10, respectively.

[0015] Figure 4 shows, by way of example, the hinge body 3 in the position in which it is assembled to the fixed frame of the door or window unit.

[0016] The hinge body 3 may be attached to the fixed frame by fixing means 11 of the jaw type comprising a clamping plate 12 that acts in conjunction with the flap 9 to form two respective jaws designed to grip a channel defined by the profile 13 of the fixed frame.

[0017] Aligned in the principal direction in which it extends, the plate 12 presents two threaded holes 14 in which two screws 15 are fastened. The screws 15 pass freely through respective through holes 16 made in the flap 9 (Figure 3) and are stopped by their heads against

the flap 9 itself. Screwing in the screws 15 causes the flap 9 and the plate 12 to move towards each other in such a way as to clamp the profile 13 between the flap 9 and the plate 12. The hinge body 2 may be attached to the mobile frame, or sash, of the door or window unit 10 by fixing means identical to the jaw type fixing means 11 described above and, for this reason, the flap 8 also has two through holes 16 made in it (Figure 2).

[0018] The rotation of the hinge bodies 2 and 3 relative to each other is permitted by a hinge 1 pin 17.

[0019] The hinge pin 17 is usually made of steel and is inserted coaxially into the holes 6 and 7 so as to enable the hinge body 2 to turn relative to the hinge body 3 about a central axis 18 of the pin 17 itself.

[0020] In the embodiment illustrated, the pin 17 may be fixed by an interference fit in the hole 7, whilst it can turn freely in the hole 6.

[0021] From each flap 8, 9 there extends at right angles a respective bracket 19, 20 which, as specified below, can be slidably coupled with the respective tubular portion 4, 5.

[0022] In other words, each of the two hinge bodies 2 and 3 is made in two separate parts, a first part and a second part 21, 22, which can be fitted together, that is to say, the two parts 21, 22 are made separately and subsequently assembled or coupled to each other to form the hinge bodies 2, 3 themselves.

[0023] The first part 21 comprises the tubular portion 4, 5 and thus defines the respective hole 6, 7, whilst the second part 22 comprises and defines the flap 8, 9 and the respective bracket 19, 20 to be coupled with the door or window unit.

[0024] In another embodiment that is not illustrated, only one of the two hinge bodies 2 and 3 is made in the above mentioned two parts 21, 22, whilst the other is made in a single piece as in prior art hinges.

[0025] The first and the second part 21, 22 of both the hinge body 2 and the hinge body 3 have respective surfaces 23, 24 by which they can be coupled with each other and which have substantially matching shapes.

[0026] More specifically, the bracket 20 of the second part 22 has a shaped profile 25, whilst the first part 21 has a groove 26 shaped to match the profile 25 and so that the profile 25 itself can fit snugly into it.

[0027] In practice, the groove 26 and the profile 25 can be interlocked and form a dovetail joint.

[0028] In a first embodiment, the groove 26 extends lengthways in a direction parallel to the axis 27, 28 of the respective hole 6, 7 and is separated from the hole 6, 7 by a curved wall 29 which, transversally to the axis 27, 28, has a substantially C-shaped cross section defining the dovetail joint.

[0029] In particular, the wall 29 extends along a circular arc coaxial with the axis 27, 28 and has an inside radius equal to the radius of the hole 6, 7. In other words, the groove 26 is defined by a channel made in the outside wall of the substantially tubular cylindrical portion 4, 5.

[0030] The groove 26 has a limit stop 30 for the respective profile 25. The stop 30 extends in a direction transversal to the axis 27, 28 of the respective hole 6, 7 at one end of the groove.

[0031] In another non-restricting embodiment (see Figure 4a), the wall 29 separating the groove 26 from the hole 6, 7 is flat and the dovetail joint it forms has, transversally to the axis 27, 28 of the hole 6, 7, a substantially T-shaped cross section.

[0032] It should be stressed that each of the two profiles 25 is designed to be inserted into the respective groove 26 in a direction of reciprocal sliding parallel to the axis 27, 28 of the respective hole 6, 7 and that, when the hinge 1 is assembled, the two limit stops 30 of the respective portions 4 and 5 are positioned face to face.

[0033] Preferably, the two parts 21 and 22 are joined to each other by an interference fit in such a way as lock the two parts together firmly, thus forming a compact hinge 1.

[0034] According to an important aspect of this invention, each of the first parts 21 can be made by pressure die casting, whilst each of the second parts 22 can be made by extrusion, with evident advantages in terms of simplicity and economy of production.

[0035] Further, the first and second parts 21 and 22 can both be made of aluminium or a material other than aluminium and may undergo different surface treatments, providing attractive yet economical surface finishes.

[0036] The pressure die casting process used to make the first part 21 also enables the inside of the hole 6 of the portion 4 to be provided with a plurality of radially protruding fins 31, preferably four, between which a steel ball 32 can be fitted.

[0037] The position of the ball 32 along the axis 27 of the hole 6 defines the length of the portion of the pin 17 to be inserted into the hole 6 and, more specifically, can be selected in such a way that, once the hinge 1 has been assembled, the two face-to-face limit stops 30 of the respective portions 4 and 5 do not actually touch but have a very small gap between them.

[0038] This aspect, combined with the fact that the ball 32 is in contact with the top end of the pin 17, which has a flat free end, permits contact at a small point, thus minimising friction between the parts of the hinge 1 that move relative to each other.

[0039] A hinge made in the manner described above achieves the aforementioned aims thanks to an extremely innovative structure offering undoubted advantages.

[0040] The first advantage is that it permits a significant reduction in the cost of producing the hinge bodies because they are divided into two separate parts, one made by pressure die casting and the other by extrusion, thus greatly simplifying the production process and reducing the need for subsequent surface finishing operations.

[0041] From this comes a second advantage which is

that the securing flap of the hinge body need not be painted since it is hidden from view when fitted to the door or window unit. This reduces the overall cost of the hinge and eliminates the need to keep large numbers of hinges of different colours in stock since the flap is standard and does not need to be stocked in different colours. Only the bush, which costs less, needs to be stocked in a full range of colours.

[0042] 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 door and window units, the hinge (1) comprising at least:

   - two hinge bodies (2, 3) each presenting a cylindrical hole (6, 7) and a flap (8, 9) by which it is secured to the respective frame of a door or window unit (10);
   - a hinge pin (17) that can be inserted coaxially into the holes (6, 7) to allow the bodies (2, 3) to turn relative to each other about a central axis (18) of the pin (17) itself; and
   - fastening elements (11) for fixing the flaps (8, 9) to the respective frames; the hinge (1) being **characterised in that** at least one of the hinge bodies (2, 3) is made in a first and a second part (21, 22) which can be fitted together, the first part (21) constituting a first element presenting the respective hole (6, 7) and the second part (22) constituting a second element presenting the respective securing flap (8, 9).

2. The hinge according to claim 1, **characterised in that** the first and second parts (21, 22) have respective surfaces (23, 24) by which they can be coupled with each other and which have substantially matching shapes.

3. The hinge according to claim 2, **characterised in that** the second part (22) has a shaped profile (25) and the first part (21) has a groove (26) for accommodating the profile (25); the groove (26) being shaped to match the shape of the profile (25).

4. The hinge according to claim 3, **characterised in that** the groove (26) extends lengthways in a direction parallel to the axis (27, 28) of the respective hole (6, 7).

5. The hinge according to claim 4, **characterised in that** the profile (25) is designed to be inserted into the groove (26) in a direction of reciprocal sliding parallel to the axis (27, 28) of the respective hole (6, 7).

6. The hinge according to any of the foregoing claims from 2 to 5, **characterised in that** the profile (25) and the groove (26) are designed to be fitted together and form a dovetail joint.

7. The hinge according to claims 5 and 6, **characterised in that** the groove (26) is separated from the hole (6, 7) by a curved wall (29) which, transversally to the axis (27, 28) of the hole (6, 7), has a substantially C-shaped cross section defining the dovetail joint.

8. The hinge according to claims 5 and 6, **characterised in that** the groove (26) is separated from the hole (6, 7) by a flat wall (29) which, transversally to the axis (27, 28) of the hole (6, 7), has a substantially T-shaped cross section defining the dovetail joint.

9. The hinge according to claim 7, **characterised in that** the groove (26) is separated from the hole (6, 7) by a curved wall (29) extending along a circular arc coaxial with the axis (27, 28) of the hole (6, 7) and having an inside radius equal to the radius of the hole (6, 7).

10. The hinge according to any of the foregoing claims from 1 to 9, **characterised in that** the first part (21) is substantially cylindrical in shape.

11. The hinge according to any of the foregoing claims from 6 to 9, **characterised in that** the groove (26) is defined by a channel made in the outside wall of the first part (21).

12. The hinge according to claim 11, **characterised in that** the groove (26) has a limit stop (30) for the respective profile (25); the stop (30) extending in a direction transversal to the axis (27, 28) of the respective hole (6, 7) at one end of the groove.

13. The hinge according to any of the foregoing claims from 1 to 12, **characterised in that** the first part (21) is made by pressure die casting.

14. The hinge according to any of the foregoing claims from 1 to 13, **characterised in that** the second part (22) is made by extrusion.

15. The hinge according to any of the foregoing claims from 1 to 14, **characterised in that** the first and second parts (21, 22) have different surface finishes.

16. The hinge according to any of the foregoing claims

from 1 to 15, **characterised in that** the inside of the hole (6) in the first part (21) has a plurality of radially protruding fins (31), for positioning and holding a ball (32) on which the end of the pin (17) rests, in such a way as to obtain contact at a small point to minimise friction between the parts of the hinge (1) that move relative to each other.

17. The hinge according to claim 1, **characterised in that** each of the hinge bodies (2, 3) is made in at least a first and a second part (21, 22) which can be fitted together, the first part (21) constituting a first element presenting the respective hole (6, 7) and the second part (22) constituting a second element presenting the respective securing flap (8, 9).

FIG.1

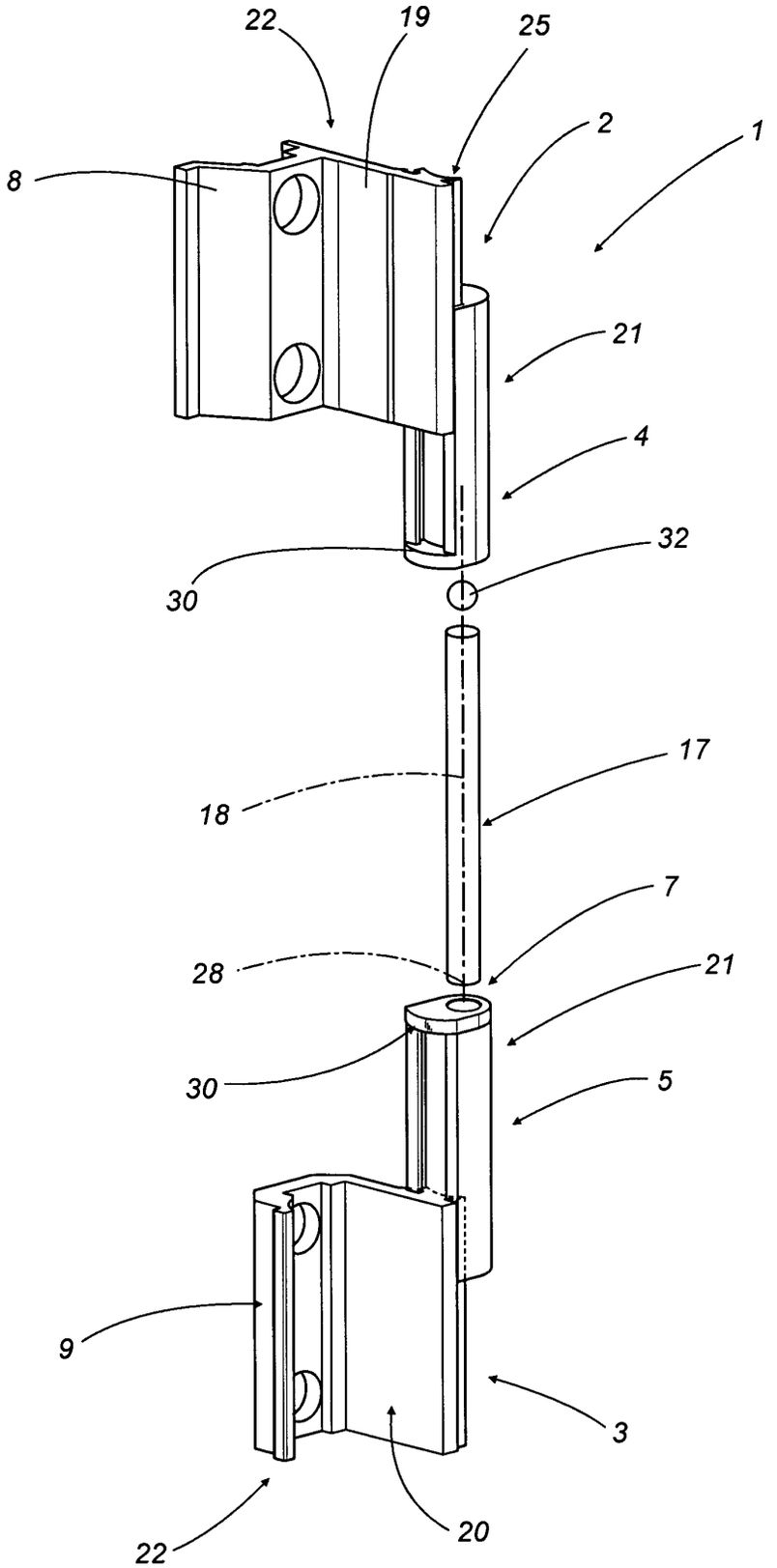

FIG.2

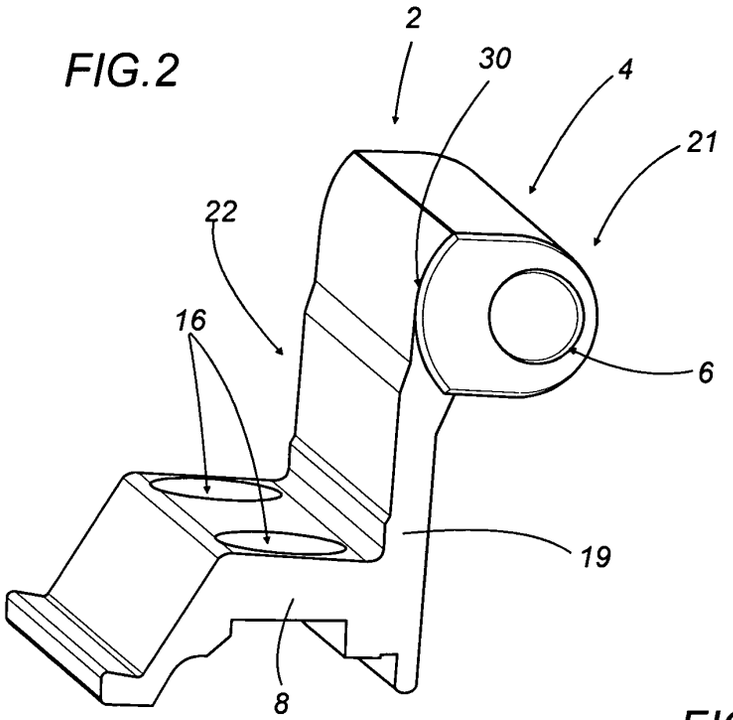

FIG.3

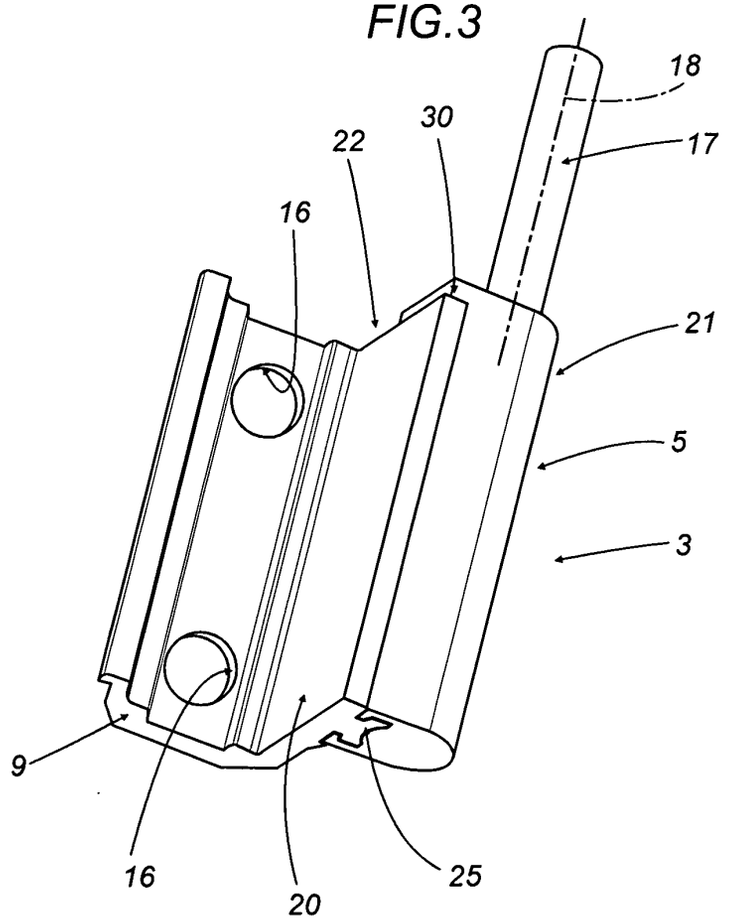

FIG.4

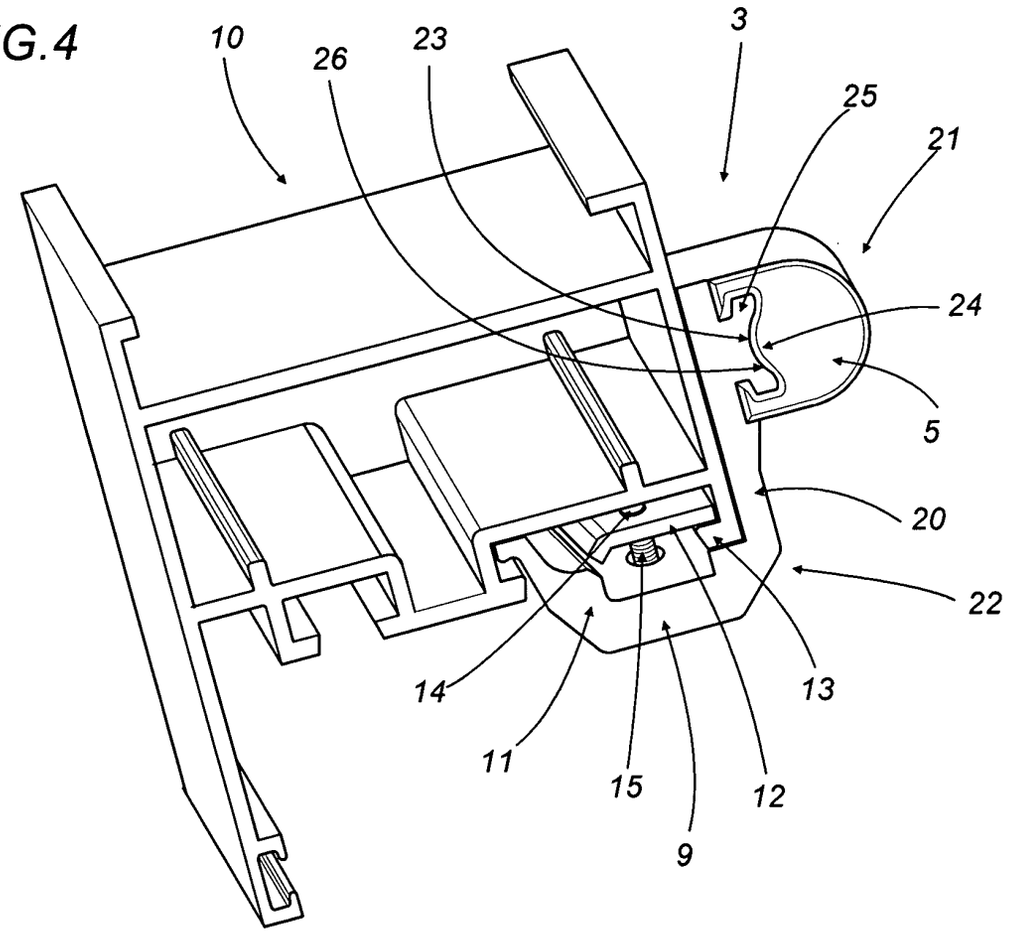

FIG.4a

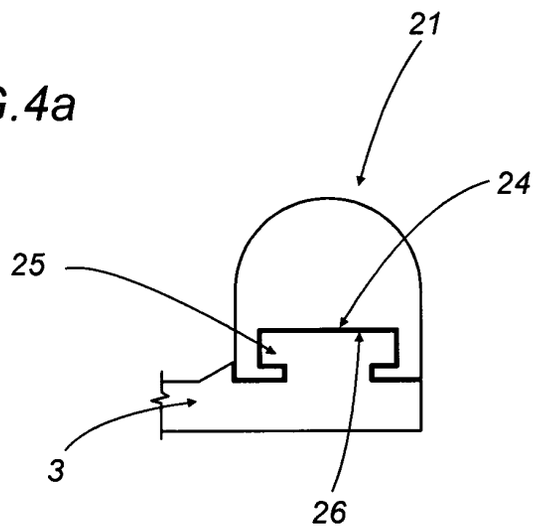

FIG.5