(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 380 701 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.01.2004 Bulletin 2004/03

(51) Int Cl.[7]: **E04B 2/96**

(21) Application number: **03076979.8**

(22) Date of filing: **26.06.2003**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **12.07.2002 IT MI20021546**

(71) Applicant: **HYDRO ALUMINIUM SYSTEMS S.p.A.**
I-20060 Ornago (Milan) (IT)

(72) Inventor: **Zanoni, Edoardo**
20124 Milano (IT)

(74) Representative: **Marchi, Massimo, Dr. et al**
Marchi & Partners,
Via Pirelli, 19
20124 Milano (IT)

(54) Joint for connecting together two sections and system for forming a frame of a facade or a roof of a building using this joint

(57) Joint (1) for forming a T-connection between two sections (2,3) having a substantially quadrangular cross-section and both being provided with a chamber (4,5). The joint (1) can be inserted inside the chamber (5) of one (3) of said sections (2,3) and is formed by a body (6) comprising a front facing plate (7) provided with a guide hole (8) for a pin (9) provided with a stopping flange (10); the stopping flange (10) bears against the internal surface of said front plate (7). The pin (9) is slidable towards the outside of said front plate (7) and can be inserted inside a hole (11) of the other section (2).

The body (6) comprises a section portion (12) having a substantially quadrangular cross-section delimited by said front plate (7), by a rear plate (13) and by two side surfaces (14,15).

Moreover, the body (6) can be constrained inside said chamber (5) of one (3) of the two sections (2,3) by means of locking means (16) arranged outside said section portion (12).

The locking means (16) comprise a tongue (17) which forms, with one (15) of said side surfaces (14,15) of said body (6), a groove (19) inside which splaying means (18) can be inserted so as to move away said tongue (17) from said side surface (15) without deforming said portion (12) of the body (6).

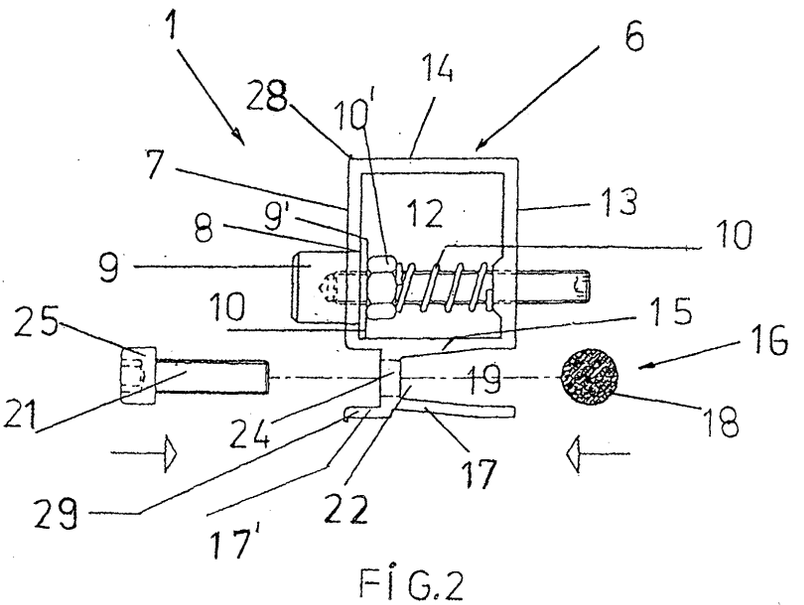

FIG.2

EP 1 380 701 A1

Description

[0001] The present invention relates to a joint for connecting together two sections and a system for forming a frame of a facade or a roof of a building using this joint.

[0002] More particularly, the invention relates to a joint for forming a T-connection between two sections.

[0003] The patent US 4,948,290 describes a T-connection between two sections of a facade, which are oriented perpendicularly with respect to each other and each of which is provided with an internal chamber. A U-shaped joint is housed in the chamber of one of the two sections.

[0004] The U-shaped joint comprises an end plate and two branches formed by the plates which extend from the opposite edges of the end plate close to the internal surfaces of the section.

[0005] A sliding pin provided with a flange is guided through a hole in the front plate.

[0006] The U-shaped joint also comprises a toggle lever shaped as a bridge having a central part and two parts which extend from the central part to said two branches forming an obtuse angle therewith. The central part of the bridge is provided with a threaded hole inside which a screw having a head bearing against the front plate extends. When the screw is tightened, the two branches of the joint press against the internal surfaces of the section.

[0007] The T-connection between two sections is formed by introducing said sliding pin inside a suitable hole formed in a wall of the other section.

[0008] This joint has the disadvantage that it is formed by a U-shaped body which is difficult and complex to manufacture owing to said shaped bridge lever.

[0009] Moreover, locking of the joint, which is obtained by splaying said two branches towards the internal walls of the section, produces only contact of the linear type with said walls.

[0010] Yet another drawback of said joint is that said locking operation deforms the U-joint, thus tending to displace the axis of said pin with respect to the hole formed in the wall of the other section.

[0011] Further drawbacks of this joint are indicated in the US patent 6,390,718 B1 in the name of the same proprietors. In particular said document criticises the T-connection of the patent US-4,948,290, asserting that the joint extends through the entire cross-section of the internal chamber of the section so that a special joint is required for each different configuration of said internal chamber.

[0012] The patent US-6,390,718 B1 describes a joint which is inserted inside a chamber of a first section so as to then effect a T-connection, by means of a sliding pin, with a second section perpendicular to the first section. A securing element extends across the whole length of said first section and is used to constrain the joint to one end of the first section facing the second section.

[0013] Said securing element is formed by an arm which extends from an internal wall of the section towards the inside of the chamber and is provided, at the end, with a securing cavity having a round shape with a groove formed in it.

[0014] In turn, the joint comprises a body provided with a groove having an internal contour complementing the shape of said arm and said cavity of the securing element. Said body is engaged onto the securing element, on which it is locked when it reaches the desired position.

[0015] This joint, although it has the advantage that it may be used with sections having cross-sections with different dimensions, has the drawback that it cannot be assembled inside sections of the traditional type since the latter do not have the securing element required by said joint.

[0016] Moreover, it is not envisaged that the sliding pin can be disengaged from the hole in which it was housed in order to form the T-connection. Consequently it is impossible to disengage from each other two sections forming a T-connection by means of said joint, without damaging at least one of the two sections.

[0017] The present invention proposes to overcome the abovementioned drawbacks.

[0018] According to a first aspect thereof, the present invention relates, therefore, to a joint for forming a T-connection between two sections having substantially quadrangular cross-sections, said sections being both provided with a chamber, said joint being able to be inserted inside the chamber of one of said sections and being formed by a body comprising a front facing plate provided with a guide hole for a pin provided with a stopping flange, said stopping flange bearing against the internal surface of said front plate, said pin being slidable towards the outside of said front plate and being able to be inserted inside a hole of the other section.

[0019] This joint is characterized in that:

- said body comprises at least one section portion having a substantially quadrangular cross-section delimited by said front plate, by a rear plate and by two side surfaces;
- the body can be constrained inside said chamber of one of the two sections by means of locking means arranged outside said section portion;
- said locking means comprise a tongue and splaying means, said tongue forming, with one of said side surfaces of said body, a groove and said splaying means being able to be actuated inside said groove so as to move away said tongue from said side surface without deforming said section portion.

[0020] Preferably, said splaying means are associated with an actuating element for displacing said splaying means inside said groove.

[0021] Conveniently, said actuating means consist of a threaded element.

[0022] Advantageously, said splaying means are provided with a threaded hole and said threaded element is a screw engaging with said threaded hole. Alternatively, said threaded element is integral with said splaying means and is able to be actuated by means of a threaded nut.

[0023] Typically, the splaying means consist of a bar provided with a threaded hole.

[0024] Preferably, said bar has a cylindrical shape and has a constant radius over its whole length.

[0025] Preferably, the cross-section of said groove has a dimension decreasing from the open end towards the bottom.

[0026] Advantageously, said body comprising said portion and said tongue is made from a single material, for example, aluminium, and as one piece, for example by shaping the body by means of extrusion.

[0027] Preferably, the joint comprises a foot which emerges protruding from one of said side surfaces of said section portion and comprises a vertical wall from the end of which said tongue and, in the opposite direction, a heel extend respectively.

[0028] Advantageously, said groove intended to receive said splaying means is delimited by said side surface from which said foot emerges, by said vertical wall and by said tongue.

[0029] Conveniently, said vertical wall has, passing through it, a hole for receiving the element for actuating said splaying means.

[0030] According to a second aspect thereof, the invention relates to a system for forming a frame for a facade or for a roof of a building, characterized in that it comprises at least one joint as described above.

[0031] According to a third aspect thereof, the invention relates to a facade or a roof of building formed by said system.

[0032] Further advantages and features of the present invention will now emerge more clearly from the following description and from the accompanying figures which are provided merely by way of example and without intended to be limiting in any way and in which:

Fig. 1 shows a perspective front view of a joint according to the invention;

Fig. 2 shows a side view of the joint according to Fig. 1;

Fig. 3 shows a cross-sectional view, along the plane III-III in Fig. 1, of the joint inserted inside the chamber of a first section during a phase preceding connection of the two sections;

Fig. 4 shows a schematic perspective view of two horizontal sections before connection to two vertical sections;

Fig. 5 shows, in a cross-sectional view of a section, means for accessing inside the said section;

Fig. 6 shows, in a side view of the joint according to Fig. 1, a phase during which the means for locking the joint are activated;

Fig. 7 shows a phase following that of Fig. 6;

Fig. 8 shows the phase where the two sections according to Fig. 3 are connected;

Fig. 9 shows, in a schematic perspective view, the connection of two horizontal sections to two vertical sections;

Fig. 10 shows a front view of the joint according to Fig. 1 inserted in the end of the chamber of a section;

Fig. 11 shows a front view of the joint inserted a section having a cross-section different from that of the section according to Fig. 10;

Fig. 12 shows a front view of the joint inserted inside a section having a cross-section different from those of the sections according to Figs. 10 and 11.

[0033] In the figures 1 illustrates a joint 1 for joining together two sections (2,3) of the traditional type having a substantially quadrangular cross-section.

[0034] The two sections are oriented perpendicularly with respect to each other. The section 2 extends perpendicularly with respect to the sheet.

[0035] The section 3 comprises means 3' of the known type for supporting a glass panel (Fig. 3).

[0036] The sections 2,3 are part of a system of adjacent frames, each enclosing a glass panel (not shown). The system of adjacent frames forms, for example, a facade or a roof of a building.

[0037] The system comprises a first section 2 parallel to a second section 2' entirely identical to the first section and a plurality of sections 3 perpendicular to the two sections 2,2' (Fig. 9).

[0038] The sections 2,2' form the so-called uprights and the sections 3 the so-called cross-pieces.

[0039] The system envisages a joint 1 at each intersection for forming the so-called T-connection between an upright and a cross-piece.

[0040] The sections 2,3 are provided with respective chambers 4,5 and the joint 1 can be inserted inside the chamber 5 of the section 3 (Fig. 3).

[0041] In particular, the joint 1 is formed by a body 6 comprising a front facing plate 7 provided with a guide hole 8 for a pin 9 in turn provided with a stopping flange 9' (Figs. 1-2).

[0042] Said stopping flange 9' bears against the internal surface of the front plate 7.

[0043] The pin 9 is slidable towards the outside of the front plate 7 and can be inserted inside a hole 11 of the section 2 (Fig. 3).

[0044] Said body 6 comprises at least one section portion 12 having a substantially quadrangular cross-section.

[0045] More particularly, this portion 12 is delimited by the front plate 7, by a rear plate 13 and by two side surfaces 14, 15.

[0046] As can be clearly seen in Fig. 2, the portion 12 is open on the side coinciding with the plane of the sheet and on the opposite side.

[0047] The pin 9 is pushed towards the outside of the front plate 7 by a spring 10 having a first end bearing against a locking nut 10' acting on the internal surface of the flange 9' and a second end bearing against the internal surface of the rear plate 13.

[0048] Moreover, the body 6 can be constrained inside the chamber 5 by locking means 16 arranged on the outside of the section portion 12. These locking means 16 comprise a tongue 17 and splaying means 18. The tongue 17 forms, with the side surface 15 of the portion 12, a groove 19. The splaying means 16 are formed by a bar 18 provided with a threaded hole 20 and by a threaded element 21. This bar 18, which has a cylindrical shape, can be actuated inside the groove 19 by means of the threaded element 21 so as to move the tongue 17 away from the side surface 15 without deforming the section portion 12.

[0049] Alternatively, the splaying means 18 are integral with a threaded element which can be actuated by a threaded nut located inside the channel 27 opposite a through-hole 24 from which the threaded element integral with the splaying means 18 emerges.

[0050] In a variant (not shown) inside the groove 19 there are advantageously provided stopping means, such as projections for example, for stopping the movement of the splaying means 18 at a predefined distance from the bottom of the groove 19.

[0051] The locking means 16 envisage a foot which emerges protruding from the side surface 15 of the portion 12 and comprises a vertical wall 23 from the end of which said tongue 17 and, in the opposite direction, a heel 17' extend respectively.

[0052] The groove 19 is delimited by said side surface 15 from which said foot emerges, by said vertical wall 23 and by said tongue 17.

[0053] The groove 19 is configured with transverse cross-sections decreasing from the open end towards the bottom 22 and the cylindrical bar 18 has a greater diameter than the groove 19 as from a given distance from the bottom 22 of the groove itself.

[0054] The vertical wall 23 is provided with a through-hole 24 inside which a threaded element 21 can be inserted, said threaded element being provided with a head 25 which can be stopped so as to bear against the external side surface 26 of the vertical wall 23. During installation, said head 25 is housed inside a channel 27 delimited by said heel 17', by said vertical wall 23 and by a section of the side surface 15 of the portion 12.

[0055] The joint 1 comprises furthermore means for correct positioning of the body 6 inside the chamber 5. These means are formed by at least one stopping element capable of stopping the movement of the body 6 inside the chamber 5. In particular, the joint 1 is provided with a first and a second stopping element 28,29 having the form of teeth. The first tooth 28 projects so as to protrude upwards from the front plate 7 and the second tooth 29 projects so as to protrude downwards from the heel 17'.

[0056] During assembly of the joint 1, these teeth 28,29 are positioned so as to bear against the edges of the two opposite and mutually parallel walls 37,38 inside the section 3 (Fig. 10).

[0057] Advantageously the joint 1 is provided with means for recalling the pin 9 inside the chamber 5 and thus disengaging the section 3 from the section 2. These means comprise a window 31 in the side wall 32 of the section 2 (Fig. 5) and a tool 33 which can be inserted inside said window communicating directly with said spring 10. The tool 33 acts on the spirals of the spring 10 and thus actuates the movement of the pin 9 towards the inside of the chamber 5.

[0058] Locking of joint 1 inside the section 3 is obtained by screwing the threaded element 21 (Fig. 1) inside the threaded hole 20 of the bar 18 and thus forcing said bar 18 to move towards the bottom 22 of the groove 19 (Figs. 6 and 7). During this operation, since the cross-section of the bar 18 is constant, while the cross-section of the groove diminishes, the movement of the tongue 17 away from the side surface 15 of the portion 12 is obtained. In practice, the tongue 17 bends towards the outside and, like a vice, locks the joint 1 inside the section 3.

[0059] This locking action is obtained without any deformation of the portion 12 since the forces transmitted by the bar 18 towards the portion 12 during its displacement inside the groove 19 are fully balanced by the mechanical rigidity which is due to the presence of the front and rear plates 7,13.

[0060] The absence of deformations on the side surface 14 of the portion 12 allows, advantageously, the whole of said surface 14 to be brought into contact with the wall 38 of the section 3 (Fig. 10), thus providing a wide locking surface.

[0061] Subsequently, the section 3, already provided at each of its ends with a respective joint 1, is inserted between the two uprights 2,2' (Fig. 4).

[0062] This operation is performed by sliding the section 3 between the two sections 2,2' until the pins 9 of each joint 1 penetrate inside the holes 11 (Fig. 3,8) of the two sections 2,2', reaching their maximum extension as a result of the thrusts exerted by the springs 10.

[0063] In order to compensate for possible misalignment between the pins 9 and the holes 11, each pin 9 comprises a suitable compensating notch 34.

[0064] The operations described above are repeated so as to connect together additional horizontal and vertical sections until completion of the desired structure.

[0065] Preferably, each horizontal section 3 is fixed definitively by screwing self-tapping screws 35 inside seats 36 of the vertical section 2 (Fig. 8).

[0066] Advantageously, the said joint 1 according to the invention can be inserted and constrained inside the chamber 5 of sections 3 having a different cross-section in which a first dimension "a" is substantially the same for all the sections and the other dimension "b" is different from one section to the other (Figs. 10-12).

Claims

1. Joint for forming a T-connection between two sections (2,3) having a substantially quadrangular cross-section, said sections (2,3) being both provided with a chamber (4,5), said joint (1) being able to be inserted inside the chamber (5) of one (3) of said sections (2,3) and being formed by a body (6) comprising a front facing plate (7) provided with a guide hole (8) for a pin (9) provided with a stopping flange (10), said stopping flange (10) bearing against the internal surface of said front plate (7), said pin (9) being slidable towards the outside of said front plate (7) and being able to be inserted inside a hole (1) of the other section (1), said joint (1) being **characterized in that**:

   - said body (6) comprises a section portion (12) having a substantially quadrangular cross-section delimited by said front plate (7), by a rear plate (13) and by two side surfaces (14;15);
   - the body (6) can be constrained inside said chamber (5) of one (3) of the two sections (2,3) by means of locking means (16) arranged outside said section portion (12);
   - said locking means (16) comprise a tongue (17) and splaying means (18), said tongue (17) forming, with one (15) of said side surfaces (14,15) of said body (6), a groove (19) and said splaying means (18) being able to be actuated inside said groove (19) so as to move away said tongue (17) from said side surface (15) without deforming said section portion (12).

2. Joint (1) according to Claim 1, **characterized in that** said splaying means (18) are associated with an actuating element for displacing said splaying means (18) inside said groove (19).

3. Joint (1) according to Claim 1 or 2, **characterized in that** said actuating means consist of a threaded element (21).

4. Joint (1) according to Claim 3, **characterized in that** said splaying means (18) are provided with a threaded hole (20) and **in that** said threaded element (21) is a screw engaging with said threaded hole (20).

5. Joint (1) according to Claim 3, **characterized in that** said splaying means (18) are integral with said threaded element (21) and **in that** said threaded element (21) can be actuated by means of a threaded nut.

6. Joint (1) according to any one of Claims 1 to 5, **characterized in that** said splaying means (18) can be inserted inside said groove (19) delimiting cross-sections decreasing from the open end towards the bottom (22).

7. Joint (1) according to Claim 1, **characterized in that** said body (6) comprising said portion (12) and said tongue (17) is formed as one piece made from a single material.

8. Joint (1) according to Claim 1, **characterized in that** a foot emerges protruding from one of said side surfaces (14,15) of the portion (12) and comprises a vertical wall (23) from the end of which said tongue (17) and, in the opposite direction, a heel (17') extend respectively, said splaying means (18) being able to be inserted inside the groove (19) delimited by one (15) of the side surfaces (14,15) of said portion (12), by the vertical wall (23) and by said tongue (17).

9. Joint (1) according to Claim 8, **characterized in that** the vertical wall (23) has, passing through it, a hole (24) inside which the element for actuating said splaying means (18) can be inserted.

10. Joint (10) according to Claims 4 and 9, **characterized in that** said actuating element is a threaded element (21) provided with a head (25) which can be stopped so as to bear against the external surface (26) of said vertical wall (23).

11. Joint (1) according to Claims 5 and 9, **characterized in that** said actuating element is a threaded element (21) provided with a threaded nut which can be stopped so as to bear against the external surface (26) of said vertical wall (23).

12. Joint (1) according to Claim 1, **characterized in that** it comprises means for controlling correct positioning of the body (6) inside the chamber (5).

13. Joint according to Claim 12, **characterized in that** said means comprise a first tooth (28) emerging so as to protrude upwards from the front plate (7).

14. Joint according to Claim 12 or 13, **characterized in that** said means comprise a second tooth (29) emerging so as to protrude downwards from said heel 17'.

15. Joint (1) according to Claim 1, **characterized in that** said pin (9) is pushed towards the outside of the front plate (7) by a spring (10) having a first end bearing against the internal surface of the flange (9') and a second end bearing against the internal surface of the rear plate (13).

16. Joint (1) according to Claim 15, **characterized in that** it also comprises means for recalling said pin

(9) into said body (6) and disengaging said two sections (2,3) from each other.

17. Joint (1) according to Claim 16, **characterized in that** said means for recalling said pin (9) comprise a window (31) in a side wall (32) of one (3) of the two sections (2,3) and a tool (33) which can be inserted inside said window (31) so as to act on the spirals of the spring (10) and thus actuate the movement of the pin (9) towards the inside of the body (6).

18. System for forming at least one frame for a facade or a roof of a building, **characterized in that** it comprises at least one joint (1) according to any one of Claims 1 to 15.

19. Facade or roof of a building, **characterized in that** it is formed by a system according to Claim 18.

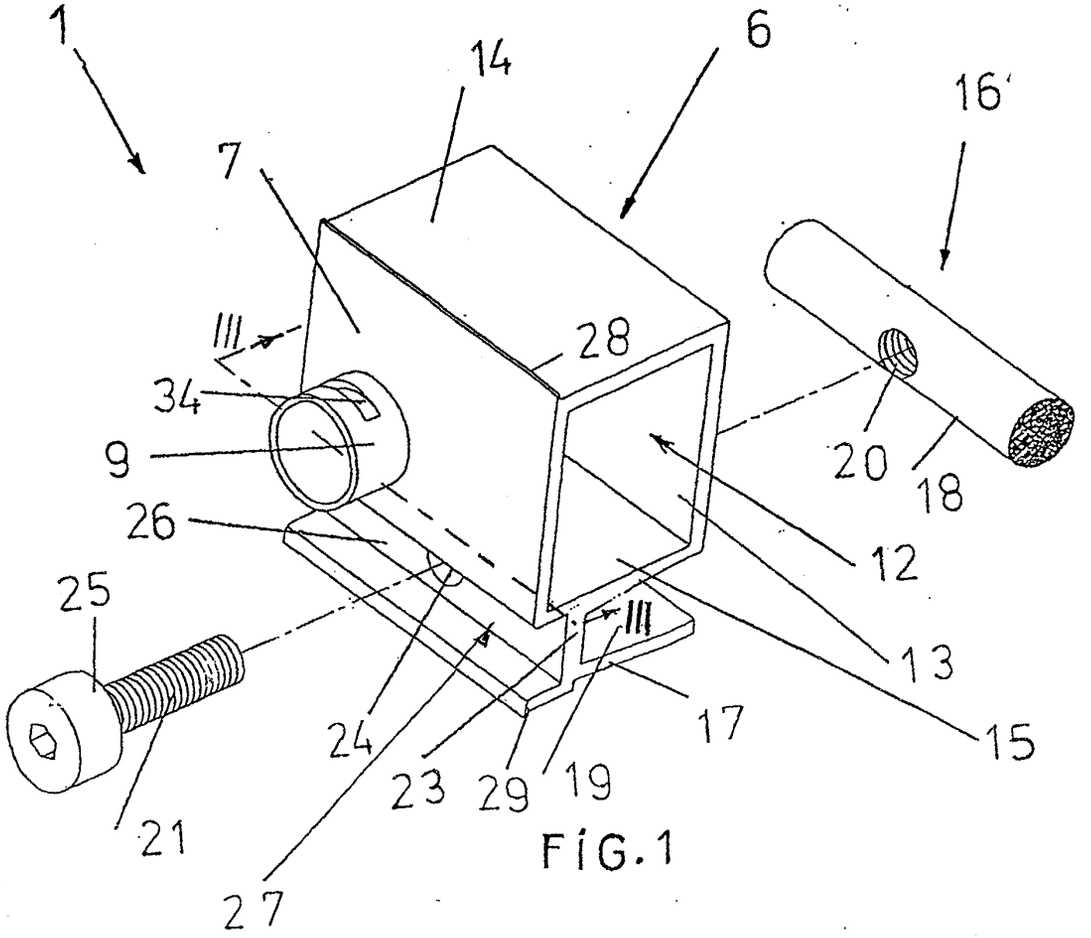
1
14
6
16'
7
III
28
34
9
26
20
18
12
25
III
13
17
15
24
23
29
19
21
27

FIG.1

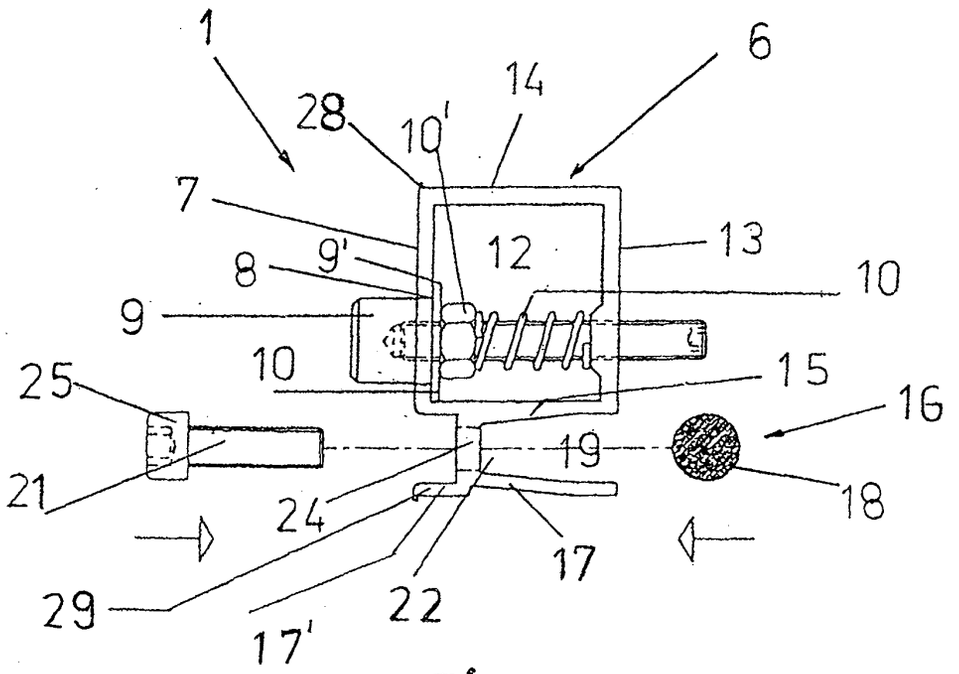
1
6
28
10'
14
7
12
13
8
9'
10
9
10
15
25
16
19
21
24
18
17
29
22
17'

FIG.2

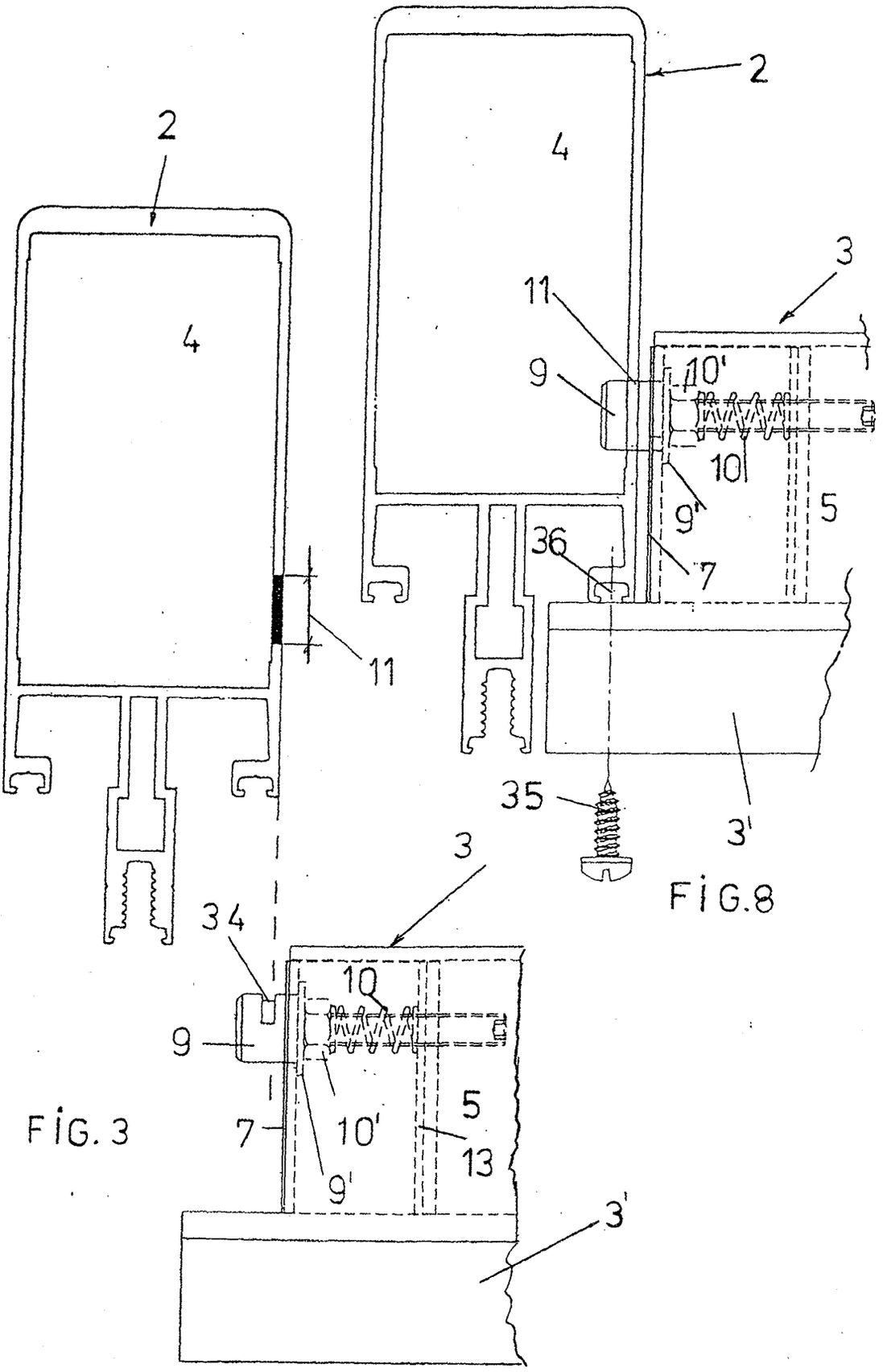

FIG.8

FIG.3

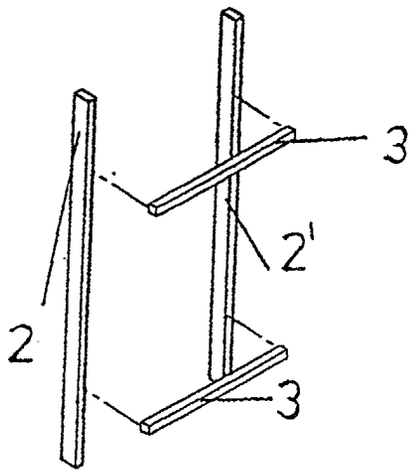

FIG.4

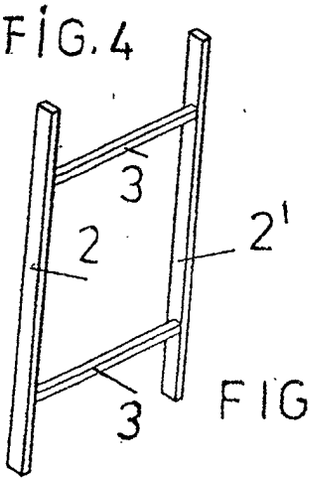

FIG.9

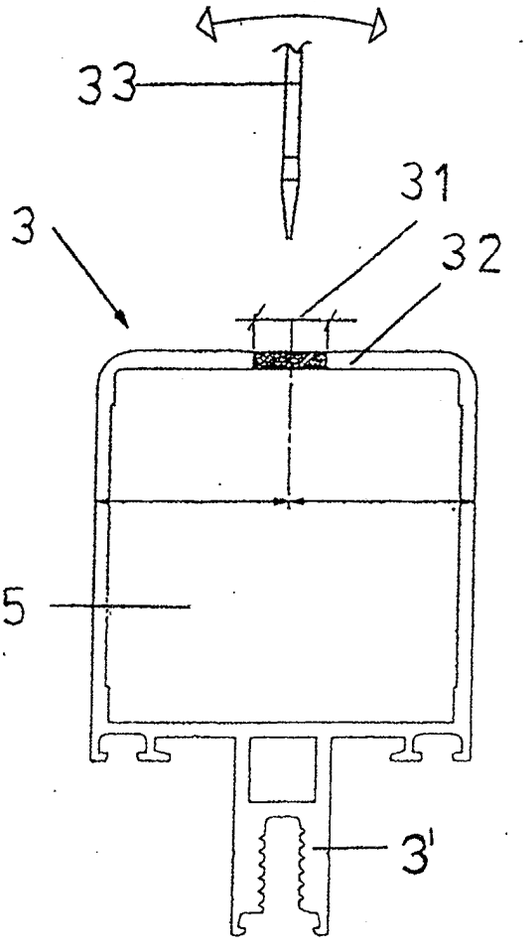

FIG.5

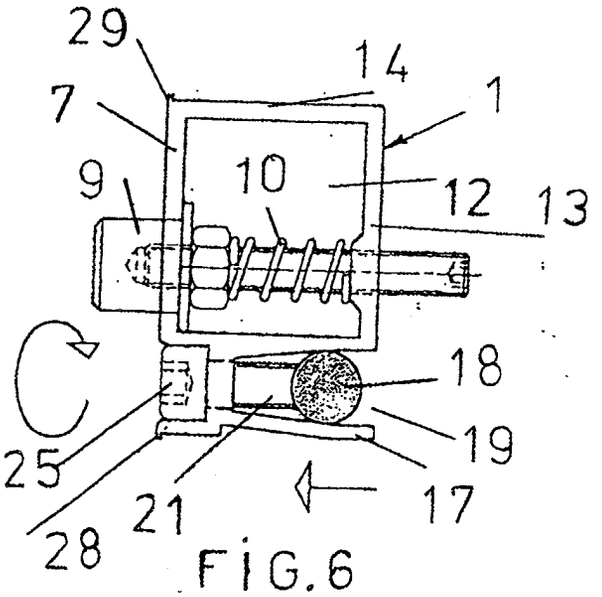

FIG.6

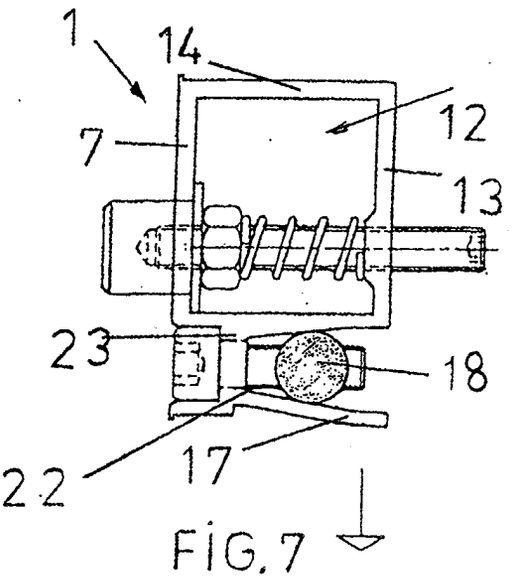

FIG.7

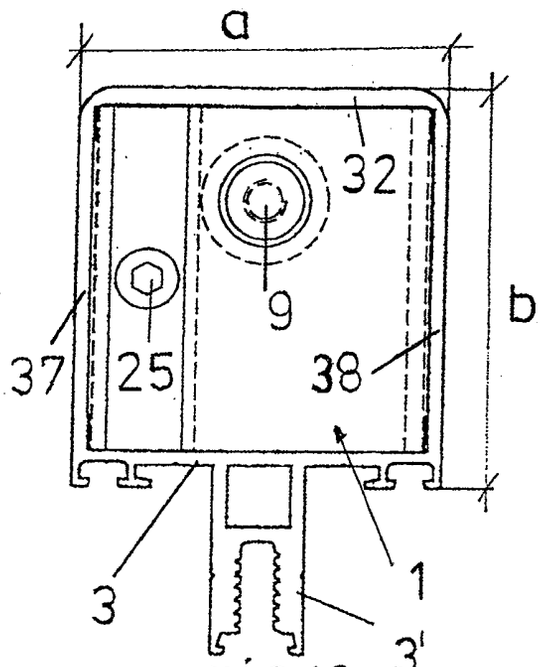

FIG.10

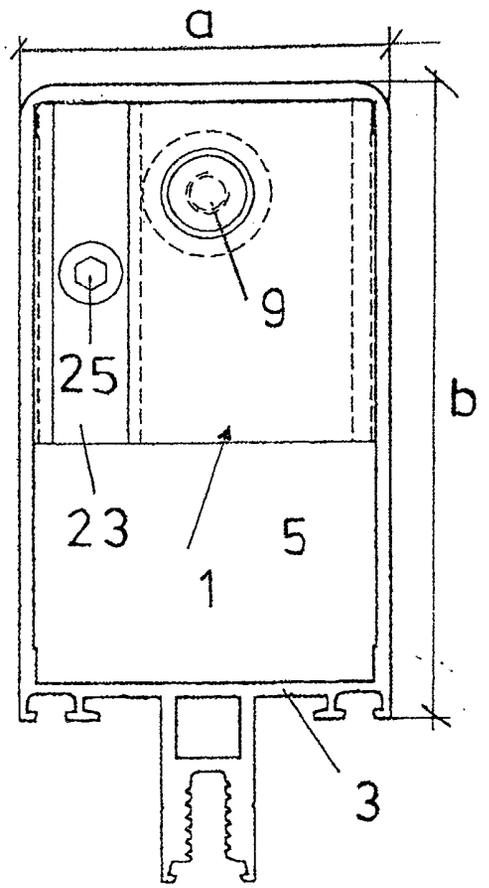

FIG.11

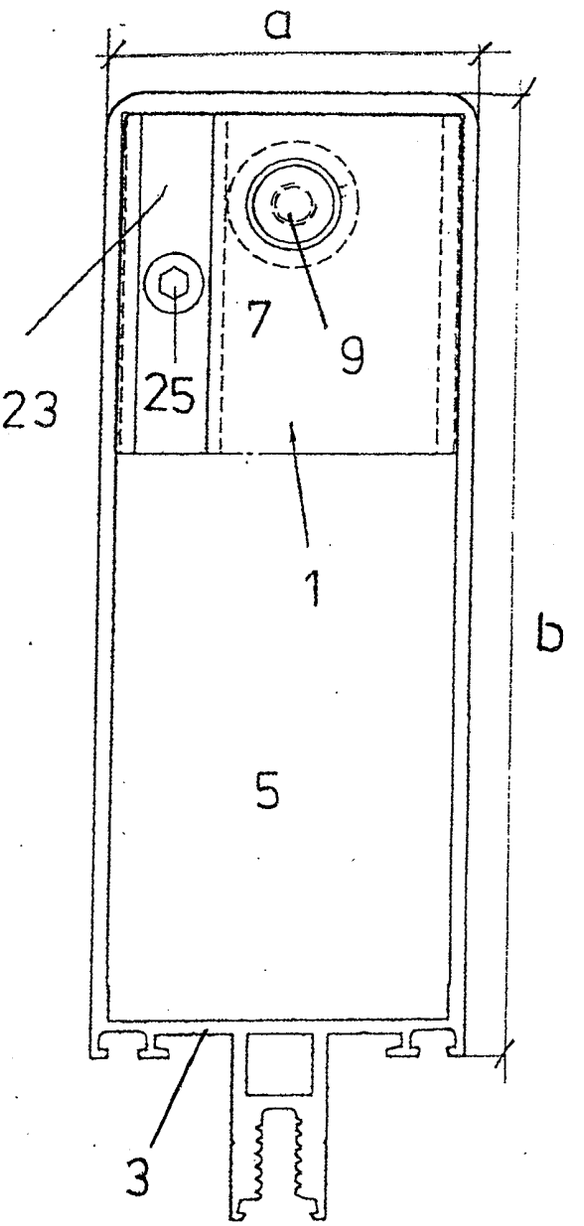

FIG.12

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 6979

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)
A	EP 0 436 869 A (REYNOLDS ALUMINIUM DEUTSCHLAND) 17 July 1991 (1991-07-17) * the whole document *	1,18,19	E04B2/96
A	DE 38 08 587 C (WICONA-BAUSYSTEME) 22 June 1989 (1989-06-22) * the whole document *	1,18,19	
D,A	US 4 948 290 A (BOCK GUENTER ET AL) 14 August 1990 (1990-08-14) * the whole document *	1,18,19	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E04B
E04D
F16B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 October 2003	Vrugt, S

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 07 6979

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-10-2003

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0436869	A	17-07-1991	DE	4000770 A1	18-07-1991
			AT	140287 T	15-07-1996
			DE	59010415 D1	14-08-1996
			EP	0436869 A2	17-07-1991
DE 3808587	C	22-06-1989	DE	3808587 C1	22-06-1989
			AT	395040 B	25-08-1992
			AT	14589 A	15-01-1992
			CH	678748 A5	31-10-1991
			FR	2628788 A1	22-09-1989
			GB	2216978 A ,B	18-10-1989
			IT	1232036 B	23-01-1992
US 4948290	A	14-08-1990	DE	3809951 A1	05-10-1989
			AT	69078 T	15-11-1991
			CA	1295591 C	11-02-1992
			DE	58900409 D1	05-12-1991
			DK	136789 A	25-09-1989
			EP	0334080 A1	27-09-1989
			ES	2025824 T3	01-04-1992
			FI	891422 A ,B,	25-09-1989
			GR	3003423 T3	17-02-1993
			JP	2024434 A	26-01-1990
			JP	2880179 B2	05-04-1999
			KR	9614624 B1	19-10-1996
			NO	891242 A ,B,	25-09-1989

EPO FORM P0459

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