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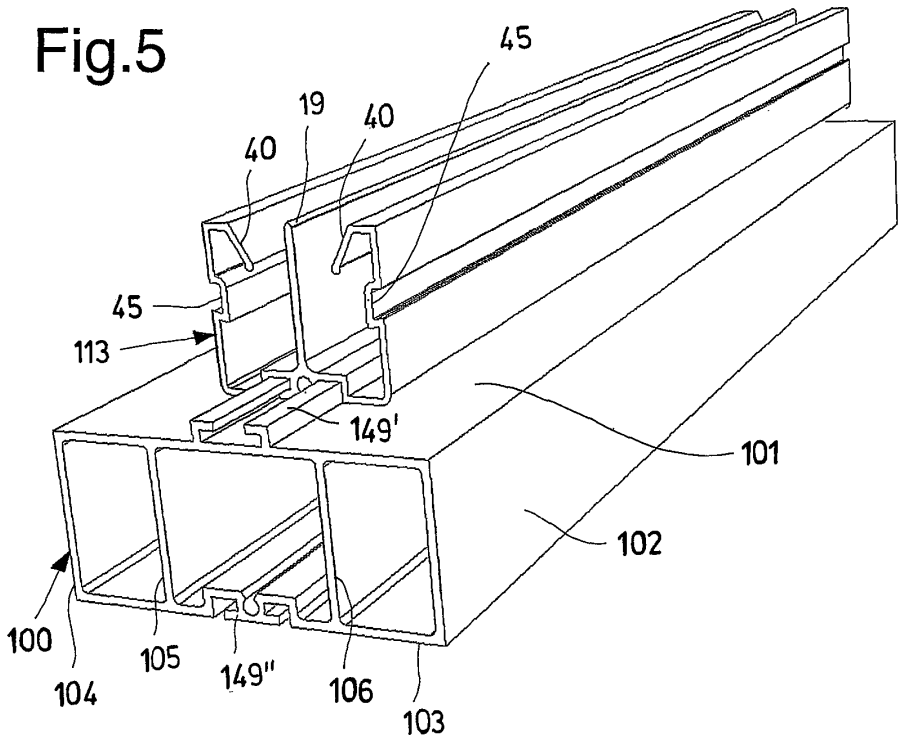
(54) **Support assembly for interconnected panels**

(57) An assembly comprising at least two panels (11, 12) and at least one joining element (13, 113) adapted to receive on the upper part and to hold an end of each of the at least two adjacent panels (11, 12) engaging them in stable manner and comprising on the lower part at least one shaped portion (49), wherein the assembly further comprises at least one support group (100, 200, 300, 400) for the at least one joining element (13, 113) provided on the upper part with at least a first portion (149', 249', 349', 449') shaped in a manner complementary to the at least one shaped portion (49) of the at least one joining element (13, 113), wherein the at least one support group (100, 200, 300, 400) is further provided with constraint means (149", 203, 204, 349", 449") for connecting one of its lower portions (103, 203, 303, 403) with another element.

Fig.5



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Description

[0001] The present invention refers to a support group for panel joining elements and panel assembly, panel joining elements and support groups for the panel joining elements.

[0002] In particular, such assembly and such group can be used in the building industry, for example in the roofing structures, curtain walls, protection walls and the like.

[0003] The expression "panels" is meant to indicate both the actual panels and the slabs or walls just like any other similar elements which cooperate, in the example, in the construction of such structures.

[0004] These panels, arranged in pairs adjacent to each other along an end edge of both, are connected and integrally joined by means "joining elements" which couple the mutual edges on one side and are directly connected to the framework on the other providing the bearing structure of the system.

[0005] Both the panels and the slabs as well as the joining elements can be made of different material, such as for example polycarbonate, aluminium or other specific resins.

[0006] In the building industry, made and known up to date have been various panels and joining elements, of various types, which are made to cooperate between them with the aim of providing an assembly of a substantial value.

[0007] As a matter of fact, over the years, in the building industry, attempts have been made to obtain a panel assembly and joining elements capable of combining the characteristics of lightness, load bearing capacity alongside water and air tightness using the most simplified structures possible.

[0008] Some of these panel joining elements assemblies known do not provide a direct and easy associability between the components; as a matter of fact, it is possible that a first panel be easily inserted into the joining element, while a second panel is harder to insert in the presence of the first inserted panel.

[0009] Another possible drawback is the one related to the fact that, once the panels and the joining element have been connected, there lacks a good sealing between the parts, hence leading to the possibility of disengaging on one side and leakage through the assembly on the other.

[0010] Another possible drawback observed in some of the known panel/joining elements regards the fact that, by performing teeth-shaped connection portions, constructing them is quite difficult and positioning them is rather complicated, as well as not guaranteeing total safety, at times causing handling hazards due to the presence of the sharp parts of the teeth.

[0011] A further drawback also lies in the possible detachment of the panel system, even leading to leakage of water, due to the frequent occurrence of atmospheric events of a considerable intensity which occur more frequently nowadays.

[0012] Therefore, disadvantageously, currently there are no panel systems capable of meeting the various load conditions, at times very different, present in the abovementioned "extreme" atmospheric phenomena.

[0013] Additionally, given that the panel joining elements are directly connected to the framework, which is usually made of material quite different from the panels and the joining element itself, nowadays there arises problems and hazards concerning breakage of the assemblies due to the thermal expansion entirely not provided for, or substantially very limited, between the assemblies themselves and the framework.

[0014] The objective of the present invention is that of providing a device capable of overcoming the abovementioned drawbacks of the known art in an extremely simple, inexpensive and particularly functional manner.

[0015] Another objective of the present invention is that of providing a support group for panel joining elements and panel assembly, panel joining elements, and support groups for the panel joining elements provided with good resistance characteristics both general and at the joint zone.

[0016] Another objective of the present invention is that of providing a support group for panel joining elements and a panel assembly, panel joining elements, and support groups for the panel joining elements provided with mechanical resistance flexible depending on the requirement.

[0017] Still, another objective of the present invention is that of providing a support group for the panel joining elements and a panel assembly, panel joining elements, and support groups for the panel joining elements capable of ensuring stable positioning between the parts, alongside a good sealing against water, air and leakages. In any case, the assembly and the group of the invention must be capable insulating against possible leakages due to accidental and inadvertent causes.

[0018] Another objective is that of providing a support group for panel joining elements and panel assembly, panel joining elements, and support groups for the panel joining elements capable of solving the problem concerning breakages due to thermal expansion between the framework and the assembly itself.

[0019] These objectives according to the present invention are attained by providing a support group for panel joining elements and a panel assembly, panel joining elements, and support groups for the panel joining elements as described in claims 17 and 1 respectively.

[0020] Further characteristics of the invention are outlined in the remaining claims.

[0021] Characteristics and advantages of a support group for panel joining elements and panel assembly, panel joining elements, and support groups for the panel joining elements according to the present invention shall be clearer from the following description, exemplifying but non-limiting, with reference to the attached schematic drawings wherein:

- Figure 1 is a perspective view of an example of a support group for panel joining elements according to the present invention;
- Figure 2 is a perspective view of another example of support group for panel joining elements according to the present invention;
- Figure 3 is a perspective view of another example of support group for panel joining elements according to the present invention;
- Figure 4 is a perspective view of an example of support group for panel joining elements according to the present invention;
- Figure 5 is a perspective view of an assembly, according to the present invention, of a panel joining element and of a support group of figure 1;
- Figure 5A is a sectional view of the assembly of figure 5;
- Figure 5bis is a perspective view of another assembly, according to the present invention, of a panel joining element and of two support groups of figure 1;
- Figure 5bisA is a sectional view of the assembly of figure 5bis;
- Figure 6 is a perspective view of another assembly, according to the present invention, of a panel joining element and of a support group of figure 3;
- Figure 6A is a sectional view of the assembly of figure 6;
- Figure 6bis is a perspective view of another assembly, according to the present invention, of a panel joining element and of two support groups of figure 3;
- Figure 6bisA is a sectional view of the assembly of figure 6bis;
- Figures 7 and 8 are two perspective views of other two support groups for panel joining elements according to the present invention;
- Figure 7bis is a perspective view of another assembly, according to the present invention, of a panel joining element and of a support group of figure 7;
- Figure 7bisA is a sectional view of the assembly of figure 7bis;
- Figure 8bis is a perspective view of another assembly, according to the present invention, of a panel joining element and of a support group of figure 8;
- Figure 8bisA is a sectional view of the assembly of figure 8bis;
- Figure 9 is a perspective view of another assembly, according to the present invention, of a panel joining element and of a support group of figure 2;
- Figure 9A is a sectional view of the assembly of figure 9;
- Figure 10 is a perspective view of another assembly, according to the present invention, of two panel joining elements and of a support group of figure 4 to form a double wall;
- Figure 10A is a sectional view of the assembly of figure 10;
- Figure 10bis is a sectional view of another assembly, according to the present invention, of two panel joining elements of a support group of figure 4 and of two support groups of figure 3 to form an assembly with high mechanical resistance;
- Figure 11 is a sectional view of an assembly of two panels and of a joining element;
- Figures 12 and 13 are details of the assembly of figure 11;
- Figure 14 is a sectional view of another assembly of two panels and of another joining element;
- Figures 15 and 16 are details of the assembly of figure 14;

[0022] With reference to the figures, is shown a support group for panel joining elements and panel assembly, panel joining elements, and support groups for the panel joining elements.

[0023] Such assembly, according to the present invention comprises at least two panels 11 and 12, at least one joining element 13, 113, adapted to receive on the upper part and to hold an end of each of the two adjacent panels 11 and 12 engaging them in a stable manner and having on the lower part at least one shaped portion 49, and at least one support group 100, 200, 300, 400.

[0024] In all the examples shown, at least one shaped portion 49 of the joining element 13, 113 is a dovetail-shaped portion but, alternatively, it can be of any geometrical shape such to provide a stable coupling, preferably sliding, having a shape complementary to it.

[0025] The support group 100, 200, 300, 400 according to the present invention is provided on the upper part with at least a first portion 149', 249', 349', 449', shaped in a manner complementary to the at least one shaped portion 49 of the joining element 13, 113 and with constraint means 149", 203, 204, 349", 449" for connecting one of its lower portions 103, 203, 303, 403 with another element, such as for example another support group or a framework.

[0026] Still according to the examples shown, given that the at least one shaped portion 49 of the joining element 13, 113 is a dovetail-shaped portion, the at least one first portion 149', 249', 349', 449' shall be at least one longitudinal counter-guide in such a manner to connect the two elements in a sliding manner longitudinally and prevent them from decoupling in a transverse and orthogonal manner at the same time.

[0027] With reference to figures 11-13, is shown a first exemplification of an assembly of two panels 11 and 12 and of a joining element 13, in particular for the building industry, associated to which according to the present invention can be a support group 100, 200, 300, 400 as described above.

[0028] The panels 11 and 12 are made of polycarbonate and they have a honeycomb structure provided by a plurality of ribs 14 of any type arranged between two main external surfaces 10, 28, 29. In the example, such honeycomb structure has a rectangular geometry thus providing better thermal insulation and higher resistance to loads, as well as high flexibility. It should be observed

that in this first embodiment of the assembly also the joining element 13 is preferably made of polycarbonate, synthetic resin or other similar material.

[0029] The section illustrated shows the type of coupling which furthermore extends along the entire length of the two panels 11 and 12 to be connected, as well as the joining element 13 which features the same extension and serves as a support element.

[0030] At the two opposite ends of each panel 11 and 12 provided are widened head extensions 15 and 16 with the body tapered towards the widened end (only one of which is shown for each panel). The two extensions 15 and 16 are arranged almost forming a square with respect to a base of the panel 11 or 12.

[0031] Concerning the tapered body, these extensions 15 and 16 respectively have an external side surface 17 of the panel 11 which is arranged opposite to the surface 18 of the other panel 12 both of which slant slightly inwards the panel itself.

[0032] This aims at facilitating their coupling with the opposite faces of a pressure element 19 which is extended centrally inside the joining element 13, U-shaped, when the latter is arranged constraining the two extensions 15 and 16 of different panels 11 and 12 in a coupling manner.

[0033] The extensions 15 and 16, in the portion of their body facing inwards each panel 11 and 12, have a pair of zones having a slanting surface 20 and 21 in the same direction of the tapering. The first zone having a slanting surface 20 is arranged beneath the widened head, while the second zone having a slanting surface 21 is provided directly on the side of the widened head itself.

[0034] These two zones with slanting surfaces 20 and 21 are blended to provide a housing 22, as well as a protrusion 23. The two zones having a slanting surface 20 and 21 facilitate the insertion of the single extension 15 and 16 into the joining element 13 cooperating with a zone having a slanting surface 24 provided on each of the two extensions 15 and 16 and converging inwards and towards the central base 25 of the joining element 13 of the assembly.

[0035] Abutting in the housing 22 is a protrusion or a widened part 26, radially projecting inwards the joining element 13, provided with rounded end. Such rounded end is also provided by a pair of converging zones having a slanting surface 24 and 27 which extend from the two U-shaped wings inwards.

[0036] The zone having a slanting surface 24 is the one that facilitates the insertion of the extension 15 and 16 into the joining element 13 sliding on the zone having a slanting surface 21 of the same extensions.

[0037] As mentioned, the joining element 13 has a U-shaped section, it is also made having a honeycomb structure and it provides for a pressure element 19 which extends centrally within it.

[0038] This pressure element 19 is cone-shaped towards the tip hence facilitating its insertion between the two extensions 15 and 16 of two adjacent panels 11 and 12 to be connected. Such cone-shape guides the coupling and the positioning of the two panels due to the cooperation of the external side surfaces 17 and 18 of the panels 11 and 12.

[0039] The shaping of the inner part of the joining element 13 has already been described previously.

[0040] The pressure element 19 cooperates to arrange and to engage a first inserted panel 11, facilitating precisely the insertion operation of the second panel 12.

[0041] It should also be taken into account that when both the panels 11 and 12 are inserted, the pressure element 19 exerts a force which presses the internal surfaces 28 and 29 of the panels against the external faces 30 of the two wings of the joining element 13. In such manner, sealing with multiple contact surfaces (panel/joining element, panel/pressure element) is facilitated.

[0042] Additionally, such sealing between the panel and the pressure element is ensured by two friction surfaces whose perpendicular force is provided by the presence of the pressure element itself, as better shown in figure 12.

[0043] Furthermore, the fact that the sealing between the panel 11, 12 and the joining element 13 is ensured by two zones having a slanting surface the first being performed by coupling the panel 11 or 12 and the second by means of the slanting zone of the joining element, as shown in figure 13, is not a negligible detail.

[0044] This pressure coupling does not allow the water, in case of roofing or other similar applications, to go into the assembly thus formed, hence keeping the assembly totally watertight against the water flowing on its surface.

[0045] Figures 14-16 show a further second exemplification of an assembly of two panels 11 and 12 having a joining element 113, associated to which, according to the present invention, there can be a support group 100, 200, 300, 400 as described above, in which identical reference numbers are used for the identical parts, or a "1" is possibly added for the parts functionally similar.

[0046] The two panels 11 and 12 are identical to the preceding ones, while the joining element 113 is made of aluminium, alloys of the same or other similar material, for example produced through extrusion.

[0047] Provided at the free ends of the two side wings of the joining element 113 are inward curved extensions 40 whose ends 41 which abut in the housing 22 provided for on the extensions 15 and 16 of the panels 11 and 12. Even such curved extensions 40 provide for a rounded end 41 adapted to facilitate the sliding between the parts. Furthermore, this curved extension 40 provides for its inclination in such a manner to be similar to the slanted surface 24 and cooperate sliding on the zone having a slanting surface 21 of the extensions 15 and 16.

[0048] Even in this case, provided is the pressure element 19, cone-shaped and tapered towards the tip, hence facilitating its insertion between the two extensions 15 and 16 of two panels 11 and 12 and provides the coupling between the external side surfaces 17 and 18

of the panels 11 and 12.

[0049] In both cases, recesses or housing seat 45 can be provided on the side external walls of the joining element 13 or 113.

[0050] As mentioned at the beginning of the description, the joining element 13 and 113 provide for a shaped portion 49.

[0051] According to the invention, connected at the lower part of the joining element 13 and 113 is at least one support element 100, 200, 300 and 400.

[0052] According to a first embodiment shown in figure 1 such support group 100, 200, 300, 400 is a parallelepiped element with a rectangular section 100, preferably hollow, provided with four main external surfaces 101, 102, 103, 104.

[0053] According to the invention, provided on the upper surface 101 is at least a first portion 149' shaped in a manner complementary to the mentioned at least one shaped portion 49 of the joining element 13, 113, while provided on the lower surface 102 is a second portion 149" substantially shaped in a manner identical to the shaped portion 49 of the joining element 13, 113.

[0054] This second shaped element 149" serves as a constraint for connecting the lower surface 102 of the parallelepiped element 100 to another element which could be the framework or any other element.

[0055] Preferably, in case the parallelepiped element 100 is hollow, it further comprises two complete surfaces 105, 106, with the function of increasing the rigidity of the assembly, parallel to the two side surfaces 102, 104 dividing the internal volume of the element 100 into three separate parts.

[0056] As observable in figures 5 and 5A this parallelepiped element 100 is connected on its upper part in a sliding manner longitudinally to their development to the related joining element 13, 113 and at its lower part, as observable in figures 6 and 6A it can be associated to another parallelepiped element 100; this allows obtaining high mechanical resistance of the assembly.

[0057] Furthermore, according to other preferred embodiments shown in figures 7, 7bis, 8 and 8bis the parallelepiped element 100 can comprise on the upper surface 101 holes 703, 704, 801, 802 preferably arranged at opposite sides with respect to the first shaped portion 149' to facilitate fastening the element using tools.

[0058] In the assemblies indicated above, and in the ones cited hereinafter, the panel elements 11 and 12 are not shown. However, these panel elements are to be provided for connected on the upper part to the at least one joining element 13, 113 as shown in figures 11-16.

[0059] In the figure is shown another example of a support group 100, 200, 300, 400 according to the invention.

[0060] Such support group 100, 200, 300, 400 comprises at least one laminar element 200, having a thin section to allow minimising the space between the framework and the panels. Such laminar element 200 has two parallel main external surfaces 201, 202, in which provided on the upper surface 201 is at least a first portion 249' shaped in a manner complementary to the at least one shaped portion 49 of the joining element 13, 113.

[0061] In such embodiment, the constraint means 149", 203, 204, 349", 449" provided for connecting the lower portion 202 of the laminar element 200 with another element are at least two through holes 203, 204 arranged at opposite sides with respect to the first shaped portion 249' which can advantageously serve as seats for screw or plug elements for connecting the element 200 with another element.

[0062] An assembly with such laminar element 200 and a related joining element 13, 113 is shown in figures 9 and 9A.

[0063] Figure 3 shows another example of a support group 100, 200, 300, 400 according to the invention comprising a parallelepiped element having a substantially square section 300 having, preferably, the same width of the related joining element 13, 113.

[0064] Such element 300, preferably hollow, is provided with four main external surfaces 301, 302, 303, 304, in which provided on the upper surface 301 is at least one first portion 349' shaped in a manner complementary to the at least one shaped portion 49 of the joining element 13, 113, and in which provided on the lower surface 302 is a second portion 349" substantially shaped in a manner identical to the shaped portion 49 of the joining element 13, 113.

[0065] Such shaped second portion 349" serves as a constraint means for connecting the lower portion of the at least one substantially square element 300 with another element.

[0066] An assembly of such laminar element 200 with a relative joining element 13, 113 is shown in figures 6 and 6A while shown in figures 6bis and 6bisA is an embodiment in which it is provided for that on the lower part of the substantially square element 300 be connected a second substantially square element 300 identical to the first one.

[0067] According to another preferred embodiment, shown in figure 4, the support group 100, 200, 300, 400 is a substantially rectangular element 400, preferably hollow, provided with four main external surfaces 401, 402, 403, 404 in which the upper surface 401 is provided with at least one first portion 449' shaped in a manner complementary to the at least one shaped portion 49 of the joining element 13, 113, and the lower surface 402 is provided with at least one second portion 449" shaped in a manner identical to the at least one first portion 449'.

[0068] Thus, by using such substantially rectangular element 400 it is possible to construct, according to the present invention, symmetrical assemblies provided in which there can be a support group 400 and two joining elements 13, 113, as observable in figures 10 and 10A, or embodiments with several support groups as described above externally connected to which there will be the related joining elements 13, 113.

[0069] An exemplified embodiment of such symmetrical assembly with several support groups is shown in

figure 10bis.

[0070] It is very easy to understand the operation of the group subject of the invention.

[0071] The assembly comprising the panels, the joining element and the support group according to the present invention allows providing particularly efficient structures with respect to the known ones allowing to meet in an entirely easy manner, due to the modularity of the elements of the invention which slide longitudinally between each other, the various load conditions encountered nowadays in the building industry.

[0072] As matter of fact, according to the invention, the joining element is no longer in direct contact with the framework but in contact with a special support group which in turn shall either be constrained against the abovementioned framework or against other elements such as other support groups or other joining elements.

[0073] In such manner, the assembly considerably and advantageously enhances its flexional rigidity allowing, depending on the requirements, fastening against the structure of the continuous or pointwise type.

[0074] The assembly according to the invention reduces the possibilities of breakage due to thermal expansion between the framework and the assembly itself as well as considerably enhancing thermal insulation between the framework and the panels.

[0075] Lastly, the assembly according to the invention allows constructing a double wall system providing a symmetric architectonic structure and the creation of a larger thermal insulation chamber.

[0076] It has thus been observed that a support group for panel joining elements, a panel assembly, panel joining elements and support groups for the panel joining elements according to the present invention attains the objectives outlined previously.

[0077] The support group for panel joining elements and the panel assembly, panel joining elements, and support groups for the panel joining elements of the present invention thus conceived are susceptible to several modifications and variants, all falling within the same invention concept; furthermore, all the details can be replaced by other technically equivalent elements. In practice, the materials used, alongside their dimensions, may vary depending on the technical requirements.

Claims

1. Assembly comprising at least two panels (11, 12) and at least one joining element (13, 113) adapted to receive on the upper part and to hold an end of each of said at least two adjacent panels (11, 12) engaging them in a stable manner and comprising on the lower part at least one shaped portion (49), **characterised in that** said assembly further comprises at least one support group (100, 200, 300, 400) for said at least one joining element (13, 113) provided on the upper part with at least a first portion (149', 249', 349', 449') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113), said at least one support group (100, 200, 300, 400) being further provided with constraint means (149", 203, 204, 349", 449") for connecting a lower portion of said at least one support group (100, 200, 300, 400) with another element.

2. Assembly according to claim 1, **characterised in that** said at least one support group (100, 200, 300, 400) is at least a parallelepiped element having a rectangular section (100) provided with four main external surfaces (101, 102, 103, 104), wherein an upper surface (101) comprises said at least one first portion (149') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113), and a lower surface (102) provided with at least one second portion (149") substantially shaped identical to said at least one shaped portion (49) of said at least one joining element (13, 113) for connecting said lower surface (102) of said at least one parallelepiped element having a rectangular section (100) with another element.

3. Assembly according to claim 2, **characterised in that** said parallelepiped element having a rectangular section (100) is hollow and comprises two internal surfaces (105, 106) parallel to said two side surfaces (104, 102) in such a manner to divide the internal volume of said parallelepiped element having a rectangular section (100) into three separate sectors.

4. Assembly according to claim 2 or 3, **characterised in that** it comprises at least two of said parallelepiped element having a rectangular section (100) connected to each other in series.

5. Assembly according to claim 2, **characterised in that** said at least one parallelepiped element having a rectangular section (100) comprises in said upper surface (101) at least two holes (703, 704, 801, 802) arranged at opposite sides with respect to said first shaped portion (149').

6. Assembly according to claim 1, **characterised in that** said at least one support group (100, 200, 300, 400) is at least a laminar element (200) having a thin section with two parallel main surfaces (201, 202), wherein an upper surface (201) comprises at least a first portion (249') shaped in a manner complementary to at least said one shaped portion (49) of said at least one joining element (13, 113), said laminar element (200) further comprising at least two through holes (203, 204) arranged at opposite sides with respect to said at least one first shaped portion (249') for connecting said lower portion (202) of said at least one laminar element (200) with another element.

7. Assembly according to claim 1, **characterised in that** said support group (100, 200, 300, 400) is a parallelepiped element having a substantially square section (300) provided with four main external surfaces (301, 302, 303, 304), wherein one upper surface (301) comprises at least one first portion (349') shaped in manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113), and a lower surface (303) provided with at least one second portion (349") substantially shaped in manner identical to said at least one shaped portion (49) of said at least one joining element (13, 113) for connecting said lower surface (303) of said at least one parallelepiped element having a substantially square section (300) with another element.

8. Assembly according to claim 1, **characterised in that** said support group (100, 200, 300, 400) is a parallelepiped element having a substantially rectangular section (400) provided with four main external surfaces (401, 402, 403, 404), wherein an upper surface (401) comprises at least one first portion (449') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113), and a lower surface (403) provided with at least one second portion (449") substantially shaped in a manner identical to said first shaped portion (449') for connecting said at least one parallelepiped element having a substantially rectangular section (400) with another element.

9. Assembly according to any preceding claim, **characterised in that** said at least one support element (100, 200, 300, 400) and said at least one joining element (13, 113) are connected to each other in a sliding manner longitudinally to their development.

10. Assembly according to any preceding claim, **characterised in that** said two panels (11, 12) are provided, in section, with a honeycomb structure arranged between two main external surfaces (10, 28, 29), with extensions (15, 16) provided at opposite ends of each panel (11, 12), and that said joining element (113) is adapted to receive an extension (15, 16) of each of said two adjacent panels (11, 12) engaging them in a stable manner, wherein both each of said extensions (15, 16) and said joining element (13, 113) have slanting surfaces (20, 21; 24, 25) for mutual coupling projecting inwards and facing to each other and **in that** said joining element (13, 113) is U-shaped and it is provided with a pressure element (19) which extends centrally within it and it is arranged wedge-engaged between the facing external walls (17, 18) of said two extensions (15, 16).

11. Assembly according to claim 10, **characterised in that** said wing ends of said joining element (13) have each a rounded protrusion (26), radially projecting inwards, adapted to interact with a respective protrusion (23) provided almost at the free ends of said extensions (15, 16) of said panels (11, 12).

12. Assembly according to claim 11, **characterised in that** said protrusion (26) is provided by a pair of zones having a slanting surface (24, 27) converging towards each other which extend from two wings of said U-shaped joining element (13) inwards it.

13. Assembly according to claim 11, **characterised in that** said rounded protrusion (26) is provided for by a pair of zones having a slanting surface (20, 21) substantially parallel and connected to provide a housing (22) for said rounded protrusion (23).

14. Assembly according to any preceding claim, **characterised in that** both said panels (11, 12) and said joining element (13) are made of polycarbonate having a honeycomb structure.

15. Assembly according to any preceding claim, **characterised in that** said panels (11, 12) are made of polycarbonate having a honeycomb structure and said joining element (113) is an aluminium extrusion or a similar alloy extrusion.

16. Assembly according to claim 10, **characterised in that** wing ends of said joining element (113) made by means of extrusion of metal material continue inwards curved extensions (40), whose ends (41) abut in a housing (22) provided on said extensions (15, 16) of said panels (11, 12).

17. Support group (100, 200, 300, 400) for at least one joining element (13, 113) of two panels (11, 12) adapted to receive on the upper part and to hold an end of each of said two adjacent panels (11, 12) engaging them in a stable manner and having on the lower part at least one shaped portion (49), **characterised in that** said support group (100, 200, 300, 400) comprises on the upper part a first portion (149', 249', 349', 449') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113) and constraint means (149", 202, 204, 349", 449") for connecting a lower portion of said support group (100, 200, 300, 400) with another element.

18. Support group (100, 200, 300, 400) according to claim 17, **characterised in that** it comprises a parallelepiped element having a rectangular section (100) provided with four main external surfaces (101, 102, 103, 104), in which an upper surface (101) is provided with at least a first portion (149') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13,

113), and in which said constraint means (149", 202, 204, 349", 449") for connecting a lower surface (102) of said parallelepiped element having a rectangular section (100) with another element are at least a second portion (149") of said lower surface (102) substantially shaped in a manner identical to said at least one shaped portion (49) of said at least one joining element (13, 113).

19. Support group (100, 200, 300, 400) according to claim 18, **characterised in that** said parallelepiped element having a rectangular section (100) is hollow and comprises two complete surfaces (105, 106) parallel to said two side surfaces (104, 102) in such a manner to divide the internal volume of said element (100) into three separate sectors.

20. Support group (100, 200, 300, 400) according to claim 18, **characterised in that** said parallelepiped element having a rectangular section (100) comprises in said upper surface (101) at least two holes (703, 704, 801, 802) arranged on opposite sides with respect to said at least one first shaped portion (149').

21. Support group (100, 200, 300, 400) according to claim 17, **characterised in that** it comprises at least one laminar element (200) having a thin section provided with two parallel main external surfaces (201, 202), wherein one upper surface (201) is provided with at least a first portion (249') shaped in a manner complementary to said at least one shaped portion (49) of said at least one joining element (13, 113), and in which said constraint means (149", 202, 204, 349", 449") for connecting a lower portion (202) of said laminar element (200) with another element are at least two through holes (203, 204) arranged at opposite sides with respect to said first shaped portion (249').

22. Support group (100, 200, 300, 400) according to claim 17, **characterised in that** it comprises a parallelepiped element having a substantially square section (300) provided with four main external surfaces (301, 302, 303, 304) wherein an upper surface (301) is provided with said first portion (349') shaped in a manner complementary to said at least one shaped portion (49) of said joining element (13, 113), and a lower portion (303) is provided with at least one second portion (349") shaped in a substantially identical manner to said at least one shaped portion (49) of said at least one joining element (13, 113).

23. Support group (100, 200, 300, 400) according to claim 17, **characterised in that** it comprises a parallelepiped element having a substantially rectangular section (400) provided with four main external surfaces (401, 402, 403, 404) wherein an upper surface (401) is provided with at least one first portion (449') shaped in a manner complementary to said at least one shaped portion (49) of said joining element (13, 113), and a lower portion (403) is provided with at least one second shaped portion (449") substantially identical to said first shaped portion (449') of said parallelepiped element having a substantially rectangular section (400).

Fig.1

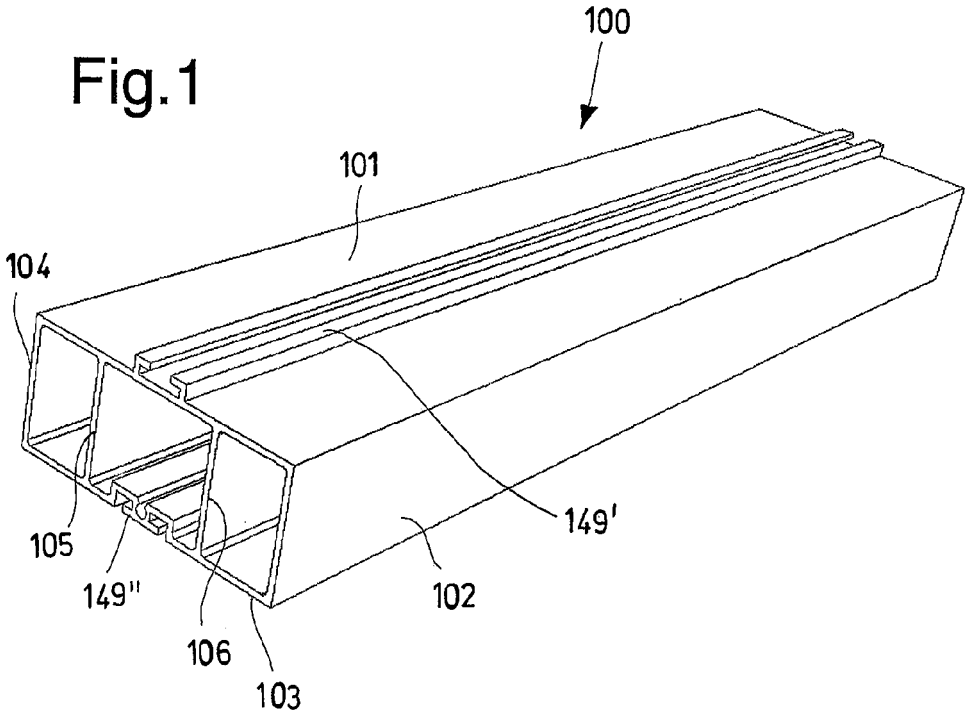


Fig.2

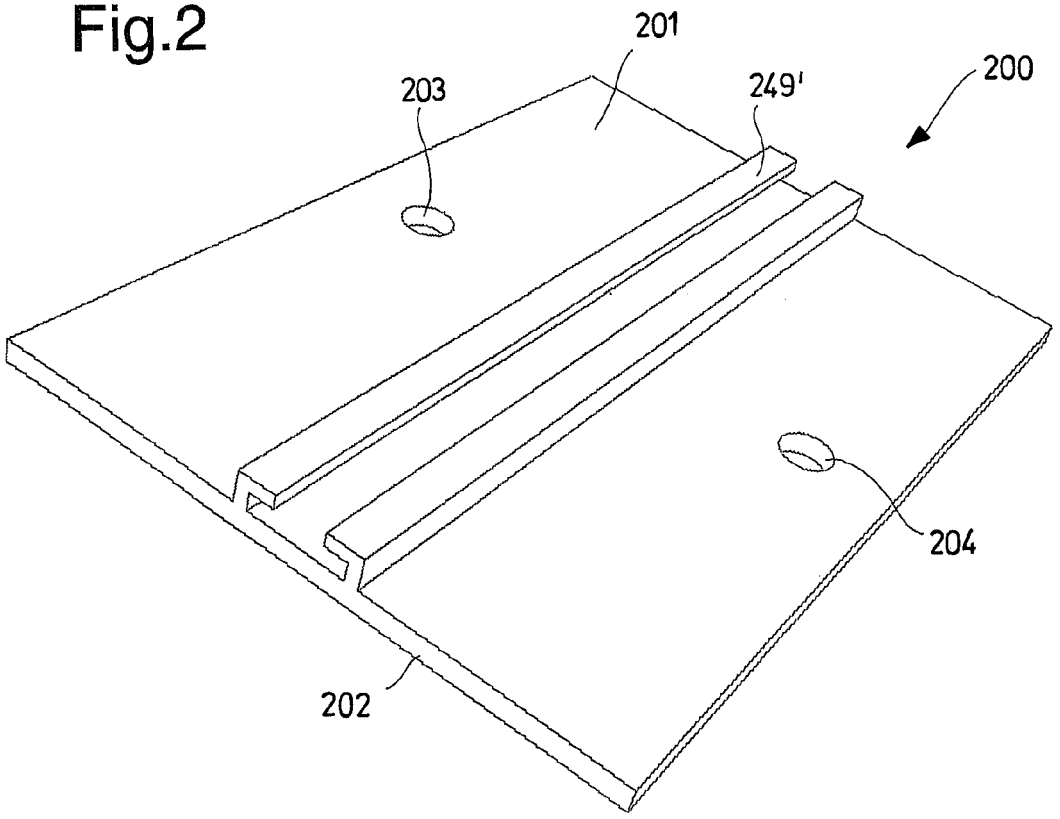


Fig.3

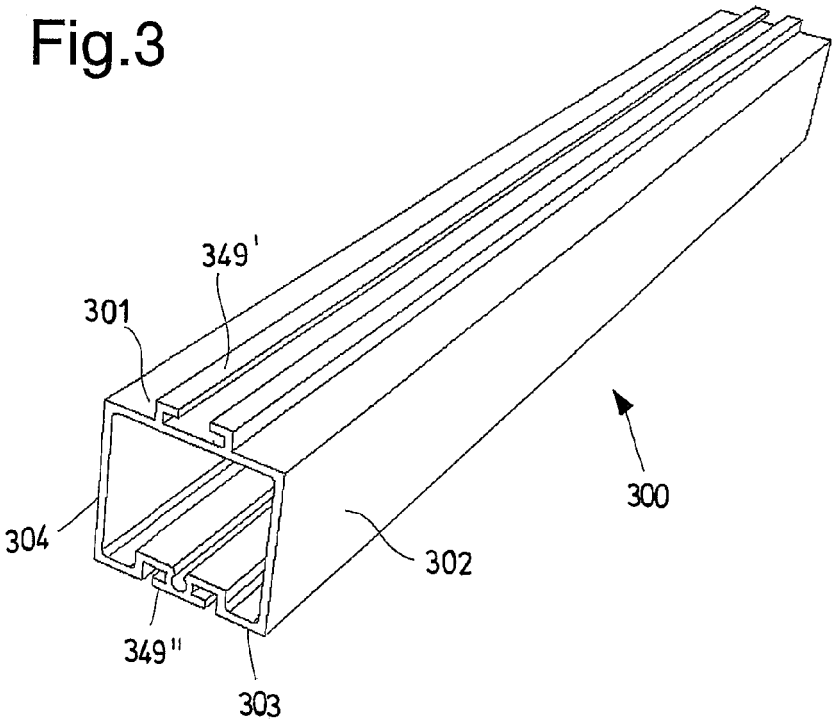


Fig.4

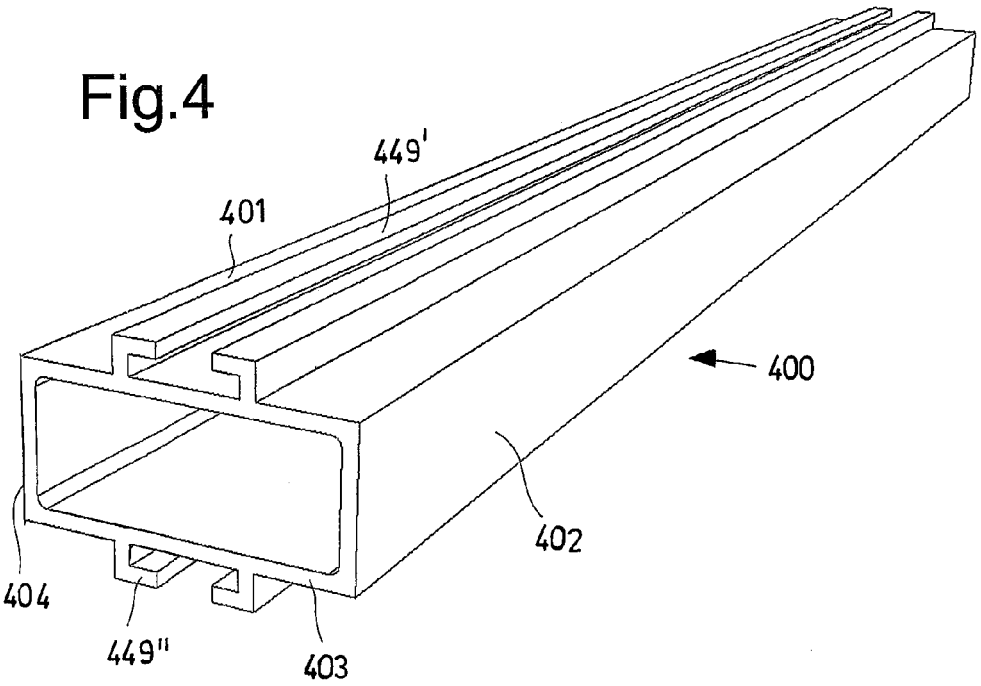


Fig.5

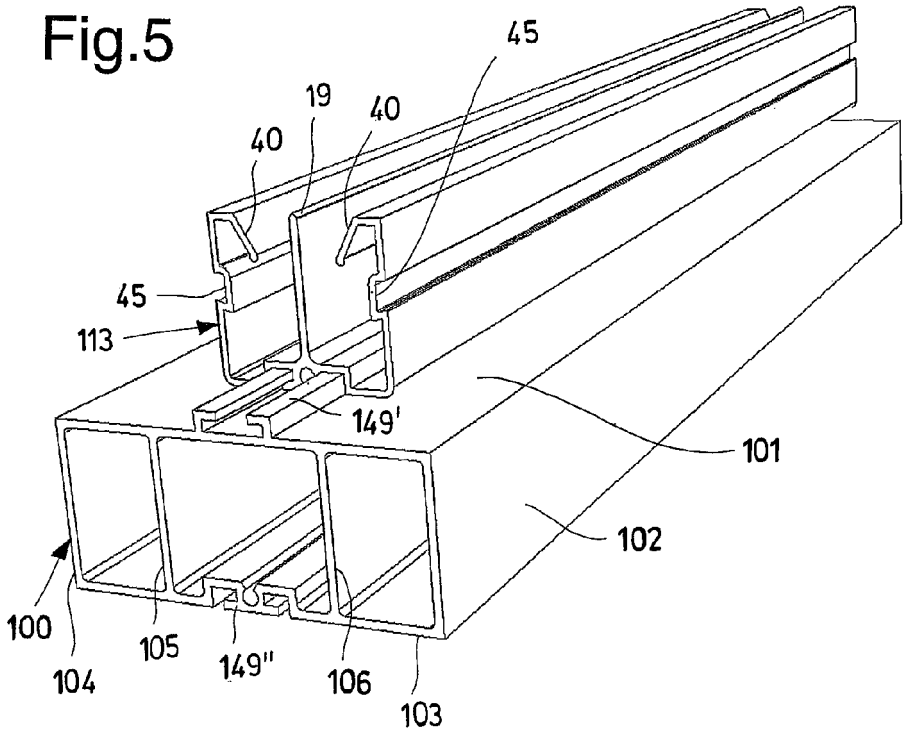

45
19
40
40
45
113
149'
101
102
100
104
105
149"
106
103

Fig.5A

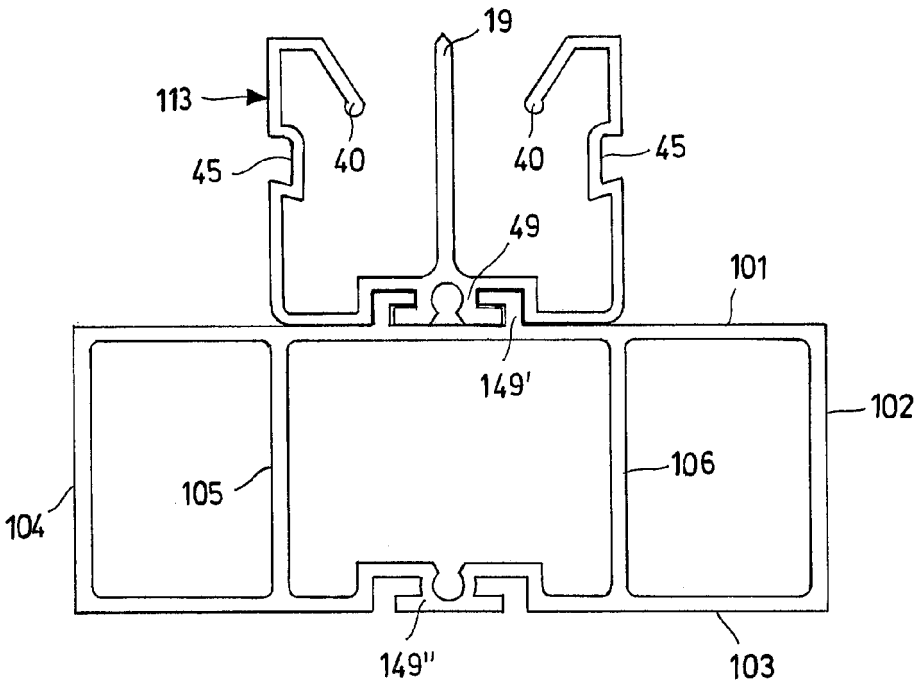

19
113
45
40
40
45
49
101
149'
102
105
106
104
149"
103

Fig.5 bis

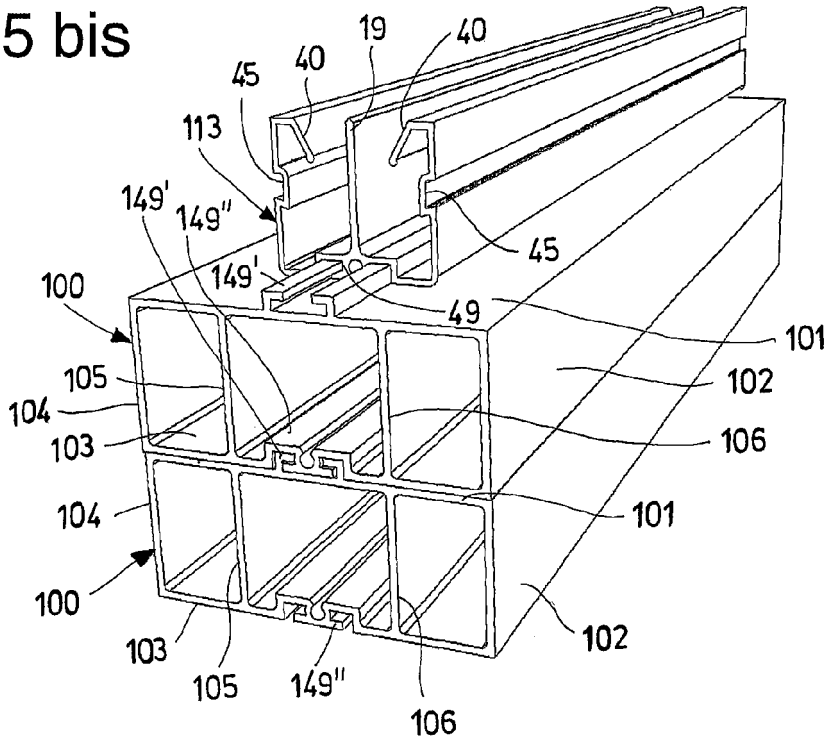


Fig.5 bis A

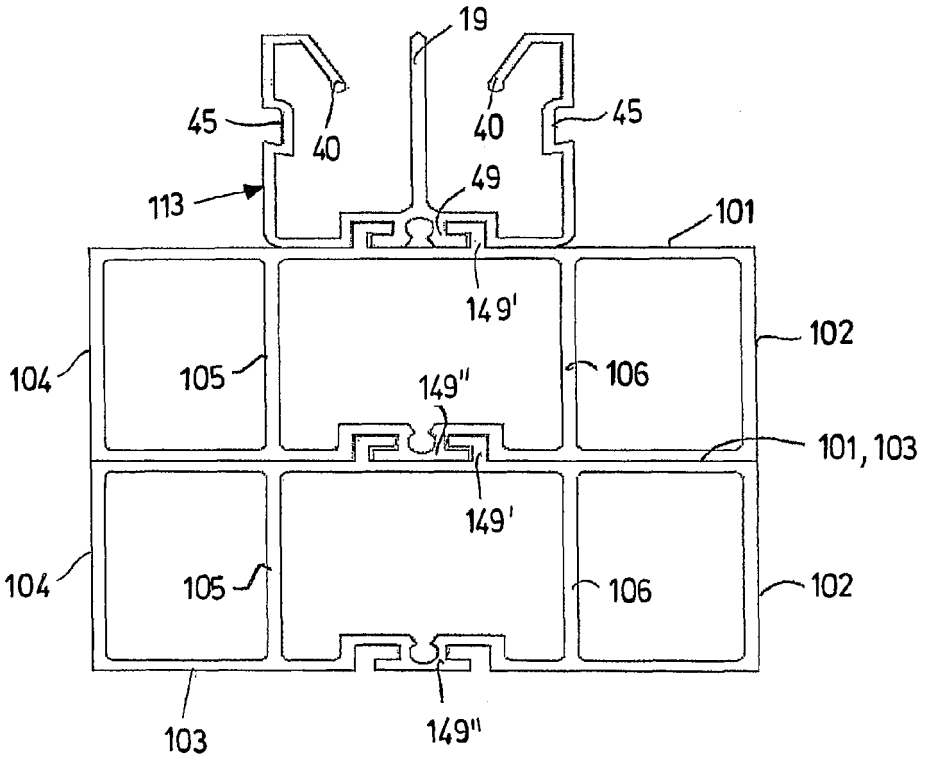


Fig.6

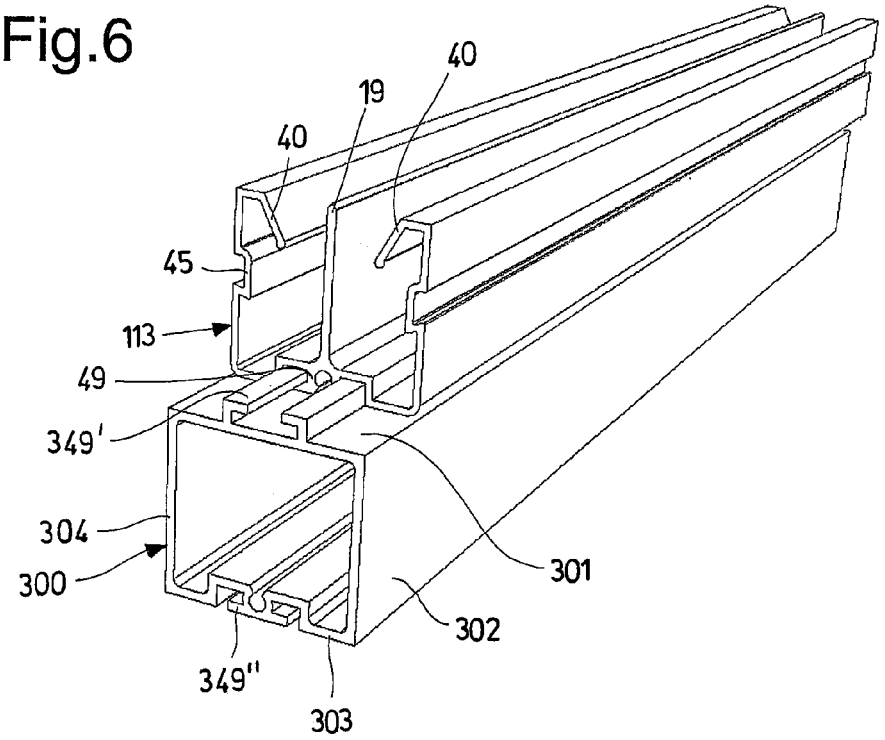

40
19
40
45
113
49
349'
304
300
301
302
349"
303

Fig.6A

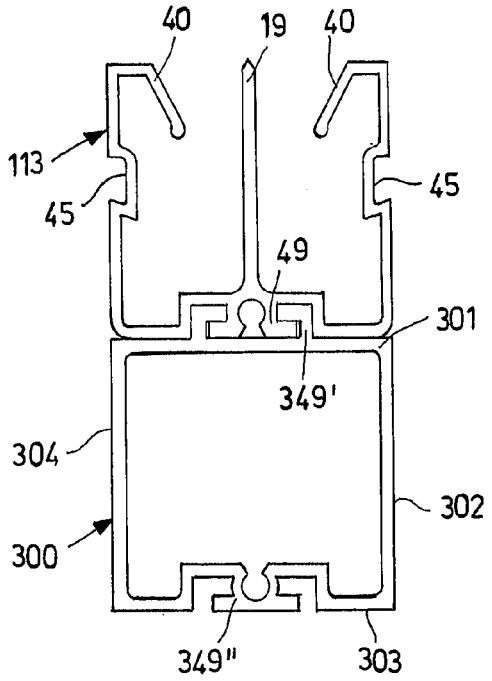

40
19
40
113
45
45
49
301
349'
304
302
300
349"
303

Fig.6 bis

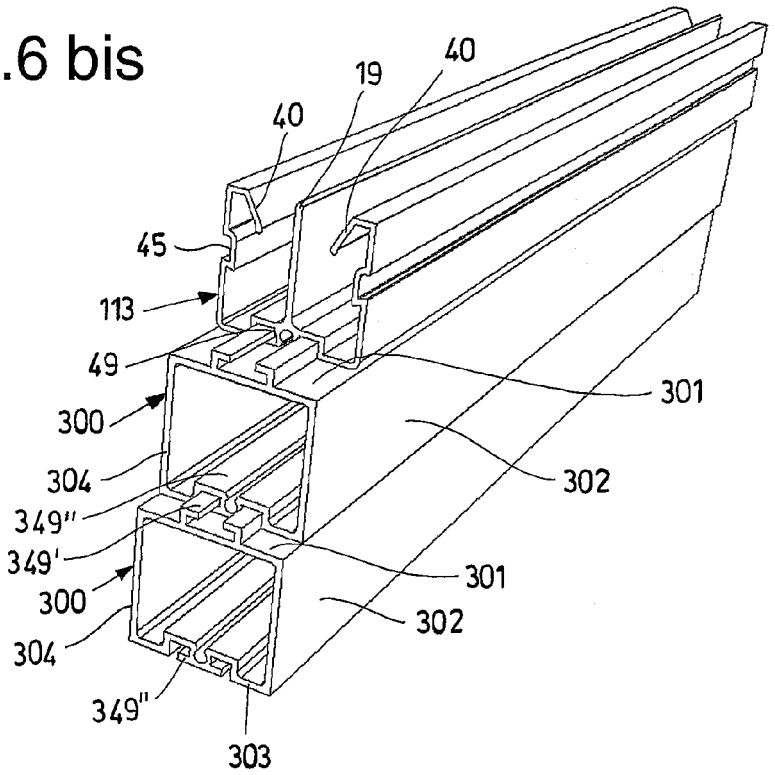


Fig.6 bis A

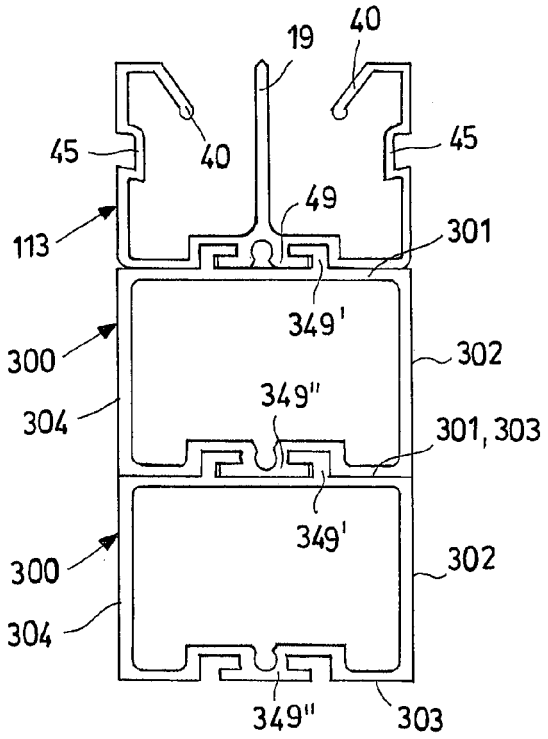


Fig.7

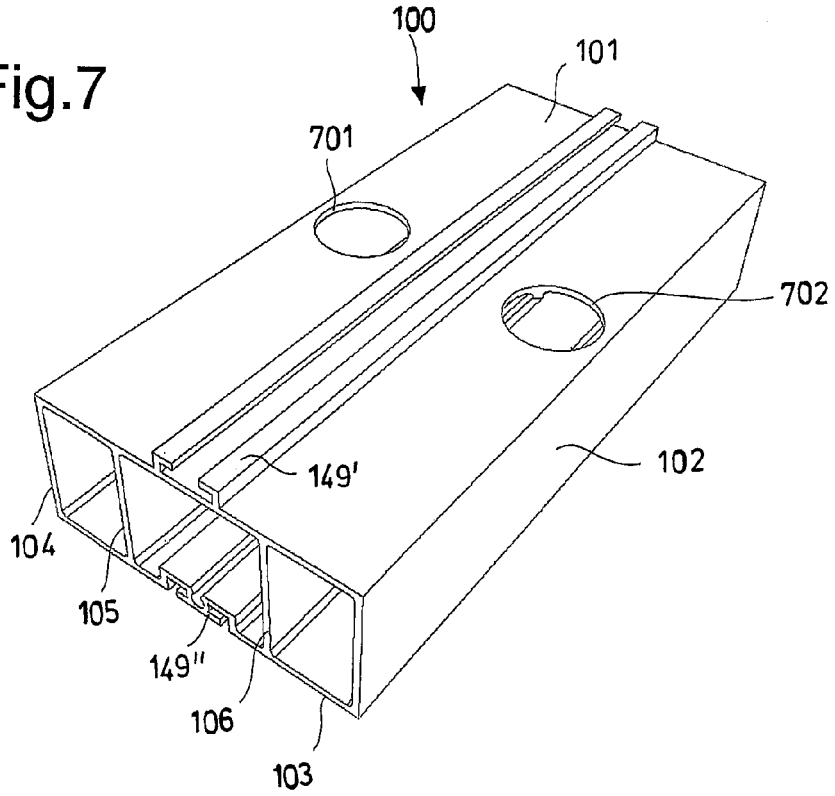

100
101
701
702
102
149'
104
105
149''
106
103

Fig.8

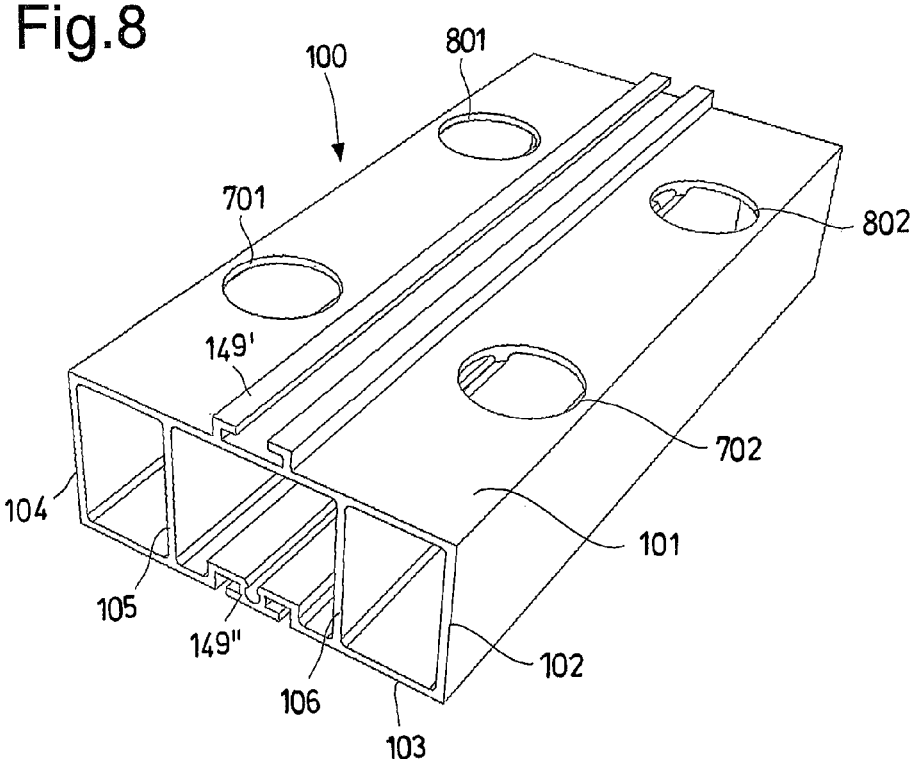

100
801
701
802
149'
702
104
101
105
149''
102
106
103

Fig.7 bis

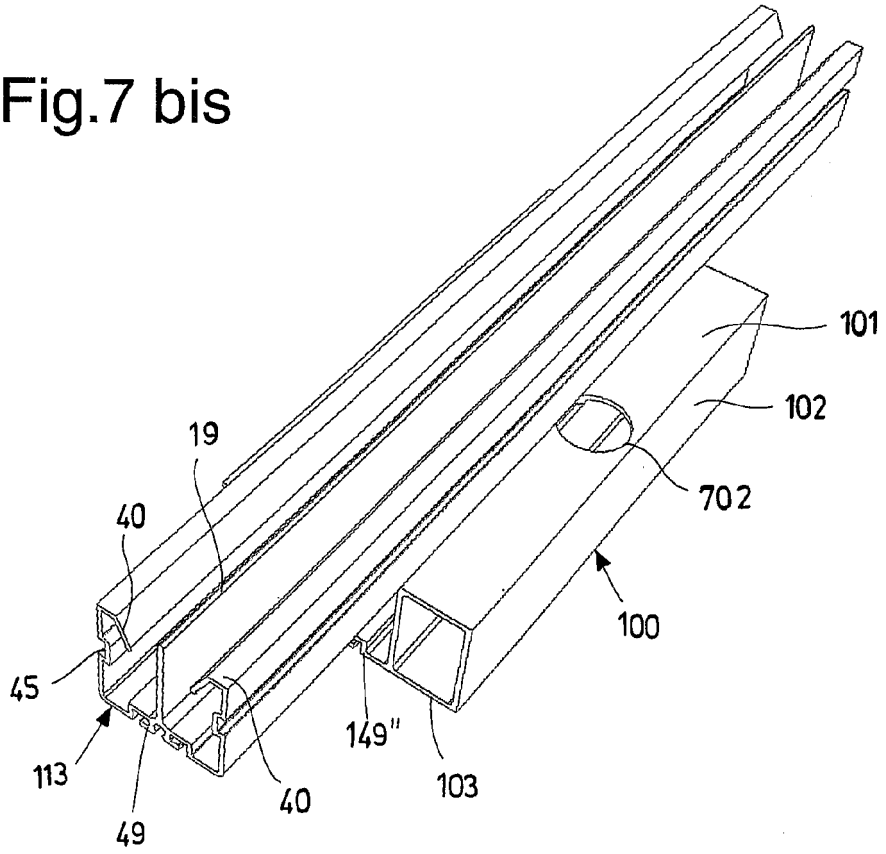


Fig.7 bis A

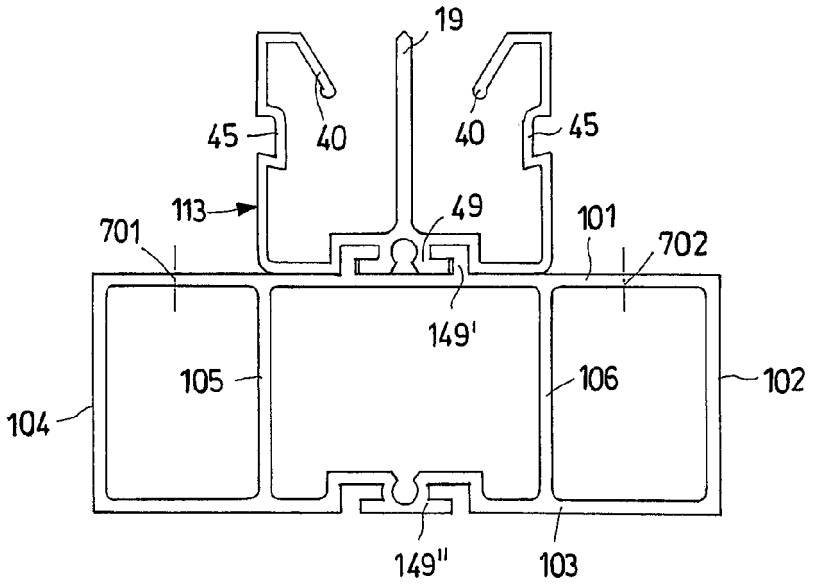


Fig.8 bis

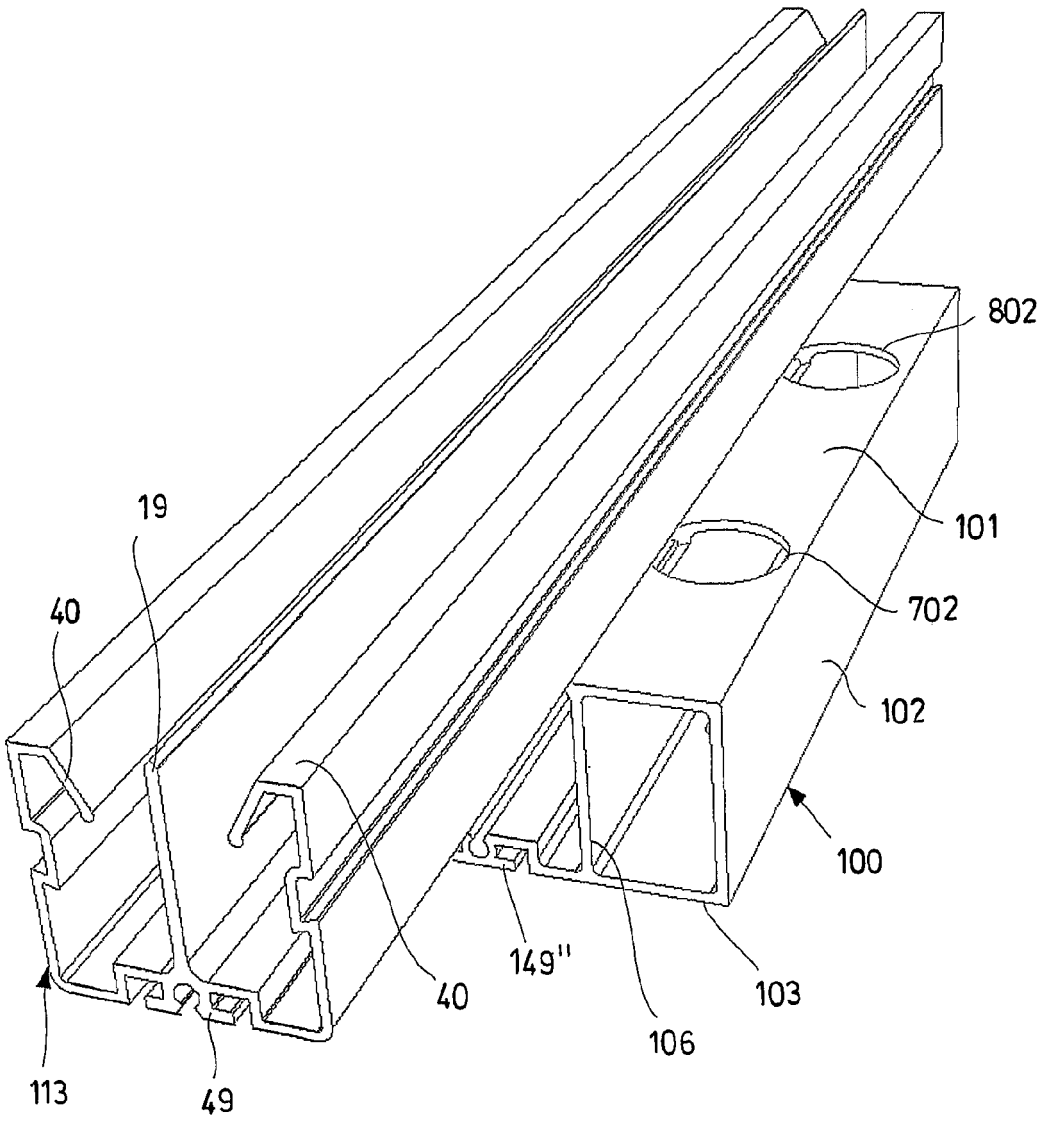


Fig.9

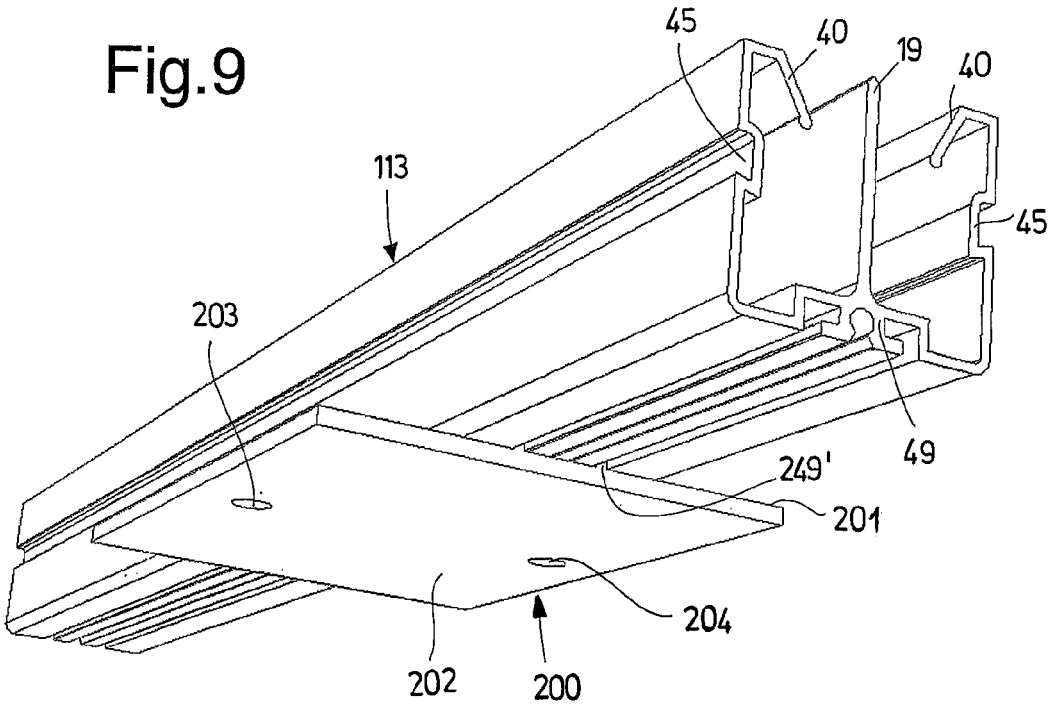

45
40
19
40
113
45
203
49
249'
201
204
202
200

Fig.9A

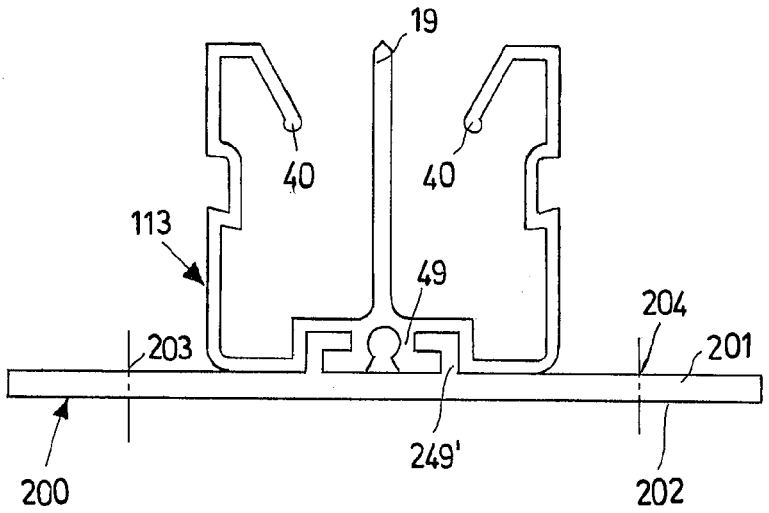
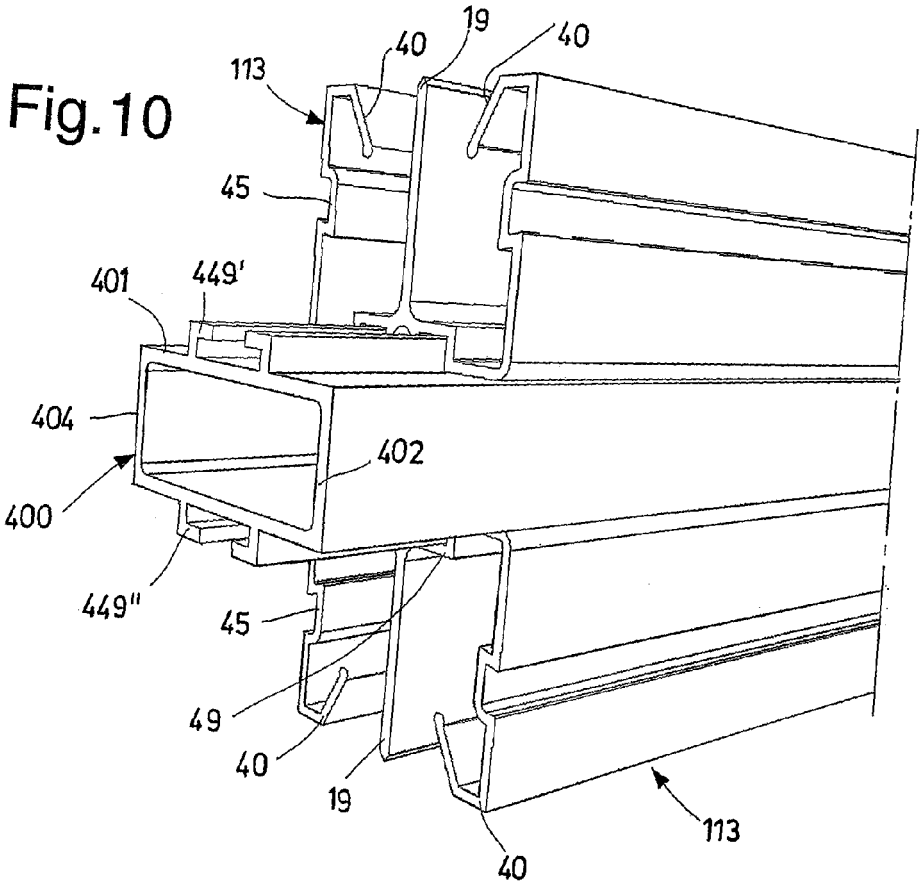

19
40
40
113
49
204
203
201
249'
200
202

Fig.10



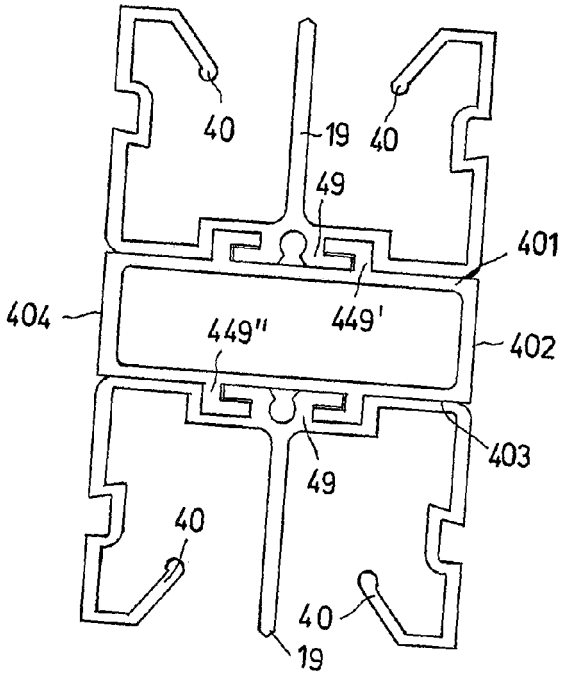


Fig.10A

Fig.10 bis

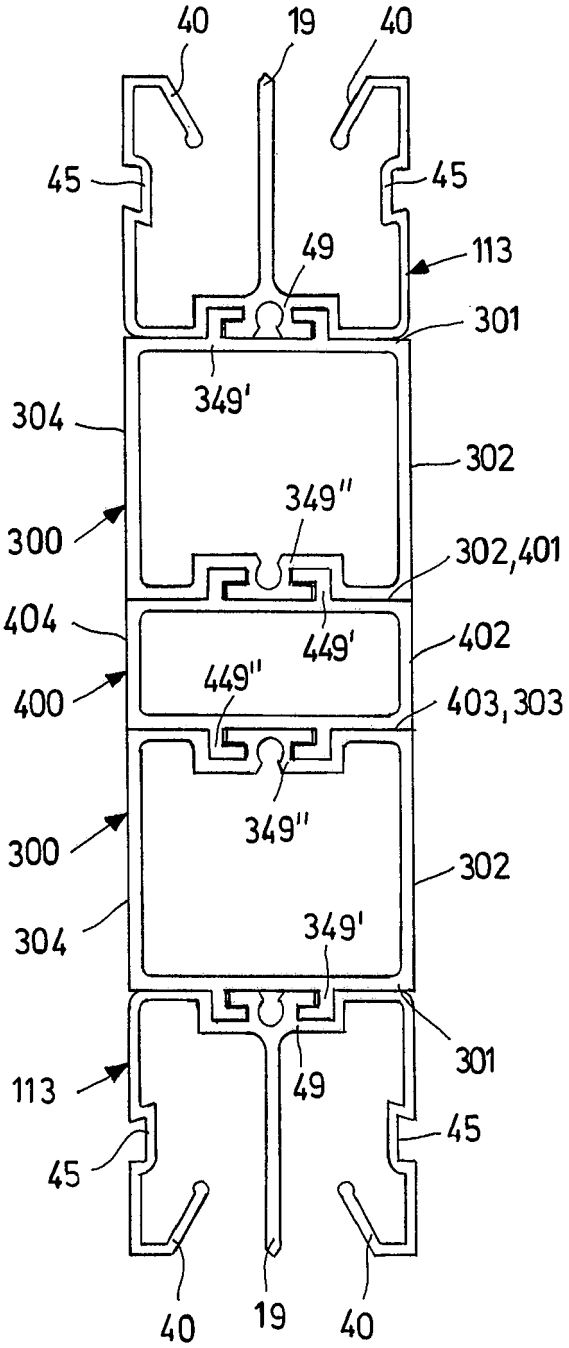

40
19
40
45
45
49
113
301
349'
304
302
349''
300
302,401
404
449'
402
449''
400
403,303
349''
300
302
304
349'
301
113
49
45
45
40
19
40

Fig.11

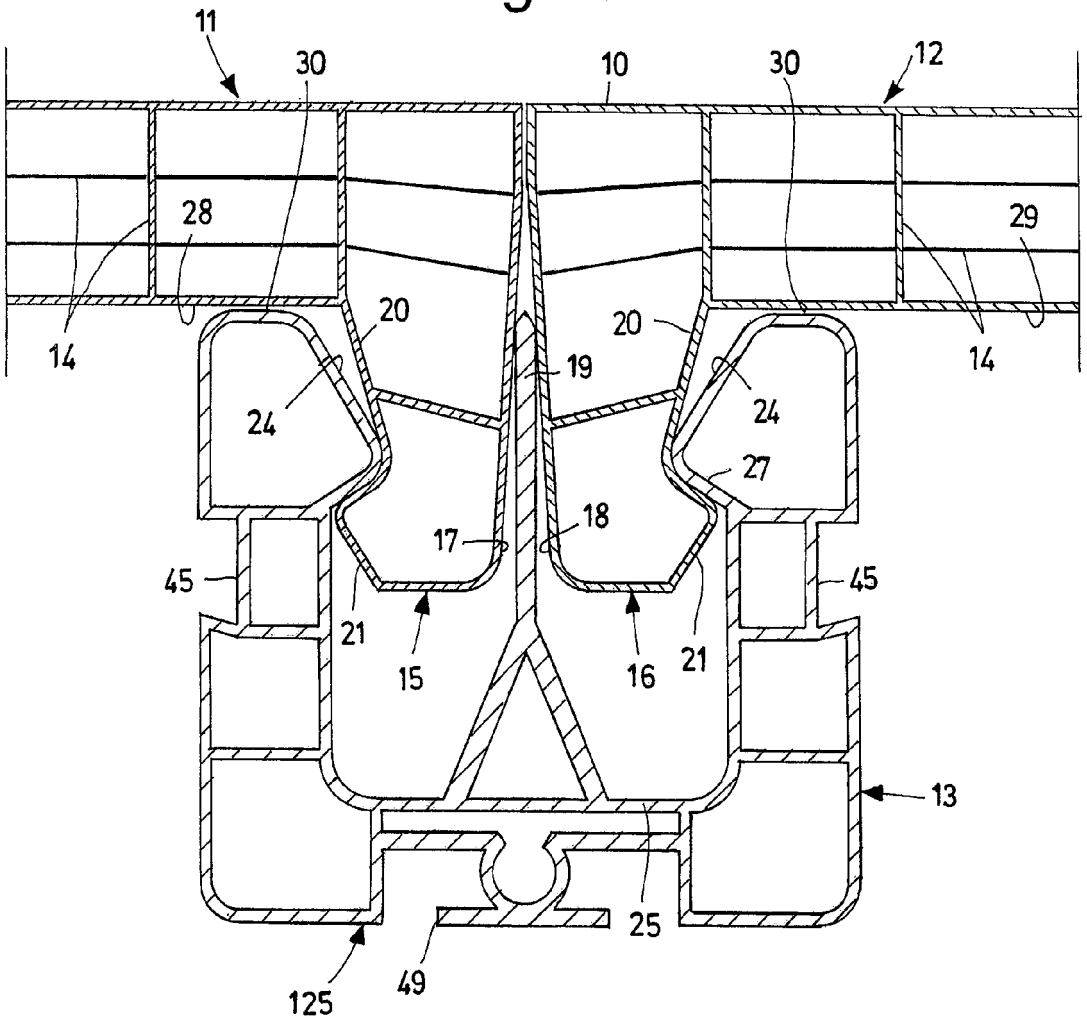


Fig.13

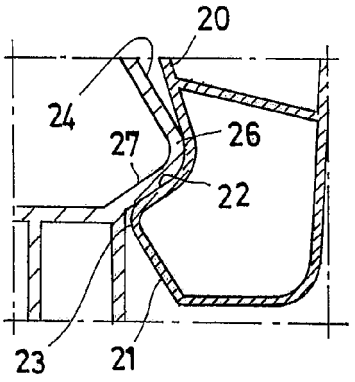


Fig.12

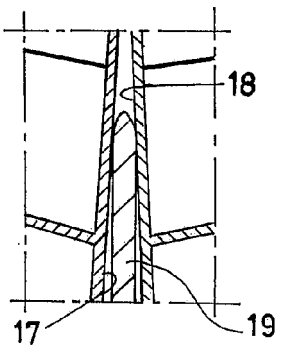


Fig. 14

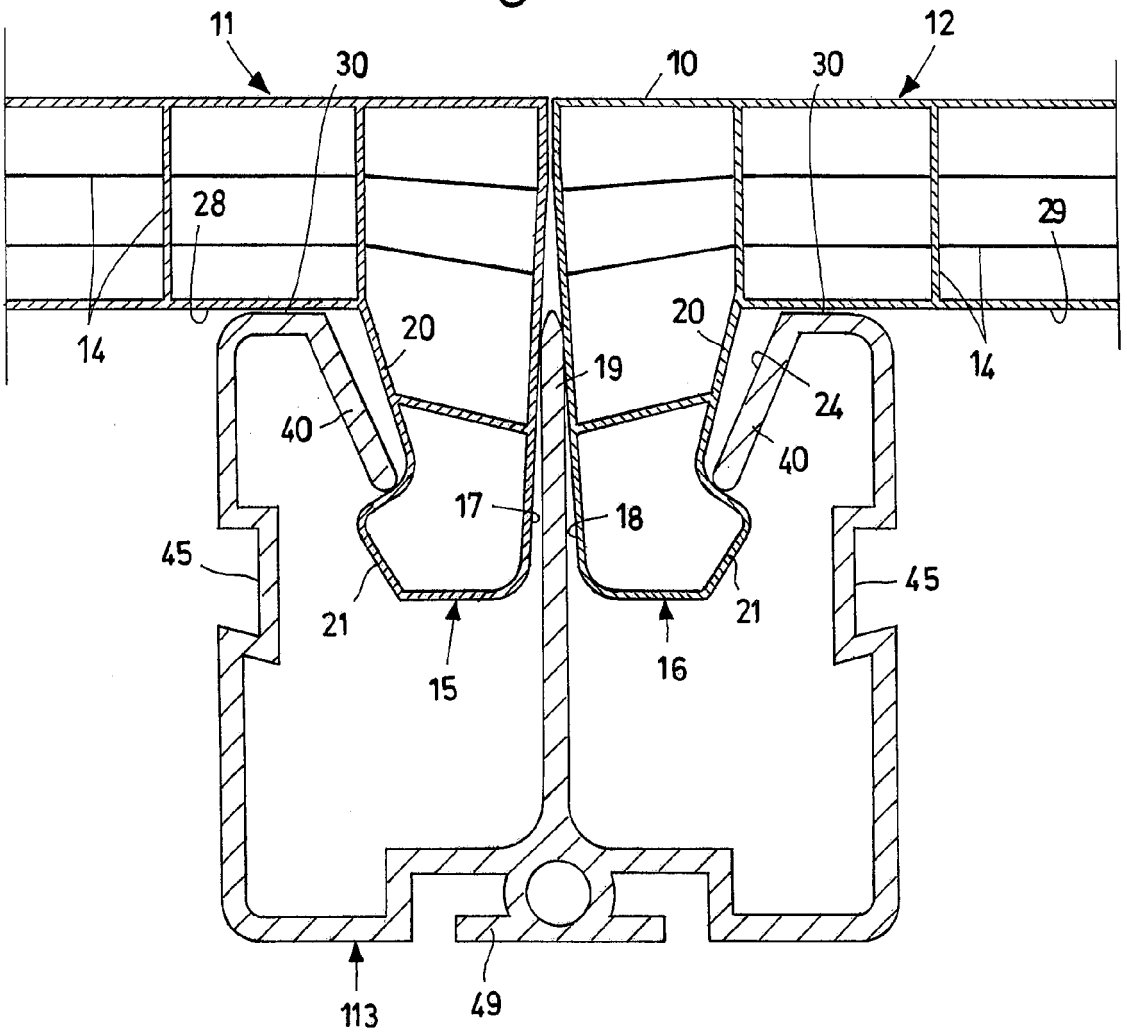


Fig. 16

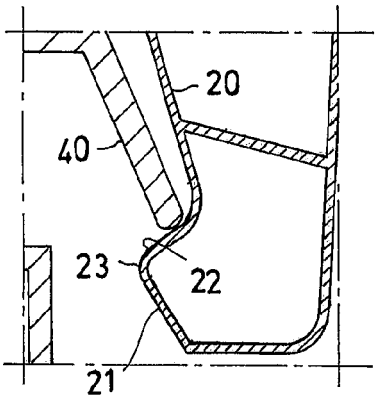


Fig. 15