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(54) An insulating frame for a roof window

(57) The invention relates to an insulating frame (1) for insulating a roof window (19). The frame comprises a plurality of insulating frame pieces (2a,2b,3,4), each of which having an inner side surface facing an opening surrounded by the frame, a bottom surface and at least one outer side surface facing away from the opening. At least one of the insulating frame pieces comprises a lower section (7) and an upper section (8), where the upper section has a first side facing the opening and a second side (9) facing away from the opening, a bottom portion of the upper section having a predetermined maximum width. The width between the first side and the second side of the upper section decreases from said maximum width in the height direction such that the second side forms a predetermined angle other than perpendicular with the bottom portion. Preferably, the upper section is substantially wedge shaped with an apex angle of 20-45 degrees. The height of the first side is such that a relatively large portion of the window frame piece (20) is overlapped by the upper section of the insulating frame piece in the mounted state.

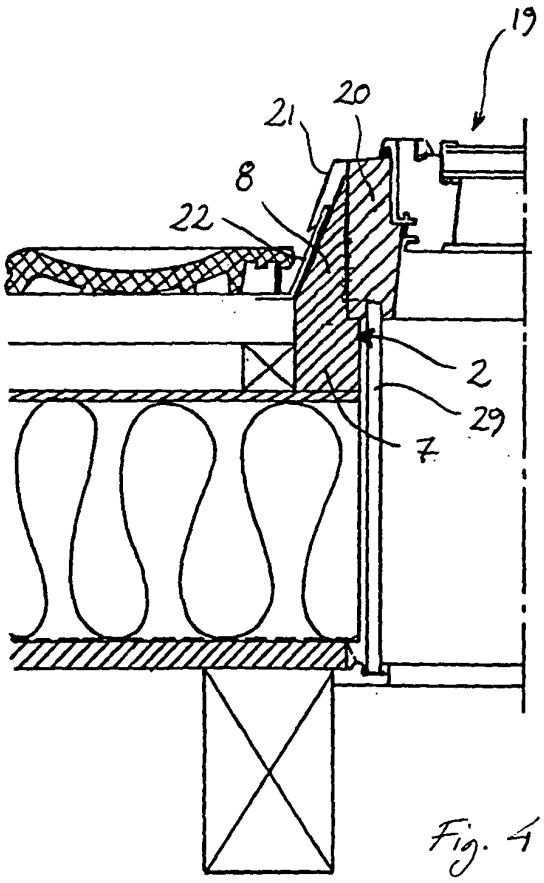

Fig. 4

EP 1 739 247 A1

Description

[0001] The present invention relates to an insulating frame for insulating a roof window, said insulating frame comprising a plurality of insulating frame pieces surrounding an opening, the shape of which corresponds substantially to the shape of the roof window and the dimensions of which is larger than or corresponding to the outer dimensions of the roof window, each insulating frame piece having an inner side surface facing the opening, a bottom surface and at least one outer side surface facing away from the opening.

[0002] Such insulating frames are known from the applicant's own prior applications EP-A1-1 061 199 and WO 98/31896 as well as from EP-B1-0 679 773 and EP-B1-0 744 512. However, the former two of these do not address the problem of achieving an insulation of the part of the window projecting above the supporting structure and the solution proposed in latter two results in a dissatisfactory result, primarily due to a non-aesthetic appearance of the mounted window.

[0003] It is therefore the object of the invention to provide an insulating frame, which insulates the part of the roof window projecting above the supporting roof structure and which may be used without jeopardizing the aesthetic appearance of the window when mounted.

[0004] This object is achieved by an insulating frame, where at least one of the insulating frame pieces comprises a lower section and an upper section, where the upper section has a first side facing the opening and a second side facing away from the opening, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that a relatively large portion of the window frame piece is overlapped by the upper section of the insulating frame piece in the mounted state.

[0005] The combination of a frame, which insulates the transition between the window and the supporting roof structure, and an upper section with a decreasing width and which insulates the part of the window projecting above the supporting structure, has been discovered to lead to a particularly effective insulation. Not only is the entire window frame insulated by a single frame unit, the decreasing width of the upper section both makes the installed window appear less voluminous seen from the outside and reduces the quantity of insulating material needed without influencing the general insulating properties of the construction.

[0006] In a preferred embodiment the upper section of the insulating frame piece(s) is substantially wedge shaped with an apex angle of 20-45 degrees. As the insulating frame does then not add any extra width at the top surface of the roof window, prior art cover and flashing members may be used by simply changing their bending angles or the position of the bend.

[0007] For the sake of simplicity of manufacture and installation it is preferred that the insulating frame consists of four frame pieces corresponding to the four sides of a rectangular roof window. These frame pieces may be manufactured separately, e.g. by extrusion or moulding, and subsequently joined together by means of suitable brackets or by welding or gluing, either at the factory or at the installation site. Alternatively some or all of the frame pieces may be moulded as one.

[0008] To allow a further optimization of the balance between the aesthetic appearance of the window, which demands a slim design, and the need for insulation, which demands a relatively bulky design, it is preferred that the two side frame pieces being located at the sides of the window in the mounted state have upper sections with substantially identical cross sections and that the frame piece being located uppermost and/or the frame piece being located lowermost in the mounted state have upper sections with cross sections that differ from that of the side insulating frame pieces. It may particularly be advantageous if the upper section of the bottom frame piece has a smaller cross section than the others, as the connecting of the bottom flashing and cover members to the roof construction below the window is traditionally performed in a quite distinct way compared to the connecting of the top and side flashing and cover members. However, it may also be advantageous with a special design of the top frame piece e.g. when insulating a top-hung window where space is needed for the downwards turning of the cover member used on the top member of the window sash. In some embodiments it may even be advantageous that the top and/or bottom frame piece have no upper section at all.

[0009] As mentioned above, the need for insulation decreases towards the outer surface of the construction. A further optimization of the use of the insulating material may therefore be reached by shaping the insulating frame so that the width of the lower section of one or more frame pieces decreases continuously or stepwise in the height direction towards the upper section.

[0010] It is to be noted, that the distinction between an upper and a lower section is not be considered as implying the need for any kind of physical boundaries, but only a difference in geometry and/or function.

[0011] The insulating frame may in principle be made from any material having insulating properties, but it is preferred that it is made from moulded or extruded foam plastic, such as polyurethane foam.

[0012] In some embodiments, the roof window may bear on ledges on the sides of the insulating frame pieces that face the opening and the frame must therefore be able to transfer the load to the supporting roof structure. This may be achieved by making the insulating frame from a sufficiently strong and rigid material, but the insulating frame pieces may also be provided with one or more stiffening members such as lists or strips. The stiffening members may advantageously be used for sup-

porting and attachment of mounting brackets for connecting the insulating frame to the supporting roof structure.

[0013] During installation of the roof window an underroof or underroof collar is normally connected to the insulating frame to ensure a watertight construction. An extremely tight construction may, however, lead to the formation of condensation and it is therefore preferred that the second side of one or more of the insulating frame pieces are provided with projections and/or recesses allowing air passage between and/or through them in a direction perpendicular to the length of the insulating frame piece. The object of the invention is further achieved with a kit for mounting and insulation of a roof window, comprising an insulating frame, an underroof collar, at least one flashing member and at least one cover member, said insulating frame surrounding an opening larger than or corresponding to the external dimensions of the roof window to be mounted, so that the window may be placed within the opening, where the insulating frame includes a plurality of insulating frame pieces at least one of which have an upper section with a first side facing the opening and a second side facing a flashing and/or cover member when mounted, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that a relatively large portion of the distance existing between an lowermost level of the flashing member and an uppermost level of the cover member in the mounted state is overlapped by the upper section of the insulating frame piece, where that the underroof collar may be brought into contact with the insulating frame at or above the bottom portion of the upper section of the insulating frame, and where one or more of the flashing and/or cover members are shaped with angles corresponding to the angle determined by the decreasing width of the upper section.

[0014] The underroof or underroof collar may be attached to the insulating frame by any suitable means such as welding, gluing, mechanical fastening means, such as clamps, or friction between the material of the underroof or underroof collar and the insulating frame.

[0015] Likewise, the object of the invention is achieved by a roof structure with a roof window mounted in an insulating frame, said roof structure including a roofing, a supporting structure and an underroof comprising at least an external waterproof membrane and an insulating layer, said underroof being located between the roofing and the supporting structure and comprising an opening for mounting of the window, said insulating frame comprising a lower surface intended for resting against the upper surface of the underroof and with an opening, which corresponds to the opening in the underroof and which is larger than or corresponding to the external dimensions of the roof window, so that the window may be placed within the opening, where the insulating frame includes a plurality of insulating frame pieces at least one of which have an upper section with a first side intended to face a corresponding window frame piece and a second side intended to face a flashing and/or cover member, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that in the mounted state a relatively large portion of the window frame is overlapped by the upper section of the insulating frame.

[0016] In the following, the invention will be described in further detail by reference to the accompanying drawing showing two embodiments of the invention.

Fig. 1 shows an insulating frame according to the invention seen in a perspective view,
Fig. 2 a section of a side piece of the frame in Fig. 1,
Fig. 3 a section of the bottom piece of the frame in Fig. 1,
Fig. 4 a roof window mounted in the insulating frame of Fig. 1 in a sectional view along the line IV-IV,
Fig. 5 a roof window mounted in the insulating frame of Fig. 1 in a sectional view along the line V-V, and
Fig. 6 a section of a side piece corresponding to Fig. 2 with an underroof collar connected thereto.

[0017] An embodiment of the insulating frame 1 according to the invention is shown in Fig. 1. The frame consists of two side frame pieces 2a,2b, a top frame piece 3 and a bottom frame piece 4, where the designations side, top and bottom refer to the orientation, when the frame has been mounted in an inclined roof. The frame encloses an opening 5, the shape and dimensions of which correspond to those of the window (not shown) to be insulated.

[0018] In this embodiment all of the frame pieces have a ledge 6 on the side surface facing the opening. This ledge is intended to fill the space underneath the part of the window frame 20 projection over the window cashing 29, i.e. between the cashing and the circumference of the window, and it may further function as a bearing for the window. The dimensions of the opening below these ledges are therefore somewhat smaller than those of the window, while the dimensions of the opening above are slightly larger. Typically, the ledges have a width of 5-15 millimetres and the oversize of the uppermost part of the opening in relation to the window amounts to 1-2 millimetres on each side.

[0019] It is preferred that the dimensions of the opening receiving the window correspond as closely as possible to the dimensions of the window to thereby achieve the tightest possible transition between the window and the insulating frame. The insulating frame may e.g. be attached to the window frame by gluing or the insulating

frame may be made from an elastic material, allowing an expansion of the insulating frame during mounting and a subsequent contraction thereof to a close fit with the window frame. The latter may be achieved by forming the insulating frame from a soft foamed plastic.

[0020] Figs. 2 and 3 shows the lower part 7 of the frame below the ledges as rectangular and massive, but it is to be understood, that it may also shaped as e.g. a trapezoid and that the ledges may be replaced by continuous or local projections (not shown). In the embodiment shown, the ledges are capable of supporting the entire weight of the window, but it is to be understood that the window may also the supported wholly or partly by mounting brackets. Likewise, it is to be understood that ledges or projections need not be present on any of or on all four frame pieces 2a,2b,3,4 and that they need not be arranged symmetrically or evenly. Further, the ledges may be provided as or strengthened by separate members (not shown), which are embedded in or attached to the frame pieces.

[0021] The frame itself, which is preferably made of a foamed polymer, may for example be manufactured by moulding in one piece or by joining of four bevelled pieces. When using separate pieces these may be manufactured by extrusion of a continuous profile, which is subsequently cut to size in the appropriate lengths. This way of making the frame is particularly preferred, as the same profile may be used for frames of several different sizes by merely adjusting the length of each piece. In addition, the need for a number of different moulds is avoided.

[0022] The joining of separate frame pieces may be achieved by means of brackets, mechanical fastening means, welding, gluing etc. or a combination of such methods and separate corner sections may be employed.

[0023] If the insulating frame serves as a support for the window, a frame material with sufficient strength must of cause be chosen, but in other cases any material with suitable insulating properties may be used. The joining of the frame may however be facilitated by choosing a relatively stiff material.

[0024] As may be seen from Fig. 1 and in particular Figs. 2 and 3, the cross section of the bottom frame piece 4 differs from that of the side and top frame pieces 2a, 2b,3.

[0025] The upper sections of the side and top pieces have the cross sectional shape of a right-angled triangle with an apex angle of approximately 20 degrees. The distance from the ledge 6 on the inner surface to the top of the upper section 8 corresponds approximately to the height of the window frame 20, as may also be seen from Fig. 4. The window frame height is typically approximately 10 cm for standard type roof windows, but vary depending on the type, design and overall size of the window.

[0026] When using an insulating frame 1, which overlaps almost the entire height of the window frame 20, the apex of the triangle will be located just below the cover member 21 covering the upper surface of the window frame. However, a distance corresponding to e.g. three quarters of the window frame height may be adequate to provide a satisfactory insulation and such a reduction may ease the mounting of the flashing members 22 and cover members 21.

[0027] Fig. 3 shows the bottom frame piece 4 in detail. This frame piece has an upper section 8 with the general shape of an isosceles triangle, but where the hypotenuse is replaced by a curved surface. This shape corresponds closely to the room available underneath a traditional lower flashing 23 as used with standard type roof window 19 as may be seen from Fig. 5. By choosing this shape the need for adaptation of the well-tried system of flashing member 23, cover member 24 and skirt member 25 for ensuring a watertight transition between the lowermost part of the window and the roofing below it, is avoided. If, however, such considerations are less important than the improvement of the insulation of the window, a more voluminous upper section may be used at the bottom frame piece as well.

[0028] As may also be seen from Fig. 5, the shape of the lower section of the top insulating frame piece 3 may vary from the one shown in Fig. 1. Thereby the insulating properties may be improved and the insulating frame may be adapted to correspond to the shape of the side cashing 29. Such an adaptation has no influence on the design of the upper section of the insulating frame piece an thus does not necessitate an adaptation of the flashing member 30 and cover member 31 used at the top of the window 19.

[0029] The insulating frame shown in Fig. 1-3 is intended for use with a centre-hung window. It is to be understood, that some factors may need adaptation if the frame is to be used with other types of windows. For example the height of some of the insulating frame pieces may be relatively smaller, such that only a smaller part of the window frame is covered, or the triangular cross section may be modified to comprise a curved outer surface. This may e.g. be the case with the top frame piece, when the insulating frame is used for mounting a top-hung window. Likewise, an insulating frame for mounting of a centre-hung window may be provided with depressions (not shown) in the side frame pieces 2a,2b below the hinge axis to thereby give room for the side cover members during opening of the window. This may e.g. be achieved by providing two side frame pieces at each side, one above and one below the hinge axis.

[0030] In Figs. 1 and 2 the outer surface 9 of the upper section 8 of the side frame piece are shown to have projecting buds 10 arranged in a continuous pattern. The purpose thereof is to create an air gap between the surface of the insulating frame 1 and an underroof collar 26, which, as shown in Fig. 6, is attached to the insulating frame to provide a watertight transition to the underroof. The air gap 27 ensures a ventilation of the space between the underroof and the insulating frame, which reduces condensation. In Fig. 6 arrows indicate the airflow.

[0031] The buds may be replaced by any other surface profile, which will ensure the ventilation, e.g. a series of recesses or grooves extending perpendicularly to the length of the frame piece.

[0032] Advantageously, all of the frame pieces are provided with such ventilation aids 10, but the aids may be different on the different frame pieces and may be distributed unevenly over the surface thereof. It is, however, to be understood that the ventilation aids may be completely omitted if using an underroof or underroof collar of a material, which allows diffusion of vapour towards the outside.

[0033] In fig. 6 the attachment of the underroof collar 26 to the insulating frame 1 is achieved by means of clamps 28 but any suitable attachment means may be used as long as the air gap is ensured. In addition, the underroof collar may be attached to the window frame 20 (not shown in Fig. 6) above the insulating frame.

[0034] If the underroof is itself made from a relatively flexible sheet material, it may be attached directly to the insulating frame in a manner corresponding the one shown in Fig. 6 or to the window frame 20 without the need for an underroof collar 26.

[0035] Finally it is noted, that the person skilled in the art will be able to realise a number of different ways, in which the shapes of the upper and lower sections of the insulating frame pieces, the type of ledges, the use of ventilation aids etc. may be varied and combined without thereby departing from the inventive concept as described in the claims.

Claims

1. An insulating frame (1) for insulating a roof window (19), said insulating frame comprising a plurality of insulating frame pieces (2a,2b,3,4) surrounding an opening (5), the shape of which corresponds substantially to the shape of the roof window and the dimensions of which is larger than or corresponding to the outer dimensions of the roof window, each insulating frame piece having an inner side surface facing the opening, a bottom surface and at least one outer side surface facing away from the opening, **characterized in that** at least one of the insulating frame pieces comprises a lower section (7) and an upper section (8), where the upper section has a first side facing the opening and a second side (9) facing away from the opening, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that a relatively large portion of the window frame piece (20) is overlapped by the upper section of the insulating frame piece in the mounted state.

2. An insulating frame according to claim 1, **characterized in that** the upper section (8) of the insulating frame piece(s) (2a,2b,3,4) is substantially wedge shaped with an apex angle of 20-45 degrees.

3. An insulating frame according to claim 1 or 2, **characterized in that** it consists of four frame pieces (2a, 2b,3,4) corresponding to the four sides of a rectangular roof window (19).

4. An insulating frame according to claim 3, **characterized in that** the two side frame pieces (2a, 2b) being located at the sides of the window (19) in the mounted state have upper sections (8) with substantially identical cross sections and that the top frame piece (3) being located uppermost and/or the bottom frame piece (4) being located lowermost in the mounted state have upper sections (8) with cross sections that differ from that of the side frame pieces.

5. An insulating frame according to claim 4, **characterized in that** the top and/or bottom frame piece (3,4) have no upper section (8).

6. An insulating frame according to any of claims 1-3, **characterized in that** the width of the lower section (7) of one or more frame pieces (2a,2b,3,4) decreases continuously or stepwise in the height direction towards the upper section (8).

7. An insulating frame according to any of claims 1-6, **characterized in that** it is made from moulded or extruded foam plastic, such as polyurethane foam, or any other suitable material.

8. An insulating frame according to any of claims 1-7, **characterized in that** the insulating frame pieces (2a,2b,3,4) are provided with one or more stiffening members such as lists or strips.

9. An insulating frame according to claim 8, **characterized in that** the stiffening member may be used for supporting and attachment of mounting brackets for the roof window (19).

10. An insulating frame according to any of claims 1-9, **characterized in that** the second side (9) of one or more of the insulating frame pieces (2a,2b,3,4) are provided with projections (10) and/or recesses allowing air passage between and/or through them in a direction perpendicular to the length of the insulating frame piece.

11. A kit for mounting and insulation of a roof window (19), comprising an insulating frame (1), an underroof collar (26), at least one flashing member

(22,23,30) and at least one cover member (21,24,31), said insulating frame surrounding an opening (5) larger than or corresponding to the external dimensions of the roof window to be mounted, so that the window may be placed within the opening,
characterized in that
the insulating frame includes a plurality of insulating frame pieces (2a,2b,3,4) at least one of which have an upper section (8) with a first side facing the opening and a second side (9) facing a flashing and/or cover member (21,22,23,24,30,31) when mounted, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that a relatively large portion of the distance existing between a lowermost level of the flashing member and an uppermost level of the cover member in the mounted state is overlapped by the upper section of the insulating frame piece,
that the underroof collar (26) may be brought into contact with the insulating frame at or above the bottom portion of the upper section of the insulating frame, and
that one or more of the flashing and/or cover members (21,22,23,24,30,31) are shaped with angles corresponding to the angle determined by the decreasing width of the insulating frame piece.

12. A kit according to claim 11, charac - terized in that upper section (8) of the insulating frame piece is substantially wedge shaped with an apex angle of 10-45 degrees and that the corresponding flashing and cover members (21,22,23,24,30,31) have interior bending angles approximately 90 degrees larger than said apex angle.

13. A kit according to claim 11 or 12,
characterized in that the second side of one or more of the insulating frame pieces are provided with projections and/or recesses allowing ventilation of the space between the insulating frame piece (2a, 2b,3,4) and the underroof collar (26).

14. A kit according to any of the claims 11-13,
characterized in that the underroof collar (26) is attached to the insulating frame (1) by any suitable means such as welding, gluing, mechanical fastening means, such as clamps, or friction between the material of the underroof collar and the insulating frame.

15. A roof structure with a roof window (19) mounted in an insulating frame (1),
said roof structure including a roofing, a supporting structure and an underroof (26) comprising at least an external waterproof membrane and an insulating layer, said underroof being located between the roofing and the supporting structure and comprising an opening for mounting of the window,
said insulating frame comprising a lower surface intended for resting against the upper surface of the underroof and with an opening (5), which corresponds to the opening in the underroof and which is larger than or corresponding to the external dimensions of the roof window, so that the window may be placed within the opening,
characterized in that
the insulating frame (1) includes a plurality of insulating frame pieces (2a,2b,3,4) at least one of which have an upper section with a first side intended to face a corresponding window frame piece and a second side (9) intended to face a flashing and/or cover member, a bottom portion of the upper section having a predetermined maximum width, the width between the first side and the second side decreasing from said maximum width in the height direction of the upper section such that the second side forms a predetermined angle other than perpendicular with the bottom portion, and the first side having such a height that a relatively large portion of the window frame is overlapped by the upper section of the insulating frame.

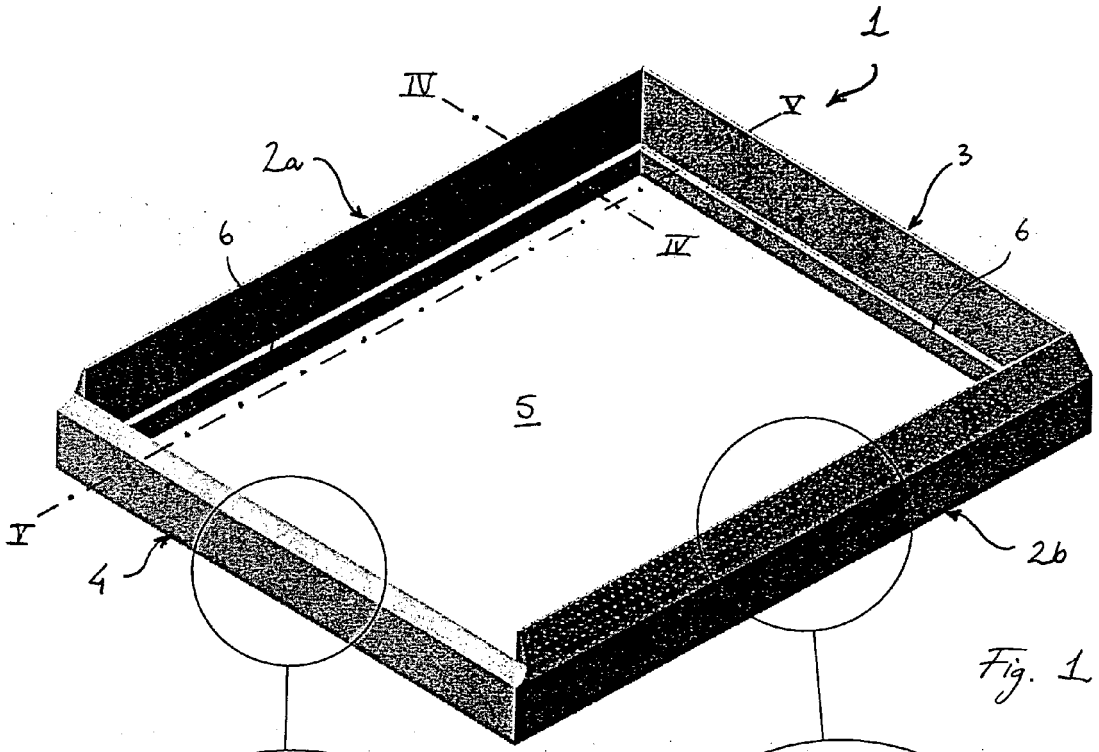

Fig. 1

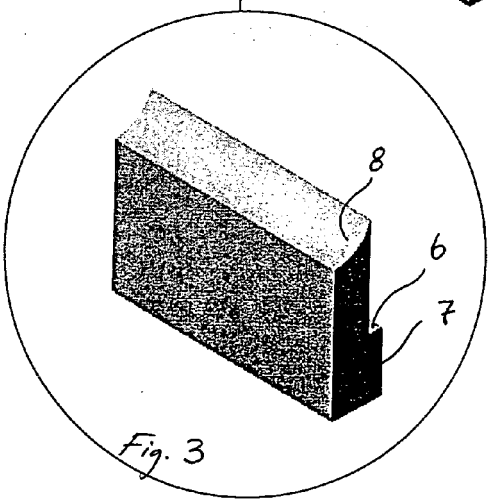

Fig. 3

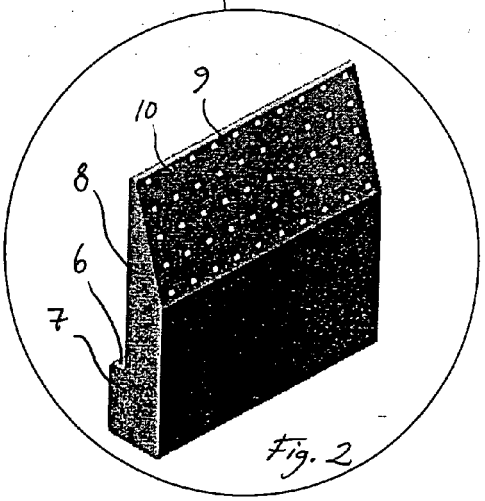

Fig. 2

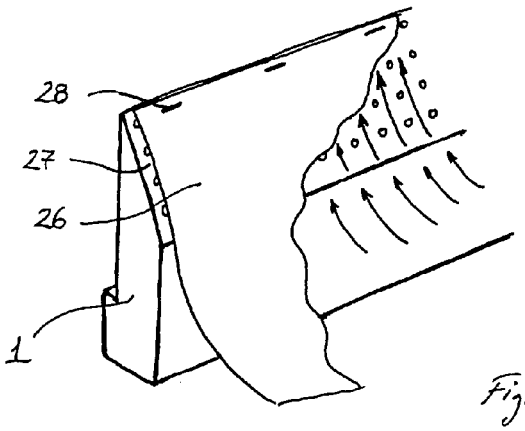

Fig. 6

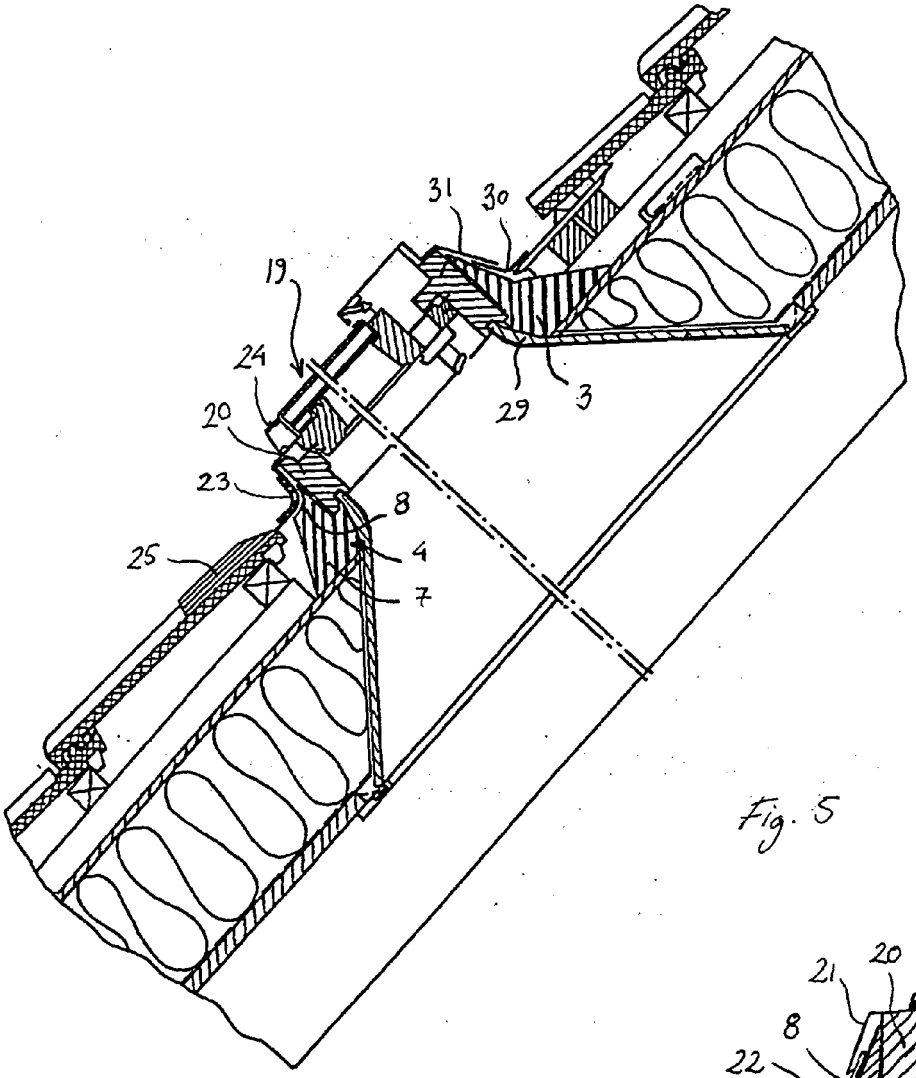

Fig. 5

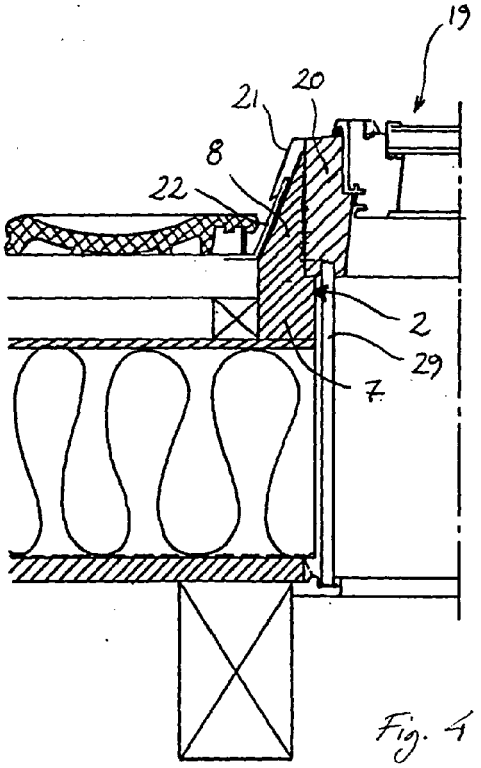

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 38 8055

DOCUMENTS CONSIDERED TO BE RELEVANT

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

E04D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 December 2005	Demeester, J

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 38 8055

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