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

(11) Publication number: **0 653 541 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **94203234.3**

(51) Int. Cl.[6]: **E06B 3/273**, E06B 7/14

(22) Date of filing: **07.11.94**

(30) Priority: **12.11.93 IT MI932410**

(43) Date of publication of application:
17.05.95 Bulletin 95/20

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

(71) Applicant: **HYDRO ALUMINIUM SYSTEMS S.p.A.**
Via Meucci, 5
I-20060 Ornago (Milan) (IT)

(72) Inventor: **Zanoni, Edoardo**
Viale Vittorio Veneto, 14
I-20124 Milan (IT)

(74) Representative: **Marchi, Massimo et al**
c/o Marchi & Mittler s.r.l.
Viale Lombardia 20
I-20131 Milano (IT)

(54) Set of cold metal section bars which are convertible into thermally-broken section bars.

(57) A set of cold metal section bars (1; 2; 3; 4; 5; 6) has been developed that can be converted into thermally-broken section bars (10; 20; 30; 40; 50; 60) wherein each section bar comprises an element of internal metal section bar (7) and an element of external metal section bar (8) connected together by means of connecting walls (9) comprising deformable teeth (11) and removable strips (12); the elements of internal and external section bar (7, 8) are provided with longitudinal recesses (18) suitable for housing insulating bars (29) and the element of external section bar (8) comprises at least one abutment fin (21) connected to a connecting tang (23) protruding outward, so as to form a chamber (19) for aeration and for collection of water.

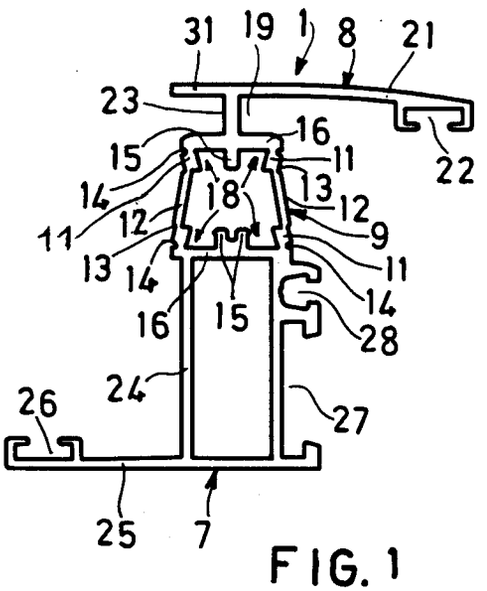


FIG. 1

EP 0 653 541 A1

The present invention relates to a set of cold metal section bars which are convertible into thermally-broken section bars suitable for cold door and window frames and for thermally-broken (insulated) door and window frames.

During the course of the present description and of the claims, the expression "cold section bars" is used to indicate section bars that are not thermally insulated while the expression "thermally-broken section bars" stands for thermally insulated section bars.

Various kinds of section bars are currently on the market:

a) so called cold or whole section bars, constituted by section bars made wholly of metal, without thermal insulation;

b) so called whole section bars with a thermal screen, constituted by section bars made wholly of metal to which insulating elements are applied, generally in plastic, on the external part of the frame, so as to form a barrier to the exchange of heat;

c) thermally-broken or insulated section bars, comprising insulating elements interposed between elements of external and internal metal section bars.

Thermally-broken section bars, in turn, can be of different type.

One type of thermally-broken section bar is obtained from two metal section bars, one internal and the other external, extruded separately, that are joined together by means of hars of insulating material inserted in specially-provided seats and then clamped through a rolling process.

These thermally-broken section bars have several drawbacks.

Tolerances and parallelisms between the two internal and external elements are difficult to obtain and to check, as they are section bars extruded separately, thus, easily, imperfections occur in joining the two elements together.

Moreover, the two internal and external elements can have a non-uniform anodization and their aging can also be non-uniform.

Another type of thermally-broken section bar is obtained from a whole metal section bar provided with a tubular casing that connects the elements of the internal and external metal section bars, extruded in one single piece. During the production step of the section bars, polyurethane foam is injected into the tubular casing and the metal walls of the tubular casing connecting the elements of internal and external metal section bars are then removed, by means of a cutting operation, so that the two internal and external elements remain connected together only through the injected polyurethane foam.

This thermally-broken section bar does not have the drawbacks of the section bar with separate internal and external elements, but it does require a laborious and expensive manufacturing process, that cannot be executed by an assembler of door and window frames, due to the complexity of the operations of injecting foam into the tubular casing and of subsequently cutting the walls connecting the internal and external section bar elements.

Attempts have been made tending to transform a cold section bar into a thermally-broken section bar, but the results attained so far have not been satisfactory.

The object of the present invention is a set of flexible section bars constituted by whole metal section bars, extruded in one single piece, that can be used as cold section bars and can be converted into thermally-broken section bars with simple operations, that may also be executed outside the production line of the section bars, thus that can also be executed by an assembler of door and window frames when it becomes necessary to manufacture a thermally-broken section bar, rather than a cold section bar.

Another object of the present invention is a set of section bars that have an optimum conformation both as cold metal section bars and as thermally-broken section bars, obtained by the transformation of the cold metal section bars.

According to the invention, the abovementioned objects are attained with a set of cold metal section bars which are convertible into thermally-broken section bars, particularly for door and window frames, each comprising an element of internal metal section bar and an element of external metal section bar connected together by means of connecting walls, characterized in that

said connecting walls are made of metal and comprise teeth linked to said elements of internal and external section bars by means of weakening lines suitable for making them deformable, and strips connected to said deformable teeth by means of further weakening lines suitable for making them removable, the thickness of said strips being less than the thickness of said teeth,

said elements of internal and external section bar are provided with longitudinal recesses each formed by one of said deformable teeth, by at least one rigid ridge substantially parallel to said teeth and by a back wall connecting one tooth and one ridge, and

said element of external section bar comprises at least one abutment fin connected to at least one of said back walls by means of a connecting tang protruding outward, so as to form a chamber for aeration and for collection of water in the proximity of said fin and to minimize the transmission of

deformations from said teeth to said fin.

According to a preferred embodiment, said element of internal section bar is provided with at least two longitudinal recesses arranged at a distance greater than that at which two corresponding longitudinal recesses of the element of external section bar are arranged and said removable strips are inclined with respect to said back wall, converging toward said element of external section bar, so as to carry any water and condensate toward said collection chamber.

According to another preferred embodiment, said abutment fin has a substantially convex wall, so that deformations of said teeth involve only variations in the curvature of the fin.

The abovementioned objects are also attained with a set of thermally-broken section bars, particularly for door and window frames, each comprising an element of internal metal section bar and an element of external metal section bar connected together by means of insulating bars housed in matching longitudinal recesses of an element of internal section bar and of an element of external section bar, characterized in that

said longitudinal recesses are each formed by a deformable tooth, by at least one rigid ridge substantially parallel to said tooth and by a back wall connecting one tooth and one ridge, said tooth being connected to the respective element of internal and external metal section bar by means of a weakening line suitable for making it easier to fold them over extremities of said insulating bars, so as to clamp them in said recesses leaving an air space between them, and

said element of external section bar comprises at least one abutment fin connected to at least one of said back walls by means of a connecting tang protruding outward, so as to form a chamber for aeration and for collection of water in the proximity of said fin and to minimize the transmission of deformations from said tooth to said fin.

Preferably, said insulating bars are arranged inclined with respect to said back wall, converging towards said element of external section bar, so as to carry any water and condensate toward said collection chamber.

With the set of section bars according to the invention there is the great advantage of being able to produce unified section bars, that have an optimized conformation as regards weight, strength and performance, both when they are utilized as cold section bars and when they are utilized, after an easy and simple conversion, as thermally-broken section bars.

In fact, the transversal resistant cross-section of the cold section bars is dimensioned so that a reduced resistant cross-section of the removable strips, due to a lesser thickness than that of the teeth, is substantially compensated by that of the rigid ridges. The weight of the material that is removed and discarded in the case of transformation into thermally-broken section bars is thus reduced to a minimum.

In thermally-broken section bars, the ridges, together with the teeth, form longitudinal recesses suitable for housing insulating bars, keeping them at a distance from one another, so that they remain separated by an air space and an effective thermal insulation is obtained.

Moreover, the operations of conversion can also be executed outside the plant that manufactures the section bars, by an assembler of door and window frames when it becomes necessary to install a thermally-broken door and window frame. The conversion requires very simple interventions, that consist in the insertion of insulating bars in the matching longitudinal recesses of the elements of internal and external section bar, in the removal of the strips cutting them along their respective weakening lines and in folding the teeth with respect to the respective weakening lines, so as to firmly fasten ends of the insulating bars in the corresponding longitudinal recesses.

Another advantage of the set of unified section bars, made according to the invention, is represented by the possibility of carrying toward draining holes water and condensate that may infiltrate inside the door and window frames both in the case of cold door and window frames and in the case of thermally-broken door and window frames. Carrying is executed through the inclined arrangement of the removable strips, converging toward the element of external section bar in cold section bars, and through the inclined arrangement of the insulating bars, that also converge toward the element of external section bar in thermally-broken section bars.

Moreover, the substantially convex shape of the abutment fin introduces a good margin of tolerance against possible deformations caused by the bending of the teeth, because the deformations involve only variations in the curvature of the fin, that can be discerned by the naked eye only with difficulty. Thus the convex shape is also favourable from an aesthetic viewpoint.

Further advantages of the set of section bars according to the invention are represented by the low costs of extrusion and by the substantial reduction of storage stocks. In addition, parallelisms and tolerances between the two internal and external elements of the thermally-broken section bars are easy to obtain and to check, risks of imperfections in joining the two elements together are reduced and their anodization and aging are uniform.

Features and advantages of the invention will now be illustrated with reference to embodiments

of the invention represented as non-limiting examples in the enclosed figures, wherein:

Figs. 1, 3, 5, 7, 9 and 11 are top plan views of a first, second, third, fourth, fifth, sixth cold metal section bar, respectively, according to the invention;

Figs. 2, 4, 6, 8, 10 and 12 are top plan views of a first, second, third, fourth, fifth, sixth thermally-broken section bar, respectively, according to the invention, obtained from the section bars of Figs. 1, 3, 5, 7, 9 and 11, respectively;

Fig. 13 shows on an enlarged scale strips, teeth and insulating bars of the section bars of Figs. 1-12;

Figs. 14 and 15 are partial views in a transversal cross-section of door and window frames with movable panes made with the cold section bars of Figs. 1 and 3 and with the thermally-broken section bars of Figs. 2 and 4, respectively;

Figs. 16 and 17 are partial views in a transversal cross-section of door and window frames with several movable panes made with the cold section bars of Figs. 3 and 7 and with the thermally-broken section bars of Figs. 4 and 8, respectively;

Fig. 18 is a partial view in a transversal cross-section of a frame made with cold section bars of Fig. 3 and provided with a cross-beam formed by the cold section bar of Fig. 11;

Fig. 19 is a cross-sectional view in an enlarged scale of a seat and of a stem of a screw of the cross-beam of Fig. 18.

There is indicated as a whole with 1 in Fig. 1 a cold metal section bar having a transversal cross-section substantially in the shape of a "Z", made by extrusion, preferably in an aluminium alloy. The section bar 1 comprises an element of internal section bar 7 and an element of external section bar 8 connected by means of connecting walls 9. The connecting walls 9 are formed by deformable longitudinal teeth 11 and by removable longitudinal strips 12 having a thickness that is less than the thickness of the teeth 11. The strips 12 are connected to the teeth 11 by means of longitudinal weakening lines 13 suitable for making it easier to cut them; the teeth 11 are connected to the elements of internal section bar 7 and of external section bar 8 by means of weakening lines 14 suitable for making it easier to bend them, as also shown in Fig. 13.

The elements of internal section bar 7 and of external section bar 8 are provided with rigid ridges 15 substantially parallel to the teeth 11, that with back walls 16 and with the teeth 11 form longitudinal recesses 18. The recesses 18 belonging to the element of internal section bar 7 are arranged at a distance greater than that at which the recesses 18 belonging to the correspondng element of external metal section bar 8 are arranged and, thus, the strips 12 are inclined with respect to the back walls 16 and converge toward the element of external section bar 8, so as to carry water and condensate toward a chamber 19 for aeration and collection of water and condensate.

The element of external section bar 8 comprises an abutment fin 21 formed by a substantially convex wall, so that deformations of the teeth 11 involve only variations in the curvature of the fin. The fin 21 is provided with a "C"-shaped seat 22 suitable for housing a seal and an alignment bracket, not shown. The fin 21 is linked to the back walls 16 by means of a connecting tang 23 protruding outward, with which it forms the abovementioned chamber 19, so as to minimize the transmission of deformations from the teeth 11 to the fin 21. With the fin 21 there is integral a resting tang 31.

The element of internal section bar 7 is formed by a tubular casing 24, having a substantially rectangular transversal cross-section, with which there is integral an abutment fin 25, provided with a C-shaped seat 26 for a seal. In the tubular casing 24 there is a C-shaped seat 27 suitable for housing a hinged element or a glass-holding section bar, a U-shaped seat 28, suitable for housing a seal or a self-tapping screw, as shown in Fig. 19.

From the section bar 1 it is possible to obtain a thermally-broken section bar, similar to that indicated in Fig. 2 as a whole with 10, wherein the parts like to those of section bar 1 are indicated with the same reference numbers.

In order to make the thermally-broken section bar 10, a pair of insulating bars 29 is inserted into the matching recesses 18 of the section bar elements 7 and 8, as shown in Fig. 13, and the strips 12 are then cut from the teeth 11, so as to divide the element of internal section bar 7 from the element of external section bar 8. Moreover, the deformable teeth 11 are folded with respect to the weakening lines 14, so as to clamp the extremities of the insulating bars 29 in the recesses 18, as shown in Fig. 2, leaving an air space 17 between the bars. The bars 29 are inclined like the strips 12, converging toward the element of external section bar 8 and their extremities 29a have a trapeze-like shape, on which the teeth 11 are folded. The insulating bars 29 are preferably made of polyamide reinforced with glass fibres.

The section bars 1 and 10 have an optimized conformation both as cold section bars, and as thermally-broken section bars, as regards weight, resistance, performance. In fact the transversal cross-section of the cold section bars resistant to operational stresses is obtained by reducing the resistant cross-section of the removable strips, as their thickness is less than that of the teeth, and substantially compensating it with that of the rigid

ridges. The weight of the material that is removed and discarded in the case of the conversion in thermally-broken section bars is thus very small. In the thermally-broken section bar 10 the pair of insulating bars 29, separated by an air space 17, allows an effective thermal insulation to be obtained.

When it becomes necessary to install a thermally-broken section bar, an assembler of door and window frames can convert the cold section bar 1 into the thermally-broken section bar 10 with few and simple operations, thus outside the production line of the section bars.

The unification of the section bars, as has been said, allows extrusion costs and storage charges to be reduced to a minimum. Other advantages are represented by the easy obtaining and checking tolerances and parallelisms between the two elements of internal and external section bar 7 and 8 of the thermally-broken section bars, by the minimization of risks of imperfections in joining the two internal and external elements together and by the uniformity of treatment of surface finishing and of aging of the two elements.

There is shown in Fig. 3 a cold metal section bar 2 having a substantially Z-shaped transversal cross-section, wherein the parts like or corresponding to those of the section bar 1 of Fig. 1 are indicated with the same reference numbers.

The abutment fin 21 of the section bar 2 is provided with the resting tang 31 and with a bent extremity 32. The tubular casing 24 has a C-shaped seat 33 suitable for housing a hinge element or for joining up with another section bar, and a resting tang 34.

There is shown in Fig. 4 a thermally-broken section bar 20 obtained from the section bar 2 with the same operations described earlier with reference to the conversion of the cold section bar 1 into the thermally-broken section bar 10. The parts like to those of the section bars 2 and 10 are indicated with the same reference numbers.

There are shown in Figs. 5 and 6 a cold metal section bar 3 and a thermally-broken section bar 30 obtained from the section bar 3 having a substantially Z-shaped transversal cross-section. In the section bars 3 and 30 the parts like or corresponding to those of the section bars 2 and 20 are indicated with the same reference numbers. The element of external section bar 8 has a tubular casing 35 to which there are integral the tang 23 and two rigid ridges 15 that, with the back walls 16 and the deformable teeth 11, form the recesses 18.

There are shown in Figs. 7 and 8 a cold metal section bar 4 and a thermally-broken section bar 40 obtained from the section bar 4 having a substantially inverted L-shaped transversal cross-section. The parts like or corresponding to those of the section bars 1, 10 and 3, 30 are indicated with the same reference numbers. With the tubular casing 24 there are integral resting tangs 36 suitable for engaging with another section bar and a double-C seat 37 for a hinge element, for a clamping rod (bolt) of a movable part and for a supplementary lock match. In the tubular casing 35 there is a resting seat 38 suitable for engaging with another section bar.

There are shown in Figs. 9 and 10 a cold metal section bar 5 and a thermally-broken section bar 50 obtained from the section bar 5 having a substantially inverted L-shaped transversal cross-section. The parts like or corresponding to those of the section bars 7 and 8 are indicated with the same reference numbers. With the tubular casing 35 there is integral a bracket tang 39.

There are shown in Figs. 11 and 12 a cold metal section bar 6 and a thermally-broken section bar 60 obtained from the section bar 6 having a substantially T-shaped transversal cross-section. The parts like or corresponding to those of the section bars 1 and 10 are indicated with the same reference numbers.

In Fig. 14 there is represented diagrammatically a cold door and window frame with a side hung pane comprising a fixed frame 41 made with section bars 1 and a movable frame 42 made with section bars 2. There is indicated with 43 a sealing gasket housed in the seat 28, that makes abutment against the tang 34 of the section bar 2.

In Fig. 15 there is represented diagrammatically a thermally-broken door and window frame with a side hung pane comprising a fixed frame 44 made with section bars 10 and a movable frame 45 made with section bars 20.

In Fig. 16 there is represented diagrammatically a cold door and window frame with several movable panes comprising a fixed frame 46 made with section bars 2 and movable frames 47 and 48 made with section bars 4 and 2, respectively.

In Fig. 17 there is represented diagrammatically a thermally-broken door and window frame with several movable panes comprising a fixed frame 49 made with section bars 20 and movable frames 51 and 52 made with section bars 40 and 20, respectively.

In Fig. 18 there is represented diagrammatically a frame formed by section bars 2, provided with a cross-beam formed by the section bar 6, joined to the vertical section bars 2 by means of self-tapping screws like that indicated with 53. The screws 53 pass through holes 54 of a section bar 2 and are screwed into the U-shaped seats 28 of the section bar 6, as also shown in Fig. 19.

Claims

1. Set of cold metal section bars (1; 2; 3; 4; 5; 6) which are convertible into thermally-broken section bars (10; 20; 30; 40; 50; 60), particularly for door and window frames, each comprising an element of internal metal section bar (7) and an element of external metal section bar (8) connected together by means of connecting walls (9), characterized in that

   said connecting walls (9) are made of metal and comprise teeth (11) linked to said elements of internal and external section bars (7, 8) by means of weakening lines (14) suitable for making them deformable, and strips (12) connected to said deformable teeth (11) by means of further weakening lines (13) suitable for making them removable, the thickness of said strips (12) being less than the thickness of said teeth (11),

   said elements of internal and external section bars (7, 8) are provided with longitudinal recesses (18) each formed by one of said deformable teeth (11), by at least one rigid ridge (15) substantially parallel to said teeth (11) and by a back wall (16) connecting one tooth (11) and one ridge (15), and

   said element of external section bar (8) comprises at least one abutment fin (21) connected to at least one of said back walls (16) by means of a connecting tang (23) protruding outward, so as to form a chamber (19) for aeration and for collection of water in the proximity of said fin (21) and to minimize the transmission of deformations from said teeth (11) to said fin (21).

2. Set of section bars according to claim 1, characterized in that said element of internal section bar (7) is provided with at least two longitudinal recesses (18) arranged at a distance greater than that at which two corresponding longitudinal recesses (18) of the element of external section bar (8) are arranged and said removable strips (12) are inclined with respect to said back wall (16), converging toward said element of external section bar (8), so as to carry any water and condensate toward said collection chamber (19).

3. Set of section bars according to claim 1, characterized in that said abutment fin (21) has a substantially convex wall, so that deformations of said teeth (11) involve only variations in the curvature of the fin (21).

4. Set of section bars according to claim 1, characterized in that with said element of internal section bar (7) there is integral at least one U-shaped seat (28), suitable for housing a seal (43) or a self-tapping screw (53).

5. Set of thermally-broken section bars (10; 20; 30; 40; 50; 60), particularly for door and window frames, each comprising an element of internal metal section bar (7) and an element of external metal section bar (8) connected together by means of insulating bars (29) housed in matching longitudinal recesses (18) of an element of internal section bar (7) and of an element of external section bar (8), characterized in that

   said longitudinal recesses (18) are each formed by a deformable tooth (11), by at least one rigid ridge (15) substantially parallel to said tooth (11) and by a back wall (16) connecting one tooth (11) and one ridge (15), said tooth (11) being connected to the respective element of internal and external metal section bar (7, 8) by means of a weakening line (14) suitable for making it easier to fold them over extremities (29a) of said insulating bars (29), so as to clamp them in said recesses (18) leaving an air space (17) between them, and

   said element of external section bar (8) comprises at least one abutment fin (21) connected to at least one of said back walls (16) by means of a connecting tang (23) protruding outward, so as to form a chamber (19) for aeration and for collection of water in the proximity of said fin (21) and to minimize the transmission of deformations from said tooth (11) to said fin (21).

6. Set of section bars according to claim 5, characterized in that said insulating bars (29) are arranged inclined with respect to said back wall (16), converging towards said element of external section bar (8), so as to carry any water and condensate toward said collection chamber (19).

7. Set of section bars according to claim 5, characterized in that said abutment fin (21) has a substantially convex wall, so that deformations of said tooth (11) involve only variations in the curvature of the fin (21).

8. Set of section bars according to claim 5, characterized in that with said element of internal section bar (7) there is integral at least one U-shaped seat (28), suitable for housing a seal (43) or a self-tapping screw (53).

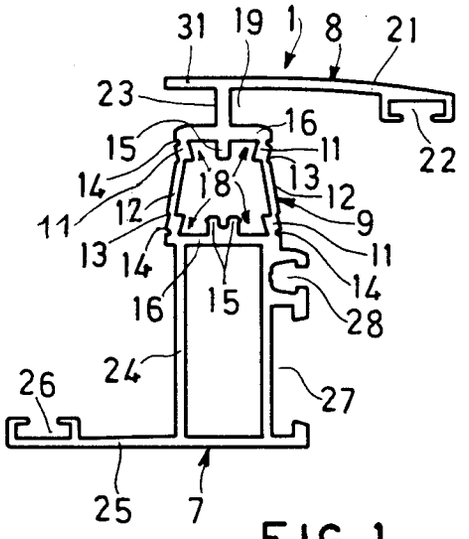


FIG. 1

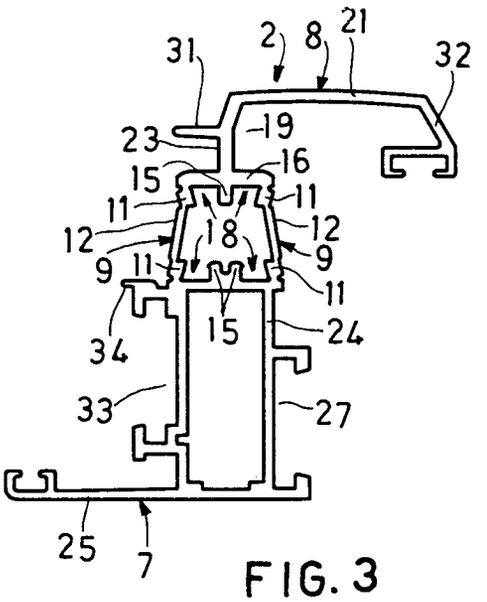


FIG. 3

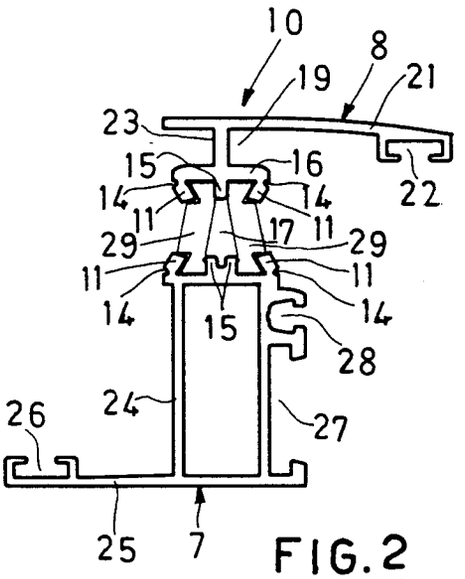


FIG. 2

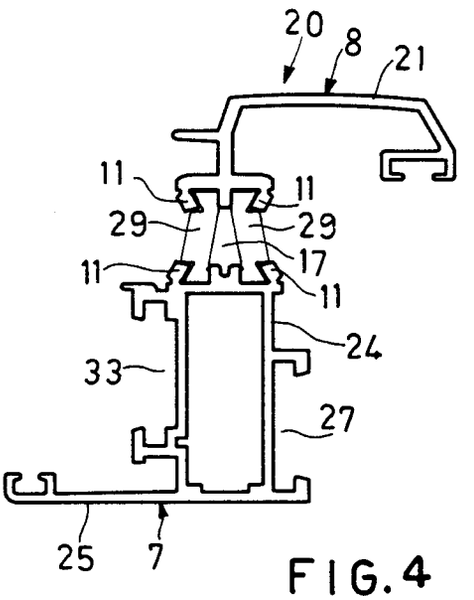


FIG. 4

FIG.5

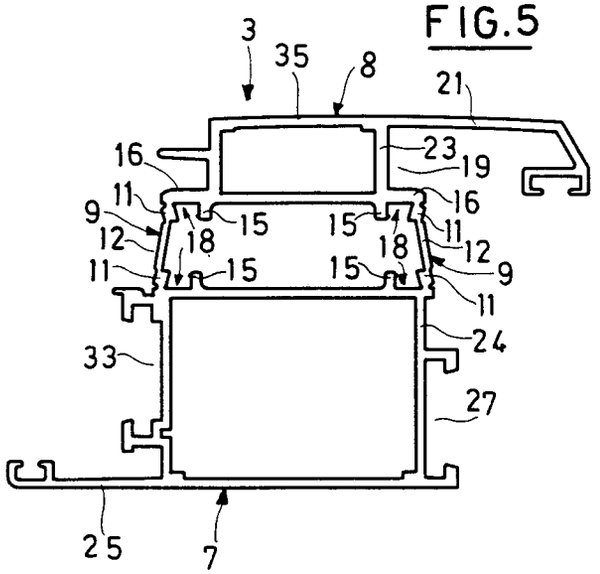


FIG.7

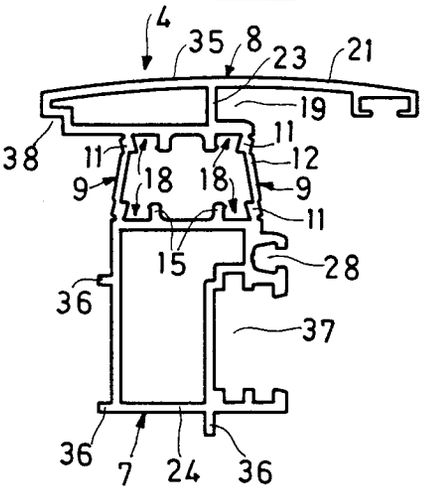


FIG.6

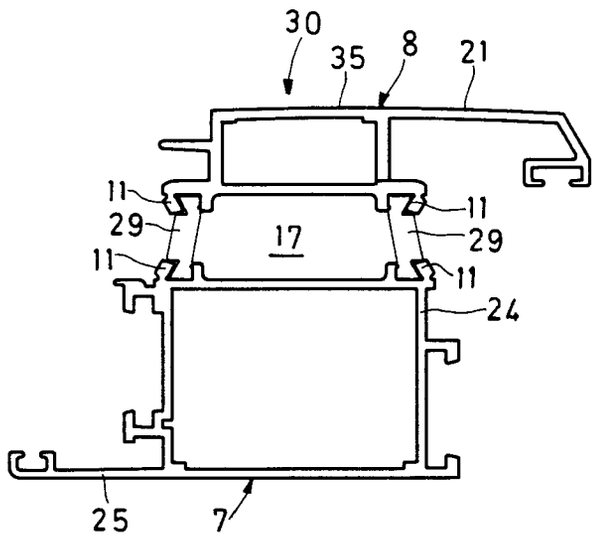


FIG.8

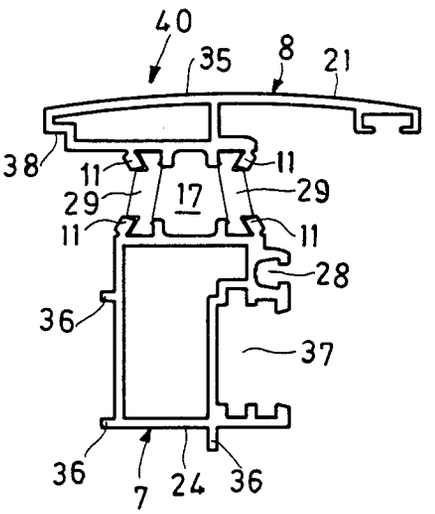


FIG. 9

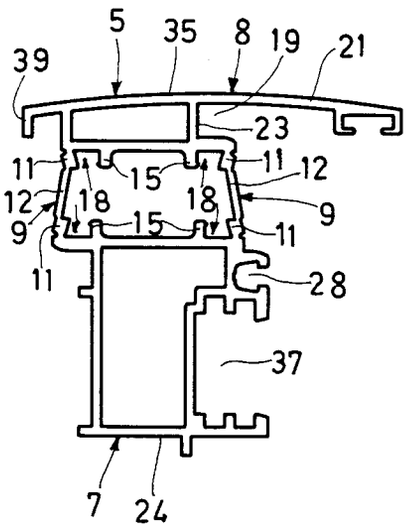


FIG. 11

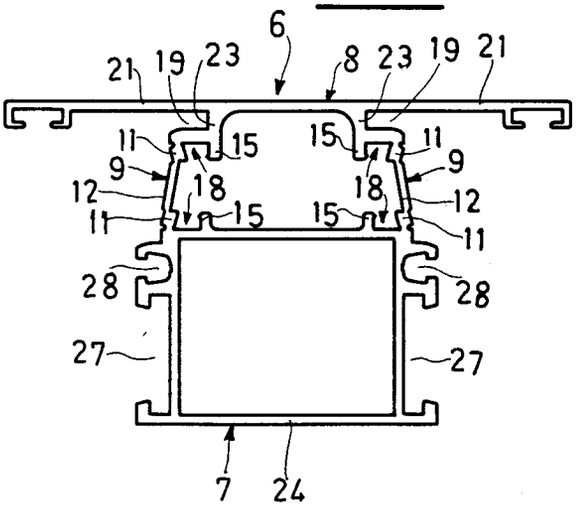


FIG. 10

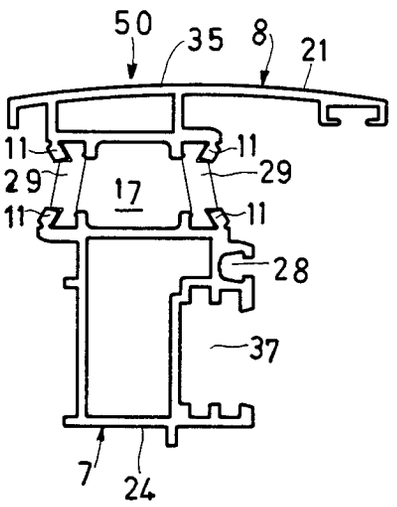


FIG. 12

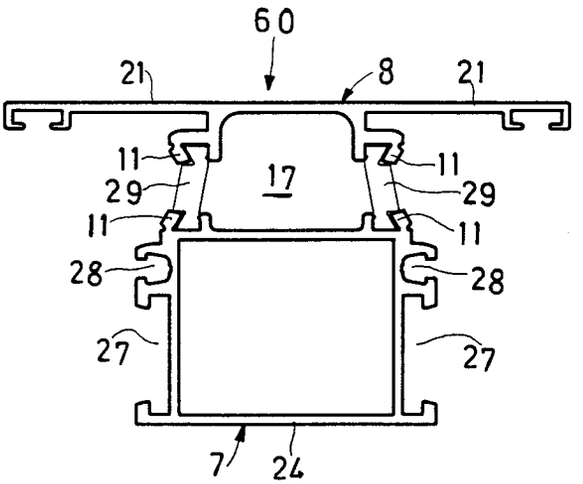


FIG. 19

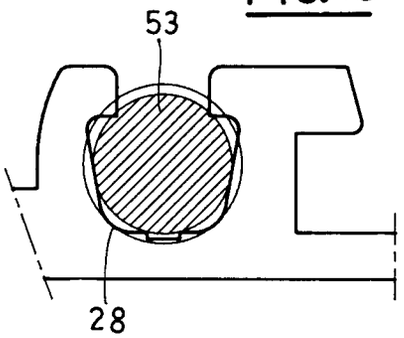


FIG. 18

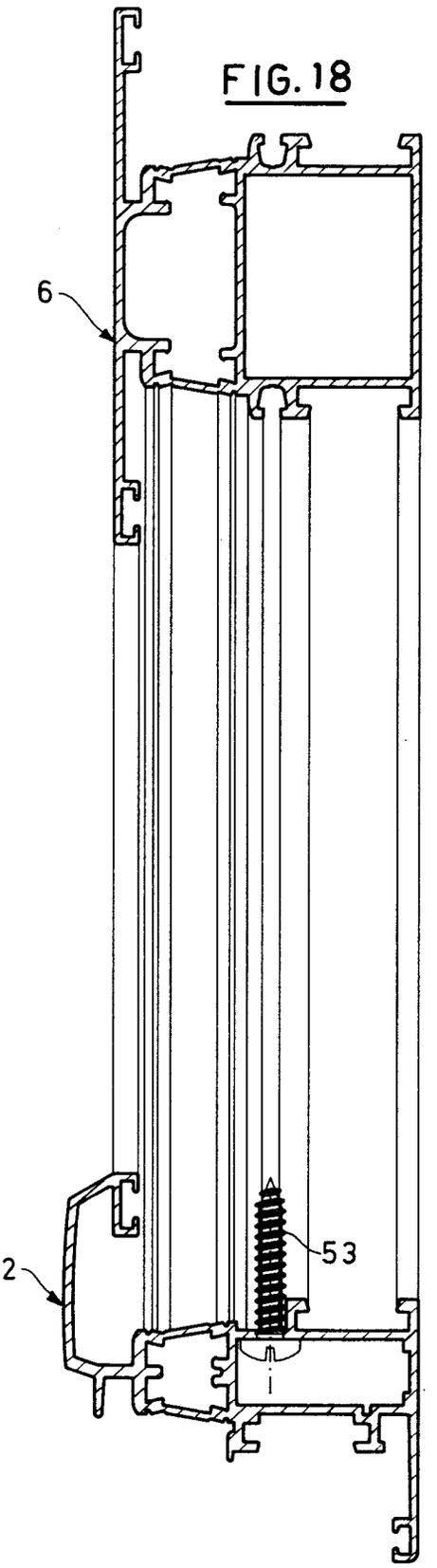
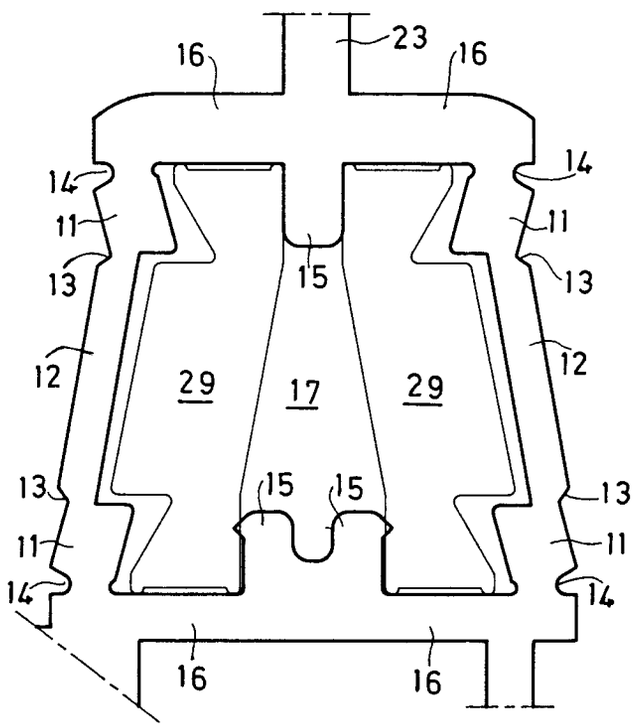


FIG. 13



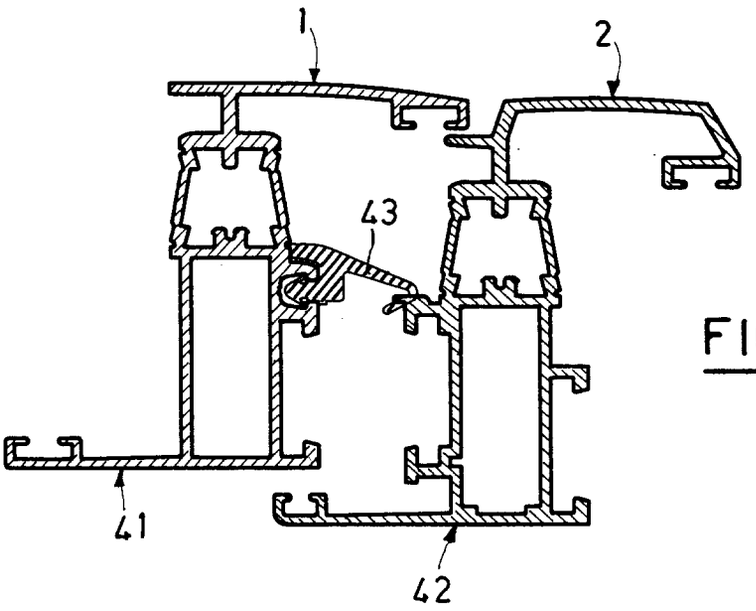


FIG. 14

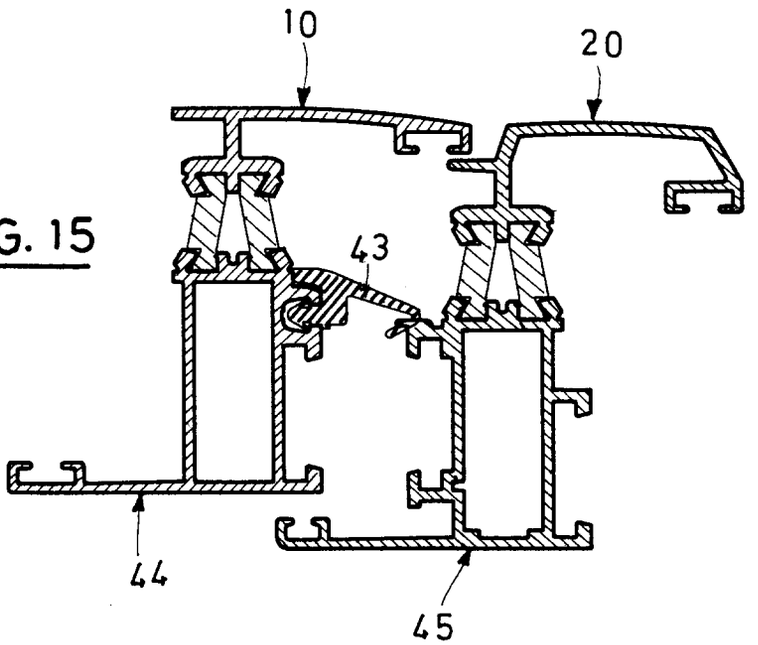


FIG. 15

FIG. 16

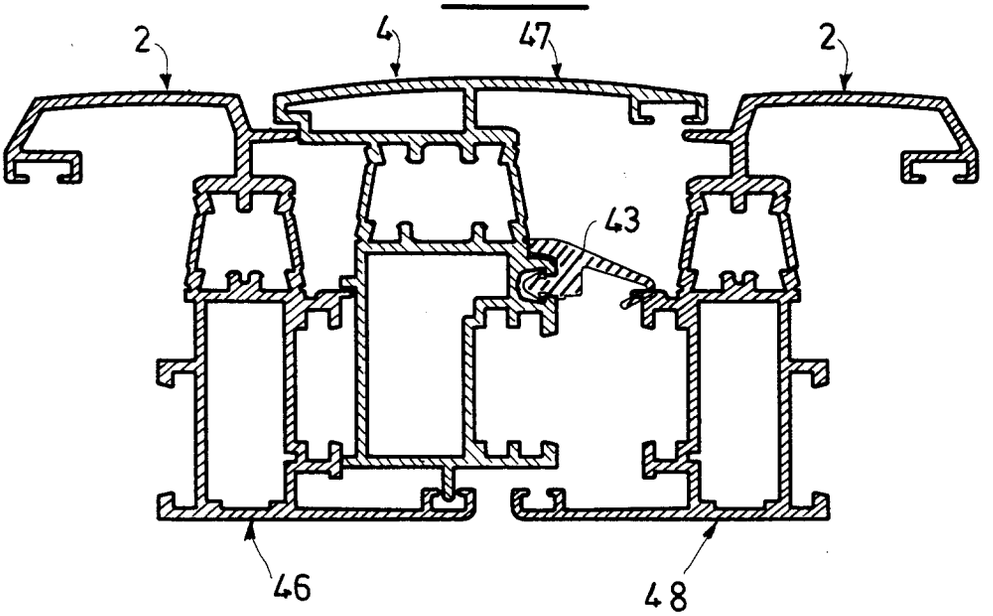
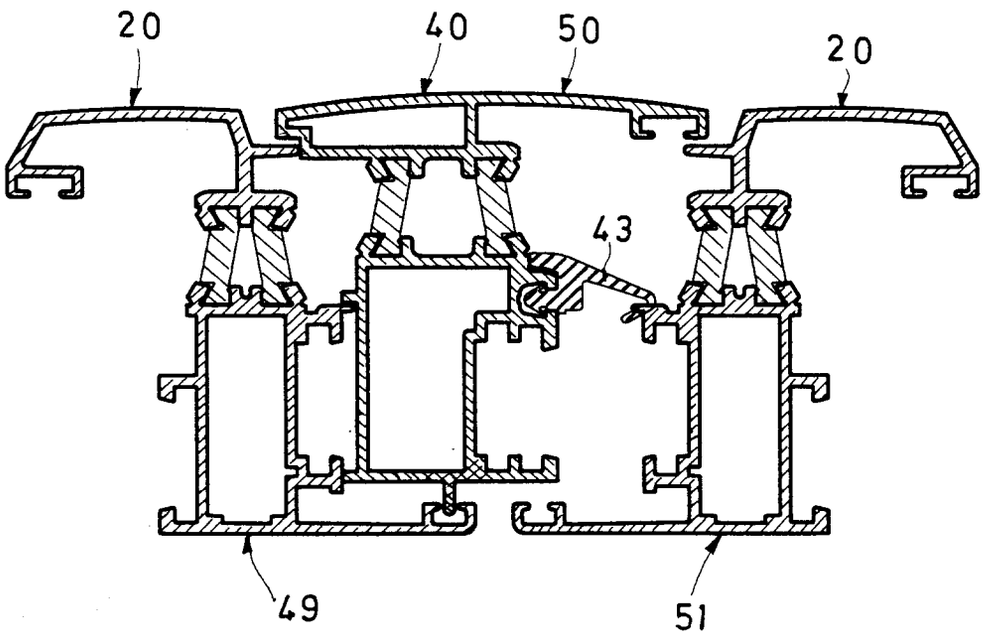


FIG. 17



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 3234

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.6)
Y	DE-A-29 23 666 (WIELAND-WERKE) * the whole document *	1,4,5,8	E06B3/273 E06B7/14
Y	EP-A-0 103 272 (INTEGRAL PROFILSYSTEM) * claim 1; figure 1 *	1,4,5,8	
A	DE-A-33 30 391 (SCHULZE ET AL) * page 8, line 4 - line 7; figures 1,2 *	1	
A	DE-A-27 10 441 (NIPP) * page 3, paragraph 2 - page 6, paragraph 1; figures *	1,2,5,6	
A	WO-A-80 01929 (RAUFOSS AMMUNISJONSFABRIKKER) * page 5, paragraph 5 - page 7, paragraph 1; figure *	1,5	
A	EP-A-0 175 094 (VEREINIGTE ALUMINIUM-WERKE) * page 3, line 28 - page 4, line 11 * * page 5, line 19 - line 30 * * figures 1,2,4,7 *	1,5	
A	DE-A-26 13 527 (MEYER) * page 9, paragraph 4 - page 10, paragraph 2; figure 1 *	1,5	
A	DE-A-33 00 599 (NAHR) * page 9, line 18 - line 25; figure 3 *	2,6	
A	WO-A-92 02706 (HYDRO ALLUMINIO ORNAGO) * page 4, line 21 - line 26; figures *	2,6	
A	WO-A-92 11434 (HYDRO ALUMINIUM SYSTEMS) * page 5, line 3 - line 4; figures *	2,6	
	-/--		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 February 1995	Depoorter, F

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)

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 20 3234

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.6)
A	DE-U-88 00 134 (KEMMLIT-BAUELEMENTE) * page 21, paragraph 2 - page 23, paragraph 1; figures 12,13 *	3,7	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 February 1995	Depoorter, F

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)