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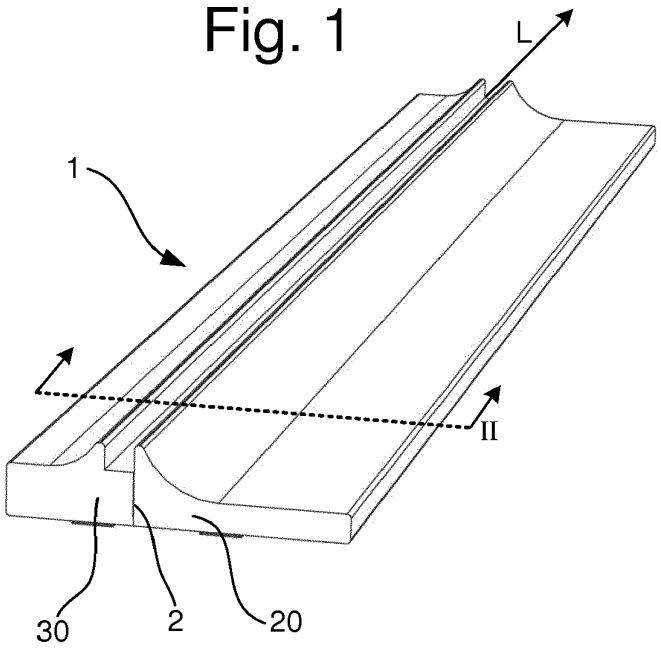
(54) **AN INSULATING MEMBER AND A METHOD FOR INSULATING A ROOF WINDOW**

(57) An insulating member for insulating a roof window, wherein said insulating member comprises, a first insulating element and a second insulating element which, in a supply condition, are interconnected at a predefined separation zone extending between a first side of the interconnected insulating member and a second side opposite to the first side and along the length of said insulating member, the first insulating element being adapted for insulating a first frame piece of the window by, in an installed condition, being arranged adjacent to the outer side of the first frame piece with an abutment side of said first insulating element facing the frame, and the second insulating element being adapted for insulating a second frame piece of the window, which is opposite to the first frame piece, by, in an installed condition, being arranged adjacent to the outer side of the second frame piece with an abutment side of said second insulating element facing the frame.

Fig. 1



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Description

[0001] The present invention relates to an insulating member for insulating a roof window comprising a stationary rectangular frame with top, bottom, and side frame pieces surrounding an opening, each frame piece having a length, an inner side facing the opening, an outer side opposite the inner side, an interior side interconnecting the inner and outer sides and adapted for facing the interior of a building, and an exterior side opposite the interior side, said insulating member having an elongate shape with a length corresponding substantially to the length of said top and bottom frame pieces or to the length of said side pieces, and a pre-defined cross-section. The invention further relates to a method for insulating a roof window.

[0002] It is well known, that the work associated with installing roof windows is highly demanding and often presents the worker with many challenges, such as working on inclined surfaces and in strong winds. Therefore, it is desirable to simplify the installation of such windows to avoid mistakes that might lead to incorrect mounting or building material falling or blowing of the roof during installation.

[0003] On this background it is an object of the invention to provide an insulation member as described above, which improves the step of insulating a roof window to ensure correct installation and safer working conditions.

[0004] According to the invention this is accomplished by means of an insulating member comprising a first insulating element and a second insulating element which, in a supply condition, are interconnected at a predefined separation zone extending between a first side of the interconnected insulating member and a second side opposite to the first side and along the length of said insulating member, the first insulating element being adapted for insulating a first frame piece of the window by, in an installed condition, being arranged adjacent to the outer side of the first frame piece with an abutment side of said first insulating element facing the frame, and the second insulating element being adapted for insulating a second frame piece of the window, which is opposite to the first frame piece, by, in an installed condition, being arranged adjacent to the outer side of the second frame piece with an abutment side of said second insulating element facing the frame.

[0005] With such an insulating member the insulating elements may remain interconnected in one piece up until installation, meaning that fewer components have to be handled before insulating the roof window, thereby making the installation work easier.

[0006] In the supply condition, wherein the insulating member is in one piece, each insulating element may be connected to the other at its abutment side or a portion of its abutment side, i.e. the abutment side is exposed by the separation, or it may be connected at another surface, such that the abutment side forms part of the exposed surface of the insulating member.

[0007] In some embodiments the first insulating element is adapted for insulating the top frame piece of the window and the second insulating element is adapted for insulating the bottom frame piece of the window. Such embodiments are advantageous because insulating elements adapted for insulating the top and bottom frame pieces often have different cross-sectional shapes due to the different requirements for these insulating elements, and by having them as one insulating member it is ensured that one of each will be available at installation.

[0008] The interconnection between the first and second insulating elements may be provided by fusing the two insulating elements together, e.g. by chemically or thermally softening the material at part of the surface of the insulating elements such that they can be merged together, or by using fastening means, such as welds, adhesives, clamps, hook-and-loop, etc., or a combination thereof. However, in a preferred embodiment the insulating member is moulded or extruded in one piece. In such an embodiment, the interconnection between the first and second insulating elements is provided by a portion of the insulating member which is adapted for being cut or broken to separate the insulating elements, thereby serving as the separation zone. Besides avoiding the need for fastening means, simultaneous manufacturing of the first and second insulating elements has the additional advantage that the need for an extra molding or extrusion process is avoided, thereby lowering production costs.

[0009] The separation zone should be understood as a narrow zone or plane extending through the insulating member to allow predetermined separation. In the simplest embodiments it may be provided by external markings showing the worker where to cut the insulating member to separate the first and second insulating elements. However, in some embodiments the insulating member is provided with a weakening of the interconnection between the first and second insulating elements at the separation zone. The weakening may be realized by the material of the separation zone or the fastening means being weak compared to the material of the first and second insulating elements, such that when pulled or wringed apart the insulating member will separate at the separation zone. This may be accomplished by using a weak adhesive, weld, foam, or similar as fastening means or by creating a structural weakening, e.g. by making a gap, a slit, or a cavity extending partially through the material of the insulating member at the separation zone or by lowering the density or strength of the material of the insulating member locally at the separation zone. Structural weakenings of the material at the separation zone can be created either during manufacture of the insulating member by creating the insulating member with less material at the separation zone, or subsequently by removing or cutting part of the material at the separation zone.

[0010] In some embodiments of the invention the width between the abutment side and an opposite side of the

first and/or second insulating elements decreases over at least part of the height of the insulating element, wherein the height of an insulating element is defined as the direction which, when said insulating element is arranged in its installed position, extends from the interior to the exterior side, such that said insulating element has a maximum width at the side adapted for facing the interior. It is noted that the heights are defined by the orientation of the insulating elements relative to the window in the installed condition, and that in the supply condition the height direction of each insulating element may point in different directions depending on how the first and second insulating elements are interconnected.

[0011] By shaping the insulating elements in this way they can be made to follow the shape of flashing- and cover members typically used on the outer and exterior sides of the roof window. This can be advantageous as particularly the flashing might be subjected to heavy loads during installation and subsequent work on the roof and the support provided by the insulating element fitting closely underneath helps the flashing withstand such pressure in addition to improving insulation by filling the cavity below the flashing members.

[0012] The insulating member may in principle be made from any thermally insulating material, but it is preferably made from a thermally insulating material which is also elastic and/or compressible, such as moulded or extruded polymer foams, e.g. foams made from polystyrene, polyethylene, polyvinyl chloride, or polyurethane.

[0013] In an embodiment of the invention the first and/or second insulating elements comprise one or more secondary separation zones. Said secondary separation zones being adapted for allowing an adaptation of the shape of the insulating elements, e.g. according to an installation depth and/or angle of the window. This means that the shape of the insulating element can be easily modified to meet the requirements of certain installation conditions, since the predefined secondary separation zones can be used to indicate where to remove superfluous material. The secondary separation zones can be realized in the same way as the separation zone between the first and the second insulating elements described above, and two or more ways of realizing the separation zones may be used in one insulating member.

[0014] In some embodiments the first and/or second insulating elements comprise an adhesive arranged on the abutment side and/or another side of the insulating element. Such an adhesive may further facilitate installation, as it may be used for at least temporary fastening of the insulating element to a fixed structure, such as the stationary window frame or the roof structure, ensuring that the insulating element will stay in place at least during installation. In embodiments where adhesives have been used for interconnecting the insulating elements, they may additionally fulfill the purpose as means for at least temporary fastening to the roof structure or the frame of the roof window during construction.

[0015] In further developments of this embodiment the adhesive is, in the supply condition, protected by a cover strip. Besides protecting the adhesive up until installation the cover strip may additionally serve as a surface on which the installation instructions can be printed, ensuring that they will not be separated from the insulating member before installation.

[0016] In an embodiment of the invention the first and/or second insulating elements comprise a sealing element projecting out from the abutment side of the insulating element, said sealing element being adapted for, in the installed condition, being arranged overlapping the frame piece at the exterior side of the frame piece. The roof window will generally further comprise an exterior cover on top of the stationary frame to protect it from the weather. By providing a sealing element between the frame and cover the window may gain improved thermal and sound insulation, and by attaching it to the insulating member additional loose components may be avoided. In some embodiments the sealing element may in itself serve as a cover, thereby further reducing the number of individual components.

[0017] In an embodiment of the invention the first and/or second insulating elements comprise a guide abutment projecting out in the height direction, such that it, in the installed condition, extends away from the frame in a direction substantially perpendicular to the frame towards the exterior. In such an embodiment, the exterior cover may be aligned to the edge of the frame, simply by pushing it against the guide abutment, thereby ensuring correct installation.

[0018] The object of the invention is further achieved by way of a method for insulating a roof window comprising a stationary frame with top, bottom, and side frame pieces, each having a length, an inner side facing the window and an opposite outer side, and an interior side facing the structure and an opposite exterior side, wherein the method comprises the steps of providing an insulating member which comprises a first insulating element having an abutment side and a length corresponding substantially to the length of a first frame piece of the window and a second insulating element having an abutment side and a length corresponding substantially to the length of a second frame piece, which is opposite to the first frame piece, of the window, wherein, in a supply condition, the first and second insulating elements are interconnected to each other; separating the interconnected first and second insulating elements; and arranging the first insulating element adjacent to the outer side of the first frame piece with the abutment side facing the first frame piece and the second insulating element adjacent to the outer side of the second frame piece with the abutment side facing the second frame piece. The method is preferably used to insulate a frame of a roof window, wherein the first frame piece is the top frame piece and the second frame piece is the bottom frame piece.

[0019] The method may further comprise a step of adapting the first and/or second insulating element to an installation depth and/or installation angle of the roof win-

dow by using a predefined secondary separation zone of the insulating element to remove superfluous material.

[0020] The method may in some embodiments comprise a step of temporarily fixating the first and/or second insulating element to a frame piece or to another building component, by using and adhesive which is arranged on a surface of said first and/or second insulating element.

[0021] The invention will be described in more detail below by means of non-limiting examples of presently preferred embodiments and with reference to the schematic drawings, in which:

Fig. 1 shows a perspective view of an insulating member according to the invention from above,
Fig. 2 shows a perspective view of the insulating member in fig. 1 from below.
Fig. 3 shows the cross-section of the insulating member in fig. 1, taken at the II-line of fig. 1,
Fig. 4 shows a cross-sectional view of a separated first insulating element,
Fig. 5 shows a cross-sectional view of a separated second insulating element,
Fig. 6 shows a sectional view of a roof window installed in a roof and insulated at the top and bottom frame pieces by use of an insulating member according to the invention,
Fig. 7 shows a sectional view of the top frame piece of the roof window in fig. 6 insulated by a first insulating,
Fig. 8 shows a sectional view of the bottom frame piece of the roof window in fig. 6 insulated by a second insulating element according to the invention, and
Fig. 9-12 show various realizations of the separation zone.

[0022] The same reference numbers have been used throughout the entire description, even when describing different embodiments. It should be understood that the reference numbers relate to particular features of the invention having similar function but which are not necessarily identical in every embodiment.

[0023] An embodiment of an insulating member 1 according to the invention is shown in fig. 1 and 2. The insulating member 1 comprise a first portion in the form of a first insulating element 20 and a second portion in the form of a second insulating element 30, which in the shown embodiment are adapted for insulating the top and bottom frame pieces of a roof window.

[0024] Throughout this text the terms "top", "bottom" and "side" are used to indicate the intended position of different parts in the installed position even though these parts may be located differently during for example storage and transportation or during manufacture of the insulating member 1. Likewise, the term "interior" and "exterior" are used to indicate that something is intended to face the interior or exterior of the building in which the insulating member and the roof window are installed, respectively, and the terms "inner" and "outer" that something is intended for facing towards or away from the inner opening surrounded by the frame of the window, respectively, in the installed condition.

[0025] The insulating member 1 has an elongate shape with a length in the length direction L corresponding to the length of the frame pieces of the roof window, which it is adapted for insulating, and a pre-defined cross-section which is substantially uniform along the length. While the cross-sections of the two insulating elements 20, 30 shown in this embodiment are different from each other, they can in some embodiments be identical.

[0026] The insulating elements 20, 30 may be made from any natural or synthetic thermally insulating material, preferably with a thermal conductivity of less than 1 W/mK in order to achieve good insulation properties. In a preferred embodiment less than 0.1 W/mK and in a more preferred embodiment it should be lower than 0.040 W/mK. However, it is also preferable that the material be structurally stable, such that it can provide support for flashing members 14 used on the exterior side or similar, while to an extent being compressible and elastic, such that it is easy to handle and install.

[0027] If the material used to make the insulating member 1 is suitable for extrusion or molding the insulating elements may be produced simultaneously, such that they are interconnected by the material itself, and, particularly if extrusion is used as the manufacturing method, many insulating members may be produced as one continuous profile which can be cut into appropriate lengths afterwards. These manufacturing options are advantageous as they are cost-efficient. Alternatively, the first and second insulating elements 20, 30 may be manufactured individually and interconnected by fastening means, such as adhesives, welds, clamps, etc. or by a combination thereof.

[0028] Fig. 3 to 5 show cross-sectional views of an insulating member 1 according to the invention in the interconnected and separated conditions. Each insulating element 20, 30 is designed such that it has an abutment side 21, 31 adapted to abut the outer side of a frame piece of the roof window. In the shown embodiments the insulating member 1 is further designed such that the width between the abutment side 21, 31 and the opposing side of the first and second insulating elements 20, 30 decreases along the height h of each insulating element, so that they may follow the shape of the flashing members 14 as will be described with reference to fig. 6-8. As shown, this decrease does not have to be continuous or over the entire height h of the insulating elements.

[0029] In the shown embodiments the second insulating element 30 is connected to the first insulating element 20 at a part of its abutment side 31, such that the abutment side 31 is only fully exposed after the separation. The first insulating element 20 is connected to the second insulating element 30 at an interior side which is adapted for, in the installed condition, facing the interior direction, such that the abutment side 21 of the first insulating el-

ement 20 forms part of the surface of the interconnected insulation member 1. In alternative embodiments the first and second insulating elements 20, 30 can be interconnected at others sides as will be readily understood by the skilled person.

[0030] In the embodiment shown in fig. 3 the insulating member is designed with a weakening of the interconnection at the separation zone 2, which weakening is realized by a slit extending partially through the insulating member 1, such that the insulating member 1 will separate at the material in extension of the slit if pulled or wringed apart. Similar structural weakenings may be realized by a gap, a cavity, a row of cavities, etc., or a combination thereof extending through or into the insulating member 1 at the separation zone 2.

[0031] The embodiment of the first and second insulating elements 20, 30 of the insulating member 1 shown in fig. 4 and 5 further comprise secondary separation zones 24, 34 on each insulating element. These secondary separation zones 24, 34 provide adaptation options of the cross-sectional shape of each insulating element, such that an insulating element can be adapted according to a secondary building component, the angle at which the roof window is installed, and/or the installation depth of the roof window, by providing the option of tearing or cutting superfluous material away if needed. Although the shown embodiments comprise multiple secondary separation zones 24 on the first insulating element 20 and only one secondary separation zone 34 on the second insulating element 30, the number and positions of the secondary separation zones of each insulating element may vary in other embodiments.

[0032] The first and second insulating elements 20, 30 shown in fig. 3-5 further comprise adhesives 25, 35 arranged on the abutment side 21 of the first insulating element 20 and on the interior side the second insulating element 30, which adhesives are adapted for at least temporarily fastening the insulating elements 20, 30 to the roof structure or a frame piece of the roof window during installation. Some embodiments may have several such adhesives arranged on the abutment and/or on other sides. In the shown embodiments each of the adhesives 25, 35 are covered by a cover strip 26, 36 ensuring that the adhesives 25, 35 are protected up until use.

[0033] In the embodiment shown in fig. 4 the first insulating element 20 comprise a sealing element 28, which is projecting out from the first abutment side 21 and which is adapted to provide a sealing between a frame piece of the roof window and an outer cover. In the shown embodiment the sealing element is molded or extruded with the insulating member 1, it can however also be produced separately and attached, in which case it may be produced from a material different from that of the insulating element such as rubber or polymers. The second insulating element 30 can also be provided with a similar sealing element.

[0034] In fig. 4 the first insulating element further comprise a guide abutment 29 projecting out from the top of the insulating element 20, such that it in an installed condition extends substantially perpendicularly away from the frame of the window in the exterior direction, said guide abutment 29 being adapted to facilitate placement of a cover for the frame of the roof window by providing an abutment which the cover can be pushed against to ensure that it is aligned with the frame of the window. Like the sealing element 28 the guide abutment 29 is in the shown embodiment molded or extruded in one piece with the insulating member 1 but it can also be manufactured separately, possibly in one integral piece with the sealing element, and attached afterwards. The second insulating element 30 can also be manufactured with a similar guide abutment.

[0035] In the embodiment shown in fig. 5, the second insulating element 30 have a ledge 37 extending from the abutment side 31 of the insulating element. It is adapted for extending below the interior side of a frame piece or into an indentation of the frame piece, such that the insulating element supports the frame and fills the space below the part of the window which projects above the roof. The first insulating element 20 can also be manufactured with a similar ledge.

[0036] It is noted that even though the adhesive 25, 35, the cover strip 26, 36, the sealing element 28, the guide abutment 29, the secondary separation zones 24, 34, and the ledge 37 are shown and described here in relation to one embodiment of the invention, these features are not dependant on each other, and that one may be used without the others.

[0037] Fig. 6-8 show an insulating member 1 in the installed condition with a roof window structure 10 installed in a roof opening. The insulating member 1 has been separated into the first and second insulating elements 20, 30 and used to insulate the top and bottom frame pieces 12, 13 by arranging the insulating elements 20, 30 at their respective frame pieces 12, 13 with the height direction of each insulating element pointing in the exterior direction.

[0038] As shown in figures 6-8, the cross-sectional shape of the insulating elements 20, 30 allow them to substantially follow the shape of the flashing members 14, thereby allowing the flashing members 14 to withstand external pressure which they might be subjected to, particularly during installation of the roof window, and providing improved insulation.

[0039] Fig. 7 further show how a sealing element 28 on the first insulating element 20 provides a seal between the top frame cover 15 and the exterior side of the top frame piece 12 giving the roof window 10 improved sound and thermal insulating properties. The figure also shows that the edge of the cover 15 have been pushed against a guide abutment 29 provided on the first insulating element 20, thereby assuring that the cover 15 is aligned with the frame piece 12. In the embodiment shown in fig. 7 the sealing element 28 and guide abutment 29 have been provided by means of a separate element attached

to the insulating element during installation.

[0040] Fig. 9-12 show various examples of how the separation zone may be provided. In fig. 9 the separation zone has been defined by a portion of the insulating member wherein the material density is reduced locally to lower the strength compared to the remaining material. In fig. 10 the two insulating elements have been connected by using an adhesive. In fig. 11 the separation zone have been defined by a row of cavities, each cavity extending through the material in the length direction. In fig. 12 the insulating elements have been connected by means of a secondary material, such as a weaker polymer.

[0041] The person skilled in the art realizes that the present invention by no means is limited to the preferred embodiments described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

Claims

1. An insulating member for insulating a roof window comprising a stationary rectangular frame with top, bottom, and side frame pieces surrounding an opening, each frame piece having a length, an inner side facing the opening, an outer side opposite the inner side, an interior side, and an exterior side opposite the interior side,
said insulating member having an elongate shape with a length corresponding substantially to the length of said top and bottom frame pieces or to the length of said side pieces, and a pre-defined cross-section,
characterized in that said insulating member comprises:

> a first insulating element and a second insulating element which, in a supply condition, are interconnected at a predefined separation zone extending between a first side of the interconnected insulating member and a second side opposite to the first side and along the length of said insulating member,

the first insulating element being adapted for insulating a first frame piece of the window by, in an installed condition, being arranged adjacent to the outer side of the first frame piece with an abutment side of said first insulating element facing the frame, and the second insulating element being adapted for insulating a second frame piece of the window, which is opposite to the first frame piece, by, in an installed condition, being arranged adjacent to the outer side of the second frame piece with an abutment side of said second insulating element facing the frame.

2. The insulating member of claim 1 wherein the first insulating element is adapted for insulating the top frame piece of the window and the second insulating element is adapted for insulating the bottom frame piece of the window.

3. The insulating member of claim 1 or 2, wherein the width between the abutment side and an opposite side of the first and/or second insulating elements decreases over at least part of the height of the insulating element, wherein the height of an insulating element is defined as the direction which, when said insulating element is arranged in its installed position, extends from the interior to the exterior side.

4. The insulating member of any of the previous claims, wherein the insulating member is moulded or extruded in one piece.

5. The insulating member of any of the previous claims, wherein the insulating member is provided with a weakening of the interconnection between the first and second insulating elements at the separation zone.

6. The insulating member of any of the preceding claims wherein the insulating elements are made from a thermally insulating material, such as polystyrene, polyethylene, polyvinyl chloride, polyurethane, or any other suitable material.

7. The insulating member of any of the preceding claims wherein the first and/or second insulating elements comprise one or more secondary separation zones.

8. The insulating member of any of the preceding claims wherein the first and/or second insulating elements comprise an adhesive arranged on the abutment side and/or another side of the insulating element.

9. The insulating member of claim 8, wherein the adhesive is, in the supply condition, protected by a cover strip.

10. The insulating member of any of the preceding claims wherein the first and/or second insulating elements comprise a sealing element projecting out from the abutment side of the insulating element, said sealing element being adapted for, in the installed condition, being arranged overlapping the frame piece at the exterior side of the frame piece.

11. The insulating member of any of the preceding claims wherein the first and/or second insulating elements comprise a guide abutment projecting out in the height direction, such that it, in the installed condition, extends away from the frame in a direction substantially perpendicular to the frame.

12. A roof window for installation in a load-bearing roof structure, said roof window comprising a stationary frame with top, bottom, and side frame pieces, each having a length, an inner side facing the window and an opposite outer side, and an interior side facing the structure and an opposite exterior side, said roof window further comprising an insulation member according to any of the previous claims wherein, after separation, the first insulating element is arranged adjacent to the outer side of a first frame piece and the second insulating element is arranged adjacent to the outer side of the second frame piece, which is opposite to the first frame piece.

13. A method for insulating a roof window, comprising a stationary rectangular frame with top, bottom, and side frame pieces, each having a length, an inner side facing the window and an opposite outer side, and an interior side facing the structure and an opposite exterior side, said method comprising the steps of:

(a) providing an insulating member which comprises

a first insulating element having an abutment side and a length corresponding substantially to the length of a first frame piece of the window; and
a second insulating element having an abutment side and a length corresponding substantially to the length of a second frame piece, which is opposite to the first frame piece, of the window,

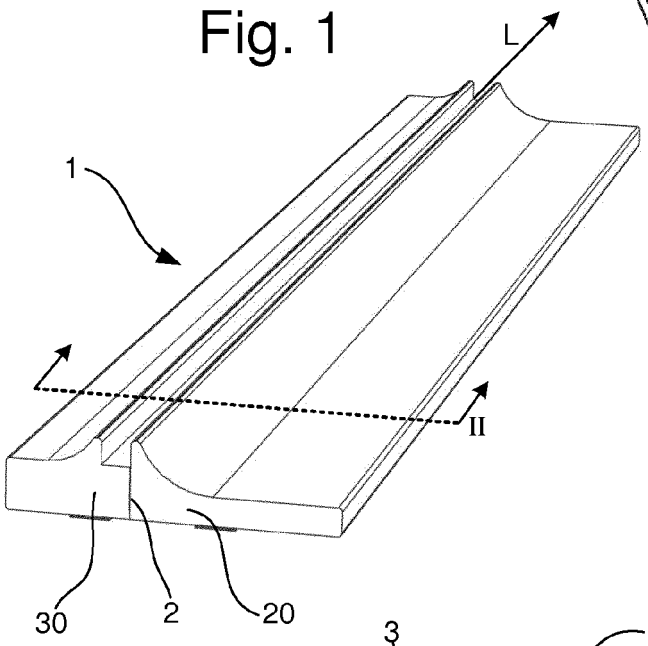
wherein, in a supply condition, the first and second insulating elements are interconnected to each other,
(b) separating the interconnected first and second insulating elements, and
(c) arranging the first insulating element adjacent to the outer side of the first frame piece with the abutment side facing the first frame piece, and the second insulating element adjacent to the outer side of the second frame piece with the abutment side facing the second frame piece.

14. The method of claim 13, wherein the first frame piece is the top frame piece and the second frame piece is the bottom frame piece.

15. The method of claim 13 or 14 further comprising the step of adapting the first and/or second insulating element to an installation depth and/or installation angle of the roof window by using a predefined secondary separation zone of the insulating element to remove superfluous material.

16. The method according to any of claim 13 to 15 further comprising the step of temporarily fixating the first and/or second insulating element to a frame piece or to a secondary building component, by using and adhesive which is arranged on a surface of said first and/or second insulating element.

Fig. 1



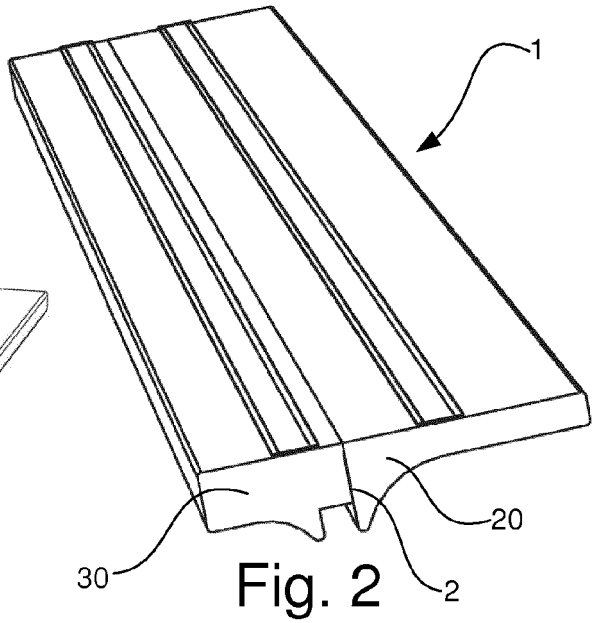


Fig. 2

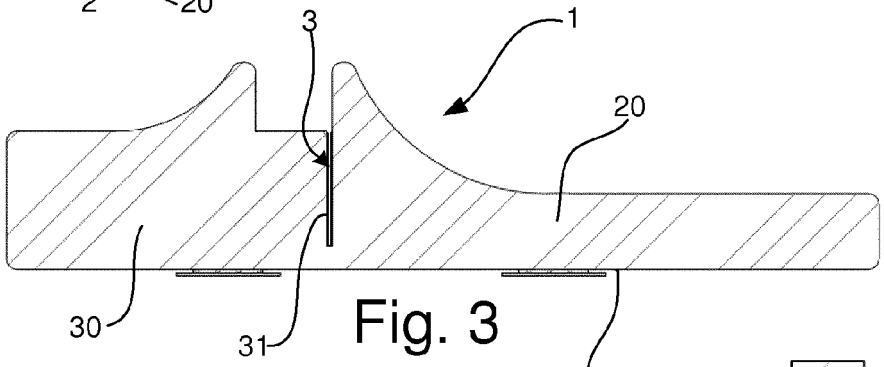


Fig. 3

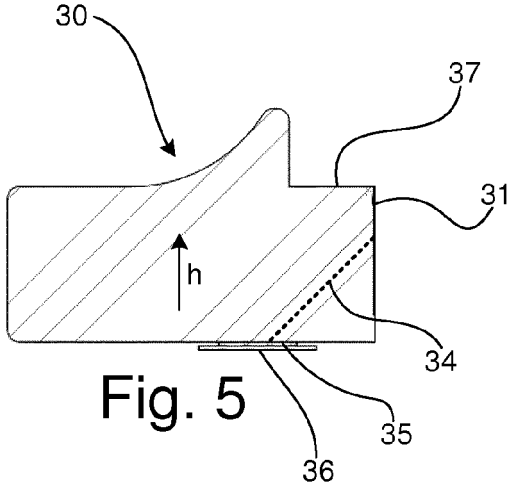


Fig. 5

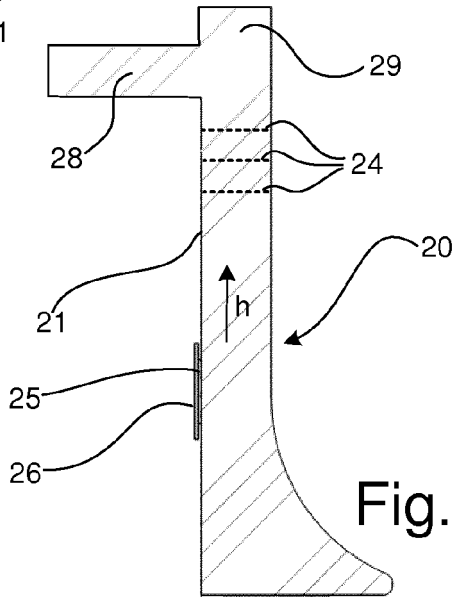


Fig. 4

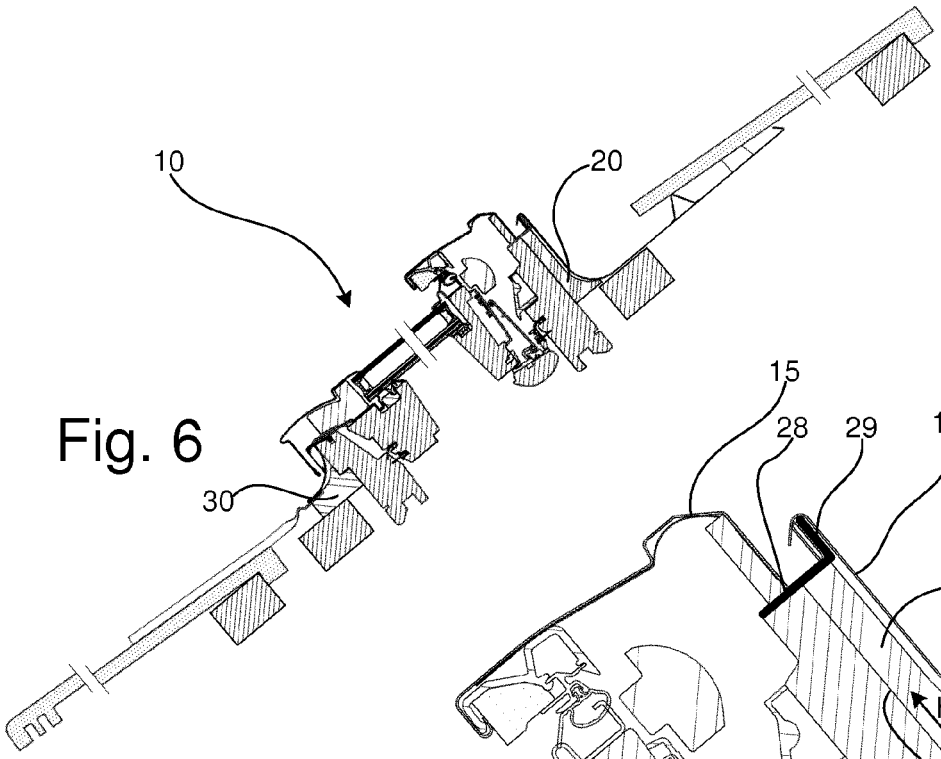


Fig. 6

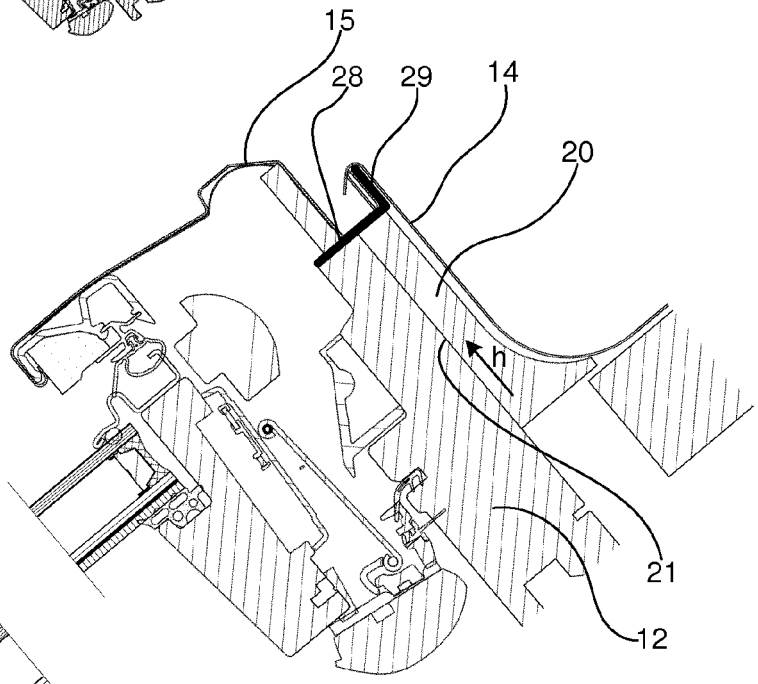


Fig. 7

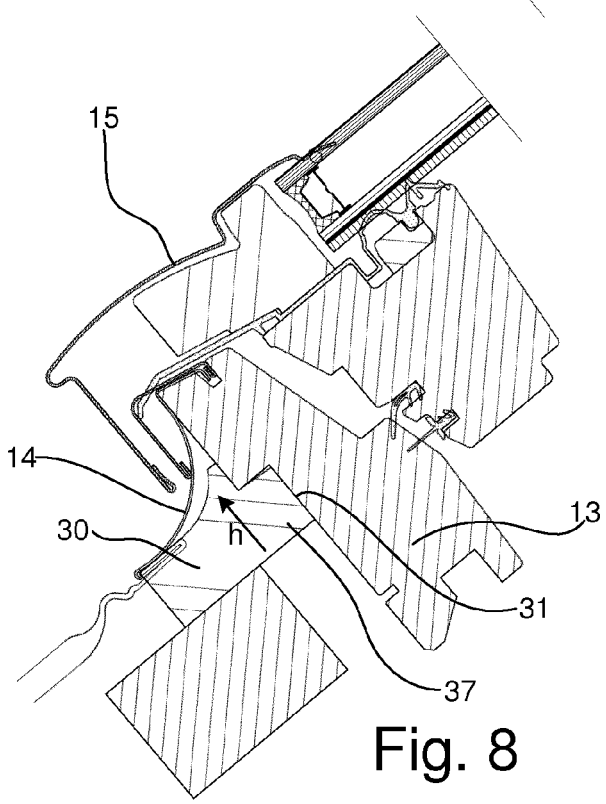


Fig. 8

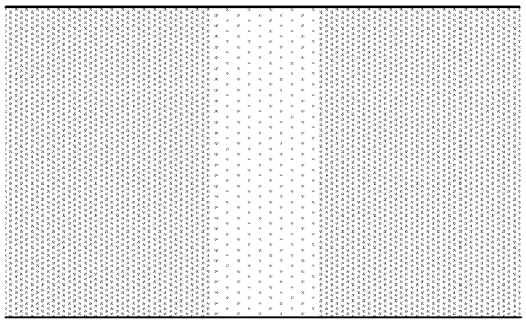


Fig. 9

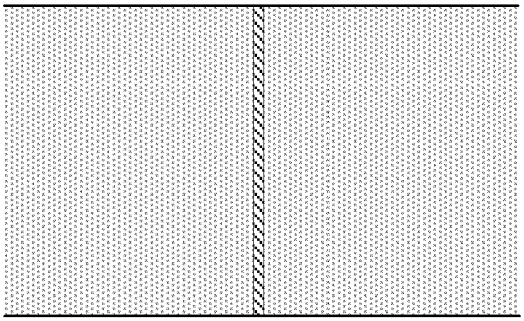


Fig. 10

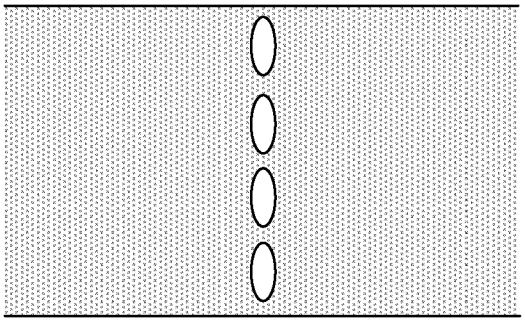


Fig. 11

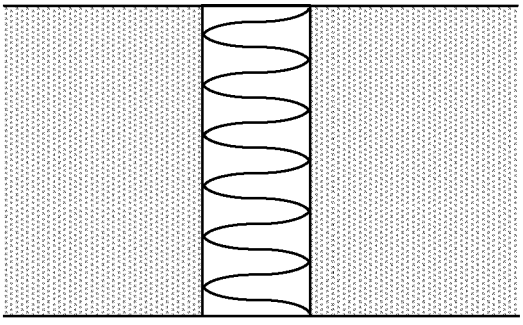


Fig. 12

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EUROPEAN SEARCH REPORT

Application Number
EP 16 18 1997

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	6 October 2016	Tran, Kim Lien

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