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(72) Inventor: **Monticelli, Domenico**
60027 Osimo (Ancona) (IT)

(74) Representative: **Lanzoni, Luciano**
c/o BUGNION S.p.A.
Via Cairoli, 107
47900 Rimini (Forli) (IT)

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(71) Applicant: **L.M. dei F.lli Monticelli S.r.l.**
60027 Osimo (Ancona) (IT)

(54) **An apparatus for connecting section bars for the fabrication of planar frames, in particular of frames for windows and doors**

(57) An apparatus for connecting section bars (2) for the fabrication of planar frames (3) in particular of frames for windows and doors, in which the section bars (2) are provided with a cavity (4) with open contour, delimited by a base wall (5) intermediate to two lateral walls (6) transverse thereto - comprises a rigid connecting body (7), of angular shape, able to be housed in the cav-

ity (4) of the section bars (2) astride their junction area, located on a vertex of the frame (3); and securing means (8,11) for securing the section bars (2) of the frame to the connecting body (7). The connecting body (7) and the securing means (8) are shaped to secure the section bars (2), at least in the plane (xy) of the frame, securing mechanically to their single lateral wall (6) of the respective cavity (4).

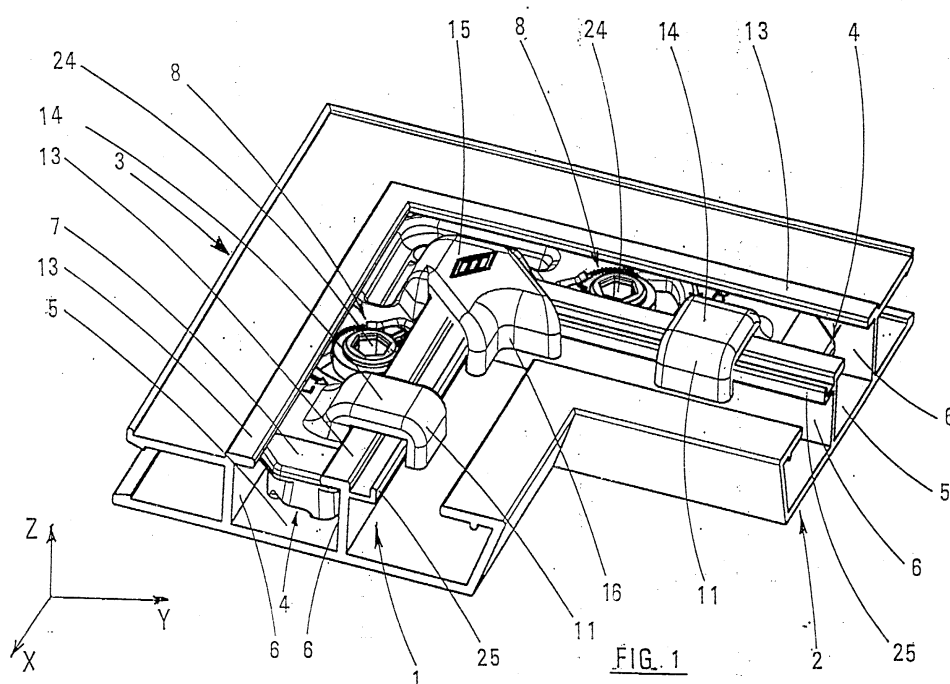


FIG. 1

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Description

[0001] The present invention relates to the fabrication of frames, in particular of frames for windows and doors, and it concerns an apparatus for connecting, in the vertices of the frames, the section bars constituting the frames themselves.

[0002] In the technology for constructing window and door frames, connecting apparatuses are known which, in general, connect the section bar elements by twos, contiguous and concurring in the various vertices, in a manner suitable to provide the frame with an overall monolithic behaviour, assuring both the strength junction of the section bars, and the achievement of the continuity and co-planarity of the corresponding surfaces of the various elements that concur in the junction.

[0003] To obtain such connections, the connecting apparatuses fundamentally comprise rigid connecting bodies with angular shape, so-called squares, and securing means for connecting the section bars to the squares.

[0004] The securing means allow to exert on each of the section bars forces directed parallel to the related axis line, which thrust the section bars against each other on the vertex of the frame.

[0005] The connecting squares are also shaped in such a way as to impose, by effect of their shape, a rigid and predetermined spatial orientation to the section bars connected to them.

[0006] If the section bars to be connected are provided with cavities for housing the connecting body, shaped with an open contour, the securing of the connecting bodies with the section bars requires such procedures as to prevent the cavity of the section bars from warping under the effect of the securing forces. With section bars of this kind it is not possible to use with advantage, for instance, the securing technique whereby wedge-shaped mechanical elements expand in the housing cavities of the squares.

[0007] To overcome the limitations described above, a known procedure for executing the connections between section bars with open cavity calls for the use of a connecting apparatus in which a rigid, angularly shaped connecting body, after being introduced into the cavity of the two section bars to be connected, is anchored to the walls of the section bars by means of caulking effected against wedges appropriately obtained in the connecting body.

[0008] This securing technique entails no global distortions of the containment cavity and thus allows to employ securing procedures that are fully satisfactory from the strict point of view of their execution. Use of caulking, however, entails drawbacks of a different nature: the main one is the need to have specific tools available; the need to position the section bars on a suitable support plane; and, not least, the need for personnel executing the procedure to have a suitable technical competence.

[0009] The aim of the present invention is to allow the angular connection in the vertices of the frames of section bars with open cavity by means of a securing such as to meet the fundamental requirement of preventing the distortion of the cavity by means of a securing procedure that can be executed by anyone, with the use of a wholly conventional and generic tool, and without the need to adopt particular and special means for supporting the frame and its elements during the frame mounting operations.

[0010] In accordance with the invention, this aim is achieved by an apparatus for connecting section bars for fabricating planar frames, in particular frames for windows and doors in which the section bars to be connected are provided with a cavity with open contour delimited by a base wall intermediate to two lateral walls transverse thereto, the apparatus comprising a rigid, angularly shaped connecting body, able to be housed in the cavity of the section bars astride their junction area, located on a vertex of the frame; and securing means for securing the section bars of the frame to the connecting body, characterised in that the connecting body and the securing means are shaped to secure the section bars, in the plane of the frame, by mechanically fastening to their single lateral wall of the respective cavity.

[0011] The mechanical fastening is achieved in particular by means of securing means that comprise at least two first latching elements, transversely projecting from the connecting body, which are shaped to be associated to the lateral wall of the respective section bars, and securing elements which can be associated to the lateral wall of the respective section bars on a side opposite the one engaged by the latching elements. The securing elements have eccentric contour and are able to swivel, upon manual actuation effected for instance by means of a wholly conventional wrench, from their inoperative condition, in which the connecting body and the section elements, while paired, are free to move relative to each other, and an operative condition in which instead they engage, with their eccentric contour against the lateral wall in opposition with the reaction thereon exerted by the related latching element. The latter condition causes the connecting body and the section bars to be secured according to a first direction of the plane of the frame and which imparts to the section bars and to the connecting body a simultaneous relative translation along a second direction of the plane of the frame until the section bars come in contact in correspondence with the vertex junction.

[0012] The securing elements are also provided with a head, so shaped as to present a wedge-like profile in a meridian section plane, passing through the axis of rotation of the securing element. The head is interposed between an edge of the lateral wall and the connecting body, so that, in correspondence with the rotation of the securing element, the head is forced between the connecting body opposed by the base wall of the cavity and the edge of the lateral wall. The action of the head there-

fore allows to interfere the relative mobility of the connecting body and of the section bars and consequently to inhibit the relative translations of the connecting body and of the section bars along a direction perpendicular to the plane of lay of the frame.

[0013] The apparatus further comprises means for retaining the tightening imparted to the securing means, which are embodied by mutually complementary toothings, obtained both on the contour of the securing elements and on an opposite surface of the connecting body.

[0014] Further technical features of the invention, according to the aforesaid aims, can clearly be noted from the content of the claims set out below and its advantages shall become more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which show an embodiment provided purely by way of non limiting example, in which:

- Figure 1 is a perspective view of a vertex of a window or door frame provided with the connecting apparatus of the invention;
- Figure 2 is a perspective view of a vertex of a window or door frame provided with the connecting apparatus of the invention and shown in an intermediate phase of execution of the connection;
- Figure 3 is a view of the frame vertex of the previous figures, shown schematically to illustrate the operation of the various parts of the apparatus;
- Figures 4, 5 and 6 are respectively a top plan view, an elevation view and a bottom plan view of the apparatus shown in its entirety;
- Figures 7, 8 and 9 are respectively an enlarged scale view, a top plan view, and an elevation view of a detail of the apparatus shown in perspective.

[0015] With reference to the accompanying drawings, the reference number 1 globally indicates an apparatus for connecting section bars 2 for fabricating planar frames 3, in particular frames for windows and doors, in which the component section bars 2 are provided with a cavity 4 with open contour, delimited by a base wall 5 intermediate to two lateral walls 6 transverse thereto [Figures 1 and 2].

[0016] The apparatus 1 essentially comprises a rigid connecting body 7, angularly shaped and with substantially quadrilateral section, able to be housed in the cavity 4 of the section bars 2 astride their junction area, located on a vertex of the frame 3, and securing means 8, 11 for securing the section bars 2 of the frame 3 to the connecting body 7.

[0017] The connecting body 7 and the securing means are so shaped as to secure the section bars 2, in the xy plane of the frame, mechanically fastening to a single lateral wall 6 of the respective cavity 4 of each of the section bars 2.

[0018] The anchoring means fundamentally comprise

[Figures 4,5 e 6] securing element 8, movably supported by the connecting body 7, and first latching elements 11 fixed and transversely projecting from the connecting body 7 itself.

5 **[0019]** The securing element 8 have a cylindrical body 22 surmounted by a head 17 wider than the body 22, at the centre of which head is obtained a preferably hexagonal seat 24 for the insertion of a wholly conventional corresponding wrench. The head 17 has eccentric contour 9 provided with surface 12 corrugated by toothings projecting outwards, obtained in correspondence with two distinct peripheral arcs. The head 17 is so shaped as to present a wedge-like profile 18 in a meridian section plane, passing through the axis 10 of symmetry of the cylindrical body 22 [Figures 7,8 and 9] and it is provided with an upper face 19 having its surface corrugated by radial teeth 30, positioned in correspondence with an arc of its own peripheral band having annulus shape.

10 **[0020]** The securing elements 8, preferably in the number of two - one for each section bar 2 - are housed in a respective seat 23 of the connecting body 7, centrally traversed by a hole, with which the cylindrical body 22 is pivotally coupled in free rotation. This allows the securing elements 8 freely to rotate in the seat 23 about the axis 10 of symmetry of the body 22.

20 **[0021]** The first latching elements 11 are borne by the connecting body by means of related first arms 14, which project in overhang from the connecting body 7 itself and which are shaped to be associated to the lateral wall 6 of the respective section bars 2 going around their summit in correspondence with its planar edges 13, 25 which, in turn, are respectively oriented parallel and transversely to the base wall 5 of the section bar 2.

25 **[0022]** The connecting body 7 is also provided with a second arm 15, borne in overhang in correspondence with the bisector of its own vertex. The second arm 15 is provided with its own latching elements 16 whose contour angularly envelops the lateral wall 6 of the two mutually approached section bars 2. This latching element 16 can therefore be associated simultaneously with both corresponding lateral walls 6 of the section bar 2 which concur in the vertex of the frame 3 and is shaped in such a way as to be aligned also with both latching elements 11 of the vertical wall 6 of each of the section bars 2.

30 **[0023]** The first and second arms 14, 15 are mutually co-planar and with the edges 13, 25 of the lateral walls 6 of the cavity fastened to the connecting body 7; edges 13, 15 with which the arms 14, 15 themselves are associated in planar opposition.

35 **[0024]** The apparatus 1 is mounted by insertion of the connecting body 7 inside the cavities 4 of the two section bars 2 concurring in the vertex of the frame 3 and with the latching elements 11 associated to a face of the lateral walls 6 involved with the securing; the opposite side of the lateral walls 6 is instead involved by the eccentric contour 9 of the securing elements 8.

40 **[0025]** Starting from an initial condition in which the connecting body 7 and the section bar elements 2 are

mutually associated, but freely movable relative to each other, the securing elements 8 are progressively rotated about the axis of rotation 10 of the cylindrical body 22. As they are made to rotate [Figure 3], their corrugated surface 12, projecting towards the vertical wall 6 of the section bars 2, comes to mesh into the wall 6 itself operating in contact and in opposition to the contrary reaction exerted on the lateral wall 6 by the related latching element 11. In this way each of the securing elements 8 fastens the connecting body 7 to the section bars 2 according to a first direction x (or y) of the plane of the frame and simultaneously causes the section bar element 2 to translate along a second direction y (or x) of the plane of the frame 3, until the mutual contact with the section bar 2 in correspondence with the vertex junction.

[0026] Simultaneously to this rotation of the securing element 8, the head 17 which is interposed between the edge 13 of the lateral wall 6 parallel to the bottom wall 5 of the cavity 4 and the connecting body 7 is inserted between the connecting body 7 and the edge 13, bringing the connecting body 7 against the base wall 5.

[0027] In this way, by effect of the wedging in of the head 17, the play along a direction z perpendicular to the plane xy of lay of the frame 3, observable between the connecting body 7 and the cavity 4 that contains it, is progressively and completely eliminated, whilst correspondingly every possibility of a free relative translation between the connecting body 7 and the section bars 2 is inhibited.

[0028] In sum then the simple rotation of the securing element 8 allows to tighten the section bars 2 against each other along the directions x and y of the plane of the frame 3 and simultaneously to secure the connecting body 7 and the section bars along the direction z perpendicular to the plane.

[0029] Maintenance of the tight condition is assured in itself by the corrugated nature both of the eccentric contour 9 and of the upper face 19 of the head 17 of the securing elements 8. For greater security, however, the apparatus 1 is also provided with specific means for retaining the tightness of the connecting body 7 with the section bars 2. The latter means, in particular, are constituted by the tothing 20 of the securing element 8, already mentioned, and by a surface 21, opposite and correspondingly toothed, of the seat 23 of the connecting body 7.

[0030] The invention thus conceived is suitable for obvious industrial application; moreover, it can be subject to numerous modifications and variations without thereby departing from the scope of the inventive concept. All details of the invention can, moreover, be replaced with technically equivalent elements.

Claims

1. An apparatus for connecting section bars (2) for fab-

ricating planar frames (3), in particular frames for windows and doors - in which the section bars (2) are provided with a cavity (4) with open contour delimited by a base wall (5) intermediate to two lateral walls (6) transverse thereto - comprising a rigid connecting body (7), angularly shaped, able to be housed in the cavity (4) of the section bars (2) astride their junction area, located on a vertex of the frame (3); and securing means (8, 11) for securing to the connecting body (7) the section bars (2) of the frame; the apparatus (1) being **characterised in that** the connecting body (7) and the securing means (8) are shaped to secure the section bars (2), at least in the plane (xy) of the frame (3), mechanically fastening to their single lateral wall (6) of the respective cavity (4).

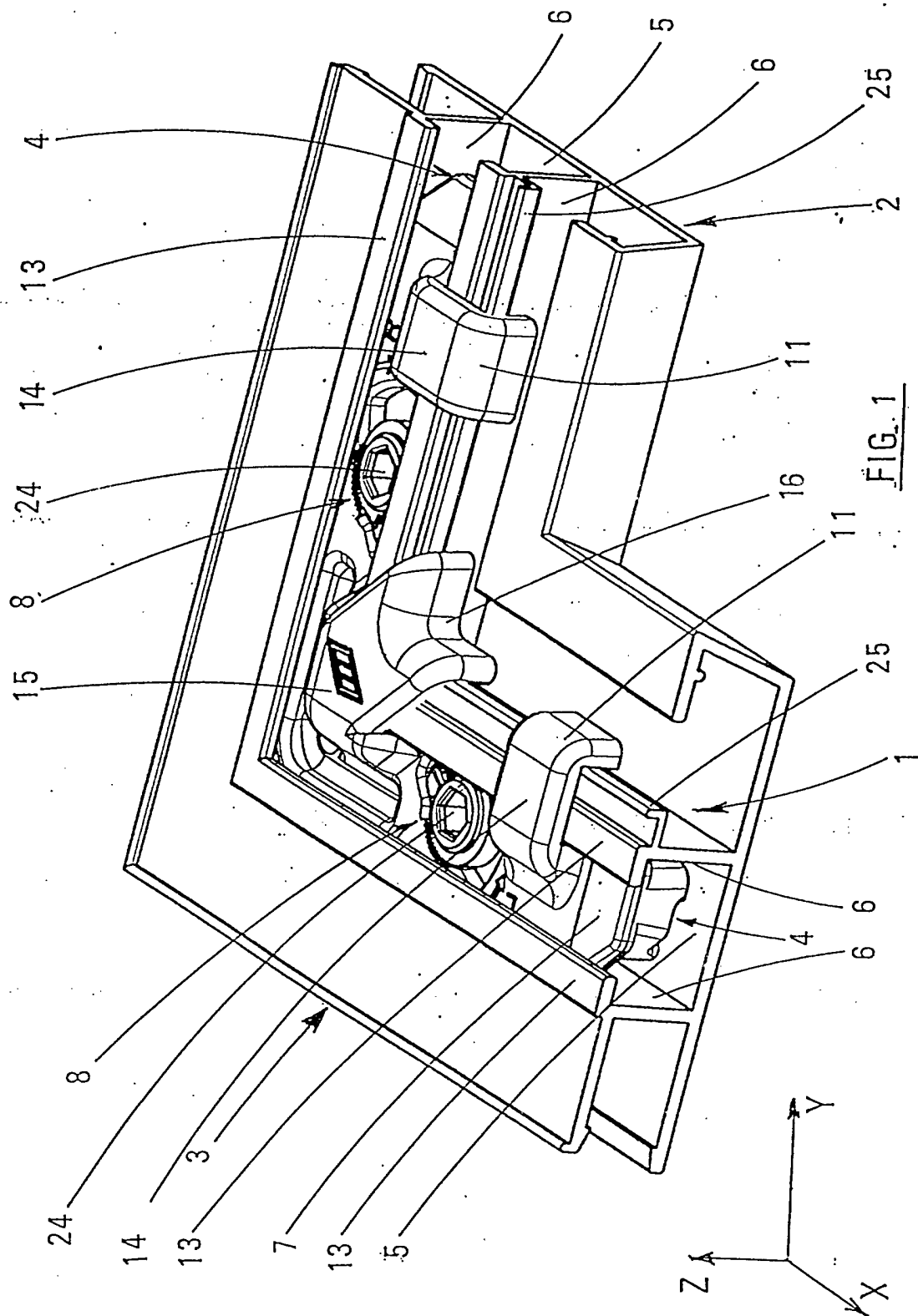
2. An apparatus, as claimed in claim 1, in which the securing means comprise securing means (8), pivotally supported by the connecting body (7), provided with eccentric contour (9) relative to their axis of rotation (10), **characterised in that** the securing means comprise at least two first latching elements (11), transversely projecting from the connecting body (7), which are shaped to be associated to the lateral wall (6) of the respective section bars (2), said securing elements (8) being able to be associated to the lateral wall (6) of the respective section bars (2) on a side opposite the one engaged by the latching elements (11) and being able to rotate from their inoperative condition, in which the connecting body (7) and the section bar elements (2) are freely movable relative to each other, and an operative condition in which instead they engage, with their eccentric contour (9) against the lateral wall (6) and in opposition with the reaction thereon exerted by the related latching element (11), said securing elements (8) fastening the connecting body (7) to the section bars (2) according to a first direction (x;y) of the plane of the frame (3) and simultaneously causing the section bar elements (2) to translate along a second direction (y;x) of the plane of the frame (3) until their mutual contact in correspondence with the related vertex junction.
3. An apparatus, as claimed in claim 2, **characterised in that** the eccentric contour (9) of the securing elements (8) is provided with corrugated surface (12) able to mesh in the wall of the section bars (2).
4. An apparatus, as claimed in claim 3, **characterised in that** the corrugated surface (12) is provided with a tothing projecting towards said lateral wall (6) of the section bars (2).
5. An apparatus, as claimed in one of the previous claims, in which at least one of the lateral walls (6) of the section bars (2) is provided with at least a

planar edge (13) parallel to the base wall (5) of the section bar (2), **characterised in that** said latching elements (11) are borne by respective first arms (14) which project in overhang from the connecting body (7), said first arms (14) being able to be associated in planar opposition with the edge (13) of said lateral wall (6) of each section bar (2).

6. An apparatus, as claimed in claim 6, **characterised in that** the connecting body (7) is provided with a second arm (15), borne in overhang in correspondence with the bisector of its own vertex, which can simultaneously be associated with a pair of lateral walls (6) of the section bars (2) concurring in the vertex of the frame (3). 15
7. An apparatus, as claimed in claim 6, **characterised in that** said second arm (15) is provided with its own latching elements (16) whose contour angularly envelops the lateral wall (6) of the section bars (2), said contour (16) being so shaped as to be aligned with both latching elements (11) of the vertical wall (6) of each of the section bars (2) concurring in the vertex of the frame (3). 20 25
8. An apparatus, as claimed in one of the previous claims, **characterised in that** said first and second arms (14, 15) are mutually co-planar and with the edges (13) of the lateral walls (6) of the cavity (4) fastened to the connecting body (7). 30
9. An apparatus, as claimed in one of the previous claims, **characterised in that** the securing elements (8) are provided with a head (17) so shaped as to present a wedge-like profile (18) in a meridian section plane, passing through the axis of rotation (10) of the securing element (8), which head (17) is interposed between an edge (13) of the lateral wall (6) and between the connecting body (7), said head (17), in correspondence with the rotation of the securing element (8), forcing itself between the connecting body (7) opposed by the base wall (5) and said edge (13) of the lateral wall (6) of the cavity (4) in such a way as to inhibit the relative translations of the connecting body (7) and of the section bars (2) along a direction (z) perpendicular to the plane (xy) of lay of the frame (3). 35 40 45
10. An apparatus, as claimed in claim 9, **characterised in that** said head (17) with wedge-like profile is provided with a face (19) having corrugated surface. 50
11. An apparatus, as claimed in claim 10, **characterised in that** said corrugated surface is oriented towards the edge (13) of the lateral wall (6) of the respective section bar (2). 55
12. An apparatus, as claimed in one of the previous

claims, **characterised in that** it comprises means for retaining the tightened condition of the connecting body (7) with the section bars (2).

- 5 13. An apparatus, as claimed in claim 12, **characterised in that** the means for retaining the tightened condition are embodied by mutually complementary toothings (20) obtained on the contour of the securing elements (8) and on an opposite surface (21) of the connecting body (7).



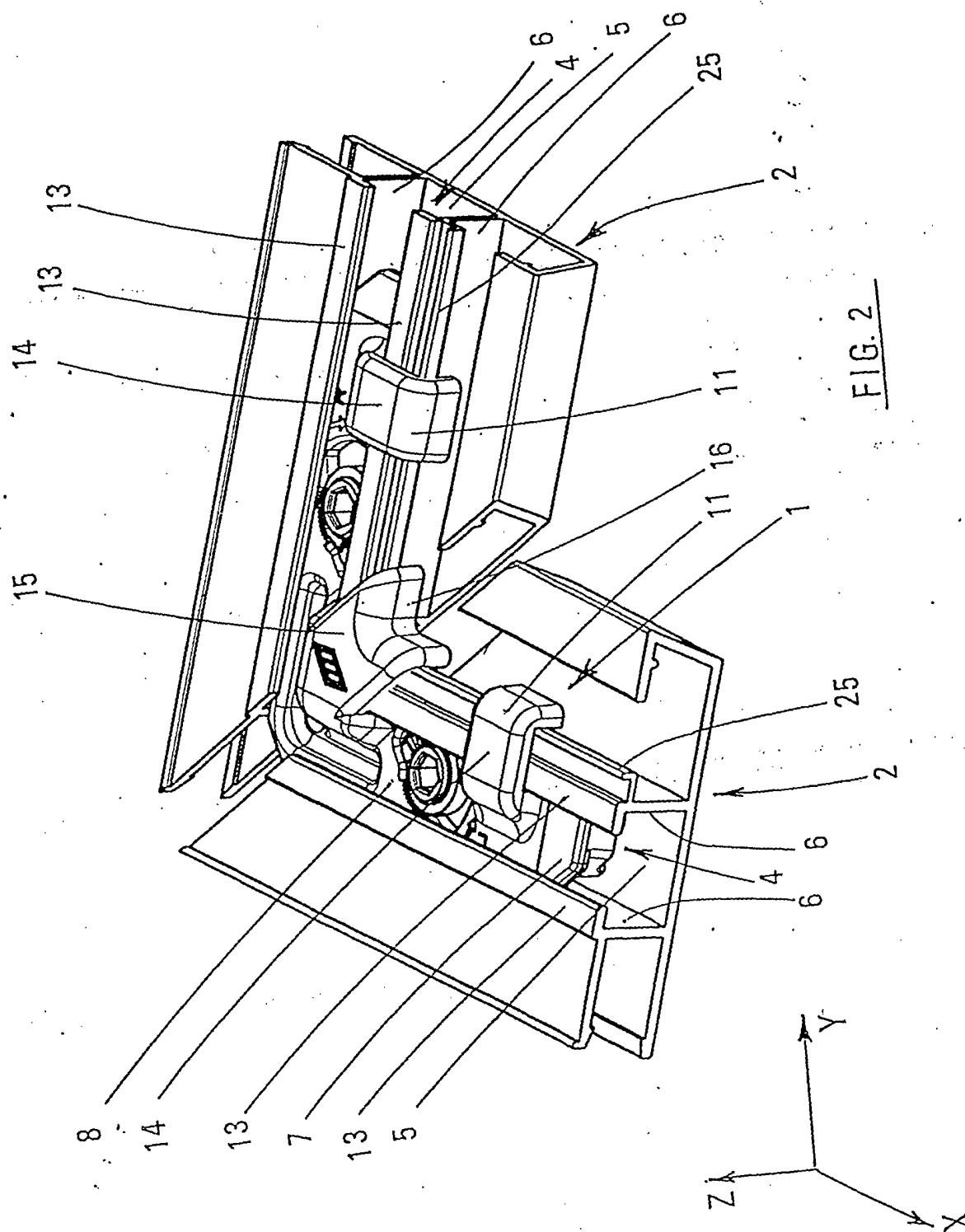


FIG. 2

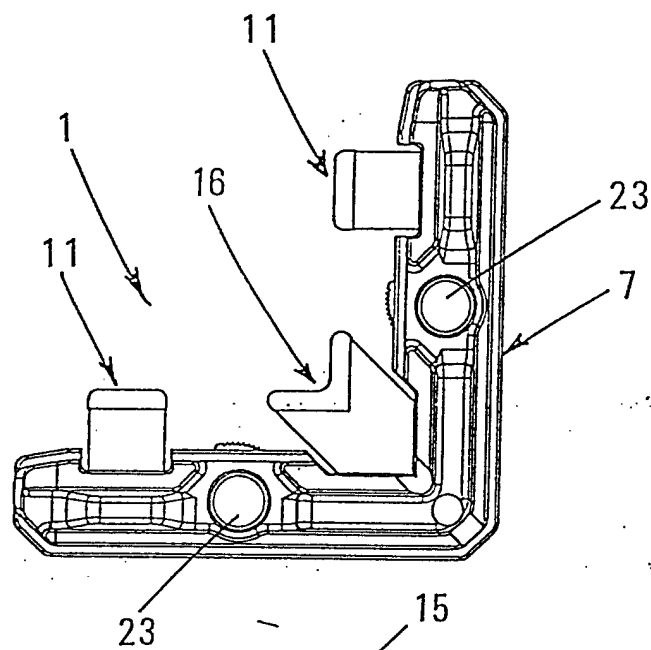


FIG. 6

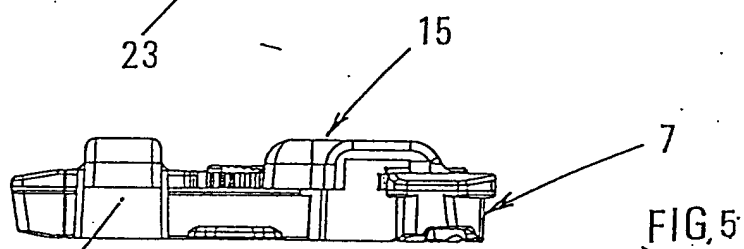


FIG. 5.

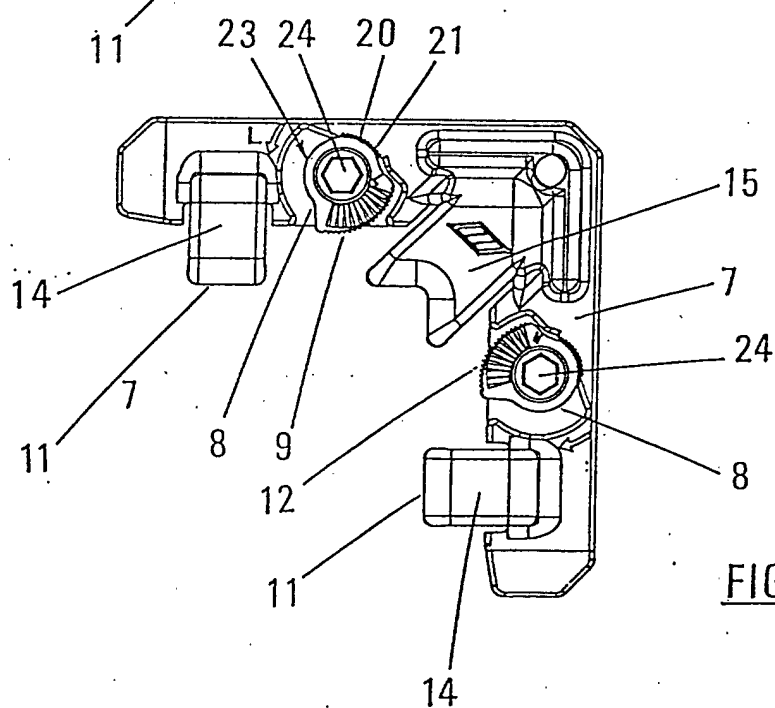
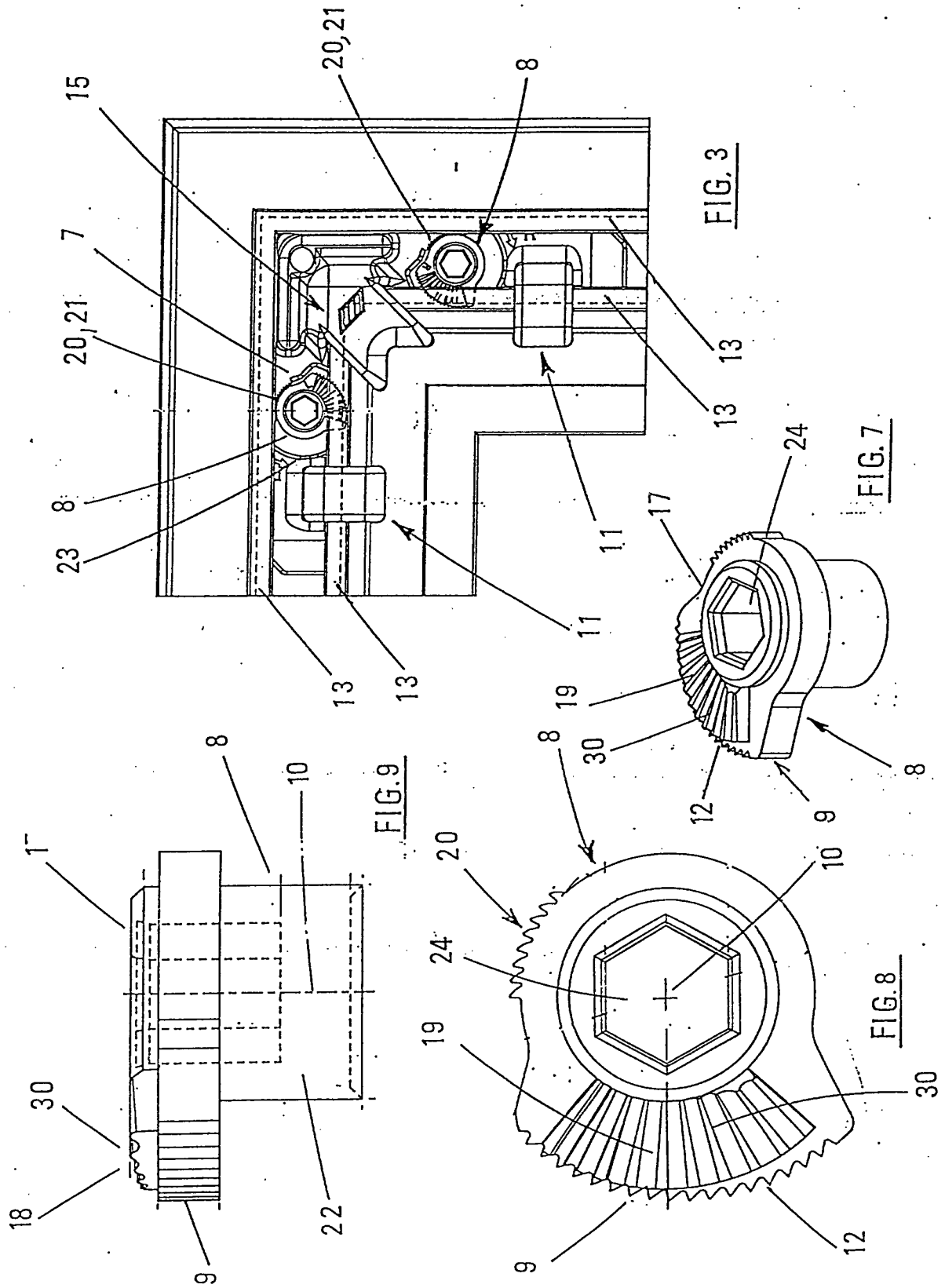


FIG. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 00 83 0643

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 2 228 546 A (HEYWOOD WILLIAMS LTD) 29 August 1990 (1990-08-29) * the whole document *	1	E06B3/96 E06B3/30
X	FR 2 761 753 A (ALUGRIP) 9 October 1998 (1998-10-09) * the whole document *	1	
X	GB 901 029 A (CRITTAL MAUFACTURING) 11 July 1962 (1962-07-11) * page 2, line 66 - line 91; figure 6 *	1	
A		2	
A	DE 43 09 274 A (HUELS TROISDORF) 29 September 1994 (1994-09-29) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			E06B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		13 July 2001	Fordham, A
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 83 0643

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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13-07-2001

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