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(54) **Frame for windows**

(57) A frame (20) for windows that can be connected to a sheet of glass (5) to separate and thermally insulate an outdoor environment from an indoor environment, comprises an external profile (2) in aluminium, an internal profile (3) in wood, an intermediate element (1) in polyamide set between and coupled to said external profile (2) and said internal profile (3), defining said intermediate element (1) and said external profile (2) at least one first interspace (17), said one first interspace (17) comprising a connecting element (4), such as a polyurethane foam, suitable for creating a mechanical joint for said intermediate element (1) and said external profile (2) and thermal cutting between said outdoor environment and said indoor environment.

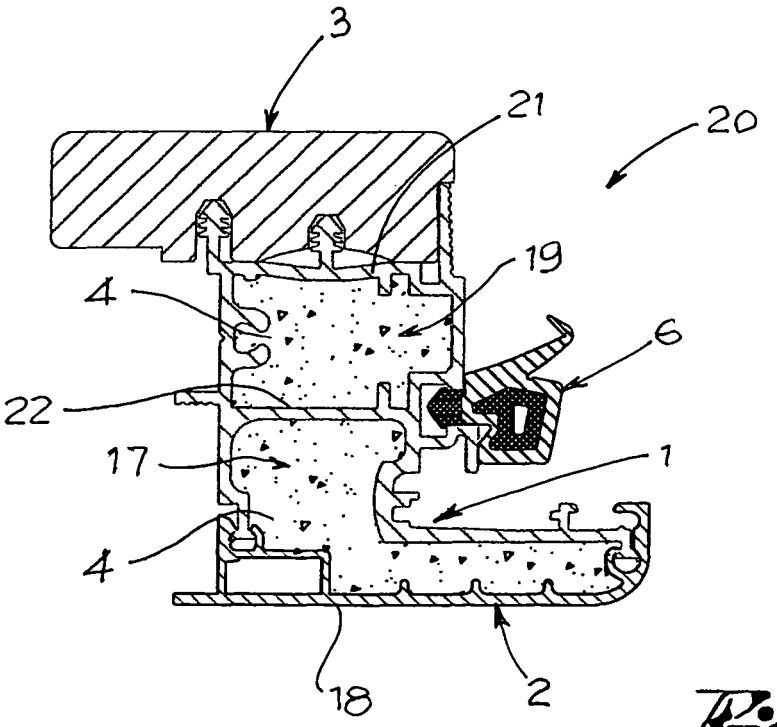

Fig.1

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Description

[0001] The present invention relates to frames for windows, in particular of the type with wood on the inside and aluminium on the outside.

[0002] We know, for example from document BS2001U000009, of frames created with a profile in wood on the inside and a profile in aluminium on the outside that include the interposition between the outside profile in aluminium and the inside profile in wood of a section in plastic material, such as polyamide, which acts as a means for joining and thermal cutting between the parts in metal and wood, respectively.

[0003] However, these known frames exhibit considerable problems of heat insulation between the components.

[0004] It is the object of the present invention to create a frame for windows that overcomes the stated inconveniences with reference to the prior art.

[0005] Said object is achieved with a frame for windows created according to the following claim 1. The claims dependent on this describe embodiment variations.

[0006] The features and advantages of the frame for windows according to the present invention will become apparent from the description reported below, given by way of example and not limiting, in keeping with the accompanying drawings, wherein:

[0007] - figure 1 shows a section view of a portion of a frame for windows;

[0008] - figure 1a shows a transversal section view of a portion of an alternative embodiment of a frame for windows;

[0009] - figures from 2 to 7 show a transversal section view of a portion of different alternative embodiments of a frame for windows; and

[0010] - figures from 8 to 11 show an enlarged view of a portion of different alternative embodiments of a frame for windows.

[0011] A frame for windows that can be connected to a sheet of glass 5 to separate and thermally insulate an indoor environment (INT) from an outdoor environment (EXT) is globally indicated with reference numeral 20 in accordance with the accompanying drawings.

[0012] The frame 20 comprises at least one external profile 2, for example designed to be in contact with the outdoor environment.

[0013] In accordance with a preferred embodiment, the frame 20 comprises at least one internal profile 3, for example designed to be at least partially in contact with the indoor environment.

[0014] Favourably, the internal profile 3 is set in a position that is substantially opposite to said external profile 2.

[0015] In other words, the internal profile 3 is facing towards said indoor environment.

[0016] The internal profile 3 is preferably in direct contact with the indoor environment.

[0017] According to the present invention, the frame 20 comprises at least one intermediate element 1, which is substantially next to the external profile 2 and coupled to the external profile 2, defining at least a first closed interspace 17, as we shall illustrate in detail later on.

[0018] According to the present invention the first interspace 17 has a first wall 18 in contact, in other words exposed or for interfacing, with the outdoor environment.

[0019] The intermediate element 1 is preferably arranged between the external profile 2 and the internal profile 3.

[0020] According to the present invention, the intermediate element 1 is coupled to the external profile 2 and to the internal profile 3 (figure 2, 3, 4, 5, 6, 7).

[0021] The intermediate element 1 is adapted to creating means for mechanical joining and thermal cutting between the internal profile 3 and the external profile 2, by means of specific means for fastening and coupling.

[0022] According to an aspect of the present invention, the intermediate element 1 exhibits coupling means 12 suitable for engaging in said external profile 2 to create an insertion guide between said intermediate element 1 and said external profile 2.

[0023] Favourably, the coupling means 12 are suitable for joining said intermediate element 1 to said external profile 2 and defining the first closed interspace 17.

[0024] The external profile 2 exhibits fastening holes 15 suitable for being engaged by said coupling means 12 of said intermediate element 1 to create said insertion guide.

[0025] The intermediate element 1 also exhibits fastening means 14 suitable for fastening said intermediate element 1 to said internal profile 3.

[0026] Correspondingly, the internal profile 3 exhibits fastening slots 16 suitable for acting with said fastening means 14, to fasten said intermediate element 1 to said internal profile 3.

[0027] In accordance with an embodiment of the present invention, the intermediate element 1 in polyamide is presented in the form of a section bar with coupling means 12, such as shaped flaps, and fastening means 14, such as pins or screws for fastening to the external profile 2 on one side and to the internal profile 3 on the other.

[0028] The shaped flaps are designed to engage in the corresponding fastening holes 15 made in the external profile 2, whilst the fastening pins or screws join, as said, to the internal profile 3.

[0029] In this way a frame 20 structure is created, which, seen in a transversal section, exhibits a series of layers, for example from the outdoor environment to the indoor environment, which, in sequence, include the external profile 2, the intermediate element 1 and the internal profile 3.

[0030] According to a preferred embodiment of the present invention, the intermediate element 1 defines at least one second closed interspace 19, next to said internal profile 3 with at least one second wall 21 in contact

with the internal profile 3 and the intermediate element 1 itself.

[0031] In other words then, the intermediate element 1 acts with the external profile 2 to define the first interspace 17, as well as defining the second closed interspace 19, which is separated from said first interspace 17 and next to said first interspace (17).

[0032] In fact the first interspace 17 preferably has at least one intermediate wall 22 in common, in other words shared, with said second interspace 19.

[0033] In accordance with the present invention the first interspace 17 comprises connecting means 4 inside, which are suitable for creating a mechanical joint between said external profile 2 and said intermediate element 1.

[0034] According to an embodiment of the present invention, the connecting means 4 occupy the first interspace 17 at least partially, in other words its internal volume.

[0035] In accordance with a further embodiment of the frame 20, the connecting means 4 substantially occupy the first interspace 17 completely.

[0036] The connecting means 4 are also preferably suitable for creating the thermal cutting between the indoor environment and the outdoor environment, in other words between the external profile 2 and the internal profile.

[0037] In accordance with an embodiment of the present invention, the connecting means 4 comprise a polymeric material, with material affinity with the material in which the intermediate element 1 is created and the external profile 2 and the ability to expand inside the first interspace 17 itself, such as for example a polyurethane foam and the like.

[0038] For example the polyurethane foam is injected into the first interspace 17 and hardened so that when it expands inside the first interspace 17 itself it comes into contact with the intermediate wall 22 and with the first wall 18.

[0039] Thanks to the material affinity with the material in which the intermediate element 1 is created and the external profile 2, and to the volumetric expansion, the polyurethane foam creates the connection between the external profile 2 and the intermediate element 1.

[0040] So that the connecting means 4, in other words the polyurethane foam, does not come out of the first interspace, the coupling means 12 comprise a protuberance 13 suitable for acting with the fastening holes 15 to prevent the polyurethane foam from coming out of said first interspace 17.

[0041] Favourably the external profile 2 is made of a material suitable for resisting atmospheric agents, in other words for example for resisting redox processes, such as for example a polymeric material or a metal material, such as aluminium and the like.

[0042] According to a feature of the present invention, for example the internal profile 3 is made of wood.

[0043] Alternatively, the internal profile 3 is made of a material desired by a user, for example a polymeric or plastic material, a metal material and the like.

[0044] Also advantageously the intermediate element 1 is created with an insulating material, in other words with a low coefficient of thermal conductivity, for example a polymeric material, such as polyamide and the like.

[0045] In keeping with a further embodiment, the second interspace 19 also comprises the polyurethane foam inside to increase the heat insulation that can be created with the frame 20.

[0046] The polyurethane foam is injected inside the second interspace 19, as shown previously.

[0047] According to an embodiment of the present invention, the frame 20 comprises an insulating element 11 set next to said intermediate element 1 designed to be in contact with the sheet of glass 5 to create heat insulation between said intermediate element 1 and said sheet of glass 5 (see figures 2, 3, 4, 5, 6 and 7).

[0048] The element 11 is preferably made of a material such as foamed Purene S TPE on the inside and compact Purene S TPE on the outside to increase its insulating capacity.

[0049] Advantageously, the insulating element 11 is packing that is substantially "herringbone", made of thermoplastic elastomer material.

[0050] The frame 20 also preferably comprises at least one sealing element 6, 7, 8, 9, designed to create a seal between said frame 20 and a part of said window set in contact, in other words next to said frame 20.

[0051] According to an embodiment of the present invention, the gaskets 6, 7, 8 and 9 are also made of a material such as foamed Purene S TPE on the inside and compact Purene S TPE on the outside to increase its insulating capacity.

[0052] The sealing elements 6, 7 are for example foreseen in the case of a frame 20 of a window that is closed touching on another window and on another frame connected to the walling of the window space to improve the thermal cutting and insulation.

[0053] For example, in the case of a frame 20 bearing a sheet of glass 5 connected to another frame with a sheet of glass 5 (figure 2, 3, 4) or without a sheet of glass 5 (figure 5), sealing elements 6, 7 are foreseen longitudinally, in other words substantially parallel, between the frame 20 and the other frame to improve the thermal cutting and insulation between the outdoor environment and the indoor environment.

[0054] The sealing element 6 is preferably connected to the intermediate element 1 to create the seal between said frame 20 and a part of said window set in contact with said frame 20.

[0055] Furthermore, the sealing element 7 is connected to the internal profile 3 so that for example it creates the seal between the internal profile 3 and another internal profile of another frame for windows.

[0056] Favourably, the sealing element 8 is connected to the external profile 2 to create the seal between the external profile 2 itself and the sheet of glass 5 (figures

2, 3, 4, 5 and 6).

[0057] According to the present invention the sealing element 9 is set between said internal profile 3 and said sheet of glass 5 to create the seal between the sheet of glass 5 and the internal profile 3.

[0058] Favourably, the frame 20 also comprises a packing 10 element in silicone material, suitable for joining said sheet of glass 5 to said frame 20 and creating a seal between said sheet of glass 5 and said frame 20, for example to prevent water from leaking between the outdoor environment and the indoor environment.

[0059] Advantageously the dimensions of the intermediate element 1 are comparable or greater than those of said internal profile 3 and said external profile 2.

[0060] An example of embodiment of a frame 20, according to the present invention (figure 5) will be illustrated below by way of example only and which is not limiting.

[0061] As we can see in figure 5, a frame 20 is foreseen with a total thickness of about 78 millimetres and a total length of about 72 millimetres, which acts with a corresponding frame 120, with an overall thickness of about 65, 3 millimetres and a total length of about 80, 5 millimetres.

[0062] When put together, the two frames 20, 120 have an overall length of about 118 millimetres.

[0063] The frame 20 and the frame 120 each exhibit an intermediate element 1 in polyamide PA 6.6 with about 25% glass phase and thermal transmissibility of about 0,30 W/(m*K).

[0064] The intermediate element 1 of the frame 20 and of the frame 120 is completely filled with polyurethane foam PUR 447 / 900-1, with a density of about 50 Kg/m^3 and thermal conductibility, in other words thermal transmissibility, of about 0,030 W/(m*K).

[0065] The frames 20 and 120 have an internal profile 3 made of soft wood, for example conifer wood, with thermal transmissibility of about 0,13 W/(m*K).

[0066] The frames 20 and 120 also have an external profile 2 made of aluminium, with thermal transmissibility of about 160 W/ (m*K).

[0067] For example, in the case of an outdoor environment temperature of about 0°C and an indoor environment temperature of about 20°C, a flow of heat is obtained between the INT and EXT of about 6, 28 W/m and a corresponding global thermal exchange coefficient of the whole of the frame 20 and 120 of about 1, 2 W/ (m^2*K).

[0068] With the added inclusion of an insulating element 11 that is substantially "herringbone" packing, made of Deventer Purene S TPE (thermoplastic elastomer) microfoam, with a thermal transmissibility of about 0,077 W/ (m*K), a flow of heat is obtained between the INT and EXT of about 6, 20 W/m and a corresponding global thermal exchange coefficient of the whole of the frame 20 and 120 of about 1, 1 W/ (m^2*K). Purene S is an effective material for heat insulation, which can easily absorb thermal unbalances and be welded to form a continuous cordon that is perfectly hermetic along the whole of the perimeter of the window.

[0069] Advantageously, it is clear how with the frame according to the present invention, coupling between the intermediate element and the external profile of the frame itself is enabled with the connecting means, such as the polyurethane foam, at the same time avoiding having to use machinery for coupling between the intermediate element and the external profile, such as machinery for stapling, punching, rolling and the like, as is the case in the prior art (see figures 1 and 1a).

[0070] Advantageously, in this way the thickness needed for the external profile is reduced; in fact it is made for example of aluminium, and a reduction in its thickness also leads to a reduction in the thermal transmissibility from the outdoor environment to the inside environment, in other words the dew point associated with the frame moves towards the outdoor environment.

[0071] Therefore according to the present invention an external profile thickness is envisaged that is strictly necessary for the protection of the frame and the window from atmospheric agents, without additional thicknesses resulting from working requirements of the frame itself.

[0072] In other words there is a reduction in the frame thermal transmissibility thanks to the smaller quantity of aluminium, polyurethane foam and polyamide, and the simultaneous creation of the external protection of the frame with the same aluminium.

[0073] Surprisingly, the presence of the connecting means, such as the polyurethane foam, allows a considerable reduction in the global thermal exchange coefficient of the frame, consequently allowing the flow of heat between the indoor environment and the outdoor environment to be reduced drastically, thus achieving efficient thermal cutting.

[0074] Unusually, the polyurethane foam is foreseen as a joining means between the intermediate element in polyamide and the external profile in aluminium thanks to its ability to "cling" to the surfaces of the interspaces of the frame, as well as as an effective thermally insulating element.

[0075] In fact the polyurethane foam is for example foreseen in contact on the one side with a conducting material, such as the external profile in aluminium, and on the other with an insulating material, such as the intermediate polyamide, so that the flow of heat is advantageously limited and/or stopped.

[0076] Advantageously the polyurethane foam is also foreseen in the interspaces formed completely with the polyamide, such as the second, previously described interspace, to increase the heat insulation effectively.

[0077] Advantageously then an excellent reduction in the global thermal transmissibility of the frame itself is obtained, which consequently achieves a considerable thermal cutting.

[0078] Advantageously, thanks to its low coefficients of thermal dilation, as well as its mechanical resistance, the intermediate element in polyamide lends itself perfectly to joining two different materials, avoiding heat bridges from forming, both with the heat and cold, guar-

anteeing perfect thermal separation and, with the addition of the packings 6, 7, 8 and 9 in the most appropriate parts, a perfectly hermetic seal.

[0079] Advantageously, the presence of the intermediate element 1 in polyamide also gives the frame 20 elevated static resistance.

[0080] The first and second interspace defined by the intermediate element 1 are, as said, advantageously foamed, improving the qualities of heat insulation and resistance.

[0081] Also advantageously an interspace of air is foreseen between aluminium and polyamide and between polyamide and wood to prevent condensates from forming in the profiles and protect the wood over the years.

[0082] According to a further advantageous feature, the fastening screws and hardware are fixed directly onto the intermediate layer in polyamide, which avoids direct contact with the aluminium and consequent heat bridges.

[0083] Advantageously, the external profile 2, the intermediate element 1 and the internal profile 3, conveniently shaped at the beginning and assembled with respective angular couplings, can be used to construct each fixed, moving, vertical and horizontal part of frames 20 for fixtures of windows and French windows, both sliding and with wings.

[0084] Advantageously in fact, wood and polyamide are connected in the corners with three angular couplings: one for the profile in aluminium, a second one for the intermediate element in polyamide and a third one for the profile in wood, created with an insert in glued laminated wood. The same type of angular coupling is present, for example, in the frame of the window.

[0085] Advantageously then, the frame according to the present invention allows extremely innovative windows and French windows to be made to protect indoor environments and make them comfortable. The frame is created using wood and aluminium, which are materials suitable for satisfying these needs thanks to the resistance and stability of the aluminium and the natural heat and energy of the wood. Advantageously the internal profile in wood can be made in a wide variety of colours and types of wood for all tastes and needs: local pinewood, Douglas, oak and cedar for the inside, combined with a wide range of RAL colours for the outside in aluminium. Made in this way, the frame is surprisingly resistant to bad weather and very easy to clean. This is not only thanks to the method used to make the profiles that form it, but also thanks to the considerable resistant qualities of the aluminium on the outside, which represents a safe protection in all weather conditions.

Claims

1. Frame (20) for windows that can be connected to a sheet of glass (5) to separate an indoor environment from an outdoor environment, comprising:

- at least one external profile (2) facing towards said outdoor environment;
- at least one intermediate element (1) coupled to said external profile (2);

wherein said external profile (2) and said intermediate element (1) act together to define together at least one first interspace (17), which is closed and has a first wall (18) in direct contact with said outdoor environment; and wherein said first interspace (17) comprises at least one connecting element (4) inside, which is suitable for creating a mechanical joint between said external profile (2) and said intermediate element (1).

2. Frame (20) according to claim 1, wherein said connecting element (4) occupies said first interspace (17) at least partially.

3. Frame (20) according to claim 1, wherein said connecting element (4) substantially occupies said first interspace (17) completely.

4. Frame (20) according to any one of the previous claims, wherein said connecting element (4) is suitable for creating said thermal cutting between said indoor environment and said outdoor environment.

5. Frame (20) according to any one of the previous claims, wherein said connecting element (4) is a polymeric material, such as a polyurethane foam.

6. Frame (20) according to any one of the previous claims comprising at least one internal profile (3) set in a substantially opposite position to said external profile (2).

7. Frame (20) according to claim 6, wherein said intermediate element is set between and coupled to said internal profile (3) and said external profile (2).

8. Frame (20) according to claim 6 or 7, wherein said intermediate element (1) defines at least one second interspace (19), which is closed and next to said internal profile (3) with at least one second wall (21) in contact with said internal profile (3) and said intermediate element (1).

9. Frame (20) according to any one of the claims from 6 to 8, wherein said second interspace (19) is separate from said first interspace (17) and next to said first interspace (17) and exhibits at least one intermediate wall (22) in common with said first interspace (17).

10. Frame (20) according to any one of the previous claims, wherein said external profile (2) is made of wood.

11. Frame (20) according to any one of the claims from 6 to 10, wherein said internal profile (3) is made of aluminium.

12. Frame (20) according to any one of the previous claims, wherein said intermediate element (1) is made of polyamide.

13. Frame (20) according to any one of the previous claims, wherein said intermediate element (1) exhibits its coupling means (12) suitable for engaging in said external profile (2) to create an insertion guide between said intermediate element (1) and said external profile (2).

14. Frame (20) according to claim 13, wherein said coupling means (12) are suitable for joining said intermediate element (1) to said external profile (2) and defining said first interspace (17).

15. Frame (20) according to claim 13 or 14, wherein said external profile (2) exhibits fastening holes (15) suitable for being engaged by said coupling means (12) of said intermediate element (1) to create said insertion guide.

16. Frame (20) according to any one of the claims from 13 to 15, wherein said coupling means (12) comprise a protuberance (13) suitable for preventing said element (4) from coming out of said first interspace (17).

17. Frame (20) according to any one of the claims from 6 to 16, wherein said intermediate element (1) exhibits fastening means (14) suitable for fastening said intermediate element (1) to said internal profile (3).

18. Frame (20) according to claim 17, wherein said internal profile (3) exhibits fastening slots (16) suitable for acting with said fastening means (14) to fasten said intermediate element (1) to said internal profile (3).

19. Frame (20) according to any one of the previous claims comprising an insulating element (11) set next to said intermediate element (1) designed to be in contact with said sheet of glass (5) to create heat insulation between said intermediate element (1) and said sheet of glass (5).

20. Frame (20) according to claim 19, wherein said insulating element (11) is packing that is substantially "herringbone", made of thermoplastic elastomer material.

21. Frame (20) according to any one of the previous claims comprising at least one sealing element (6, 7, 8, 9) designed to create a seal between said frame (20) and a part of said window set in contact with said frame (20).

22. Frame (20) according to claim 21, wherein said sealing element (6) is connected to said intermediate element (1), to create the seal between said frame (20) and a part of said window set in contact with said frame (20).

23. Frame (20) according to claim 21 or 22, wherein said sealing element (7) is connected to said internal profile (3).

24. Frame (20) according to any one of the claims from 21 to 23, wherein said sealing element (8) is connected to said external profile (2) to create the seal between said external profile (2) and said sheet of glass (5).

25. Frame (20) according to any one of the claims from 21 to 24, wherein said sealing element (9) is set between said internal profile (3) and said sheet of glass (5).

26. Frame (20) according to any one of the previous claims comprising at least one packing element (10) in silicon material suitable for joining said sheet of glass (5) to said frame (20) and creating a seal between said sheet of glass (5) and said frame (20).

27. Frame (20) according to any one of the claims from 6 to 26, wherein the dimensions of said intermediate element

(1) are comparable or greater than those of said internal profile (3) and said external profile (2).

28. Frame (20) for windows that can be connected to a sheet of glass (5) to separate an indoor environment from an outdoor environment, comprising:

- at least one external profile (2) facing towards said outdoor environment;
- at least one intermediate element (1) coupled to said external profile (2);

wherein said external profile (2) and said intermediate element (1) act together to define together at least one first interspace (17) that is closed;
and wherein said first interspace (17) comprises at least one connecting element (4) inside that is suitable for expanding to occupy said first interspace (17) at least partially, and create a mechanical joint between said external profile (2) and said intermediate element (1).

29. Frame (20) according to claim 28, wherein said con-

necting element (4) is in contact with said intermediate element (1) and said external profile (2).

30. Frame (20) according to claim 28 or 29, wherein said connecting element (4) substantially occupies said first interspace (17) completely.

31. Frame (20) according to any one of the claims from 28 to 30, wherein said connecting element (4) is suitable for creating a thermal cutting between said indoor environment and said outdoor environment.

32. Frame (20) according to any one of the claims from 28 to 31, wherein said connecting element (4) is a polymeric material, such as a polyurethane foam.

33. Frame (20) according to any one of the previous claims, suitable for thermally insulating said indoor environment from said outdoor environment.

34. Frame (20) according to any one of the previous claims, wherein said intermediate element (1) is suitable for creating a thermal cutting between said indoor environment and said outdoor environment.

35. Fixture for windows, French windows and the like, both with wings and sliding, comprising at least one frame (20) according to any one of the previous claims.

36. Window, French window and the like comprising a window according to claim 35.

PRIOR ART

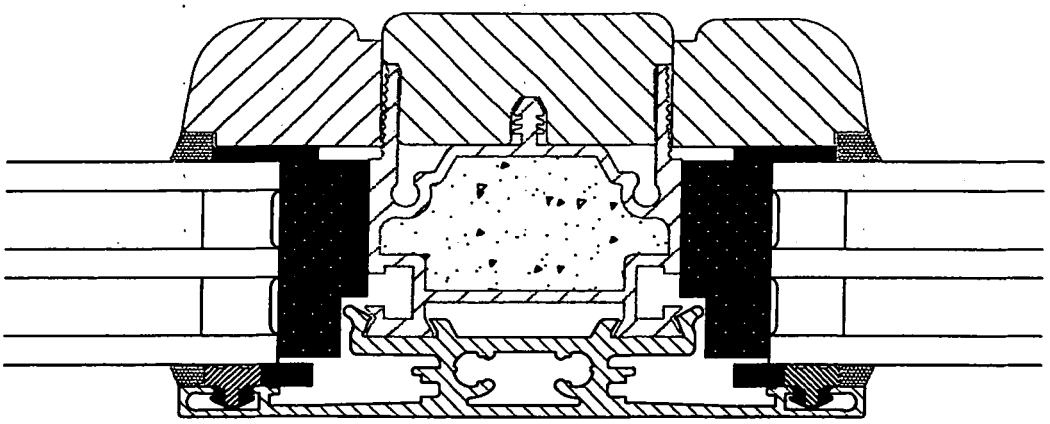

Fig.1

PRIOR ART

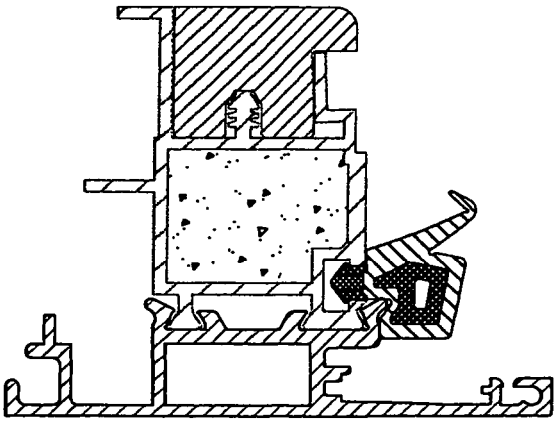

Fig.1a

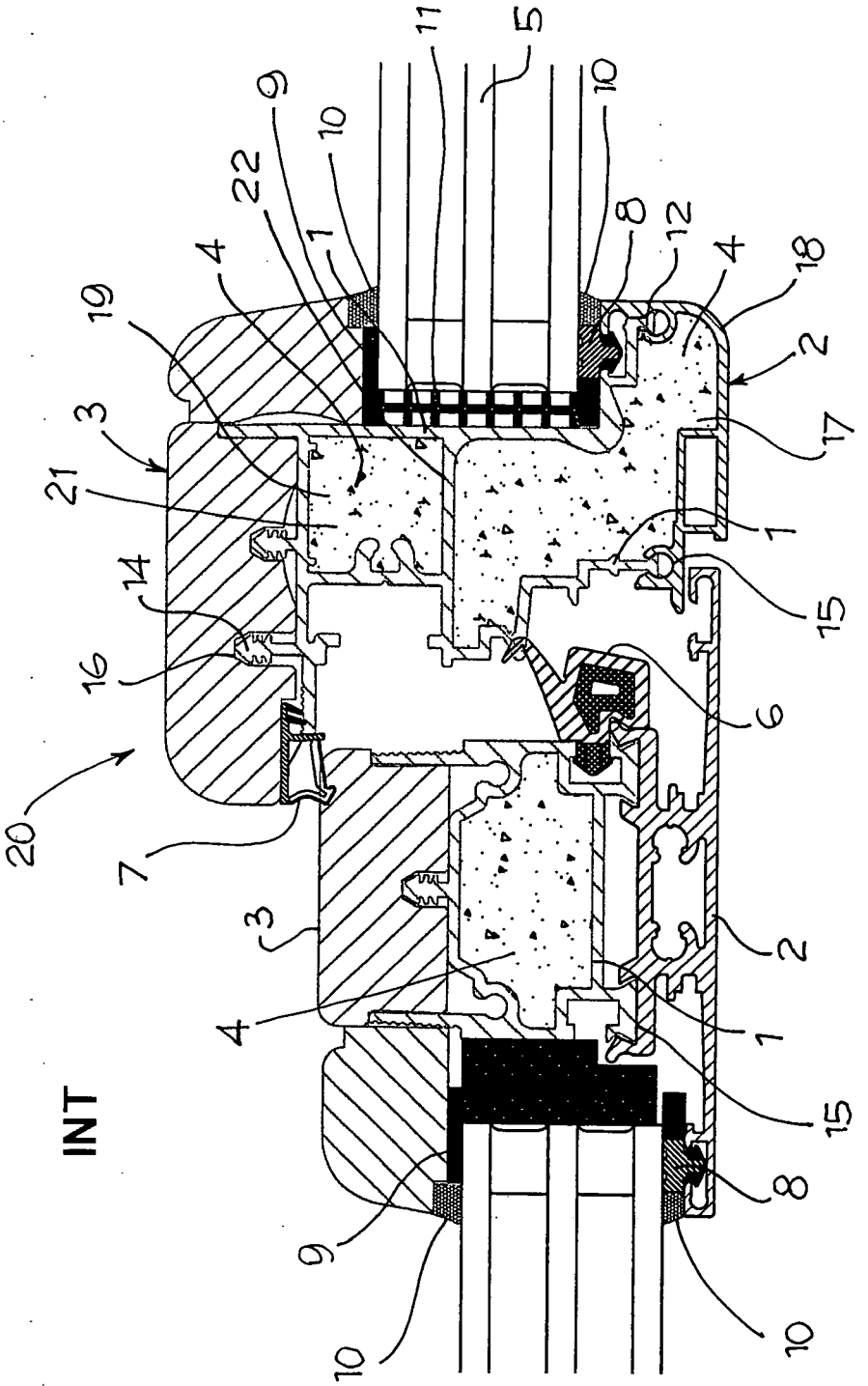

Fig.2

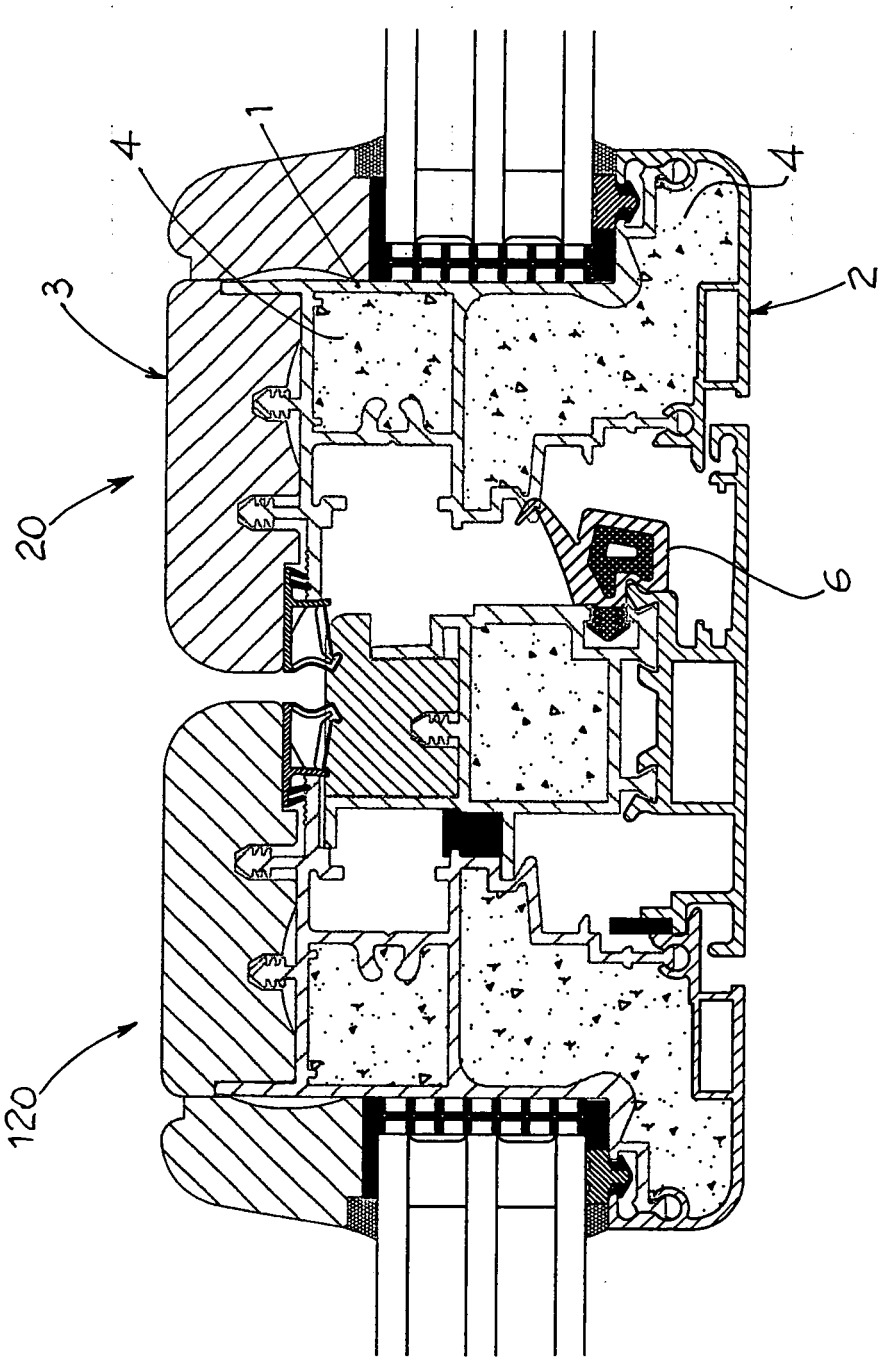

Fig.3

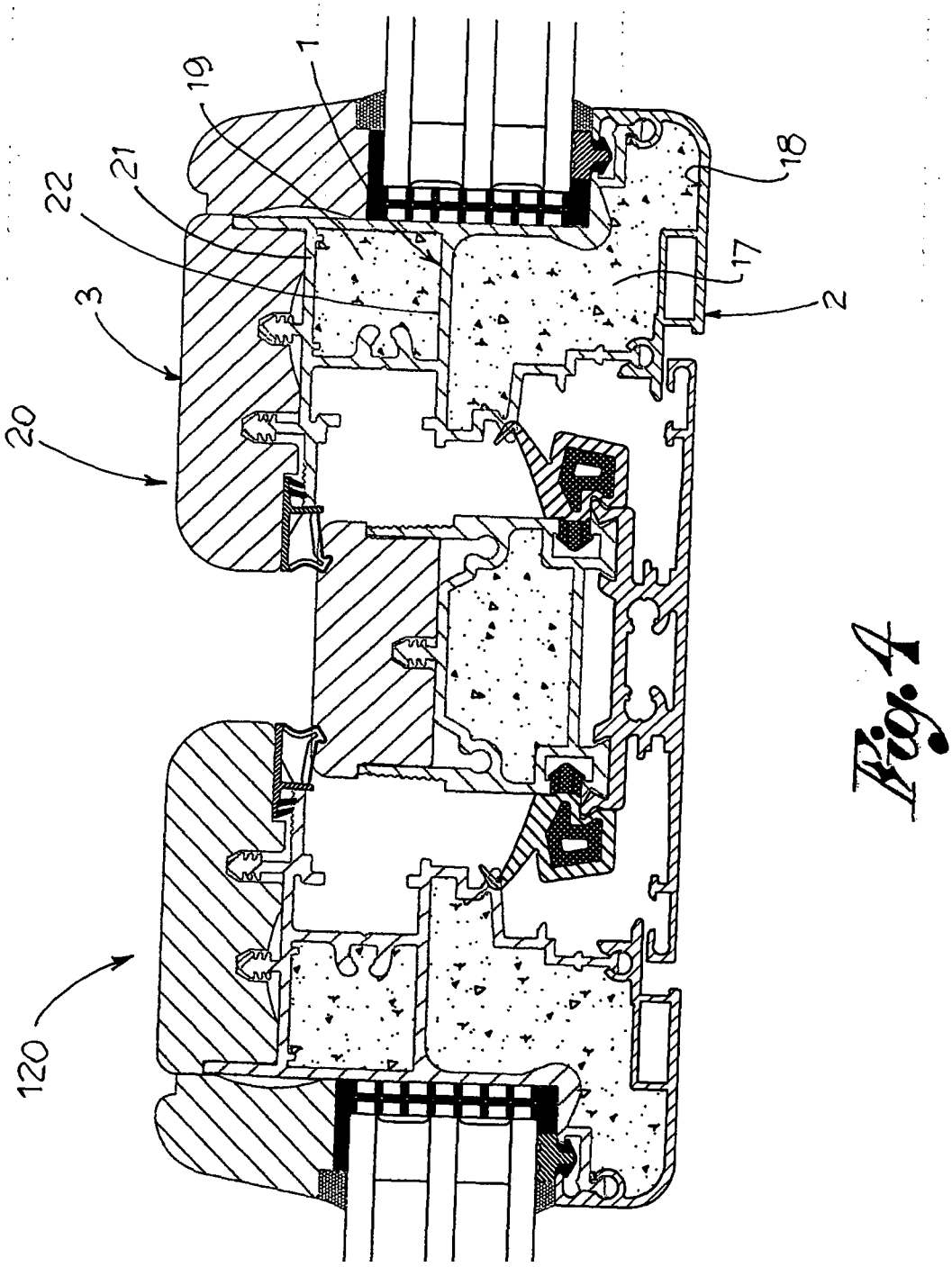

Fig. 4

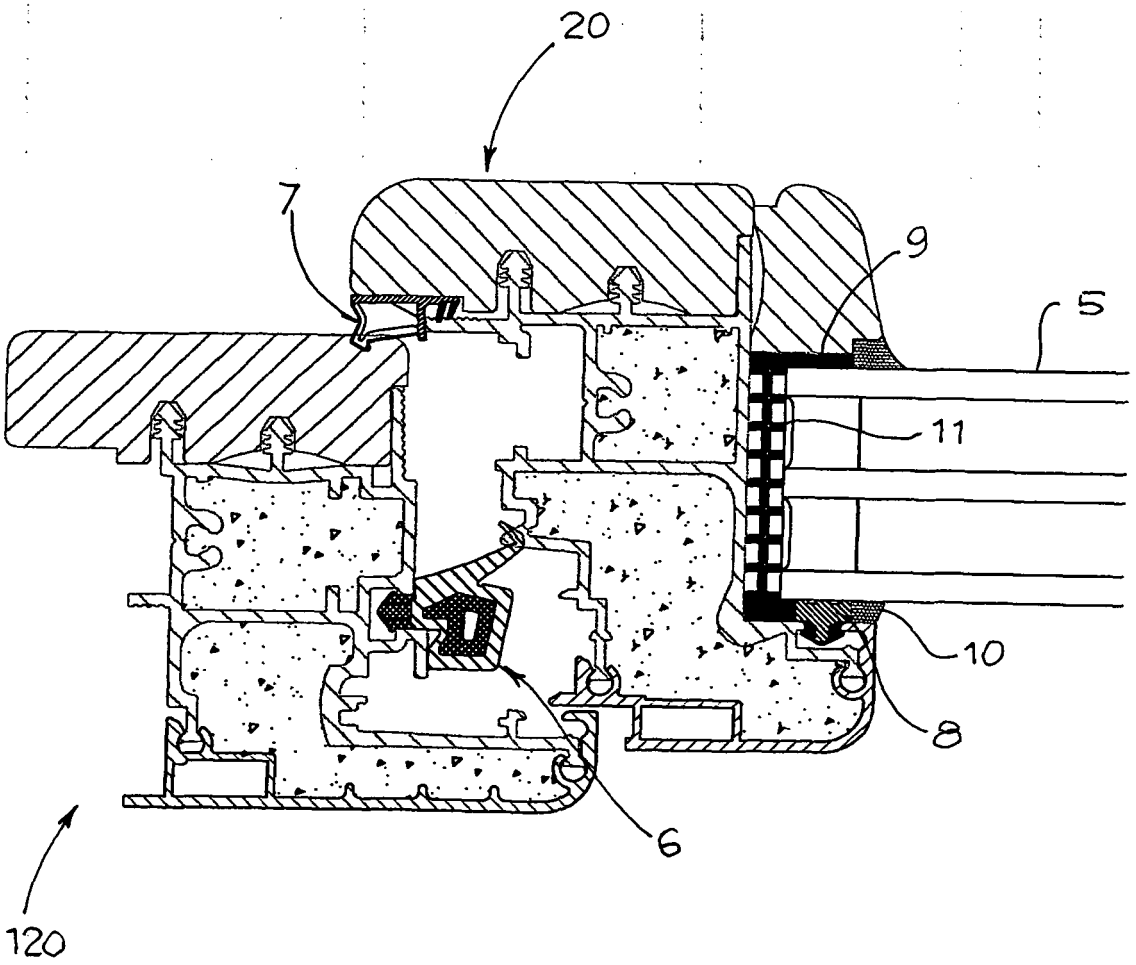

Fig.5

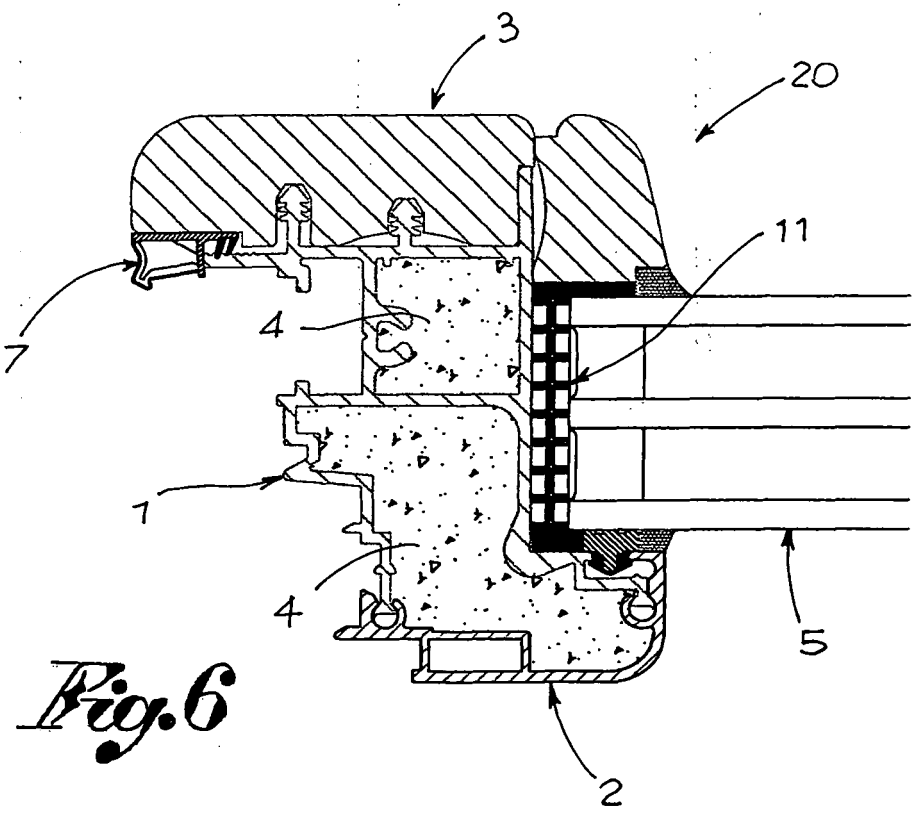

Fig.6

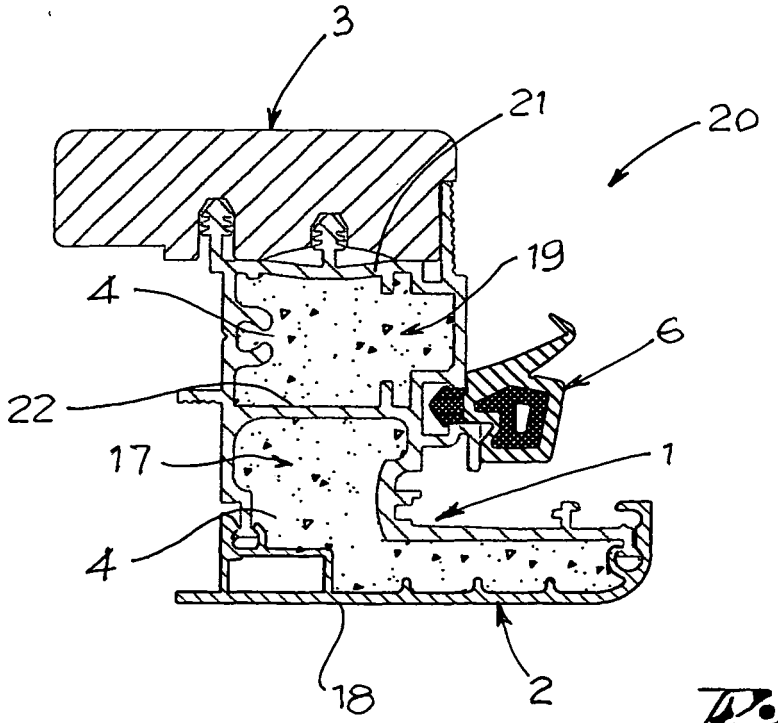

Fig.7

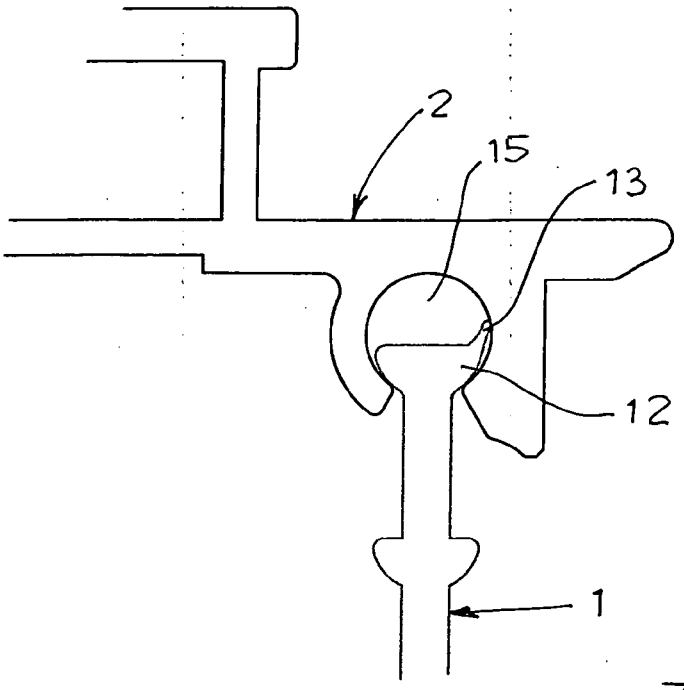

Fig. 8

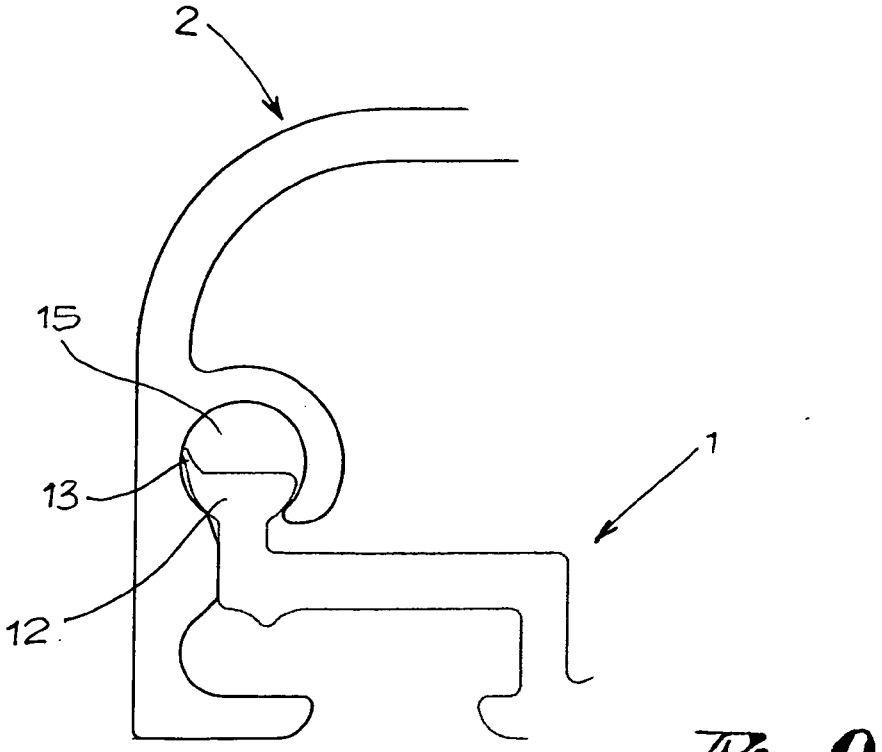

Fig. 9

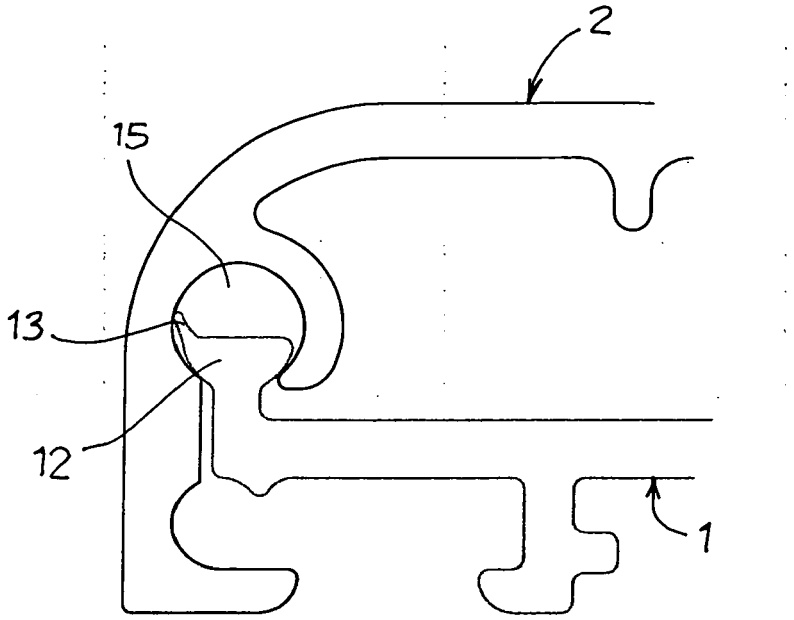

Fig. 10

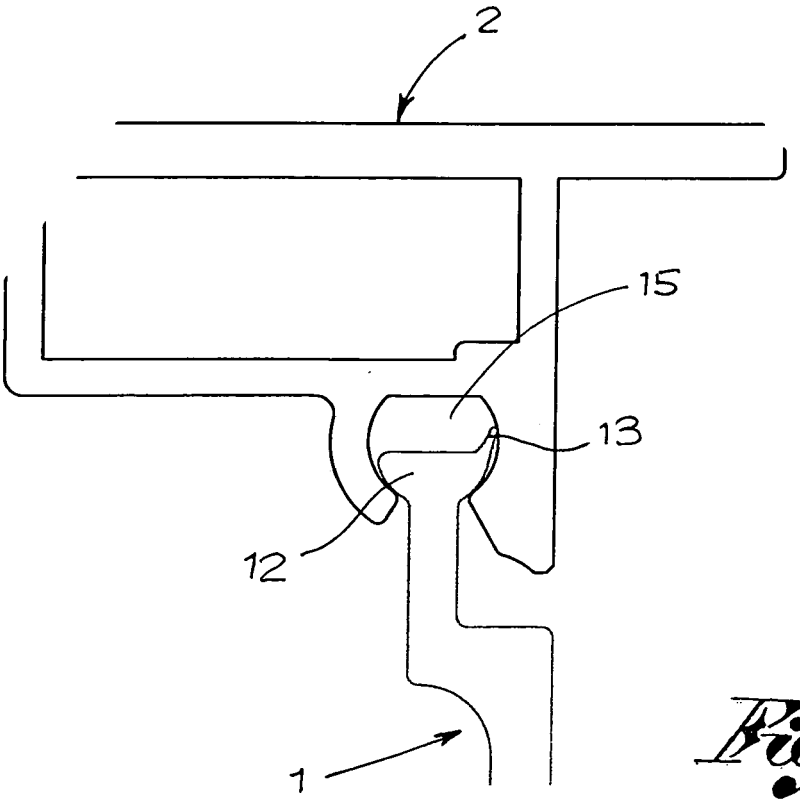

Fig. 11

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Application Number
EP 05 42 5617

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 February 2006	Verdonck, B

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07-02-2006

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