

(19)



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(11)

EP 0 733 764 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

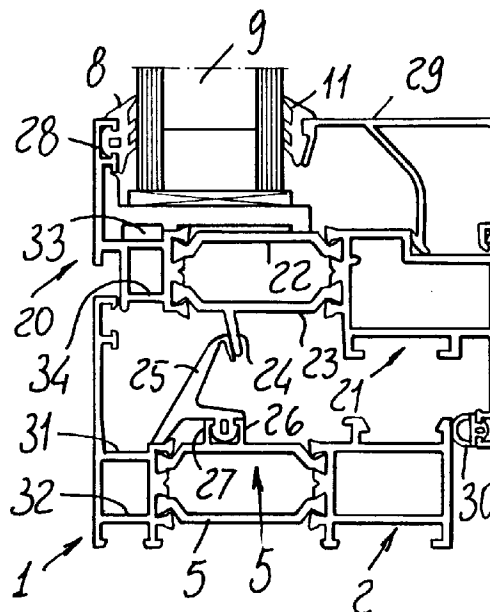
25.09.1996 Bulletin 1996/39(51) Int Cl.⁶: **E06B 3/26**(21) Application number: **96830120.0**(22) Date of filing: **18.03.1996**

(84) Designated Contracting States:

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(54) **Cooperating section member assembly with thermal bridge interruptions for making improved thermal property metal window and door frames**

(57) The present invention relates to a cooperating section member assembly with thermal bridge interruptions for making improved thermal property metal window and door frames. The subject section member assembly comprises fixed frame section members and/or movable frame section members constituted by an outer metal section member (20), provided to be exposed to the outside environment, and an inner metal section member (21), provided to be exposed to the inside environment. The outer metal section member (20) is coupled to the inner metal section member (21) by thermally insulating material elements, constituted by a pair of small bars (22,23), which are arranged with a mutually adjoining relationship and are provided with enlarged end regions, for engaging in seats defined by projecting fins, which project from the inner metal section member (21) faces and from the mutually facing surfaces of the outer metal section member (20). The bars are provided with a contoured body with a middle region which is laterally offset from the end regions, at the opposite portion of an adjoining bar. This middle region is substantially coplanar with the seat defining fins, in which seat are engaged the end portions of the bars, and which are arranged outside of the bar pair.

*FIG. 4***EP 0 733 764 A1**

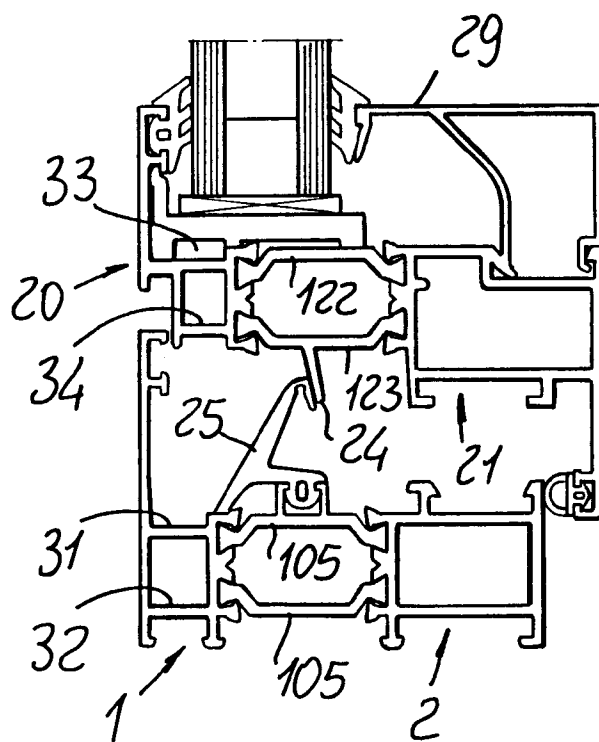


FIG. 4A

Description

BACKGROUND OF THE INVENTION

The present invention relates to a cooperating section member assembly with thermal bridge interruptions for making improved thermal property metal window and door frames.

Thermal bridging interruption section member assemblies are already known which are substantially constituted by an outer metal section member, provided to be subjected to the outside environment, and an inner metal section member, provided to be subjected to the inside environment, said section members being coupled to one another by a thermally insulating material small bars or rods.

Usually, the mentioned thermally insulating material bars are also formed by extruded section members, made of synthetic material, instead of a metal material, such as, for example, a polyamide material.

The mentioned bars are provided, at the side end portions thereof, with increased thickness regions, to be engaged in suitably seats as formed on the faces of the outer metal section member and on the mutually facing surfaces of the inner metal section member.

The seats or recesses in which are engaged the side end portions of the thermally insulating material bars are defined by projecting fins and, accordingly, between the mentioned fins and the thermally insulating material bars is defined a step formed with the body of the bars laying in a recessed region, where water tends to accumulate and penetrate inside the section member.

The presence of such a recessed region makes the making of these section members very complex, since it is necessary to perform boring or milling operations on said section members, so as to drain to the outside the collected water.

In addition to this penetrating water, condensate material can collect in this regions, said condensate material being generally formed inside the window or door frame because of the contact of air of the inside environment, usually moist, with the cold regions of the window or door frame.

Another region where penetrating water can collect is constituted by the central gasket which is conventionally arranged between the movable frame and fixed frame of a window or door frame construction.

Moreover, in some types of window or door frames the inner metal section members usually are arranged straddling the abutment plane of the central gasket and movable frame and, accordingly, they are inevitably exposed to temperatures which are much smaller than the temperatures of the inside environment.

Thus, the thermally insulation properties of the window or door frame are actually unsatisfactory.

SUMMARY OF THE INVENTION

The aim of the present invention is to overcome the above mentioned drawbacks, by providing a cooperating section member assembly, with thermal bridge interruptions for making improved thermal property metal window and door frames which is not affected by any problems related to the draining of water and condensate material from the inside of a window or door frame.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a section member assembly which allows to drain penetrating water even from the abutment region of the central gasket arranged between the fixed frame and movable frame of a window or door frame.

Another object of the present invention is to provide such a section member assembly which allows to easily make metal window or door frames provided with a high thermal insulation property, while having a very reduced making cost.

According to one aspect of the present invention, the above mentioned aim and object, as well as yet other objects, which will become more apparent hereinafter, are achieved by a cooperating section member assembly with thermal bridge interruptions for making improved thermal property metal window and door frames, comprising fixed frame section members and/or movable frame section members, constituted by an outer metal section member provided to be subjected to the outside environment, and an inner metal section member, provided to be subjected to the inside environment.

The outer metal section member is connected to the inner metal section member by thermally insulating material elements, and being characterized in that the thermally insulating material elements comprise a pair of adjoining bars and are provided with enlarged end portions engageable in seats defined by fins projecting from the faces of the inner metal section member and from the facing faces of the outer metal section member; said bars being provided with a contoured body with a middle region laterally offset at the end portions thereof, on the part opposite to the adjoining bar and being substantially coplanar with the fins defining said seats and arranged outside of said pair of bars.

BRIEF DESCRIPTION OF THE DRAWING

Further characteristics and advantages of the section member assembly according to the present invention will become more apparent hereinafter from the following detailed disclosure of some preferred, though not exclusive, embodiments thereof which are illustrated, by way of a merely indicative, but not limitative, example, in the accompanying drawings, where:

Figure 1 schematically illustrates a fixed window or door frame;

Figure 2 is an enlarged cross-sectional view of Fig-

ure 1, substantially taken along the axis II-II;
 Figure 2a illustrates those same metal section members, i.e. the inner and outer section members, shown in Figure 2, which are connected to one another by bars the lengths of which are different from the lengths of the bars shown in Figure 2;
 Figure 3 is a schematic view illustrating a movable window or door frame;
 Figure 4 is an enlarged cross-sectional view of Figure 3, substantially taken along the section axis IV-IV;
 Figures 5 and 6 are cross-sectional views similar to those of Figure 4, in which are shown section members having a different aesthetic configuration, i.e. different from that shown in Figure 4;
 Figures 4a, 5a and 6a are cross-sectional views similar to those shown in Figures 4, 5 and 6, with the same section members illustrated in these Figures and mutually connected by different length bars;
 Figure 7 is a schematic view illustrating a window having two openable wings;
 Figure 8 is an enlarged cross-sectional view of Figure 7, with section members having a different aesthetic configuration;
 Figures 8a and 9a are cross-sectional views similar to Figures 8 and 9 with the same metal section members and connecting bars having different lengths;
 Figure 10 is a cross-sectional view illustrating the fixed frame section member shown in Figures 2, 4, 5, 6;
 Figure 11 is a cross-sectional view illustrating the movable frame section member shown in Figure 4;
 Figures 10a and 11a are cross-sectional view illustrating those same metal section members shown by Figures 10 and 11, connected to one another by a thermally insulating material bars, of different lengths;
 Figure 12 is a cross-sectional view illustrating the movable frame section member defining a central abutment region, and being shown also in Figure 8 and 9;
 Figure 13 is a cross-sectional view illustrating a further "thermal-cut" section member, as transversely cross-sectioned;
 Figure 14 is a further cross-sectional view illustrating one of the movable frame section members shown in Figure 9;
 Figure 15 is a further cross-sectional view illustrating one of the movable frame section members shown in Figure 6;
 Figure 16 is a cross-sectional view illustrating yet another fixed frame section member having a "thermal-cut" property;
 Figures 12a to 16a illustrate, by respective cross-sectional views, section members made by using the same inner and outer metal section members

shown in Figures 12 to 16, connected by a thermally insulating material bars having different lengths;
 Figures 17 to 20 illustrate further cross-sectional views of thermal-cut section members, for making window and door frames; and
 Figures 21 to 33 illustrate several types of glass-restraining section members.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the above mentioned figures, the section member assembly according to the present invention comprises fixed frame section members and/or movable frame section members which, as shown for example in figure 2, which relates to a fixed frame section member, are constituted by an outer metal section member 1, provided to be subjected to the outside environment, and an inner metal section member 2, provided to be subjected to the inside environment.

On the two faces of the section member 1 and section member 2, which are mutually facing one another, are defined seats or recesses 3, delimited by fins 4 for the side end portions of a pair of bars 5, of a thermally insulating material, which mechanically connects, by thermally insulating them, the section members 1 and 2.

The bars 5 can also be made by an extruding process, but starting from a synthetic or resinous material, such as, for example, polyamide, and have a specifically designed configuration, with the enlarged end portions 5a and with a middle region 5b which is lateral offset from the end portions 5a, on the opposite part with respect to an adjoining bar, so that the middle region 5b is substantially coplanar with the fins 4 defining the mentioned seats or recesses 3 and arranged outside of the pair of bars 5.

Thus, the bars 5 and fins 4 will be substantially continuous, so as to prevent any steps from being formed and thereby efficiently preventing water or condensate material from collecting at the passage region between the bars 5 and fins 4.

The outer or outside metal section member is provided, in a per se known manner, with a wing 7, or leg, ending with an end portion provided with a seat or recess for a gasket 8, provided for contacting a glass plate or a panel 9.

On the inside or inner metal section member 2 is assembled a glass restraining element 10, for example of a snap assemblable type, which bears on the other face of the panel or plate 9 through the interposition of a further gasket 11.

Figure 4 illustrates a side of an openable-wing window frame.

The fixed frame is herein substantially made of a fixed frame section member, constituted by the already disclosed section members 1 and 2, for which the same reference numbers have been used, and by a movable

frame section member, which is essentially constituted by an outer metal section member 20 and an inner metal section member 21 which are mutually coupled by the bars 22 and 23 made likewise the bars 5, i.e. with the middle regions thereof offset with respect to the end portions thereof.

The bar 23 facing the fixed frame is provided with a fin 24 defining an abutment portion for a central gasket 25, making an open joint connection, which is affixed inside a pair of fins 26 and 27 of one of the bars 5 which mutually connect the section members 1 and 2.

The section member 20 is provided with a leg 28, ending with a seat or recess for a gasket 8, provided to bear against a plate 9, whereas on the inner metal section member 21 is applied a glass restraining element 29 which, through another gasket 11, bears on the other face of the plate or panel 9.

The sealing between the movable frame and fixed frame can be improved by an auxiliary gasket 30, applied to the section member 21, and provided for bearing against the inner side of the section member 2.

In this connection it should be apparent that the central gasket 25 extends with a slanted arrangement toward the outer metal section member 1, so as to convey on this outer metal section the water which is susceptible to enter the region between the fixed frame and movable frame.

Moreover, the regions of the outer metal section members 1 and 20 arranged laterally of the engagement regions of the bars 5, 22 and 23, define draining channels 31, 32, 33 and 34 for draining the penetrated water.

The draining channels 31, 32, 33 and 34 communicate with the outside through vertical or horizontal perforations, defined through the section members 1 and 20, and not shown for simplicity.

In the window or door frame made by the section members according to the present invention, as is clearly shown in figure 4, the inner metal section members 2 and 21, both of the fixed frame and of the movable frame, are all arranged on a same side, with respect to the sealing plane, identified by the connection of the central gasket 25 with the fin 24.

Thus, a very good thermal insulation efficiency is obtained, since all of the inner portions of the section members are arranged toward the inside of the home or room, that is in a "hot" region.

Figures 5 and 6 illustrate sides of openable wing window or door frames, of the type shown in figure 4, with the difference that, instead of using the section member 20 and the glass restraining section member 29, are herein used outer metal section members 120 and 220, respectively having a convex bent leg and a concave bent leg, and glass restraining section members 129 and 229 having different aesthetic features.

The other section members are held unchanged, and these section members have been indicated by like reference numbers, as well as have been held unchanged the reference numbers indicating the bars and

auxiliary items.

Figures 2a - 6a illustrate section members which have been made by using the same section members of figures 2 to 6, but with bars made of a thermally insulating material, and having a different length, which have been indicated by the reference numbers 105, 122 and 123.

For the section members which, as stated, have been held unchanged, like reference numbers have been used as in figures 2 to 6.

Figure 8 illustrates a cross-sectional view of a central "knot" for an openable two-wing window. A wing thereof is substantially made by the movable frame section members shown in figure 4, which have been indicated by like reference numbers, whereas the other wing has been made by using the same section members 20 and 21 forming the movable frame of figure 4, with the addition of a section member constituted by an outer section member 40 and an inner section member 41, coupled to one another by bars 5 made of a thermally insulating material, as disclosed for the preceding figures, and affixed to the section member 21, for example by screws 42.

Figure 9 shows a cross-sectional view of a central knot for an openable two-wing windows with the difference that, instead of the section member 20, a section member 120 has been used and, instead of using the glass restraining section member 29, the glass restraining section member 129 has been used, so as to provide a different aesthetic pattern.

Figures 8a and 9a illustrates cross-sectional views of a central knot of an openable two-wing window, with the difference that, with respect to figures 8 and 9, have been used bars made of a thermally insulating material 105, 122 and 123 having different lengths.

In figure 10 has been illustrated the fixed frame section member already shown in figure 2, for which the like reference numbers have been used, whereas in figure 11 has been shown the movable frame section member, illustrated in figure 4 and for which the like reference numbers have been used.

In figures 10a and 11a have been shown the fixed frame section member and the movable frame section member, already shown in figures 2a and 4a.

In figure 12 is shown the central section member, already shown in figures 8 and 9, which defines the central abutment region of the two-wing window frame and which is constituted by the outer metal section member 40 and by the inner metal section member 41, connected to one another by a pair of thermally insulating material bars 5.

In figure 13 is shown a section member constituted by an outer section member 51 with a pair of opposite legs 51a and 51b and by an inner metal section member 52 which is connected to the outer metal section member 51 through a pair of bars made of a thermally insulating material, which are identical to those already disclosed with reference to the preceding figures and which

have been indicated by the same reference numbers.

Figure 14 shows the movable frame section member illustrated in figure 9, for which the same reference numbers have been held.

Figure 15 shows the movable frame section member, already shown in figure 6, and for which the same reference numbers have been used.

Figure 16 shows a further fixed frame section member having, in its cross section, a substantially Z-shape and constituted by a metal outer section member 60 and a metal inner section member 61 connected to one another by bars identical to the bars of thermally insulating material already disclosed and indicated by the reference number 5.

Figures 12a to 16a show, by a cross-sectional view, section members made by inner metal section members and outer metal section members identical to the section members shown in figures 12 to 16 and with thermally insulating material bars having different lengths like those illustrated in figures 10a and 11a.

Figure 17 illustrates another fixed frame section member, constituted by a metal outer section member 80, a metal inner section member 81 coupled to one another by bars 105 made of a thermally insulating material.

Figure 18 illustrates a further movable frame section member constituted by an outer section member 82, an inner section member 83 coupled to one another by bars 122 and 123 made of a thermally insulating material.

Figure 19 illustrates another fixed frame section member, constituted by an outer section member 84 and an inner section member 85 coupled to one another by bars 105 of a thermally insulating material, whereas figure 20 illustrates a further movable frame section member constituted by an outer section member 86 and an inner section member 87, coupled to one another by bars 122 and 123 likewise the section member shown in figure 18.

Finally, figures 21 to 33 illustrate several types of glass restraining section members which can be used with the subject frame section member assembly.

Some of the above mentioned glass restraining section members have been already disclosed and shown in the preceding figures and, for these section members, have been held the same reference numbers, whereas the other have been individually indicated by the reference numbers from 190 to 188.

From the above disclosure and from the observations of the figures of the accompanying drawings, it should be apparent that the invention fully achieves the intended aim and objects.

In particular, the fact is to be pointed out that a section member assembly has been provided with a thermally bridge interruption, allowing to make metal window and door frames assuring a high thermal insulation from the outside environment and preventing water from collecting inside the window frame.

The thus designed section member assembly is susceptible to several variations and modifications all of which will come within the scope of the inventive idea.

Moreover, all of the details can be replaced by other technically equivalent elements.

In practicing the invention, the used materials, provided that they are compatible to the intended use, as well as the contingent size and shapes, can be any, depending on requirements.

Claims

1. A cooperating section member assembly with thermal bridge interruptions for making improved thermal property metal window and door frames, comprising fixed frame section members and/or movable frame section members, constituted by a metal outer section member, provided to be subjected to the outside environment, and a metal inner section member provided to be subjected to the inside environment, said metal outer section member being connected to said metal inner section member by elements of a thermally insulating material, characterized in that said thermally insulating material elements comprise a pair of adjoining bars and having enlarged end portions, engageable in seats defined by projecting fins which project from the faces of said metal inner section member and said metal outer section member, said faces being mutually facing, said bars having a contoured body with a middle region laterally offset at the ends thereof, on the opposite part of the adjoining bar, and substantially coplanar with the fins defining said seats and arranged outside of said pair of bars.
2. A section member assembly, according to Claim 1, characterized in that said bars are made of polyamide.
3. A section member assembly, according to the preceding claims, characterized in that one of said bars, connecting a metal outer section member and a metal inner section member of a movable frame section member is provided with an abutment fin for a central gasket, coupled to one of said bars, which connects the metal outer section member with the metal inner section member of a fixed frame section member.
4. A section member assembly, according to one or more of the preceding claims, characterized in that said gasket is slanted toward the metal outer section member for conveying to the outside penetrating waters.
5. A section member assembly, according to one or more of the preceding claims, characterized in that

in said metal outer section members are defined, laterally of the bar engagement regions, channels for draining penetrating water, said channels communicating with the outside environment.

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6. A section member assembly, according to one or more of the preceding claims, characterized in that said bars are associated with said metal section members and can be inter-exchanged with other bars, of different size, in order to change the thermal insulation properties of the section members. 10
7. A window or door frame made by the section member assembly according to one or more of the preceding claims, characterized in that said window or door frame comprises a fixed frame and a movable frame, made by fixed frame section members and movable frame section members, constituted by a metal inner section member and a metal outer section member, coupled to one another by bars, one of said bars of the movable frame section member being provided with an abutment fin for a central gasket coupled to said fixed frame and providing an open joint connection between the movable frame and fixed frame, the metal inner section members of said fixed frame and the metal inner section members of said movable frame being arranged all on a same side with respect to a sealing plane of the window or door frame identified by the connection of the central gasket with said fin. 20 25 30

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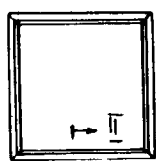


FIG. 1

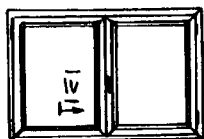


FIG. 3

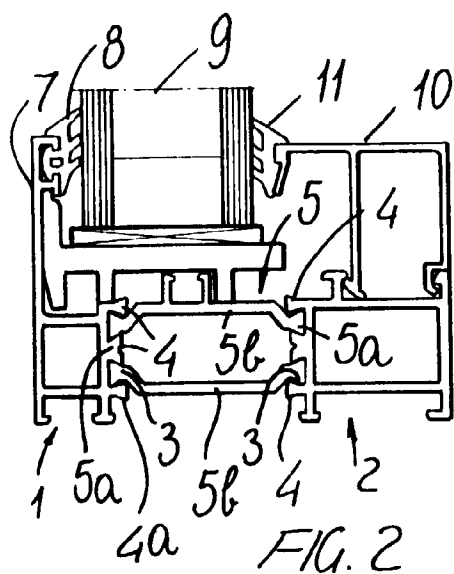


FIG. 2

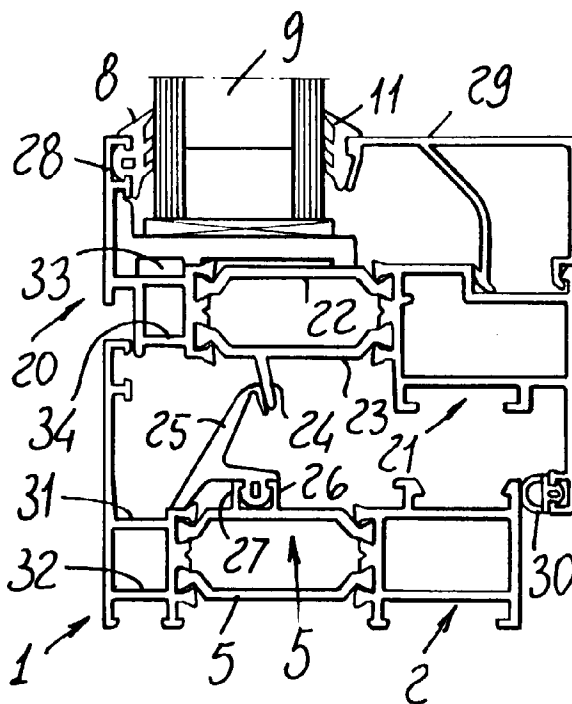


FIG. 4

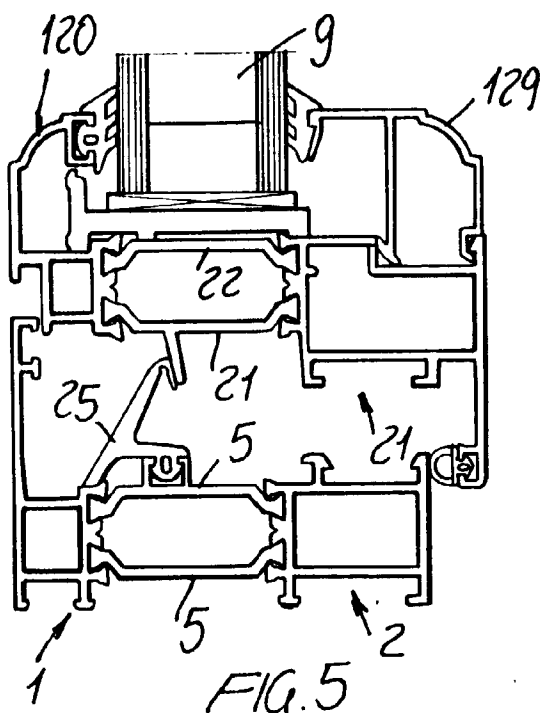


FIG. 5

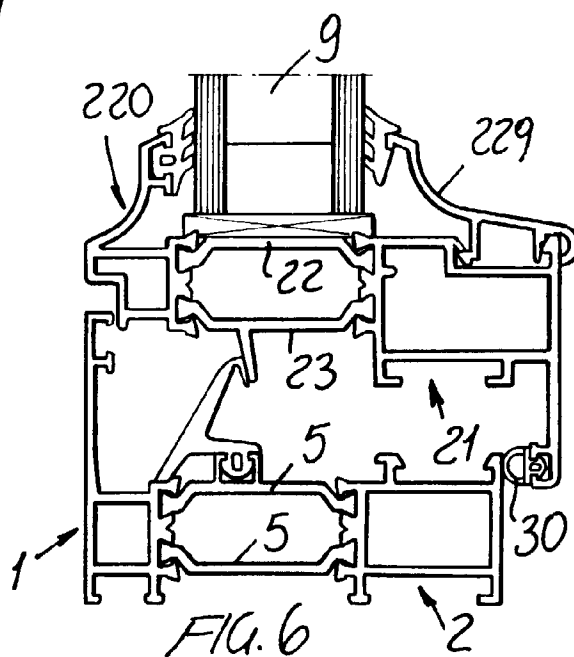


FIG. 6

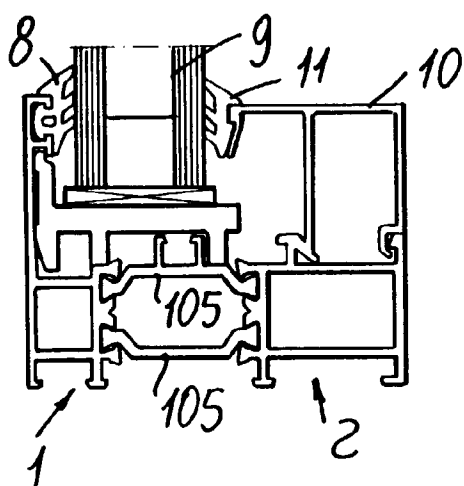


FIG. 2A

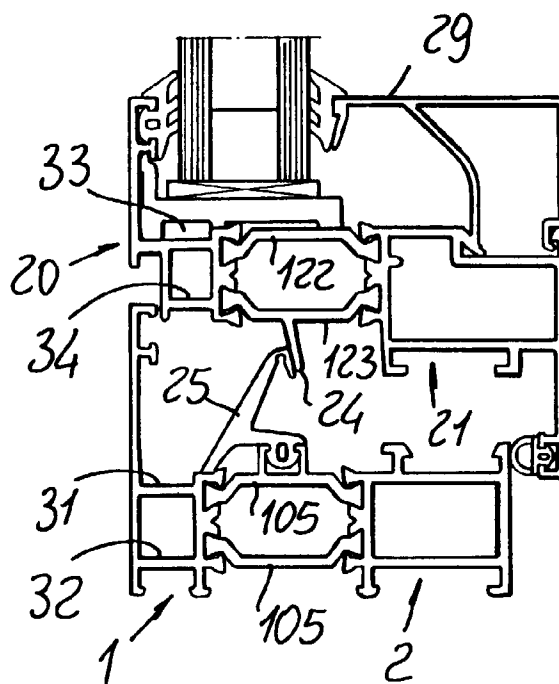


FIG. 4A

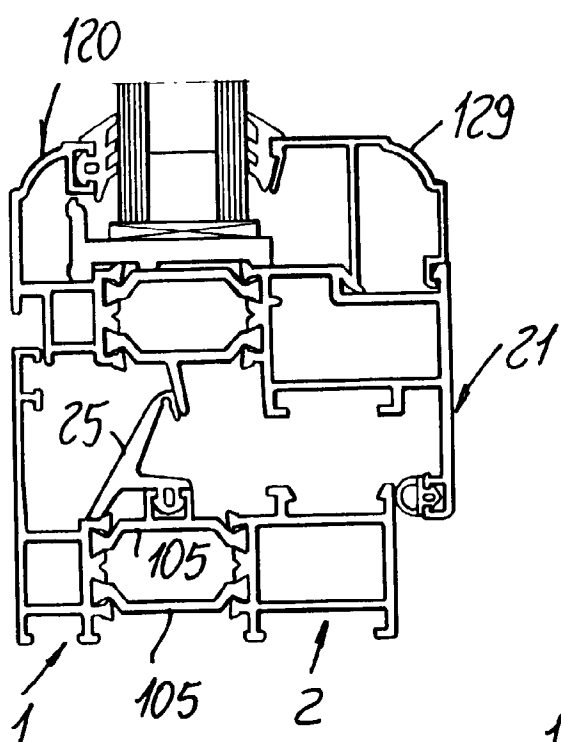


FIG. 5A

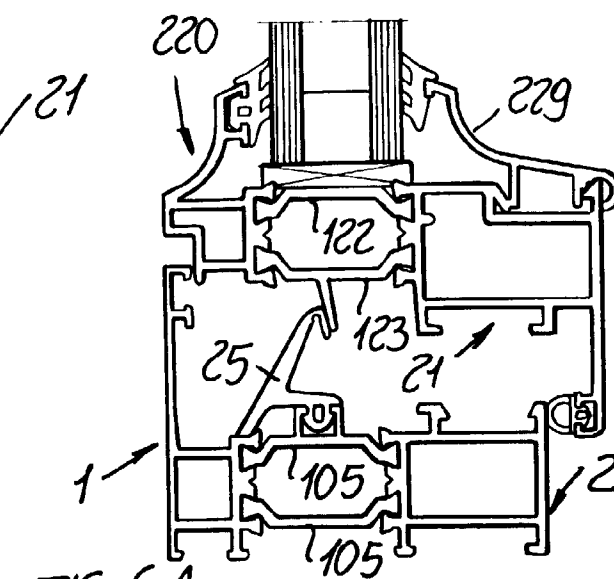


FIG. 6A

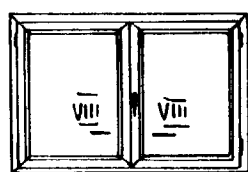


FIG. 7

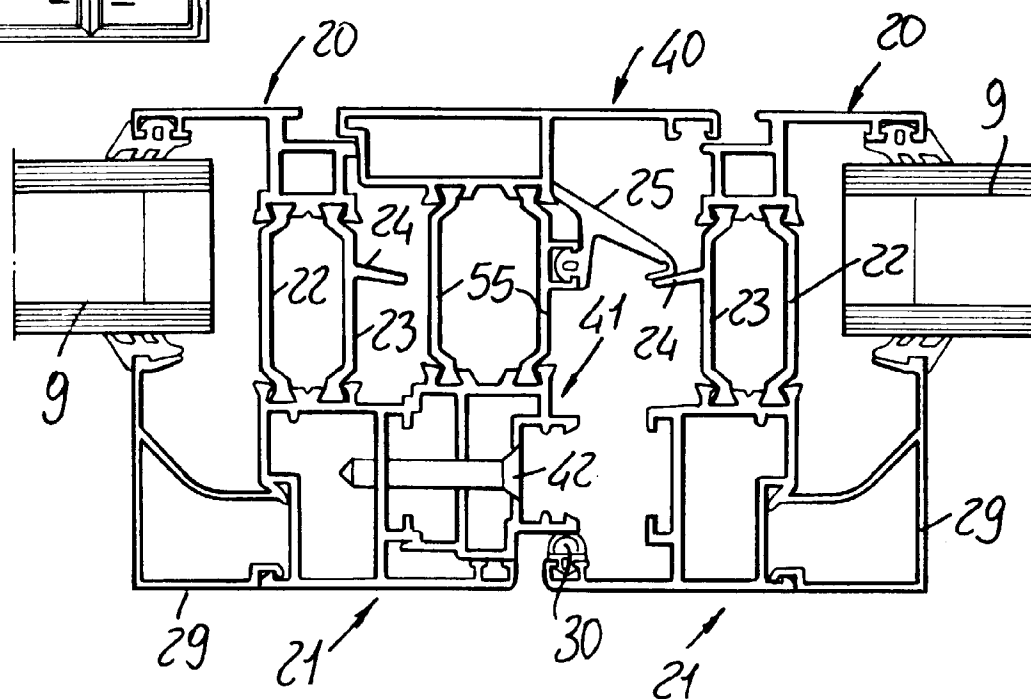


FIG. 8

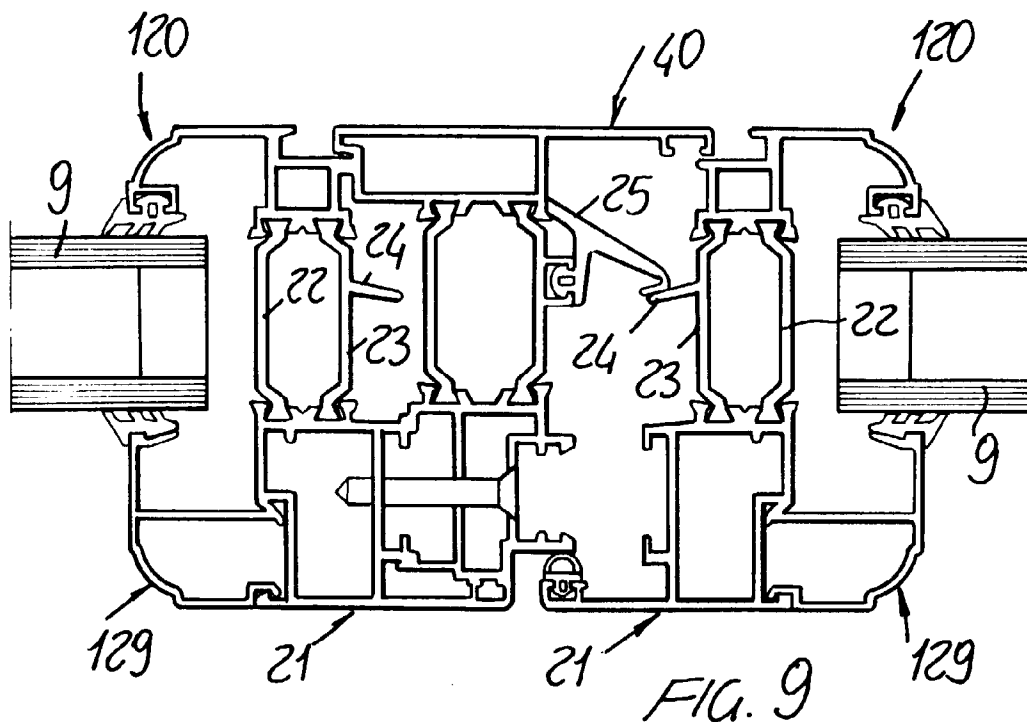


FIG. 9

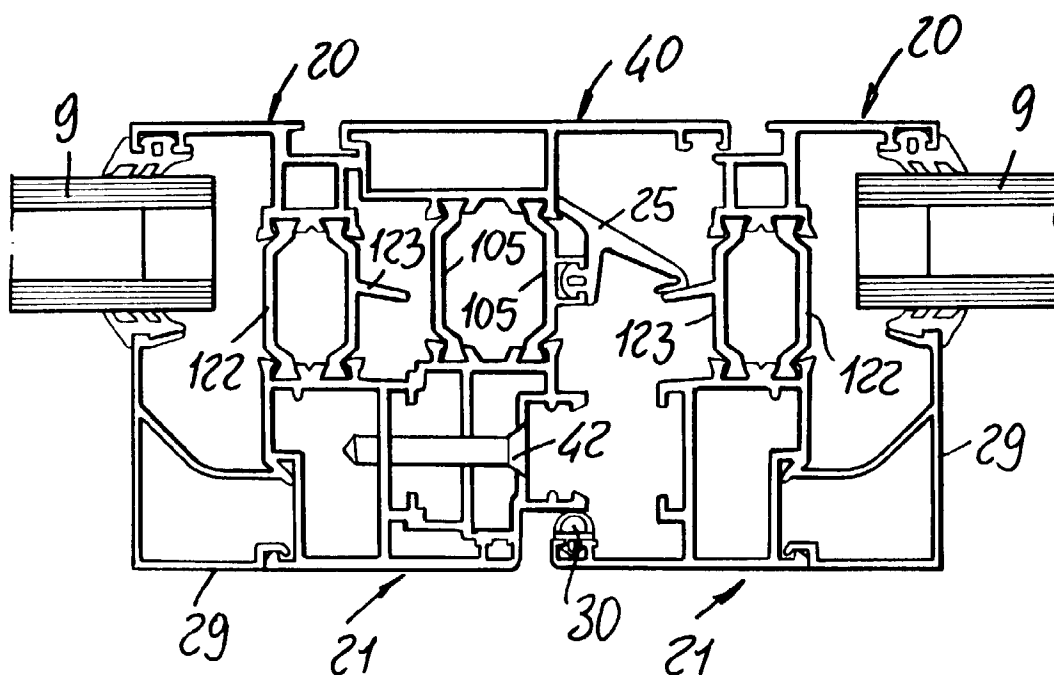


FIG. 8A

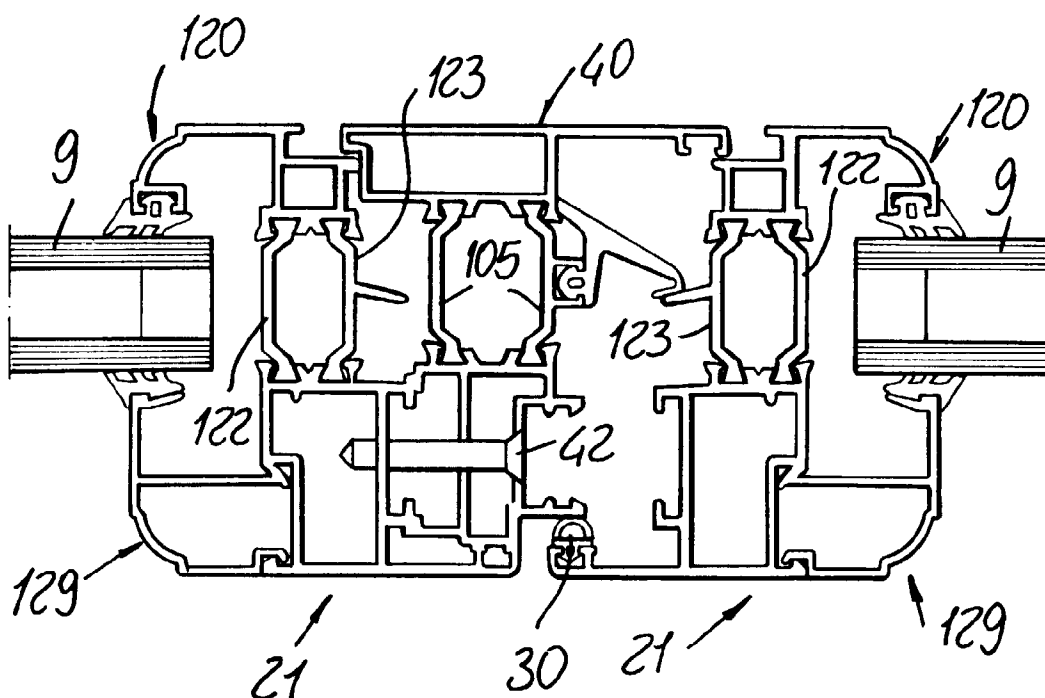


FIG. 9A

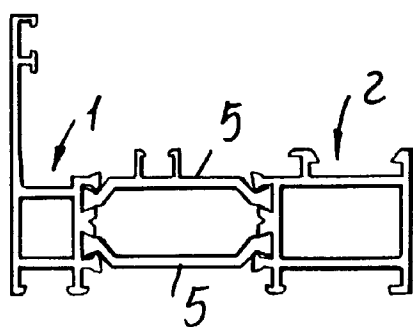


FIG. 10

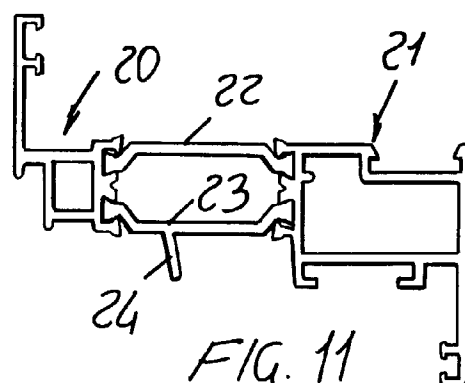


FIG. 11

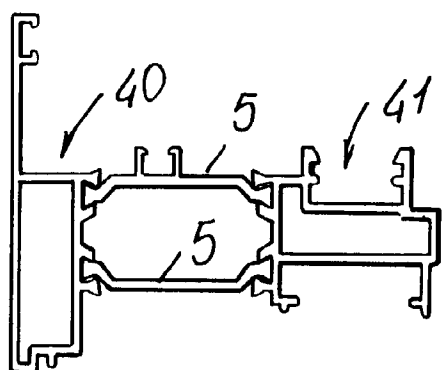


FIG. 12

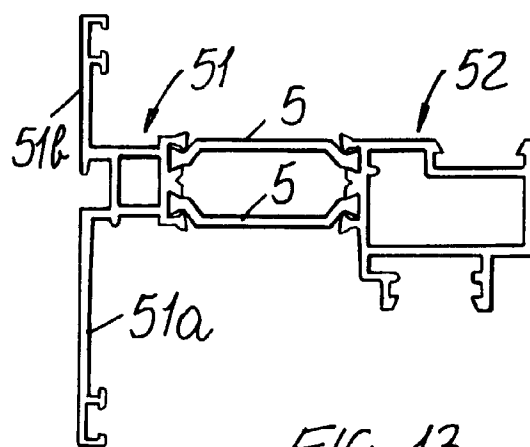


FIG. 13

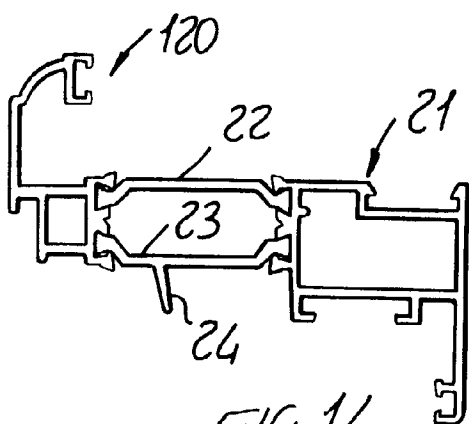


FIG. 14

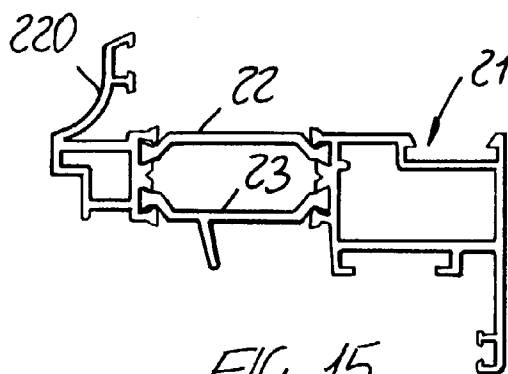


FIG. 15

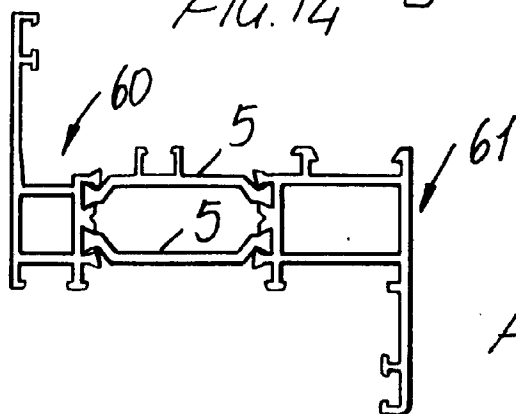


FIG. 16

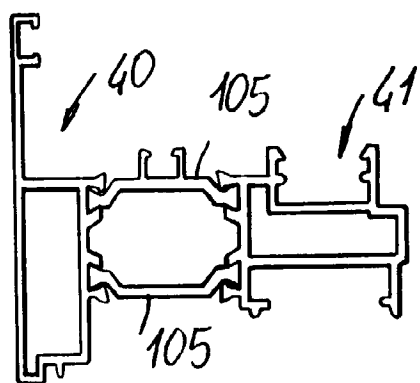


FIG. 12A

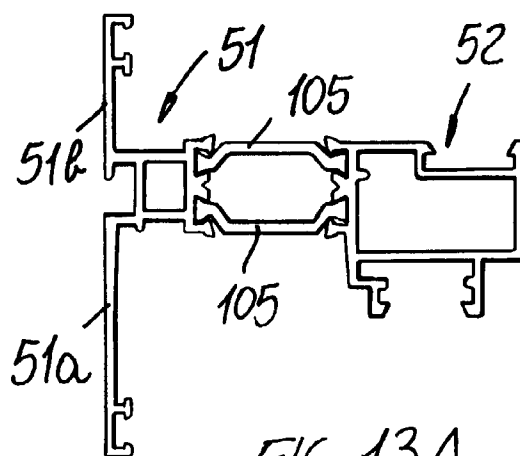


FIG. 13A

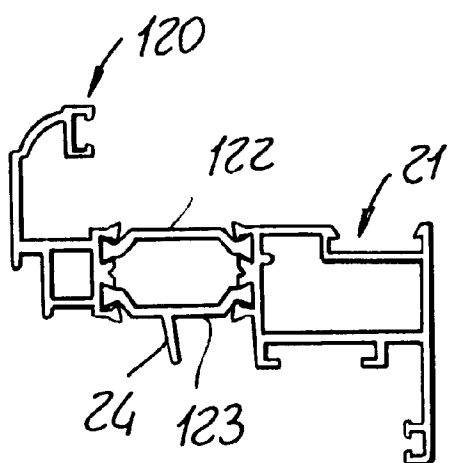


FIG. 14A

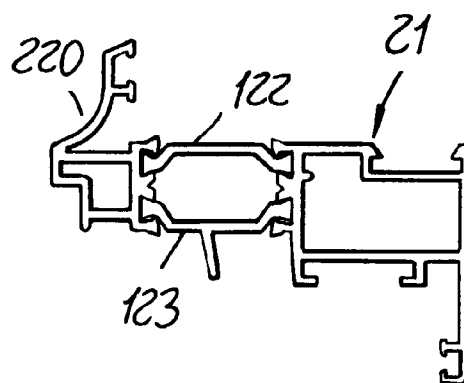


FIG. 15A

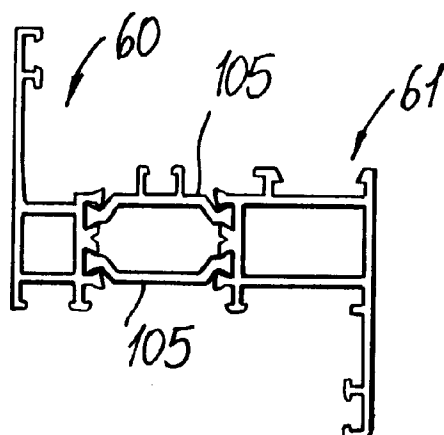


FIG. 16A

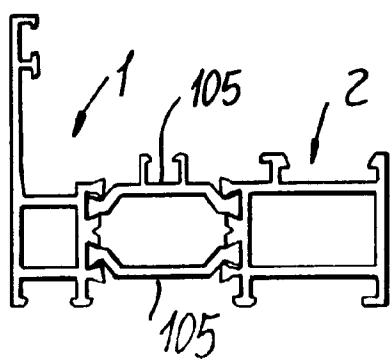


FIG. 10A

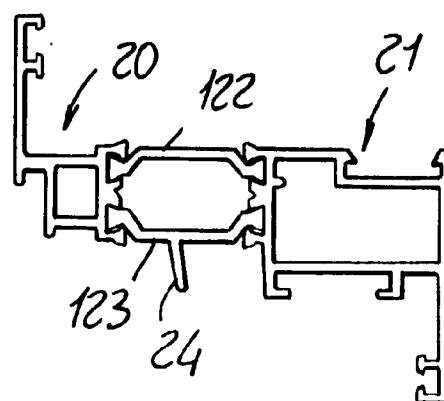


FIG. 11A

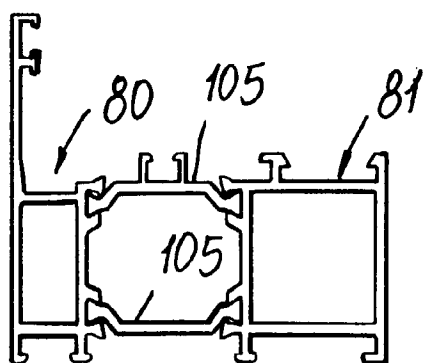


FIG. 17

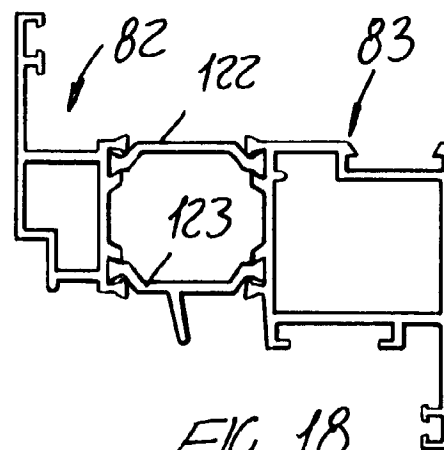


FIG. 18

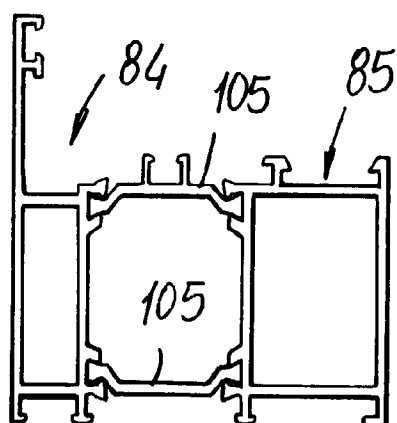


FIG. 19

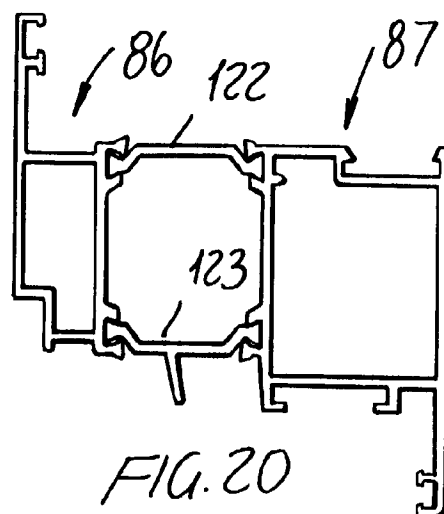
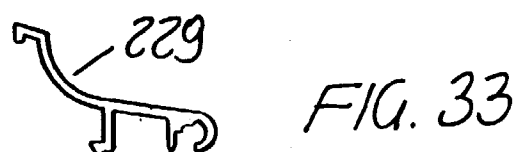
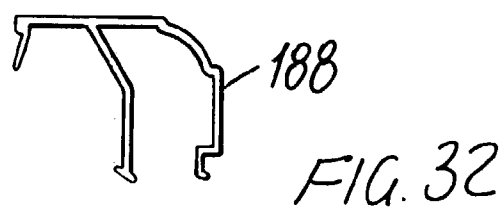
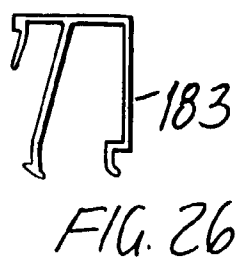
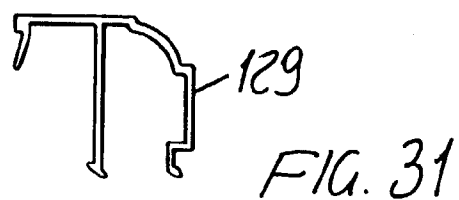
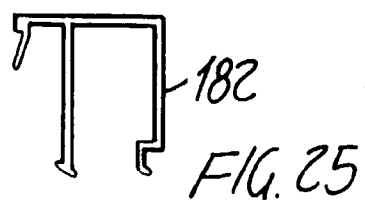
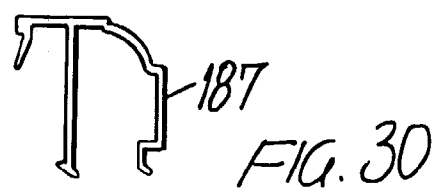
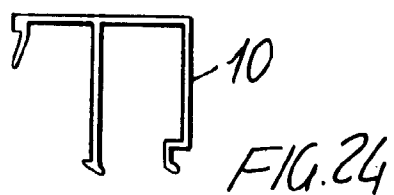
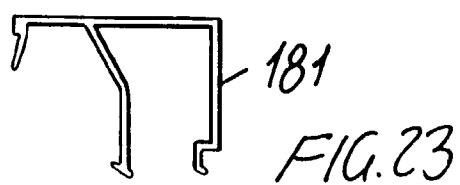
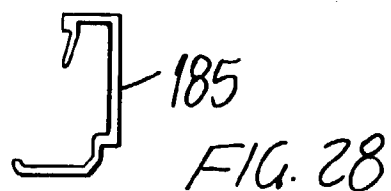
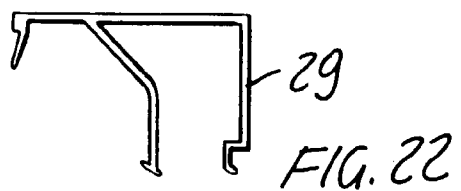
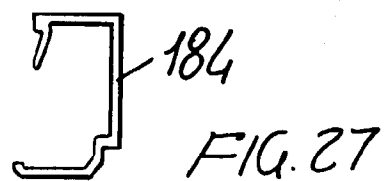
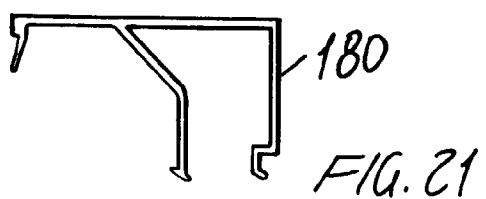


FIG. 20





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0120

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)
X	EP-A-0 460 514 (VALCASA) * column 7, line 32 - line 36; figures 4,5,24,25 *	1,3,4,6,7	E06B3/26
Y	---	2	
X	EP-A-0 103 272 (INTEGRAL PROFILSYSTEM) * figures 1,2 *	1	
Y	---	2	
Y	EP-A-0 175 094 (VEREINIGTE ALUMINIUM-WERKE) * page 3, line 32 - line 33; figure 5 *	2	
A	---	5	
A	NUOVA FINESTRA, vol. 14, no. 1, 1 January 1993, pages 33-34, XP000377129 "SERIES-A, A MULTIPURPOSE SYSTEM SERIE A, UN SYSTEME POLYVALENT" ---	3,4,7	
A	EP-A-0 253 983 (SCHÜCO) * figure 1 * -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 July 1996	Examiner Matzdorf, U
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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