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(54) **Thermally insulating body for a thermal break section for window and door frames or the like**

Wärmeisolierender Körper für ein Fenster- oder Türrahmenprofil mit thermischer Barriere

Corps thermiquement isolant pour profilés à barrière thermique pour encadrements de portes ou fenêtres

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(56) References cited:
**EP-A- 0 043 979 EP-A- 0 143 745
CH-A- 654 897 DE-A- 1 659 428
DE-A- 2 608 299 DE-A- 2 634 668
DE-A- 3 221 218**

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Description

[0001] The present invention relates to the field of aluminium sections for making window and door frames. In particular, it relates to a thermally insulating body for assembling a so-called thermal break section. As defined in the preamble of Claim 1. Such an insulating body is known from EP-A-0 143 745.

[0002] There are various known aluminium sections which are used for making frames and casements for doors, windows, or the like. In particular, there are known uninsulated sections in which there is metallic continuity between the parts of the section exposed to the external environment and the parts of the section inside a substantially closed environment (such as an apartment). Since aluminium is a good conductor of heat, uninsulated sections have the drawback of permitting an exchange of heat between the interior and the exterior.

[0003] To overcome these drawbacks, sections with a "thermal break" have been known for some time. In a thermal break section, the aluminium part exposed to the outside is separated from the inner part by means of thermally insulating bodies. A thermal break compartment having walls of thermally insulating material is formed in these sections. Generally, this material is a plastics material. Typically, this plastics material is polyamide, ABS, PVC, or the like. This compartment formed partially from plastics material interrupts the transmission of heat by conduction between the outer part and the inner part, and imparts a high thermally insulating capacity to the section.

[0004] In known thermal break sections, the thermal break compartment is formed by inserting the ends of two polyamide bars into suitable cavities provided in two half-shells of the section. Alternatively, tubular thermally insulating bodies are used. The attachment of the polyamide bars or the tubular body is carried out on a plane. In other words, the locking points are positioned on two parallel planes. Each of the aforesaid suitable cavities is delimited by a pair of bendable longitudinal retaining teeth or by one longitudinal retaining tooth and one fixed shoulder. During the insertion of the bars or of the tubular body, the retaining teeth are all open (unfolded) to enable the bars or the tubular body to be inserted easily. After the fitting of the bars or the tubular body into the corresponding cavities, the semi-finished section (comprising the two half-shells and the polyamide bars loose in their cavities) is machined by a rolling machine. The rolling machine compresses the retaining teeth of both cavities and secures the joint between the bars, or the tubular body, of thermally insulating material and the half-shells.

[0005] As indicated above, the use of insulating bodies having a tubular profile is known. The use of tubular insulating bodies is advantageous because the thermal insulation capacity is greater (in practice, there are four walls of thermally insulating material instead of two), and because fewer convective movements are created inside the tubular body. However, tubular insulating bodies are

relatively costly because of the greater quantity of material used and because an extruding machine produces a smaller number of these bodies (by comparison with bars). Moreover, tubular insulating bodies are rather bulky and voluminous. Another disadvantage of tubular bodies is that a wide range of these bodies must be available to allow adaptation to the various dimensions (and/or shapes) of the appropriate housings. Finally, tubular insulating bodies are less flexible and are less suitable for winding onto reels or the like.

[0006] Conversely, insulating bodies of the bar type are more economical than tubular ones, are much less bulky and can be easily wound onto reels. However, they have the disadvantage of providing thermal insulation characteristics which are markedly poorer than those of tubular bodies, because they form a thermal break compartment with only two insulated walls, instead of four walls as in tubular bodies.

[0007] CH 654 897 A discloses a single piece profiled tubular rod which is used, for example, for forming a window frame. It has two metal profiled rods and an insulating profiled rod which connects them together. The insulating profiled rod has two insulating strips which are provided in the vicinity of their longitudinal edges with undercuts in which limbs of the metal profiled rods engage. Two insulating webs connect the two insulating strips to one another in the region of the undercuts. These webs divide the intermediate space existing between the strips into three parts.

[0008] The insulating rod can be made in two pieces connectable to one another by using cooperating male/female parts.

[0009] EP 0 143 745 A2, which is deemed to be the closest prior art and on which the preamble of claim 1 is based, discloses a metal frame assembly for windows or doors, comprising at least two sections that are joined together via an insulating strip, wherein the insulating strip is provided with a channel to accommodate a seal.

[0010] DE 26 34 668 A discloses various thermally insulating body arrangements.

[0011] Male/female connecting parts are used to connect insulating bodies consisting of two parts.

[0012] Further arrangements are known from DE 195 32 125 A, DE 32 21 218A, DE 16 59 428 A and EP 0 043 979 A.

[0013] In view of the limitations of the known thermally insulating bodies, the Applicant has perceived the necessity of providing an improved insulating body for making thermal break sections, which would be relatively economical and easily stored. In particular, he has perceived the necessity of providing a substantially universal thermally insulating body which can be used in either bar or tubular form.

[0014] These and other objects are obtained with the thermally insulating body for thermal break sections according to Claim 1. Further advantageous characteristics of the thermally insulating body according to the invention are stated in the dependent claims. All the claims are

considered to form an integral part of the present description.

[0015] According to a first aspect the present invention provides a longitudinally extending thermally insulating bar-like body for making metal thermal-break sections. The thermally insulating bar-like body has a cross-section comprising a stem and two enlarged end heads. The enlarged end heads are provided substantially at the respective ends of the stem. The enlarged end heads have a profile, in cross section, substantially in the form of a trapezium with its longer base forming a first support surface for engaging with a corresponding bottom surface of a recess for the said thermally insulating body and with its inclined sides for engaging with longitudinal inclined retaining teeth or longitudinal shoulders of metal half-shells. According to the invention, the body further comprises a first male member and a corresponding first female member that are suitable to mate with a female member and a male member, respectively, of an analogous thermally insulating body in order to form a substantially tubular-like thermally insulating body.

[0016] The first male and female members are arranged substantially at the ends of said stem in proximity of the enlarged end heads.

[0017] The stem comprises an engagement seat for engaging with a spacing element.

[0018] Advantageously, the first support surface of the enlarged end heads comprises a channel for a line of adhesive.

[0019] According to a second aspect, the present invention provides a longitudinally extending thermally insulating body assembly for making metal thermal-break sections. The assembly comprises a first and a second longitudinally extending thermally insulating bodies as set forth above. The first and second thermally insulating bodies are connected together so that the female member and the male member of the first thermally insulating body mate with the male member and the female member of the second thermally insulating body, respectively, in order to form a substantially tubular thermally insulating body assembly.

[0020] The assembly advantageously comprises a thermally insulating spacing element. The spacing element comprises two male members and two female members mating with the first female members and the first male members, respectively, of the two thermally insulating bodies that are connected together to form a substantially tubular thermally insulating body assembly.

[0021] According to one embodiment, the spacing element is cruciform and comprises two enlarged heads having a substantially rectangular cross section and one stem, each of the enlarged heads comprises a male member on one face and a female member on the other face.

[0022] According to one variant, the cruciform spacing element comprises partitions substantially perpendicular to the stem. According to another variant, the cruciform spacing element comprises substantially diagonal parti-

tions.

[0023] According to one embodiment, ends of the partitions are housed in the engagement seats.

[0024] According to a third aspect, the present invention provides a thermal break section with a first metal half-shell, a second metal half-shell and a thermally insulating body assembly as set forth above.

[0025] The present invention will be explained by the following detailed description, provided purely by way of example and without restrictive intent, to be read with reference to the attached sheets of illustrative drawings, in which:

- Figure 1 shows a cross section through a thermally insulating body according to a first embodiment;
- Figure 1.1 shows two recesses for housing the thermally insulating body of Figure 1;
- Figure 1.2 shows, in cross-section, a square thermal break section assembled with two separate thermally insulating bodies according to Figure 1;
- Figure 2 shows, in cross section, two thermally insulating bodies according to the first embodiment, coupled together;
- Figure 3 shows, in cross section, a thermal break section assembled with the two thermally insulating bodies coupled as in Figure 2;
- Figure 4 shows, in cross section, two thermally insulating bodies according to the first embodiment, coupled together by means of a first type of spacer;
- Figure 4.1 shows two recesses for housing the thermally insulating bodies of Figure 4;
- Figure 5 shows, in cross section, a thermal break section assembled with the two thermally insulating bodies coupled as in Figure 4;
- Figure 6 shows, in cross section, two thermally insulating bodies according to the first embodiment, coupled together by means of a second type of spacer;
- Figure 7 shows, in cross section, a thermal break section assembled with the two thermally insulating bodies coupled as in Figure 6; and
- Figure 8 is a partial cross-sectional view of two thermally insulating bodies according to a second embodiment, in a corresponding seat with a spacer between them.

[0026] Similar reference numbers are used in the various figures to indicate parts which are similar or functionally equivalent. Not all the drawings are to scale.

[0027] Figure 1 shows a cross section of a first embodiment of a bar-like thermally insulating body 11 according to the present invention. Typically, it is made from polyamide or the like. Conveniently, it has a longitudinal extension and is produced continuously by extrusion.

[0028] The thermally insulating body 11 of Figure 1 comprises a stem 12 and two heads 13 at the ends of the stem 12. The stem 12 is roughly C-shaped with a substantially rectilinear central portion. Each of the heads

13 is substantially in the shape of an isosceles trapezium with its longer base 13a facing outwards and its shorter base connected to the stem 12 in the proximity of its terminal part. The angles, particularly those between the sides 13b and the longer base 13a, are rounded. The longer base 13a of each end has a channel 13c for a line of adhesive (not shown). The longer base 13a of each head 13 forms a first support surface 13d for engaging with a corresponding bottom surface 14d of a recess 14c formed in half-shells 14a, 14b of a thermal break section 14. The recesses are shown in Figure 1.1 and are formed with an inclined shoulder and a bendable locking retaining tooth.

[0029] As shown in Figure 1, at one end of the stem, in proximity of a head 13, a cavity or female member 15a is provided. The female member has a longitudinal extension. At the other end of the stem, in proximity of the other head 13, a projection or male member 15b is provided. The male member 15b has a longitudinal extension as well. The female and male members 15a, 15b are substantially complementary.

[0030] Owing to the presence of the female member 15a and the male member 15b, two thermally insulating bodies 11 such as that of Figure 1 can be interlocked to form a thermally insulating body (in two pieces) which is substantially tubular (see Figure 2). The C-shaped profile of the thermally insulating body 11 according to the first embodiment enables a tubular body to be produced with a substantially closed area 16.

[0031] Profitably, the thermally insulating body 11 according to the present invention can also be used alone, not interlocked to a corresponding thermally insulating body 11. This is shown in Figures 1.1 and 1.2. Figure 1.1 shows two recesses for housing a single thermally insulating body 11 of Figure 1. Figure 1.2 shows, in cross-section, a square thermal break section assembled with two separate thermally insulating bodies 11.

[0032] It will be understood that the possibility to use the same thermally insulating body 11 singularly (namely, as a single piece) or interlocked with another identical thermally insulating body 11 is a peculiar feature offered by the present invention. This results in high money savings as just one type of thermally insulating body 11 should be provided for standard bar-like use or for tubular-like use.

[0033] Figure 3 shows a thermal break section 14 assembled by using two insulating bodies 11 joined together as in Figure 2. The section 14 of Figure 3 comprises a first half-shell 14a and a second half-shell 14b. Recesses 14c are formed in the first and second half-shells to house the coupled thermally insulating bodies 11. Figure 3 shows the step of rolling to bend two retaining teeth 14e towards the body of insulating material 11 and lock it in position. The retaining teeth 14f on the side of the glass retaining strip are, however, fixed.

[0034] The configuration of the closed area 16 formed by the two thermally insulating bodies 11 is such that good thermal break characteristics, fewer convective

movements and greater economy are achieved by comparison with known thermally insulating bodies.

[0035] Figure 4 shows, in cross section, two thermally insulating bodies 11 according to the first embodiment, coupled together by means of a first type of spacer 17. The thermally insulating bodies 11 are substantially similar to that of Figure 1, but their stems 12 have longer rectilinear central portions. A first type of spacer 17 is interposed between the two C-shaped thermally insulating bodies 11. The spacer 17 comprises a stem 17a and two enlarged heads 17b. Each head 17b has a longitudinal extending female member 17c on one face and a longitudinal projection 17d on the other face, so that it engages with the male member 15b and the female member 15a of the thermally insulating bodies 11. Preferably, the heads 17b of the spacer 17 form surfaces 17e which are joined to the support surfaces 13d of the thermally insulating bodies 11.

[0036] In an intermediate position along the stem 17a of the spacer 17 there is a perpendicular partition 17f which additionally divides the substantially closed area 18 formed by the two bodies 11 and by the spacer 17.

[0037] It will be realized that the presence of the spacer 17 enables the said thermally insulating bodies 11 to be used additionally in wider recesses.

[0038] Figure 5 shows a thermal break section assembled with the two thermally insulating bodies and the first type of spacer of Figure 4. Figure 5 also shows a roller for folding teeth only at one side of the thermal break section (the other side being "covered" by a curved flange). Through the arrangement according to Figure 4, large recesses (see Figure 4.1) can be filled by two thermally insulating bodies 11 and a spacer 17. Thus, the thermally insulating bodies 11 can be employed as a single piece (Figures 1, 1.1 and 1.2), simply interlocked together (Figures 2 and 3) or interlocked with a spacer therebetween (Figures 4, 5, 6 and 7). Thus, advantageously, a thermal break section manufacturer has to stock only one type of thermally insulating body and, possibly, a type of spacer. By properly combining them, the manufacturer could make a variety of thermal break sections.

[0039] Figure 6 shows, once again, the bodies 11 of thermally insulating material of Figure 4 with a second type of spacer 17. In this case, the spacer 17 comprises a pair of diagonal partitions 17g which divides into six portions the substantially closed area 16 formed by the two bodies 11 and by the spacer 17. Owing to this arrangement, the convective movements within the area 16 are practically non-existent.

[0040] Figure 7 shows, in cross section, a thermal break section 14 assembled with the two thermally insulating bodies 11 coupled as in Figure 6.

[0041] Figure 8 shows a second embodiment 21 of the invention. Two thermally insulating bodies 21, substantially identical to those of the previous Figures, are connected by means of a third type of spacer 17. The thermally insulating bodies 21 of Figure 8 differ from thermally insulating bodies of previous Figures in the presence of

an engagement seat 48 in the stem 12, This engagement seat 48 houses the ends of a transverse partition 17f of the spacer 17. Owing to these forms of interlocking, the two individual thermally insulating bodies 21 are fixed together in a reliable and robust way.

[0042] With reference to Figures 3, 5 and 7 another advantage of the present invention will become clear. When two thermally insulating bodies are assembled together (with or without a spacer) a tubular thermally insulating body is realized. This, in turn, results in the possibility to make a thermal break section as those of Figures 3, 5 and 7 wherein a curved flange prevents the folding of teeth at one side of the thermal break section. A robust and not out-of-line (namely, not staggered) assembly can be made.

[0043] A high number of identical bar-like thermally insulating bodies according to the present invention can be made by a die through an extrusion process.

[0044] Naturally, a person skilled in the art will be able to devise numerous modifications, adaptations, variants and replacements of parts with other functionally equivalent parts, but clearly all these modifications, adaptations, variants and replacements of parts should fall within the scope of the invention which is limited solely by the following claims.

Claims

1. A longitudinally extending thermally insulating bar-like body (11) for making metal thermal-break sections,

a) the body (11) having a cross-section comprising a stem (12) and two enlarged end heads (13), the enlarged end heads (13) being provided substantially at the respective ends of said stem (12),

b) said enlarged end heads (13) having a profile, in cross section, substantially in the form of a trapezium with its longer base forming a first support surface (13d) for engaging with a corresponding bottom surface (14d) of a recess for the said thermally insulating body and with its inclined sides for engaging with longitudinal inclined retaining teeth or longitudinal shoulders of metal half-shells, **characterized in that**

c) said body further comprises a first male member (15b) and a corresponding first female member (15a) that are suitable to mate with a female member (15a) and a male member (15b), respectively, of an analogous thermally insulating body in order to form a substantially tubular-like thermally insulating body,

d) said first male and female members (15b, 15a) are arranged substantially at the ends of said stem (12) in proximity of said enlarged end heads (13).

2. The thermally insulating body according to claim 1, wherein said stem (12) comprises an engagement seat (48) for engaging with a spacing element (47).
3. The thermally insulating body according to any one of the preceding claims, wherein said first support surface (13d) of the enlarged end heads (13) comprises a channel (23c) for a line of adhesive.
4. A longitudinally extending thermally insulating body assembly for making metal thermal-break sections comprising a first and a second longitudinally extending thermally insulating bodies according to any of claims 1 to 3, said first and second thermally insulating bodies being connected together so that the female member (15a) and the male member (15b) of the first thermally insulating body mate with the male member (15b) and the female member (15a) of the second thermally insulating body, respectively, in order to form a substantially tubular thermally insulating body assembly.
5. The assembly according to claim 4, wherein it additionally comprises a thermally insulating spacing element (17), said spacing element (17) comprising two male members (17d) and two female members (17c) mating with the first female members (15a) and the first male members (15b), respectively, of the two thermally insulating bodies that are connected together to form a substantially tubular thermally insulating body assembly.
6. The assembly according to claim 5, wherein said spacing element (17) is cruciform and comprises two enlarged heads (17b) having a substantially rectangular cross section and one stem (17a), each of the enlarged heads (17b) comprising a male member (17d) on one face and a female member (17c) on the other face.
7. The assembly according to claim 6, wherein said cruciform spacing element (17) comprises partitions (17f) substantially perpendicular to the stem (17a).
8. The assembly according to claim 6, wherein said cruciform spacing element (17) comprises substantially diagonal partitions (17g).
9. The assembly according to claim 6, wherein ends of said partitions (17f, 17g) are housed in said engagement seats (48).
10. A thermal break section wherein it comprises a first metal half-shell, a second metal half-shell and a thermally insulating body assembly according to any one of claims 4 to 9.

Patentansprüche

1. Ein sich länglich erstreckender wärmeisolierender stangenförmiger Körper (11) zum Bilden von Metallprofilen mit thermischer Barriere, wobei

a) der Körper (11) einen Querschnitt mit einem Schaft (12) und zwei vergrößerten Endköpfen (13) aufweist, wobei die vergrößerten Endköpfe (13) im Wesentlichen an den jeweiligen Enden des Schafts (12) vorgesehen sind,

b) die vergrößerten Endköpfe (13) ein Querschnittsprofil im Wesentlichen in Form eines Trapezes aufweisen, welches mit seiner längeren Unterseite eine erste Trägerfläche (13d) zum Eingreifen in eine entsprechende Auflagefläche (14d) einer Aussparung für den wärmeisolierenden Körper und mit seinen schrägen Seiten zum Eingreifen in längs laufende geneigte Haltezähne oder längs laufende Schultern metallener Halbschalen ausbildet,

dadurch gekennzeichnet,

c) **dass** der Körper ferner ein erstes Einführelement (15b) und ein korrespondierendes Aufnahmeelement (15a) aufweist, die geeignet sind, mit einem Aufnahmeelement (15a) beziehungsweise einem Einführelement (15b) eines entsprechenden wärmeisolierenden Körpers ineinander zu greifen, um einen im Wesentlichen röhrenförmigen wärmeisolierenden Körper zu bilden,

d) **dass** die ersten Einführ- und Aufnahmeelemente (15b, 15a) im Wesentlichen an den Enden des Schaftes (12) in der Nähe der vergrößerten Endköpfe (13) angeordnet sind.

2. Wärmeisolierender Körper nach Anspruch 1, wobei der Schaft (12) einen Beaufschlagungssatz (48) zum Beaufschlagen mit einem Abstandselement (17) aufweist.

3. Wärmeisolierender Körper nach einem der vorhergehenden Ansprüche, wobei die erste Trägerfläche (13d) der vergrößerten Endköpfe (13) eine Rinne (13c) für eine Klebstofflinie aufweist.

4. Eine sich länglich erstreckende Anordnung wärmeisolierender Körper zum Bilden von Metallprofilen mit thermischer Barriere mit einem ersten und einem zweiten sich länglich erstreckenden wärmeisolierenden Körper nach einem der Ansprüche 1 bis 3, wobei der erste und der zweite wärmeisolierende Körper so zusammen verbunden sind, dass das Aufnahmeelement (15a) und das Einführelement (15b) des ersten wärmeisolierenden Körpers mit dem Einführelement (15b) beziehungsweise dem Aufnahmeelement (15a) des zweiten wärmeisolierenden

Körpers ineinander greift, um eine im Wesentlichen röhrenförmige Anordnung wärmeisolierender Körper zu bilden.

5. Anordnung nach Anspruch 4, wobei sie zusätzlich ein wärmeisolierendes Abstandselement (17) aufweist, wobei das Abstandselement (17) zwei Einführelemente (17d) und zwei Aufnahmeelemente (17c) aufweist, welche in die ersten Aufnahmeelemente (15a) beziehungsweise die ersten Einführelemente (15b) der zwei wärmeisolierenden Körper ineinander greifen, die miteinander verbunden sind, um eine im Wesentlichen röhrenförmige Anordnung wärmeisolierender Körper zu bilden.

6. Anordnung nach Anspruch 5, wobei das Abstandselement (17) kreuzförmig ist und zwei vergrößerte Köpfe (17b) mit einem im Wesentlichen rechteckigen Querschnitt und einen Schaft (17a) aufweist, wobei jeder der vergrößerten Köpfe (17b) ein Einführelement (17d) auf der einen Seite und ein Aufnahmeelement (17c) auf der anderen Seite aufweist.

7. Anordnung nach Anspruch 6, wobei das kreuzförmige Abstandselement (17) Aufteilungen (17f) im Wesentlichen senkrecht zu dem Schaft (17a) aufweist.

8. Anordnung nach Anspruch 6, wobei das kreuzförmige Abstandselement (17) im Wesentlichen diagonale Aufteilungen (17g) aufweist.

9. Anordnung nach Anspruch 6, wobei Enden der Aufteilungen (17f, 17g) in dem Beaufschlagungssatz (48) aufgenommen sind.

10. Profil mit thermischer Barriere, wobei sie eine erste Metallhalbschale, eine zweite Metallhalbschale und eine Anordnung wärmeisolierender Körper nach einem der Ansprüche 4 bis 9 aufweist.

Revendications

1. Corps en forme de barre thermiquement isolant (11) s'étendant longitudinalement pour réaliser des sections de résistance thermique en métal,

a) le corps (11) ayant une section transversale comprenant une tige (12) et deux têtes d'extrémité agrandies (13), les têtes d'extrémité agrandies (13) étant prévues sensiblement au niveau des extrémités respectives de ladite tige (12),
b) desdites têtes d'extrémité agrandies (13)

- ayant un profil, en coupe, se présentant sensiblement sous la forme d'un trapèze avec sa base plus longue qui forme une première surface de support (13d) pour se mettre en prise avec une surface de fond (14d) correspondante d'un évidement pour ledit corps thermiquement isolant et avec ses côtés inclinés pour se mettre en prise avec des dents de retenue inclinées longitudinales ou des épaulements longitudinaux de demi-coques métalliques, **caractérisé en ce que** :
- c) ledit un corps comprend en outre un premier élément mâle (15b) et un premier élément femelle (15a) correspondant qui sont appropriés pour se coupler avec un élément femelle (15a) et un élément mâle (15b) respectivement, d'un corps thermiquement isolant analogue afin de former un corps thermiquement isolant sensiblement de forme tubulaire,
- d) lesdits premiers éléments mâle et femelle (15b, 15a) sont agencés sensiblement au niveau des extrémités de ladite tige (12) à proximité desdites têtes d'extrémité agrandies (13).
2. Corps thermiquement isolant selon la revendication 1, dans lequel ladite tige (12) comprend un siège de mise en prise (48) pour la mise en prise avec un élément d'espacement (47).
 3. Corps thermiquement isolant selon l'une quelconque des revendications précédentes, dans lequel ladite première surface de support (13d) des têtes d'extrémité agrandies (13) comprend un canal (23c) pour une ligne d'adhésif.
 4. Ensemble de corps thermiquement isolants s'étendant longitudinalement pour réaliser des sections de résistance thermique en métal comprenant un premier et un deuxième corps thermiquement isolants s'étendant longitudinalement selon l'une quelconque des revendications 1 à 3, lesdits premier et deuxième corps thermiquement isolants étant raccordés ensemble de sorte que l'élément femelle (15a) et l'élément mâle (15b) du premier corps thermiquement isolant se couplent avec l'élément mâle (15b) et l'élément femelle (15a) du deuxième corps thermiquement isolant respectivement, afin de former un ensemble de corps thermiquement isolants sensiblement tubulaires.
 5. Ensemble selon la revendication 4, dans lequel il comprend de plus un élément d'espacement thermiquement isolant (17), ledit élément d'espacement (17) comprenant deux éléments mâles (17d) et deux éléments femelles (17c) se couplant avec des premiers éléments femelles (15a) et des premiers éléments mâles (15b), respectivement, des deux corps thermiquement isolants qui sont raccordés ensemble afin de former un ensemble de corps thermiquement isolants sensiblement tubulaires.
 6. Ensemble selon la revendication 5, dans lequel ledit élément d'espacement (17) est cruciforme et comprend deux têtes agrandies (17b) ayant une section transversale sensiblement rectangulaire et une tige (17a), chacune des têtes agrandies (17b) comprenant un élément mâle (17d) sur une face et un élément femelle (17c) sur l'autre face.
 7. Ensemble selon la revendication 6, dans lequel ledit élément d'espacement cruciforme (17) comprend des séparations (17f) sensiblement perpendiculaires à la tige (17a).
 8. Ensemble selon la revendication 6, dans lequel ledit élément d'espacement cruciforme (17) comprend des séparations sensiblement diagonales (17g).
 9. Ensemble selon la revendication 6, dans lequel les extrémités desdites séparations (17f, 17g) sont logées dans lesdits sièges de mise en prise (48).
 10. Section de résistance thermique dans laquelle, elle comprend une première demi-coque métallique, une deuxième demi-coque métallique et un ensemble de corps thermiquement isolants selon l'une quelconque des revendications 4 à 9.

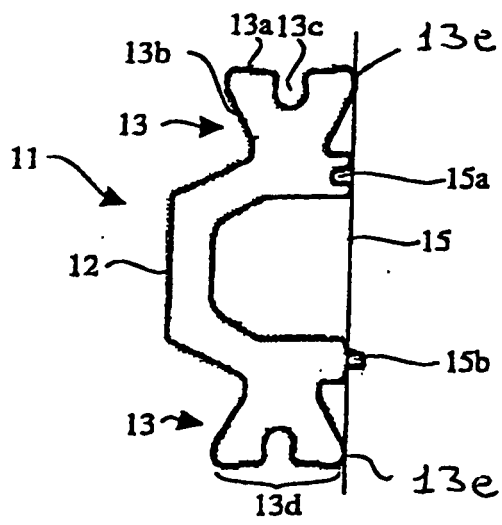


Fig. 1

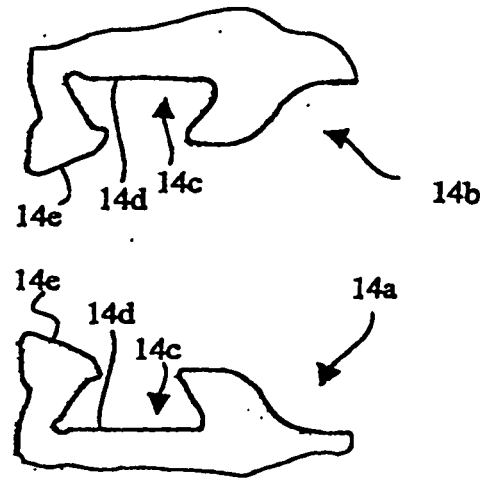


Fig. 1.1

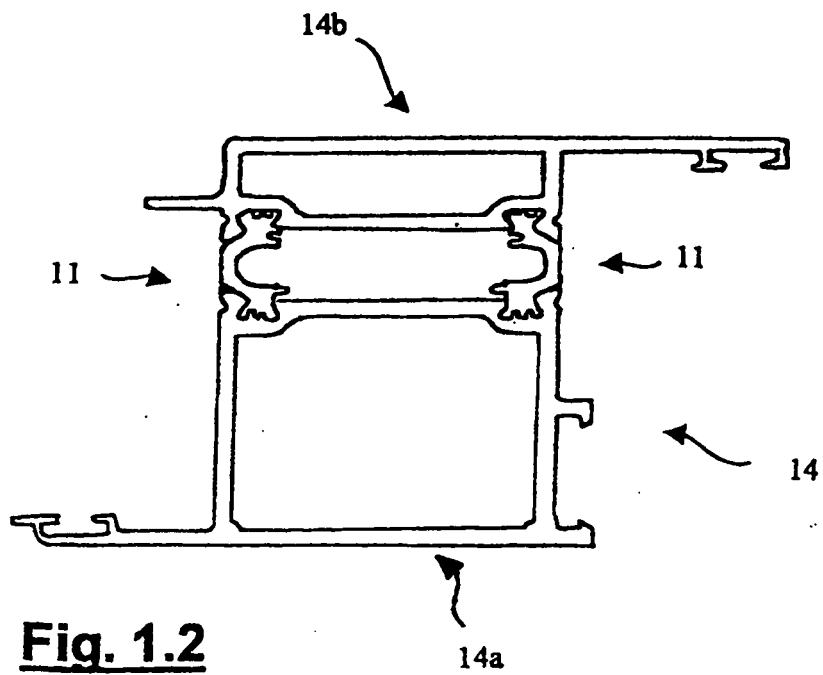


Fig. 1.2

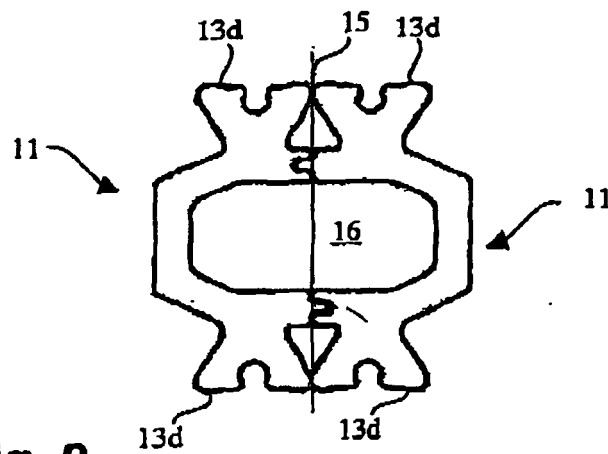


Fig. 2

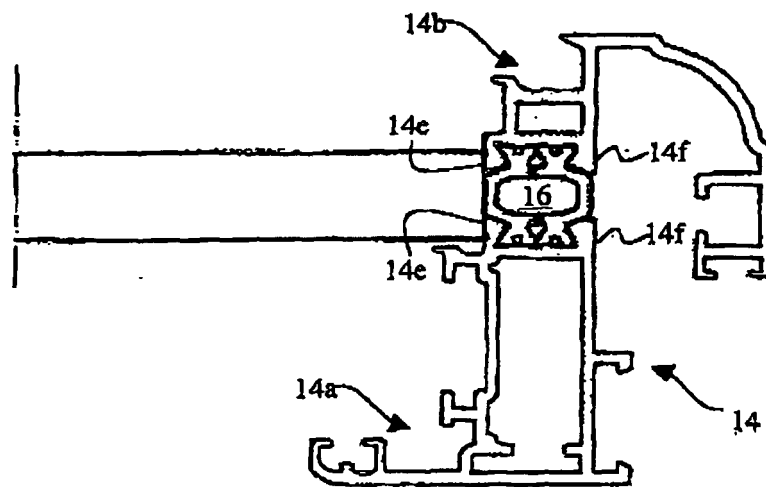


Fig. 3

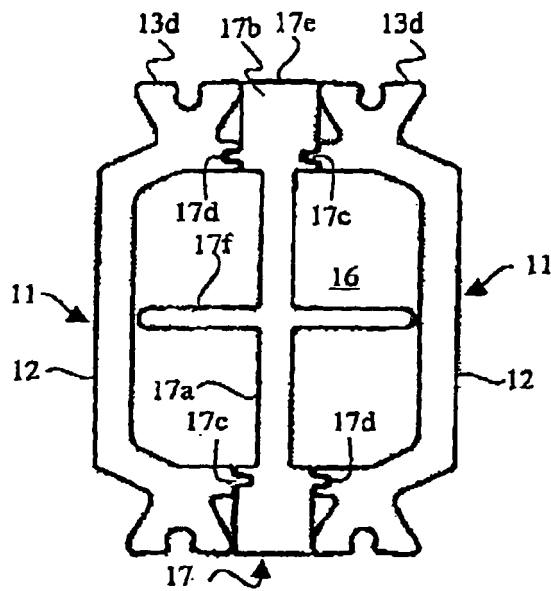


Fig. 4

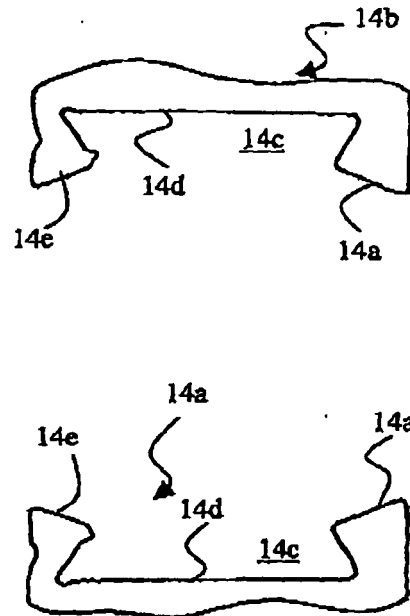


Fig. 4.1

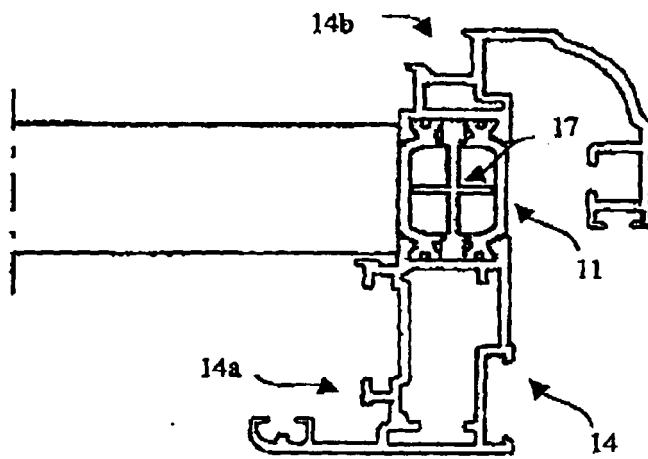


Fig. 5

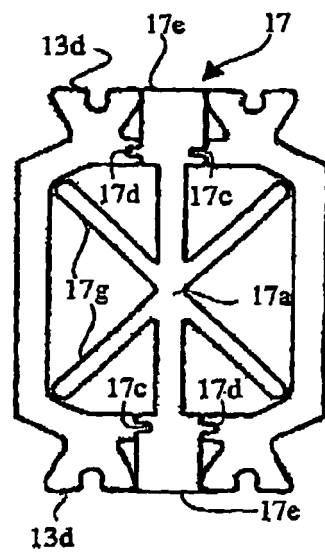


Fig. 6

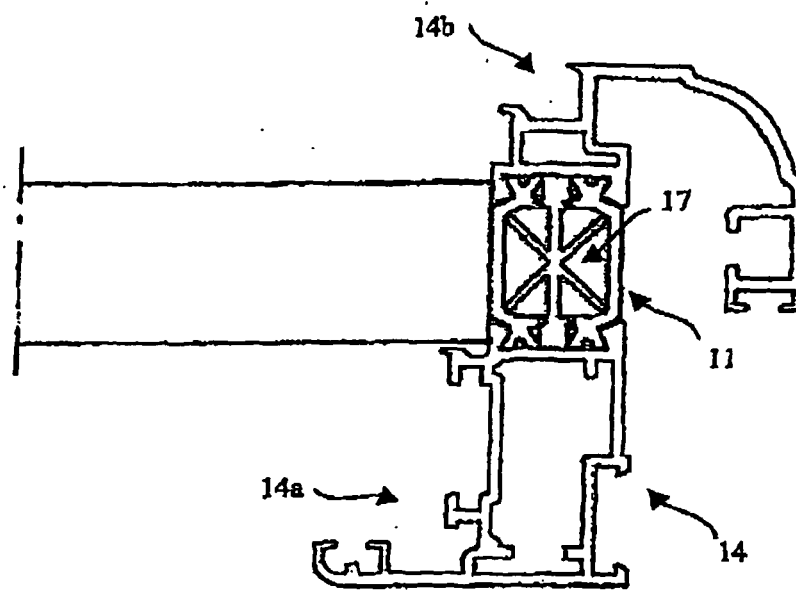


Fig. 7

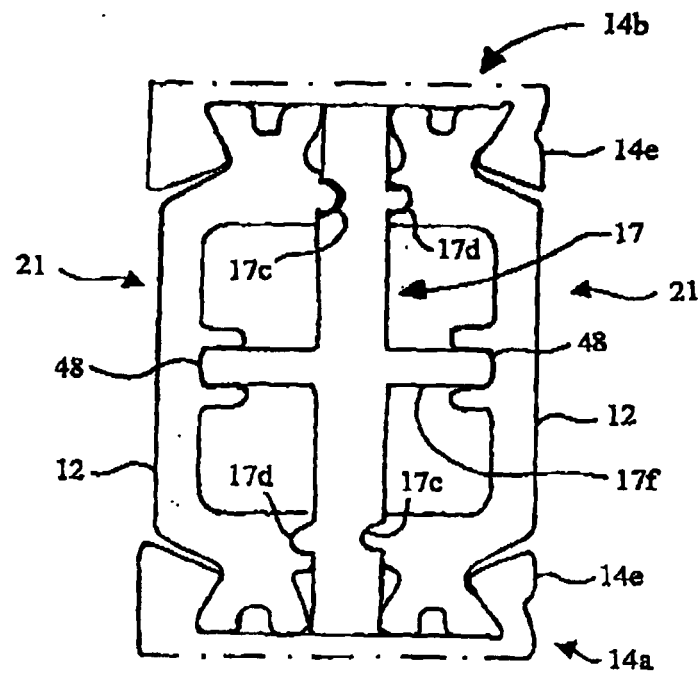


Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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