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(54) A SKYLIGHT WINDOW

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EP 3 779 085 B1

Description

[0001] The present invention relates to a skylight window for being installed in or on a roof of a building, the skylight window comprising:

a window frame having four frame side members and potentially a window sash having four sash side members, the frame side members or the potential the sash side members supporting an insulating glazing unit (IGU) having multiple layers of glazing, a first of the frame side members and a potential first sash side member extending in a longitudinal direction along a first peripheral side of the IGU,
a weather shield attached to the frame or to the potential sash so as to protect a window portion of the skylight window, the window portion comprising the frame, IGU and the potential sash,
a curb flange having a bottom flange surface, a side flange surface, and an inclined flange surface, said inclined flange surface connecting said bottom and side flange surfaces,
wherein the curb flange is adapted for extending along a longitudinal extent of said first side frame member in an installed position of the skylight window, said bottom flange surface being positioned in abutment with an outer surface of said roof and said side flange surface being positioned in abutment with said first side frame member, whereby said inclined flange surface functions as a roofing felt mounting surface.

Background

[0002] There is often a desire to position one or more skylight windows in a roof of a building in order to allow daylight to reach the interior of the building. This, however, may give rise to a variety of challenges.

[0003] Inclined skylight windows are typically built into an opening in an inclined roof structure with an angle above 15 degrees with a substantial part of the inclined skylight window is positioned within the inclined roof structure in an installed position. Flat-roof skylight windows are generally installed on top of the exterior side of flat roofs of buildings, where the inclination of the roof is less than 5 degrees with respect to a horizontal plane of the roof. In general, flat-roof skylight windows are installed to cover an opening in the roof, i.e. a substantial part of the flat-roof skylight window extends above an exterior side of the flat roof structure in an installed position.

[0004] Furthermore, skylight windows of this type often comprise a dome-shaped weather shield attached to the sash. During an opening movement, the weather shield typically follows the movement of the sash. The main purpose of the dome or weather shield is to protect the sash and frame from the weather and to avoid accumulation of precipitation and dirt on the IGU.

[0005] It is common today to use a skylight window in flat roofs and potentially cover the window portion with a dome-shaped weather shield. One example of this type of skylight window is disclosed in WO 2009/080026 A1. This roof window comprises a standard VELUX ® outwardly hung window, to the sash of which a dome-shaped weather shield is attached.

[0006] In general, skylight windows of the prior art may be associated with relatively poor insulating properties and/or limited entry of light into an interior of the building on which the flat-roof skylight window is installed, as well as limited visibility through the window from the interior of the building as well as limited compatibility with different roof angles. This may be attributed to the manner, in which flat-roof skylight windows are installed on a roof structure of a building which generally results in a larger proportion of the window portion structure being exposed to the surrounding environment. Furthermore, with a weather shield attached to the top of the skylight, there are more layers of glazing which may result in a long travel path for light entering the flat-roof skylight window into the interior of the building. Curb flanges, which are integral parts of the roof skylight windows are commonly used in prior art flat roof windows of the above type to assist in mounting of roofing felt, in order to prevent the roofing felt from being mounted with a 90 degrees bend which may destroy the roofing felt and/or its sealing abilities. Curb flanges are also known as cant strips. In inclined roof windows curb flanges are not included because in inclined roofs the window often is installed deeper and rather than roofing felt which benefits from a flange, a metal flashing is used.

[0007] Roof windows of the prior art are furthermore known from US 2010/269426 A1, EP 3 396 100 A1 and EP 1 550 777 A1.

[0008] On this background it may be an object of the present invention to provide a skylight window according to the introduction in which the insulation properties are improved.

[0009] A further object of the invention may be to provide a skylight window with improved light entry and/or in which view through the window is improved.

[0010] In addition, an object of the invention may be to provide a skylight window that can potentially be installed on both flat and inclined roofs.

[0011] According to the invention, these and further objects are met by a skylight window according to claim 1, inter alia according to the introduction, where curb flange is provided so that it can be attached to and detached from the first frame side member.

[0012] An advantage of this invention is that the same skylight window may be installed on both flat and inclined roofs. In the case of an inclined roof, the curb flange may be removed since there might be possibly no need for an additional waterproofing element. In the case that more than one skylight window needs to be placed on the roof close to each other, this may be difficult due to lack of space on the roof area and due to the space that

the exterior structure of the skylight window takes up. Being able to detach the curb flange from the frame side member facilitates the installation of two neighboring skylight windows close to each other. In addition, the skylight window may need to be moved or installed in a different installation position such as depth in the roof structure or with a different angle. A further advantage of the invention is that the curb flange, when installed on the roof, may provide structural support to the skylight window, while still being detachable. Thus, the curb flange may hold the window in place acting as a bracket, in connection with the roof structure or possible roofing felts and also make it more resistant to outdoor conditions, such as weather, physical activities or other installations on the roof. The structural support of the window is enabled without the curb flange being an integrated part of the skylight window.

[0013] The term "detachable" or "attachable" may be understood as the curb flange being attached to and detachable from the skylight window or detached from and attachable to the skylight window. That also means that the curb flange may be mechanically detached and attached without causing substantial damage to the skylight or the curb flange itself.

The curb flange may be attachable at different postions on the frame side member in a height direction. The curb flange extends in the longitudinal direction of the frame side member in each of the positions. The curb flange may be attachable in at least 2, 3, 4, or 5 different positions. One or more positions may be associated with a marking indicating when use of that position is relevant in relation to installation of the skylight window. The marking may be inscribed, embossed or printed on etc.

The curb flange may be either attached to and detachable from or detached from and attachable to an outer surface of said first frame side member, or the curb flange may be attached to the first frame side member so as to be adjustable between different positions on the first frame side member. In the latter case, the curb flange may be attached to the first frame side member in such a manner that the curb flange is slideable along the first frame side member so as to enable adjustment of the position of the curb flange. The outer surface of the first frame side member may be substantially flat.

[0014] In an embodiment, the curb flange is substantially triangular in cross section, each of the three surfaces forming a side of the triangular cross section.

[0015] This may have the effect of improving the installation of the curb flange as the substantially triangular cross-section may be optimally suited to installation on the skylight window and roof structure in which the skylight window is installed. The three surfaces of the sides of the triangular cross-section may be adapted and so optimally suited for their specific purpose e.g. abutting and/or attaching to a frame side member of the skylight window, abutting and/or attaching to an outer surface of the structure in which the skylight window is installed or proving a mounting surface for a roofing felt.

[0016] This, along with the detachability of the curb flange, can potentially help with the structural support of the skylight window onto flat and/or inclined roofs, as well as with any rainwater running off the curb flange.

[0017] In an embodiment, the curb flange comprises attachment projection(s) and/or fasteners such as nails, clips, screws to be inserted into one or more pre-defined holes in a first frame side member.

[0018] This improves attachment and detachment of the curb flange on a frame side member of the skylight window. This may improve the installation process for a potential installer. Both the ease of attachment and detachment as well as the strength of attachment may be improved. The use of screws for the attachment of the curb flange onto the frame may be particularly advantageous, since screws may contribute to the curb flange acting as a bracket, as well as they may be easily removed when the curb flange has to be detached.

[0019] In an embodiment, the first side frame member comprises a track or groove for connection to the attachment projection(s) on the curb flange.

[0020] This improves the attachment and detachment of the curb flange on a frame side member of the skylight window. Both the ease of attachment and detachment as well as the strength of attachment may be improved.

[0021] The connection to the attachment projections may be in the form of snaplock.

[0022] Snaplock may be achieved by snapping into grooves provided in the window frame side. The grooves may be provided at different heights and positions.

[0023] In an embodiment, the material of the curb flange is stiff, with the material having a Young's Modulus value such as higher than 0.1 GPa, allowing the curb flange to carry load and structurally support the skylight window.

[0024] The material of the curb flange may have a Young's Modulus of higher than 0.5, 1, 1.5, 2, 2.5, 3, 4, 5, 10, 15, 20, 25, 30, 50, 65, 75, 100, 150 or 200 GPa. This may provide a more secure installation of the skylight window. It may also facilitate that the curb flange is the substantially only element securing the window to a roof structure. Examples of materials which may be used comprise plastics, wood, aluminium and composites. An example of a composite is HELO, which is a thermoset plastic polymer material comprising fibers.

[0025] In an embodiment, the length of said curb flange corresponds to the length of the first frame side member.

[0026] This allows the roofing felt to be mounted on the curb flange along the length of the first frame side member, so improving sealing and insulation properties. It also allows the curb flange to carry load along the entire length of the frame side member of the skylight window, improving the strength of the window. This may also allow the curb flange to be made of a material with a lower Young's modulus as the load is carried/supported over a larger area.

[0027] In an embodiment, a curb flange is installed on said four sides of said skylight window and where the

flanges when installed, together are able to carry at least half or substantially all of the weight of the skylight window in the installed position.

[0028] This may provide a more secure installation of the skylight window as it is supported on all four sides by a curb flange. It may further improve the sealing and insulation properties of the skylight window.

[0029] In an embodiment, the curb flange may be attached to the first frame side member in different positions according to an installation position of the skylight window in the roof.

[0030] This allows the skylight window to be adapted to different installation positions and scenarios. It allows the window to be installed in different positions using the same parts i.e. without the need for different or other parts. This allows production of one type of skylight window and curb flange to suit different installation positions and scenarios, which may reduce costs and improve production efficiency due to economies of scale. The position of the curb flange may be adjustable to e.g. different heights, which may facilitate the proper installation of the curb flange to different inclinations of the roof. That is the curb flange may be installed at positions of different heights on the frame side member of the skylight window.

[0031] In an embodiment, the curb flange in the installed position of the skylight window can act as a bracket structurally supporting the skylight window on the roof.

[0032] This allows the skylight window to be installed in a roof structure without further structural support besides the curb flange. This provides an alternative installation possibility and allows the skylight window to be adapted to an increased amount of installation positions and scenarios, e.g. where it may not be possible or viable to structurally support the skylight window in ways other than through the curb flange.

[0033] In an embodiment, the curb flange comprises a hollow profile and/or core spacings, e.g. having a box structure.

[0034] This may provide a stiffer and stronger curb flange. It may reduce material consumption. It may also provide a lighter curb flange which is easier to lift and handle, making it easier to handle and install for a potential installer.

[0035] In addition, the curb flange may comprise a filler and/or an insulating and/or stiffening material or member, which may comprise or consist of wood and/or a foamed polymer material. The plates of material may be extruded, and may optionally be extruded as one or more separate elements for each frame or potential sash side member, which are subsequently attached to each other, and a filler material potentially being positioned in the core spacings afterwards. As an alternative, the surrounding material may be moulded around a core of filler material. These structures may provide good strength and insulation properties and may be low-cost in manufacture.

[0036] The term movably attached may be interpreted such that it may be moved to a desired location in its attached state. It may be movable in a lateral and/or vertical direction.

[0037] The movable curb flange portion allows the curb flange portion to be adjusted to a given installation case, pre and post installation of the skylight window. This adjustability will allow the installer to compensate for discrepancies in the installation of the skylight window compared to the ideal case and so may ensure optimum performance of the skylight window. It may further allow the curb flange portion to be adjusted to meet local or regional law requirements, such as the height of the curb flange portion to the roof membrane, for the installation of the skylight windows.

[0038] The curb flange may further comprise a rain sealing lip at its outer end.

[0039] The bottom flange surface of the curb flange may be provided with adhesive elements etc. for connecting to the roof membrane. This may facilitate an improved ease of installation of the curb flange.

[0040] According to a second aspect of the invention, a method of installation of a skylight window in or on a roof of a building, according to claim 10 comprises the steps of:

providing a kit, comprising a skylight window comprising a window frame having four frame side members, potentially a window sash having four sash side members, and a curb flange having a bottom flange surface, a side flange surface, and an inclined flange surface, said inclined flange surface connecting said bottom and side flange surfaces, the frame side members or potentially the sash side members enclosing and supporting a window pane or an IGU, a first of the frame side members extending in a longitudinal direction along a first peripheral side of the window pane or IGU, wherein the curb flange can be attached to the first frame side member in different positions according to an installation position of the skylight window in the roof, the curb flange in each said position extending along a longitudinal extent of said first side frame member,

attaching the curb flange to the first frame side member in one of said different positions selected according to a selected installation position of the skylight window in the roof so that the curb flange, said side flange surface being positioned in abutment with said first side frame member, and

positioning the curb flange so that said bottom flange surface is positioned in abutment with an outer surface of the roof so that the curb flange acts as a bracket contributing to structurally supporting the skylight window on the roof.

[0041] This has the effect of providing a skylight window that may be adapted to different installation positions and scenarios. It also provides a skylight window that has a curb flange contributing to structurally supporting the skylight window.

[0042] In an embodiment, the method comprises the step of mounting a roofing felt on said inclined flange surface.

[0043] The inclined flange surface may comprise a recess and/or groove to facilitate the mounting of the roofing felt. This may provide a more secure mounting of a roofing felt which may contribute to improved sealing properties and insulation properties of the skylight window.

[0044] This provides a skylight window which is adaptable to different installation positions and scenarios with a more secure mounting of a roofing felt and thus improved sealing and insulation properties.

[0045] According to a third aspect of the invention, An embodiment concerns the use of a curb flange for structurally supporting an installed skylight window on a roof, according to claim 11, wherein said curb flange is attached to a first frame side member of the skylight window in a position selected from a number of different possible positions according to an installation position of the skylight window in the roof.

[0046] This provides a skylight window adapted to an installation positon with a curb flange. This may improve the ease of the installation. Furthermore, it may allow the skylight window to be installed in installation postions otherwise not possible.

[0047] In a development of the previous embodiment, the curb flange in the installed position of the skylight window acts as a bracket structurally supporting the skylight window on the roof.

[0048] This may improve the structural support of the skylight window. Furthermore, it may allow the skylight window to be installed in installation otherwise not possible as the curb flange may be used to structurally support the skylight window in the installed position.

[0049] This provides a skylight window that is adaptable to be installed in different installation positons, some of which which may otherwise not be possible. Another advantage may be improved sealing and insulating properies as well as structural support.

[0050] A first of the frame side members may be associated with a first of the potential sash side members, each of said first frame and potential sash side members extending in a respective longitudinal direction substantially in parallel with a first peripheral side of the IGU,

said IGU may have an exposed interior major surface for facing an interior of said building in an installed position of the skylight window, said interior major surface extending in an outward direction away from a center of the IGU, an inward direction extending in a direction opposite to said outward direction,

said IGU further having an exposed exterior major surface for facing in an exterior direction which is opposite of said interior of said building in said installed position of the skylight window, said exterior major surface extending in the outward direction, an upward direction being defined as extending away from at a right angle to said exterior major surface of the IGU

[0051] The potential first sash side member may constitute or comprise a thermal break. The thermal break may be substantially made of a material having a lower thermal conductivity than the remaining sash.

[0052] In general in this specification, in relation to a potential first sash side member, a length dimension may be defined as a dimension in which said longitudinal direction extends, a height dimension may be defined as a direction perpendicular to the length dimension and to major surfaces of the IGU, and a width dimension may be defined as a dimension perpendicular to the height and length dimensions. The width and length dimensions are thus parallel to the major surfaces of the IGU. Whereas the longitudinal direction extends in the length dimension, the width and height dimensions can be said to extend in transverse or lateral directions. The length dimension may also be denoted longitudinal direction. The width dimension may also be denoted width direction. The height dimension may also be denoted height direction.

[0053] Throughout this text the term "interior" is used to indicate that something is intended to face the interior of the building in which the skylight window is installed, in an installed position of the skylight window. The term "exterior" is used to indicate that something is intended to face in a direction opposite to the interior of the building in which the skylight window is installed, in an installed position of the skylight window. The terms "inner" and "outer" are used to indicate that something is intended for facing towards or away, respectively, from the opening in the frame of an assembled skylight window.

[0054] The terms "insulation", "insulating", "insulation properties" and "insulating properties" are to be understood in the sense of thermal insulation and thermal insulation properties and thermally insulating and insulating properties. However, other insulation may also be provided such as for example acoustic insulation.

[0055] The potential first sash side member may constitute or comprise a thermal break. The thermal break may be substantially made of a material having a lower thermal conductivity than the remaining potential sash.

[0056] As mentioned above, skylight windows for inclined roofs are typically built into the roof structure. This means that the frame and potential sash, i.e. most of the frame and potential sash structures, are embedded in the roof so that much, most or all of an outer surface of the frame facing away from the opening in the frame is positioned within the roof structure. The inventors of the present invention have realized that in inclined skylight windows installed in this way the insulation properties of the frame and potential sash are to a large extent not decisive for the total heat loss through the window. However, in skylight windows where the frame and potential sash are positioned higher than the level of the roof i.e. above the exterior surface of the roof, the typically inferior

insulation properties of the frame and potential sash structures compared to those of the IGU are to a much lesser degree alleviated by the insulation properties of the roof structure. In prior art skylight windows of the above described type the IGU is typically the best insulated part of the window, i.e. having the lowest thermal conductivity or "U-factor", unit W/(m2K), especially compared to the thermal conductivity of the frame and potential sash. Thus, the inventors have realized that it is important to minimize the area of the frame and potential sash through which heat energy will escape.

[0057] The IGU may have multiple layers of glass which define a volume comprising an inert gas or aerogels or vacuum. The IGU may in a conventional manner comprise two, three or more layers of glazing, i.e. layers of glass, polycarbonate or the like or glass panels, positioned at a distance from each other to form one or more spacings or cavities between them. This spacing may be filled with an inert gas or may hold a vacuum to improve insulation. One or more of the layers of glazing may have a low emissivity coating or coating stack. One or more of the layers of glazing may be laminated e.g. the interior layer of glazing. One or more of the layers of glazing may be tempered. Similarly, the weather shield pane may be tempered. The IGU may be see-through transparent to provide a view out. The exposed interior major surface of the IGU is in that case a lower major surface of a lowermost of the layers of glazing. Sealing and/or supporting members may be provided at one or more of four peripheral sides of the IGU between the layers of glazing. The sealing and/or supporting members may distance adjacent layers of glazing from each other and may together with lateral edges of the window glazing layers form respective side or lateral surfaces of the IGU. These side surfaces may be substantially plane and extend substantially in the height dimension as defined herein.

[0058] The potential sash may be made movable in relation to the window frame by the sash being outwardly hung, i.e. being rotatable about an axis extending along one of the potential sash side members. Generally by outwardly hung it is to be understood that the sash moves outwards from the frame during opening. This is contrary to pivot hung skylights which move both outwards and inwards during opening and employ a different design. The potential sash being outwardly hung may be achieved by using a rotary hinge positioned at this potential sash side member and connecting this potential sash side member with an associated, adjacent frame side member. Alternatively or additionally, the potential sash may be parallel-displaceable so that all four potential sash side members shift upwardly or downwardly between the open and closed positions of the window in which case further or other hinges or the like connect the potential sash with the frame. The skylight window may be openable by a combination of a rotary movement and a shifting movement or other movement paths of the potential sash in relation to the frame. Hinges may be linear displacement mechanisms or multi-link mechanisms. The skylight window may be hinged to open in the exterior direction i.e. away from the interior of the building.

[0059] The exposed interior major surface of the IGU may be a lower surface of the IGU and/or may face in a downwards direction towards an interior of the building in an installed position of the skylight window. The exposed interior major surface faces in a direction away from the weather shield.

[0060] The IGU comprises an exposed exterior major surface positioned oppositely from the exposed interior major surface and facing towards the outside, in an installed position of the skylight window. The exterior major surface may be substantially parallel with and/or may have substantially the same or the same shape and size as the interior major surface of the IGU. A distance between the two major surfaces defines a thickness of the IGU, which distance may be measured in the height dimension.

[0061] The IGU may have a rectangular shape and may have further second to fourth peripheral sides that each extends linearly along, potentially along substantially a total extent of, a corresponding respective sash member. The peripheral sides may define a shape of the IGU.

[0062] The four frame side members may together form a substantially rectangular shape. Additionally or alternatively, the four potential sash side members may together form a substantially rectangular shape. A rectangular shape of the four potential sash side members may be smaller than a rectangular shape of the four frame side members, which may allow the potential sash to be embedded within the frame.

[0063] In an embodiment, the first frame side member further comprises a lining panel protrusion located lower than the exposed interior major surface of the IGU in the height direction, wherein the interior pane comprises a side surface extending substantially along the first frame and sash side members, wherein the lining panel protrusion protrudes away from the IGU, the lining panel protrusion comprising a first surface for abutting a surface of a reveal panel or lining panel so as to position the reveal panel or lining panel, and-wherein, in the closed position of the skylight window, the first surface of the lining panel protrusion in a lateral direction extending along the exposed interior major surface of the IGU is positioned farther away from the side surface of the interior pane than the supporting section.

[0064] The skylight window may further comprise a removable lining panel protrusion and/or recess. The removable lining panel protrusion and/or recess may be separately affixed to the frame and may be a part that is separate from the frame i.e. not an integral part of the frame.

[0065] The weather shield may be provided as a unitary structure, which is detachably attached to the to the potential sash. The weather shield may be attached detachably to the potential sash, providing for access to clean the IGU; this may also be of advantage during

mounting of the skylight window, e.g. when positioning or attaching the window portion or when attaching roofing felt to cover a potential gap between the frame and the roof structure.

[0066] The weather shield is mounted on the window portion to protect it from the elements and preventing rain and other downfall from entering into gaps or slots in the roof or the window portion.

[0067] The weather shield comprises a weather shield pane that is surrounded by a weather shield skirt that extends on an outer side of all four sides of the frame, i.e. of the respective frame side members. The skirt may be manufactured from or include metal. The weather shield pane may curve upwardly in relation to the window portion or the IGU to allow for rain and snow to slide or flow off of the weather shield pane. Alternatively or additionally, the weather shield pane may be a transparent window pane that may be of glass or hardened glass. The weather shield pane may comprise only one single layer of glazing. In the following, the weather shield may be understood as a transparent cover member, preferably a dome of glass or a clear polymer.

[0068] The frame may enclose the potential sash in the closed position of the skylight window.

[0069] Respectively associated frame and potential sash side members may be positioned to be substantially parallel to each other in both the open and closed positions of the skylight window.

[0070] The first frame and/or potential sash side member may extend substantially along an entire length of said first peripheral side or side surface of the IGU.

[0071] The first leg may have a height in the height dimension of at least 1.5, 1.8, 2 or 2.2 times a height or thickness of the IGU, where the height of the IGU as mentioned may be defined as a distance between its exposed exterior major surface and its exposed interior major surface. Additionally or alternatively, the first leg may have an inner side surface facing a side surface of the first peripheral side of the IGU, this inner side surface extending 1.3, 1.5, 1.8 or 2 times the height or thickness of the IGU.

[0072] The first potential sash side member may in general in all embodiments have a substantially uniform cross section along a length of the first potential sash side member in said longitudinal direction. Alternatively or additionally, the first frame side member may have a substantially uniform cross section along a length of the first frame side member in said longitudinal direction. One or more of the remaining frame and potential sash side members may similarly have substantially uniform cross sections in the same manner.

[0073] Generally, one or more of the frame and/or potential sash side members may comprise or be made substantially of polymer materials, such as plastic, specifically PVC (polyvinyl chloride), chlorinated PVC, PUR (polyurethane), fibre reinforced PUR such as glassfibre reinforced PUR, and/or wood and/or metal such as aluminium or composites or combinations thereof. The frame and/or potential sash may have a general hollow core structure with one or more hollows inside spacings or cavities surrounded by thin layers or plates of material, such as plastic or PVC, specifically fiber-reinforced PVC, which plates may extend in the longitudinal direction and may be connected to each other at corners thereof such as to form a shell structure surrounding the spacings. One or more spacings may comprise a filler and/or an insulating and/or stiffening material or member, which may for example comprise or consist of wood and/or a foamed polymer material. The plates of material may be extruded, and may optionally be extruded as one or more separate elements for each frame or potential sash side member, which are subsequently attached to each other, and a filler material potentially being positioned in the core spacings afterwards. As an alternative, the surrounding material may be moulded around a core of filler material. These structures may provide good strength and insulation properties and may be low-cost in manufacture. Alternatively, the surrounding material or plates may comprise or substantially consist of metal, such as steel and/or aluminium. It is noted that the skylight window according to the invention can be made stronger due to the third leg of the first potential sash side member, see further below, which may have the advantage that the frame and potential sash may be made of a less strong, but better insulating material, e.g. PVC instead of steel.

[0074] The first leg of the first potential sash side member may on a surface facing the IGU, which surface may substantially extend in the height dimension, comprise two or more grooves, the first groove being positioned at a first distance from the interior major surface of the IGU, the second groove being positioned at a second distance from the interior major surface of the IGU, which is different from distance between the first groove and the interior major surface of the IGU, the first and second grooves being adapted for receiving a fixation member which can be attached to or snap-locked to either one of the two grooves, the fixation member abutting the exterior major surface of the IGU so as to hold the IGU along said first peripheral side thereof, especially in the upward direction. Hereby the IGU may be exchanged with an IGU of different thickness by switching the fixation member to the other of the two grooves. With the present invention the IGU can be positioned lower in the window structure, which means that more room may be available for including larger thicknesses of the IGU and more grooves and thus options for IGU thicknesses. The fixation member may be manufactured of or comprise a plastic and/or sealing material and may comprise one or more projections that are adapted to be in abutment with the upper or exterior major surface of the IGU such as to hold this in place against an upper resting surface of a second or third leg. The fixation member may extend substantially along an entire length (in the longitudinal direction) of the first potential sash side member and/or the first peripheral side of the IGU. Similar fixation members may be at-

tached to similar grooves of the one, two or three of the other potential sash side members along the other three peripheral sides of the IGU.

[0075] The potential sash side members may be interconnected at the corners of the respective sash by corner keys. The corner keys may be attached to respective potential sash side members in hollows thereof. The corner keys may be made substantially of of a rigid and hard material such as metals like aluminium, steel or wood. The corner keys act to prevent potential sash members from moving out of alignment with interconnected sash members respectively.

[0076] A chain drive, hinge or the like may be provided connecting the frame and potential sash for assisting in opening and closing the skylight window.

[0077] In this specification, generally one or more or all individual ones of the legs mentioned herein of the frame and potential sash members may be provided separately from each other, each leg potentially being attached to adjacent legs. Alternatively, where a leg is described as being attached to another leg, these two legs may be provided integrally or in one piece with each other.

[0078] In an embodiment of the present invention, said second leg extends as far as or farther than said secondary leg in said inward direction.

[0079] This may improve or further contribute to hiding parts of or the entire window when seen through the IGU from an interior of a building in the installed position of the window.

[0080] In an embodiment, said primary leg of said first frame side member extends as far as or farther in said upward direction than the location of said exterior major surface of the IGU.

[0081] This allows for positioning the IGU deeper or lower in the window structure. This reduces the area of the frame and potential sash through which heat energy escapes (or enters) from the interior of the building. Furthermore, improved light inflow and view through the skylight window are achieved.

[0082] In an embodiment, said first potential sash side member further has a third leg projecting from an inner end of said second leg in a direction away from said interior major surface of the IGU to provide a lower supporting surface which in the closed position of the window rests on a corresponding upper resting surface of the first frame side member. The direction away from said interior major surface of the IGU, in which direction the third leg projects, may extend substantially in the height dimension and/or may extend downwards, i.e. towards an interior the building in an installed position of the skylight window.

[0083] Said inner end of the second leg may be positioned opposite from an outer end of the second leg, said outer end preferably being connected to the first leg at a position from which the second leg projects. Said inner end may be denoted a proximal end and said outer end a distal end with relation to the first leg.

[0084] The third leg of the first potential sash side member may provide additional support to the IGU, which is a typically relatively heavy component of the window. This means that it is possible to substantially reduce the strength and/ or stiffness of the first and second legs of the first potential sash side member without compromising structural integrity of the first potential sash side member. As a consequence, the first and second legs may be made of smaller size, which again allows for positioning the IGU lower in the window structure as well as to use an IGU with a larger planar area, i.e. it extends further to the sides and so increase the relative area of IGU compared to the skylight window. This reduces the area of the frame and potential sash through which heat energy escapes from (or enters) the interior of the building.

[0085] The third leg may be provided in the form of a stiffening and/or strengthening leg, which substantially improves stiffness, strength, structural integrity and/or the like of the first potential sash side member. Accordingly, the third leg may affect stiffness, strength, moment of inertia and/or like structural properties of the first potential sash side member, including providing greater resistance to bending. Improved structural properties mean that the potential sash can hold a larger IGU or an IGU having a plurality of glazing layers.

[0086] Thus, by improving the structural properties of the potential sash in this manner, it has been found that when holding IGUs of substantially the same size and weight as in the prior art, it is possible to decrease the size of other legs of the potential sash, specifically the first and second legs. The IGU can be placed lower in the skylight window construction, and as such will improve the insulating properties of the skylight window.

[0087] Furthermore, due to the improved structural properties of the first potential sash side member the inventors have realized that inclusion of the third leg need not obstruct entry of light or the view through the IGU. On the contrary, since it is possible to position the IGU lower in the window structure, entry of light and view through the IGU may, in fact, be improved.

[0088] The third leg may comprise the only or substantially the only supporting surface or supporting point of the first potential sash side member resting on the frame in the closed position of the skylight window. Similarly, in one or more of the remaining three potential sash side members a corresponding third leg may comprise the only or substantially the only supporting surface or supporting point of the respective potential sash side member resting on the frame in the closed position of the skylight window. This may provide an improved ability to position and center the skylight window during closing thereof. Other contact points or contact surfaces between the frame and potential sash in the closed position of the skylight window, which contact surfaces are not carrying any substantial amount of the weight of the potential sash in the closed position of the skylight window, may include sealing members between associated frame and potential sash side members. An insignificant amount of a

weight of the potential sash in the closed position of the window can be defined as less than 20, 10, 5, 3, 2 or 1 percent of a total weight of the potential sash imposed by the first potential sash side member on the first frame side member. It is preferable that the only contact points between one, two, three or four of the potential sash side members to the associated frame side member are established by the abutment element(s) and potential sealing members, potentially a hinge and/or a chain drive for moving the potential sash. The abutment element (s) may be of or comprise an elastic material and/or a plastic material and/or a sealing material. The abutment element may be deformed in the closed position of the skylight window.

[0089] In case a rotary hinge and/or a chain drive is included in the skylight window, the rotary hinge and/or chain drive may also establish a contact point between frame and potential sash, which may also carry part of the weight of the potential sash in both the closed and especially in the open position of the skylight window.

[0090] Alternatively, a lower supporting surface of the second leg may in the closed position of the window rest on a corresponding upper resting surface of the first frame side member. The first leg or the potential fourth leg mentioned further below may also or alternatively comprise a lower supporting surface that rests on a corresponding upper resting surface of the first frame side member in the closed position of the skylight window. An upper resting surface of the second or third leg on which the IGU rests may be provided as an upper resting surface in the form of one or more sealing members, which sealing members may be manufactured from a polymer material, may include glue and/or a sealing material and may extend in the longitudinal direction, potentially in substantially an entire length in the longitudinal direction of the first peripheral side of the IGU and/or of the second leg. The lower supporting surface of the first leg and/or of the second leg and/or of the third leg may be provided by one or more abutment elements attached to or forming part of one or both of the frame and potential sash. This abutment element(s) may be provided at a corner (corners) of the first frame and/or potential sash side member.

[0091] The side surface extending along said first peripheral side may potentially have an angle to the interior major surface of the IGU of approximately 90 degrees. Generally, each of the first, second and/or third legs may be substantially plate-shaped and/or oblong and/or have a flat shape, potentially so that they together form a step where an upper surface of the second leg may be denoted a step surface.

[0092] Generally, the first leg may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the height dimension than in the width dimension. Similarly, the second leg may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the width dimension than in the height dimension. Similarly, the third leg may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the height dimension than in the width dimension. Alternatively or additionally, the second leg may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the width dimension than the first leg and/or than the third leg. As explained above, it is possible to increase these ratios of the first and second leg due to the improved structural properties gained by the provision of the third leg, which makes it possible to position the IGU lower in the window structure and to extend further sidewards than would otherwise be the case. The distance the legs extend in a dimension may in this context by an overall and/or total and/or largest extent of the relevant leg.

[0093] Alternatively or additionally, generally, the extent in the length dimension of the first, second and third legs may be substantially equal to or 1 to 1.3 times the extent of the first peripheral side of the IGU in the length dimension. The extents measured also in this context and in general throughout the present specification may be an overall and/or total and/or largest extent of the leg in question in the relevant direction. Alternatively or additionally, the second leg may be defined as projecting from a surface of the first leg, which surface extends substantially in the height dimension and faces the IGU, and/or the third leg may be defined as projecting from a surface of the second leg, which surface extends substantially in the height dimension and is substantially perpendicular to the IGU. These latter surfaces may be imaginary, i.e. the relevant portions may be integral with each other at said imaginary surfaces. If these surfaces are imaginary, the surfaces may be denoted planes.

[0094] Generally, an angle between the first and second legs and/or between the second and third legs may be 70 to 110 degrees or 80 to 100 degrees or substantially 90 degrees. This angle may be measured between a surface of one leg adjacent or contiguous to a surface of the other leg and/or between a overall directions in which the respective legs extend.

[0095] Generally, the first leg may be attached to or formed integrally with the second leg, and/or the second leg may be attached to or formed integrally with the third leg.

[0096] Generally, the first and third legs may project in substantially opposite directions from the second leg, these opposite directions both preferably being substantially in the height dimension. The first leg may extend in an upwards direction, and/or the third leg may extend in a downwards direction.

[0097] The third leg may be positioned with a major part thereof being located beneath the first leg.

[0098] The lower supporting surface of the third leg may form part of the third leg and/or may be a lower surface of the third leg and/or may extend substantially in the width dimension.

[0099] The direction away from said exposed interior major surface of the IGU, in which direction the third leg projects, may extend substantially in the height dimension and/or may extend downwards, i.e. towards an interior the building in an installed position of the skylight window.

[0100] In general, in a cross section perpendicular to the length dimension or to the longitudinal direction the first leg and/or second leg and/or third leg may be substantually shaped as a rectangle, e.g. outer surfaces of the individual leg form an overall rectangular shape. However, the first leg may be substantially shaped as a trapezoid or a trapezium, an outer surface of the first leg extending substantially along a surface of the first frame side member (e.g. along a surface of the primary leg of the first frame member, which may be similarly inclined, see further below) being inclined, e.g. with 1 to 10 or 2 to 5 degrees, with respect to the height dimension. This inclination may be towards the second leg and/or may be in an outward and upward direction. An inward direction may generally in this specification be defined as a direction towards a centre of the IGU, and the outward direction may be a direction opposite to the inward direction, which directions extend in the width dimension. The first frame side member may comprise a side surface extending substantially in parallel with the the latter side surface of the first leg in the closed position of the window. A surface of the first leg extending along another surface of the first frame side member (e.g. along an upper surface or the step surface of the secondary leg of the first frame side member, see further below) may extend substantially in the width dimension. A surface positioned opposite from the latter surface of the first leg may be substantially parallel to the latter surface of the first leg in the closed position of the window. Another surface of the first leg, specifically a surface extending next to the side surface of the first peripheral side of the IGU, may connect the two latter surfaces of the first leg and/or may extend substantially in the height dimension. Similarly, the third leg may comprise a side surface facing a surface of the first frame side member and extending substantially in the height dimension, but may extend at an angle of 1 to 10 or 2 to 5 degrees with relation to the height dimension. The first frame side member may comprise a side surface extending substantially in parallel with the latter side surface of the third leg in the closed position of the window. The inclination in this context may be in a direction away from the second leg and/or may be in an outward and upward direction.

[0101] Said lower supporting surface of said third leg of the first sash side member and/or the corresponding upper resting surface of the first frame side member may extend substantially in the width dimension.

[0102] One or more sealing members may be provided at a corner formed between the second and third legs, this sealing member abutting the first frame side member in the closed position of the skylight window.

[0103] In an embodiment of the invention said first potential sash side member further has a fourth leg projecting from an upper end of said first leg in a direction away from from the IGU. Said direction away from the IGU may be in said width dimension and/or be said outward direction.

[0104] The fourth leg may provide a further lower supporting surface which in the closed position of the window rests on a corresponding further upper resting surface of the first frame side member, specifically of the primary leg thereof mentioned further below.

[0105] Alternatively or additionally, the fourth leg may in the closed position of the window be positioned above the below mentioned primary leg of the first frame side member. A width of the fourth leg may substantially correspond to a width of this primary leg.

[0106] As is the case for the first, second and third legs, the fourth leg may be substantially plate-shaped or have a flat shape so that an upper surface thereof forms a further step surface similar to and potentially extending substantially in parallel with the step surface of the second leg.

[0107] Alternatively or additionally, the fourth leg may have an oblong shape in the width dimension and/or may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the width dimension than in the height dimension. Alternatively or additionally, the extent in the length dimension of the fourth leg may be substantially equal to or 1 to 1.3 times the extent of the first peripheral side of the IGU in the length dimension. Alternatively or additionally, the fourth leg may be defined as projecting from a surface of the first leg extending in the height dimension and facing away from the IGU. This surface may be imaginary in the manner described above.

[0108] An angle between the first and fourth legs may be 70 to 110 degrees or 80 to 100 degrees or substantially 90 degrees.

[0109] The fourth leg is preferably attached to or formed integrally with the first leg.

[0110] The fourth leg may extend along, preferably along a substantially entire length of, the first peripheral side of the IGU.

[0111] The fourth and second legs may extend substantially in parallel.

[0112] In a cross-section perpendicular to the length dimension or to the longitudinal direction the fourth leg may be substantually shaped as a rectangle. However, the fourth leg may be substantially shaped as a trapezoid or a trapezium, a surface of the fourth leg extending substantially along an upper surface of the first frame side member (e.g. along an upper surface of the primary leg of the first frame member, which may be similarly inclined, see further below) being inclined, e.g. with 1 to 10 or 2 to 5 degrees, with respect to the width dimension. This inclination may be in the inward and/or downward direction. The fourth leg may further comprise a first lateral side surface facing and/or attached to the first leg and potentially extending substantially in the height dimension and an opposite, substantially parallel side surface that may face in the outward direction. An upper surface of the fourth leg may extend substantially in the width dimension and may connect the two parallel surfaces thereof.

[0113] The fourth leg may have a height in the height dimension less than the thickness of the IGU and/or sub-

stantially equal to the height of the second leg.

[0114] One or more sealing members may be provided at a corner formed between the fourth and first legs, these sealing members abutting the first frame side member in the closed position of the skylight window. Alternatively or additionally, a sealing element may be attached to the fourth leg or to the first frame side member, the sealing element preferably covering an outwardly facing potential gap or a slot between the fourth leg and the first frame side member in the closed position of the skylight window.

[0115] In a development of the embodiment comprising a third leg, the IGU extends from an inner edge of the third leg towards the first leg in the width dimension to farther than half of an accumulated width of the first, second and third legs.

[0116] Hereby the IGU extends relatively far in the width dimension, which reduces heat transmission through the frame and potential sash and thus through the window as explained in the above. As explained, this is made possible due to the provision of the third leg, which allows for thinner first and second (and fourth) legs.

[0117] More preferred, the IGU extends from an inner edge of the third leg in the width dimension to farther than 0.6, most preferred farther than 0.7, of said accumulated width of the first, second and third legs.

[0118] In another embodiment the interior major surface of the IGU is positioned at a distance of less than 45 % of a total height of the first leg from said lower end of said first leg.

[0119] Hereby the IGU is positioned relatively deep in the window structure, i.e. in the downward direction, which similarly reduces heat transmission through the frame and potential sash and thus through the window as explained in the above. Again, this is made possible due to the provision of the third leg, which allows for thinner first and second legs.

[0120] The lower end of the first leg may be defined as the lowest position of the first leg in the height dimension and/or the end of the first leg from which the second leg projects.

[0121] More preferred the interior major surface of the IGU is positioned at a distance of less than 40, 35, 32 or 30 % of the total height of the first leg from said lower end of said first leg.

[0122] In another development of the embodiment comprising a third leg, the third leg has an oblong shape in the height dimension.

[0123] The oblong shape of the third leg may be defined as the height of the third leg being at least 1.5, 2, 2.5 or 3 times longer than the width thereof. Additionally or alternatively, the third leg may extend in the height dimension 1, 1.5, 2 or 2.5 times a height of the second leg. Additionally or alternatively, the third leg may have a height of 0.3 to 1, 0.3 to 0.8, 0.4 to 0.7 or 0.4 to 0.6 times a height of the first leg. Additionally or alternatively, a height of the third leg may be 0.5 to 1.5, 0.7 to 1.3 or 0.8 to 1.2 times a width of the second leg.

[0124] In another embodiment the first frame side member comprises a primary leg with a surface extending next to and along a side surface of said first leg of the first potential sash side member, said side surface of said first leg facing substantially away from said first peripheral side of the IGU, and a secondary leg extending along a surface of said second leg of said first potential sash side member, which surface faces substantially away from said interior major surface of the IGU.

[0125] In an embodiment, the cross-sectional shape of the first frame side member and the first potential sash side member may have a stepped profile, where the frame side member may comprise primary, secondary, tertiary or more legs where each leg may be substantially perpendicular to an immediately preceding leg and the immediately following leg, such that a step like structure is formed. Similarly, the first potential sash side member may comprise a first, second, third or more legs, where each leg may be substantially perpendicular to an immediately preceding leg and the immediately following leg, such that a step like structure is formed. Generally, each of the primary, secondary and/or tertiary legs may be substantially plate-shaped and/or oblong and/or have a flat shape, potentially so that they together form a step where an upper surface of the second leg may be denoted a step surface. Similarly the the first, second and/or third legs may be substantially plate-shaped and/or oblong and/or have a flat shape, potentially so that they together form a step where an upper surface of the second leg may be denoted a step surface.

[0126] A stepped configuration of adjacent surfaces of the first frame and potential sash side members may thus be achieved by means of the stepped profile of the first potential sash side member as described and an associated stepped profile of the first frame side member according to the present embodiment. This stepped configuration may provide a labyrinth like structure between the frame and potential sash side member, resulting in a less direct path for air, precipitation or dirt to pass between the interior and exterior of the building. The stepped profile also provides the possibility of placing sealing elements along the profile such that sealing is facilitated between two parallel surfaces i.e. a surface of the frame side member and a parallel potential sash side member. Furthermore, insulating sealing members may conveniently be positioned between the first frame and potential sash side members at respective corners of the stepped configurations, e.g. as described in the above. Hereby, insulating and sealing properties of the skylight window may be further improved. This allows the force exerted through the potential sash corresponding to the weight of the IGU and potential sash to be utilized in compressing the sealing elements place between the frame side member and potential sash, to ensure optimal sealing.

[0127] In the embodiment comprising a third leg, the secondary leg of the first frame side member may further comprise a side surface, which may extend substantially in the height dimension, and which faces, is placed next

to and/or extends along a side surface of the third leg of the first potential sash side member. Said side surface of the third leg of the first potential sash side member may similarly extend substantially in the height dimension and/or may face in the outwards direction. Said two side surfaces may be substantially parallel to each other in the closed position of the window and/or be inclined with 2-10 or 2-5 degrees in relation to the height dimension and/or they may extend in the length dimension and/or along substantially a total extent of the first frame and potential sash side members in the longitudinal direction.

[0128] In the embodiment comprising a third leg, the third leg may have an extent in the height dimension of at least 0.2, 0.3, 0.4 or 0.5 times an extent of the secondary leg in the height dimension.

[0129] In a development of the embodiment comprising a third leg, the first frame side member comprises a tertiary leg, which comprises said corresponding upper resting surface of the first frame side member on which said lower supporting surface of said third leg of the first potential sash side member rests in the closed position of the window.

[0130] The tertiary leg may in the closed position of the window be positioned below or immediately below the third leg of the first potential sash side member. A width of the tertiary leg may be 0.3 to 1 of a width of the third leg.

[0131] The tertiary leg may be substantially plate-shaped or have a flat shape so that an upper surface thereof forms a further step surface similar to and potentially extending substantially in parallel with the step surfaces of the primary and secondary legs. This step surface may be positioned beneath the abutment element explained further below.

[0132] The tertiary leg may have an oblong shape in the height dimension and/or may extend longer, e.g. at least 1.5, 2, 2.5 or 3 times longer, in the height dimension than in the width dimension. Alternatively or additionally, the extent in the length dimension of the tertiary leg may be substantially equal to or 1 to 1.3 times the extent of the first peripheral side of the IGU in the length dimension. Alternatively or additionally, the tertiary leg may be defined as projecting from a surface of the secondary leg extending in the width dimension and facing inwardly. This surface may be imaginary in the manner as mentioned above.

[0133] An angle between the secondary and tertiary legs may be 70 to 110 degrees or 80 to 100 degrees or substantially 90 degrees.

[0134] The tertiary leg is preferably attached to or formed integrally with the secondary leg.

[0135] The tertiary leg may extend along, preferably along a substantially entire length of, the first peripheral side of the IGU.

[0136] The tertiary and third legs may extend substantially in parallel in the closed position of the window.

[0137] The tertiary leg may project from the secondary leg substantially inwardly and/or in the width dimension.

[0138] The tertiary leg may form a third step surface, corresponding to the first and second step surfaces of the primary and secondary legs, respectively, which may be substantially parallel to the first and second step surfaces.

[0139] In a cross-section perpendicular to the length dimension or to the longitudinal direction the tertiary leg may be substantually shaped as a rectangle. However, the tertiary leg may be substantially shaped as a trapezoid or a trapezium, an inwardly facing surface of the tertiary leg being inclined, e.g. with 1 to 10 or 2 to 5 degrees, with respect to the height dimension. This inclination may be in the inward and/or the upward direction. The tertiary leg may further comprise a first lateral side surface facing and/or being attached to the secondary leg and potentially extend substantially in the height dimension and an opposite side surface that may face in the inward direction, the latter being the surface that may be inclined in relation to the height dimension. The resting surface or an upper surface of the tertiary leg may extend substantially in the width dimension and may connect the two lateral side surfaces thereof.

[0140] The tertiary leg may have a height in the height dimension less than the thickness of the IGU and/or less than that of the first, third, primary and/or secondary leg.

[0141] In a development of the embodiment comprising a third leg, an abutment element may be provided as part of said third leg of the first potential sash side member so that said abutment element provides said lower supporting surface of said third leg, and/or is provided as part of the first frame member so that said abutment element provides said corresponding upper resting surface of the first frame side member on which said lower supporting surface of said third leg rests in the closed position of the skylight window.

[0142] The abutment element may extend along substantially a total length of the first frame and/or potential sash side members and/or substantially along a total length of the third leg and or said lower surface of the third leg, these lengths being in the length dimension.

[0143] The abutment element is preferably a separate part attached to remaining parts of the tertiary leg. Furthermore, the abutment element may comprise an abutment surface, which includes or forms the resting surface on which the supporting surface of the third leg rests in the closed position of the skylight window. The abutment surface may in a position in which the third leg does not rest on it be inclined with an angle of 5 to 25 or 10 to 20 degrees with respect to the height dimension and/or may extend substantially linearly. Such an inclined abutment surface may help positioning or centering the potential sash in the frame during a closing movement. Accordingly or alternatively, the supporting surface of the third leg of the potential sash side member, which supporting surface is in abutment with the resting surface of the abutment element in the closed position of the skylight window, may comprise part of an outer side surface of the third leg as well as part of a lower surface of the third leg, these outer and lower surfaces of the third leg forming a

lower, outer corner of the third leg. Hereby the third leg and thus the first potential sash side member are held by the abutment element both in the width dimension (outwardly) and in the height dimension (downwardly). Holding the potential sash in the width dimension helps centering and embedding the potential sash in the frame in the closed position of the skylight window, especially if all frame and potential sash side members are provided with a similar configuration.

[0144] In embodiments where the secondary and tertiary legs of the frame side member are provided, the abutment element may form part of the secondary and/or of the tertiary leg of the first frame side member, and/or the abutment element may be attached to and/or abut one side the secondary leg and/or be attached to another part of the tertiary leg.

[0145] The abutment element may form a seal covering an opening or slot that would otherwise be provided between the third leg of the first potential sash side member and the tertiary leg of the first potential sash frame side member in the closed position of the skylight window.

[0146] A similar abutment element may be provided in a similar manner on or forming part of one, two or three of the remaining frame and/or potential sash side members. In this case, abutment elements with inclined surfaces in the manner described will help positioning and centering of the potential sash within the frame during closing of the skylight window.

[0147] The abutment element(s) may form the only or substantially the only resting point or resting surface of the potential sash or of one or more of the potential sash side members on the frame in the closed position of the skylight window. This provides a superior ability to position and center the skylight window during closing thereof. Other contact points between the potential sash and the frame in the closed position of the skylight window may include sealing members between associated frame and potential sash side members, but these sealing members preferably only carry an insignificant amount of the potential sash in the closed position of the window, i.e. less than 10, 5, 3, 2 or 1 percent. It is preferable that the only direct contact points between one, two, three or four of the potential sash side members to the associated frame side member are established by the abutment element(s) and potential sealing members. Generally, a potential sash side member is "associated" with a frame side member if they lie adjacent to each other in the closed position of the skylight window. In case a rotary hinge and/or a chain drive is/are included in the skylight window, the rotary hinge and/or chain drive may establish one or more indirect contact points or contact areas between potential sash and the frame, which may also carry part of the weight of the potential sash in both the closed and especially in the open position of the skylight window.

[0148] In another embodiment a second, third and/or fourth potential sash side member is/are substantially similar and/or identical in shape and/or form and/or size and/or structure to the first potential sash side member.

[0149] In another embodiment a second, third and/or fourth frame side member is/are substantially similar and/or identical in shape and/or form and/or size and/or structure to the first frame side member.

[0150] In the latter two embodiments, all frame and/or side members, respectively, may have substantially identical cross-sectional shapes in a cross section perpendicular to the length dimension associated with the first potential sash side member. Alternatively or additionally, all frame and/or potential sash side members, respectively, may be substantially identical to each other.

[0151] Thus, two or more of the four respective frame and potential sash side members may be similar or substantially identical to each other. This makes it cheaper to produce and may allow for optimal movement and positioning of the potential sash during opening and closing of the skylight window. Also, safe sealing may be provided between the potential sash and the frame, simple mounting may be achieved and the structural properties of the frame and/or potential sash are the same on all sides of the skylight window.

[0152] In case the first potential sash side member comprises the above described fourth leg, the weather shield may be attached to the fourth leg. In case all four potential sash side members comprise the above described fourth leg, the weather shield may be attached to each of the fourth legs.

[0153] In alternative embodiments, the weather shield may be replaced by a flat window pane, which may be positioned to be substantially parallel to the window portion.

[0154] In another development of the embodiment comprising a third leg, the first frame side member further comprises a cover leg that covers the third leg in the closed position of the skylight window so as to at least partly or substantially hide the third leg when seen from below the interior major surface of the IGU.

[0155] Hereby the third leg, which is typically the only or the most visible element of the first potential sash side member when seen from inside the building, may be at least partly or completely hidden when seen from inside the building in an installed position of the window.

[0156] The cover leg may extend in the longitudinal direction along substantially an entire length of the first leg and/or the first potential sash side member.

[0157] In the embodiment where the first frame side member comprises a tertiary leg, the cover leg may form part of the tertiary leg or extend from an inward surface of the tertiary leg. The cover leg and the secondary and tertiary legs of the first frame side member may establish a longitudinally extending groove, potentially with the secondary leg and the cover leg defining sides thereof and the tertiary leg defining a bottom thereof, and into which the third leg, when provided, of the first potential sash side member is inserted or embedded when the potential sash moves to the closed position of the skylight window.

[0158] The IGU extends in a lateral direction, defining

an IGU plane, and the four frame side members define a frame plane.

[0159] In an embodiment, the first frame side member comprises a first leg, the first leg extending substantially in the height direction, the height direction being perpendicular to the lateral direction, and a second leg, extending substantially in the lateral direction, wherein the first leg has an outer side, the outer side facing away from a frame opening, wherein the second leg has an interior side configured to face an interior of the building in an installed position of the skylight window frame, the outer side having a major outer surface. The frame opening is defined by the four frame side members. The frame opening is positioned towards the IGU.

[0160] The curb flange may comprise one or more pre-formed holes that are through holes. Alternatively, the curb flange may comprise a blind pre-formed hole. The curb flange may comprise a pre-formed hole adapted for receiving a fastener, such that the fastener mounts the curb flange to the outer side of the first frame side member and/or to the roof.

[0161] The skylight window may comprise a curb flange comprising a pre-formed hole and a fastener, the fastener being inserted into the pre-formed hole, such that the fastener attaches the curb flange to the outer side of the first frame side member.

[0162] In an embodiment, the curb flange comprises a bottom flange surface, a side flange surface, and an inclined flange surface, forming a substantial triangular shape, the inclined flange surface connecting the bottom and side flange surfaces, the inclined surface comprising at least one pre-formed hole adapted for receiving a fastener, such as a screw or nail. The at least one pre-formed hole extends from the inclined flange surface towards the bottom flange surface and/or the side flange surface in height direction and/or lateral direction and/or a direction which is inclined in relation to the frame plane.

[0163] The first frame side member comprises a pre-formed hole adapted for receiving a fastener, such as a screw or nail, the pre-formed hole extending from the major outer surface of the first leg towards the interior side of the second leg in a direction which is inclined in relation to the frame plane. In an embodiment, the curb flange comprises two or three pre-formed holes in the height direction and in the lateral direction and/or in the inclined direction, such that the imaginary axes that the pre-formed holes extend along are not parallel and are intersecting with each other.

[0164] In an embodiment, the major outer surface of the first leg is substantially perpendicular to the frame plane, such as the major outer surface is forming an angle of 80 to 90 degrees with the frame plane.

[0165] In an embodiment, an angle between the pre-formed hole and the frame plane is formed, the angle being in the range of approximately 10 to 80 degrees, such as 40 to 80 degrees, 55 to 75 degrees, preferably 60 to 70 degrees, 45 degrees, 65 degrees, 68 degrees or 70 degrees.

[0166] The pre-formed hole may comprise an inner geometry, such as a bushing.

[0167] In an embodiment, the outer side of the first frame side member is substantially flat and is adapted for receiving the curb flange.

[0168] In an embodiment, the skylight window may further comprise a motor-driven actuator comprising an elongated lifting element connecting the frame and the sash for moving the sash between the open position and the closed position, said elongated lifting element having a top end and a first position in which the skylight window is in the closed position and a second position in which the skylight window is in the open position. The top end of the elongated lifting element may abut or be attached to the sash. The motor-driven actuator may be positioned between the IGU and the frame in a direction parallel with the exposed interior major surface of the IGU in the closed position of the skylight window. The motor-driven actuator may be a chain actuator, the elongated lifting element may be a chain, and the top end may be a top end of a top joint of the chain. The lifting element in the closed position may be collapsed, rolled-up, folded-up, telescopically retracted or in another way compacted. The lifting element may be unrolled, unfolded, telescopically extended, or in another way extended in the open position.

[0169] The chain actuator may comprise a push-pull chain which can extend and retract to open and close the skylight window. Such a chain may be referred to as a trust chain as it may transmit a push force. The chain may be driven by an electric motor. A reduction gear may be provided. The reduction gear may comprise a worm and/or multiple gear drive. A final sprocket gear may engage the chain. A spindle may be used to drive the chain. The chain actuator may fold the chain when the chain is retracted and stored. The chain may be stored to substantially extend in a storing direction or such that one or more lengths of the chain extend substantially in a storing direction. The chain extending to open the skylight window may extend substantially perpendicularly to the storing direction. The storing direction may be the same as the longitudinal direction, in which case the chain may be stored to substantially extend in the longitudinal direction along a frame side member. This may provide a compact solution.

[0170] The chain actuator may be hidden inside a window frame or sash or otherwise arranged out of sight, e.g. outside a periphery of the skylight window. The chain actuator may be arranged in a spacing defined between the sash and the frame in the closed position of the skylight window. Preferably the chain actuator may be arranged inside a frame profile or inside a sash profile. The chain actuator may comprise an actuator housing. The chain may extend and retract through an opening in the actuator housing. The actuator housing may be an elongated actuator housing. The actuator housing may extend substantially extend in parallel with the storing direction. The chain extending to open the skylight window

may extend substantially perpendicularly to the actuator housing. The chain actuator housing may be hinged to the skylight window so the chain can tilt during movement such as extending and/ or retracting to open and/or close the skylight window. The chain actuator may be self-locking and support and/or hold the weight of sash and IGU. The chain actuator may also be assisted by a spring to carry some of the weight of sash and IGU. The chain actuator may comprise a locking mechanism and/or brake to lock-up the chain. Besides the compact design a chain actuator may have other advantages. The chain actuator may provide a stable opening force from the very beginning of the opening movement.

[0171] In an embodiment the skylight window is installed in or on a flat roof of a building to cover a roof opening of the roof, said exposed interior major surface of the IGU facing an interior of the building.

[0172] In an embodiment the skylight window is installed in or on an inclined roof of a building to cover a roof opening of the roof, said exposed interior major surface of the IGU facing an interior of the building.

[0173] A flat roof may be defined as a roof with a roof inclination, i.e. an inclination of a roof surface, of less than 5 degrees in relation to horizontal.

[0174] An inclined roof may be defined as a roof with a roof inclination. i.e. an inclination of a roof surface, of more than 5 degrees inclination in relation to horizontal.

[0175] The skylight window may be positioned so that a major part of or the entire frame and/or the entire potential sash are positioned above an upper roof surface level.

[0176] Interior and exterior major surfaces of the IGU may be substantially parallel in the closed position of the window with a plane defined by the roof surface or may have an inclination of less than 1, 2, 3, 4 or 5 degrees to said roof surface plane.

[0177] A person skilled in the art will appreciate that any one or more of the above embodiments and/or developments and/or options may be combined with each other to form further embodiments of the present invention, within the limits defined by the claims.

Detailed description

[0178]

Fig. 1 is a perspective view from above of an embodiment of a skylight window according to the present invention installed in a roof,

Fig. 2 is a cross-sectional perspective view taken along the line II-II of Fig. 1 showing a detail of the window according to Fig. 1,

Fig. 3 is a cross-sectional view along the line II-II of Fig. 1, thus corresponding to Fig. 2,

Fig. 4 is a cross-sectional side view taken along the line IV-IV of Fig. 1 showing another detail of the window according to Fig. 1,

Fig. 5 is a cross-sectional view similar to that of Fig. 2 showing an alternative embodiment of a first frame side member of the skylight window according to Fig. 1,

Fig. 6 is a cross-sectional view similar to that of Fig. 2 showing an alternative embodiment of the first sash side member of the skylight window 1,

Fig. 7 is a cross-sectional view similar to that of Fig. 6 showing an alternative embodiment of a first sash side member of a skylight window 1,

Fig. 8 is a cross-sectional view showing an alternative embodiment of a first sash side member of a skylight window. window, the window not falling within the scope of the claims as the curb flange misses a recess.

[0179] Figs 1 and 2 show an embodiment of a skylight window 1 according to the present invention installed or positioned substantially horizontally in a flat roof 2 of a building and covering an opening O in the roof. The skylight window 1 comprises a weather shield 3 and a window portion 4, which includes a transparent insulting glazing unit 5, abbreviated IGU, a sash 6 supporting the IGU 5, and a frame 7. The weather shield 3 comprises a transparent weather shield pane 8 and a skirt 9, which cover the sash and the IGU.

[0180] In this embodiment, both the entire sash 6 and the entire frame 7 are positioned above an upper roof surface, also denoted the exterior roof surface. The skylight window 1 may, however, also be positioned so that a part of the frame 7 and the sash 6 are positioned below the exterior roof surface level.

[0181] The flat roof 2 shown here has a roof inclination of less than 5 % in relation to horizontal. The skylight window may however also be installed in an inclined roof.

[0182] The IGU 5 has an exposed interior major surface 5b facing downwards towards an interior of the building in the shown installed position of the skylight window 1 and exposed exterior major surface 5g facing in the opposite direction towards the weather shielding pane 8 and the exterior. The interior and exterior exposed major surfaces of the IGU 5 are substantially parallel with a plane defined by the roof surface, i.e. the exterior roof surface level.

[0183] The frame 7 comprises four frame side members of which two 10, 11 are visible in Fig. 1, and one 10 is visible in Fig. 2. Each frame side member is associated with one of four corresponding sash side members of which and one 14 is visible in Fig. 2. The frame side member 10 is associated with the sash side member 14 and both extend a longitudinal direction L along a first peripheral side 5a of the IGU 5. The four frame side members form a substantially rectangular shape and, similarly, the four sash side members form a substantially rectangular shape. In this embodiment each frame side member is positioned at an outer side of a respective associated one of the four sash side members, i.e. on the side facing away from the opening O and the IGU, so that the sash fits into the frame and the frame 7 en-

closes the sash 6 in the closed position of the skylight window 1.

[0184] The frame side member 10 is an embodiment of the first frame side member of the skylight window according to the invention. The sash side member 14 is an embodiment of the first sash side member according to the invention.

[0185] The window sash 6 supports the IGU 5 and is connected to the window frame 7 via hinges (not shown in Figs 1-3) so that it is movable in relation to the frame 7 between an open and a closed (not shown) position of the skylight window 1. The window is shown in the closed position in all of the figures. It is, however, to be understood that the invention is not limited to openable windows or to windows including both a moveable sash and a stationary frame.

[0186] Fig. 3 shows the same cross sectional view as Fig. 2, but in a two-dimensional side view.

[0187] In relation to the sash side member 14, a length dimension is defined as a dimension in which said longitudinal direction L extends, a height dimension is defined as a direction perpendicular to the length dimension and to the interior major surface of the IGU, and a width dimension is defined as a dimension perpendicular to the height and length dimensions. The width and length dimensions are parallel to the interior major surface of the IGU. The downward direction is the direction in the height dimension towards which the interior major surface 5b of the IGU 5 faces. The upward direction is a direction opposite to the downward direction. An inward direction is a direction in the width dimension towards a centre of the IGU 5 or towards the opposing sash side member 13, and the outward direction is a direction opposite to the inward direction.

[0188] As may be seen, the frame side member 10 in this embodiment comprises a bottom surface 10a, which is level with the exterior roof surface of the roof 2. This bottom surface 10a faces downwards and comprises a recess 10b, which is an empty spacing that accomodates an upper part or upper end 50a of a reveal panel or lining panel 50 in the installed position of the skylight window 1. The remaining three frame side members are provided with similar recesses accomodating respective similar panels. These panels define the reveal or aperture or light well or light shaft, which extends through the roof 2 so as to cover side surfaces of the opening O in the roof, which allows daylight to reach the interior of the building.

[0189] The recess 10 comprises a first surface 10c that abuts an inwardly facing surface of the lining panel 50. The IGU extends beyond said first surface 10c of the recess 10 in the width direction so that the peripheral side 5a of the IGU 5 is located on the outer side of the recess in the width direction.

[0190] The recess 10b comprises a second surface 10d positioned oppositely from said first surface for abutting an outwardly facing surface of said reveal panel or lining panel when received in said recess. The first and second surfaces 10c, 10d of the recess 10 extend substantially in the height dimension and are substantially linear. A distance between these first and second surfaces defines a width of the recess, which width corresponds to a width of the upper part 50 of the lining panel 50 in order to accommodate the lining panel upper part 50 in the recess 10b.

[0191] The weather shield 3 is provided as a unitary structure, which is separate from the window portion 4. The weather shield 3 is mounted on the window portion 4 for covering and weather protecting the window portion 4 in the installed state of the skylight window 1. The weather shield pane 8 is curved towards the exterior, i.e. upwardly in Fig. 1, in relation to the window portion 4. In other embodiments, a flat pane may be used to for the weather shield 3. The weather shield pane 8 is transparent and here comprises only one single layer of glazing made for example of hardened glass.

[0192] The slightly curved weather shield pane 8 extends over the entire roof opening O, which opening the skylight window 1 is positioned to cover.

[0193] The shield pane 8 is surrounded by the weather shield skirt 9, which extends on an outer side of all four sides of the frame 7, i.e. of the respective frame side members, see Fig. 1. The weather shield 3 is provided as a unitary structure, which is separate from and detachably attached to the window portion 4, specifically to the sash 6 so as to move together with the sash 6 during the opening and closing movement thereof.As is seen in Figs 2 and 3, the sash side member 14 has a first leg 15 extending next to and along the first peripheral side 5a of the IGU 5, and a second leg 16 projecting from a lower end 15a of the first leg 15 in the lateral or width direction inwards underneath the IGU 5. As can also be seen, the exposed exterior major surface 5g of the IGU 5 is positioned at a distance from the lower end 15a of said first leg, which constitutes less than 80 % of the total height of the first leg 15.

[0194] The first sash side member 14 further has a third leg 17 projecting from an inner end 16b of the second leg 16 in a downwards direction away from the interior major surface 5b of the IGU 5 to provide a lower supporting surface 17a which in the closed position of the window 1 rests on a corresponding upper resting surface 27a of the frame side member 10. The direction away from the interior major surface 5b of the IGU 5, in which direction the third leg 17 projects, extends substantially in the height dimension and extends downwards, i.e. towards the interior the building in the installed position of the skylight window 1.

[0195] At an upper end the third leg 17 includes a resting surface 16a on which said interior major surface 5b of the IGU 5 rests. The upper resting surface 16a of the third leg 17 is provided as an upper resting surface 16a of a sealing member 22, which is manufactured from a resilient material and extends in the longitudinal direction L over substantially the entire length of the first peripheral side 5a of the IGU 5 or of the third leg 17. The sealing member 22 is a separate part attached in a slot of the

third leg 17. Thus, not an entire upper surface of the third leg 17 constitutes the upper resting surface 16a of the third leg 17. The upper resting surface 16a and/or the sealing member may alternatively be moved further to the left in Fig. 3 and instead form part of the second leg 16.

[0196] In this embodiment, all four sash side members have the structure as described for the sash side member 14 and the corresponding or associated four frame side members have the same structure as the frame side member 10, but this need not always be the case.

[0197] The lower supporting surface 17a of the third leg 17 abuts an abutment element 78 in the closed position of the window 1, which abutment element 78 is a separately provided element forming part of the frame 7 and which is attached to the remaining parts of the frame 7. This abutment element 78 is provided at or in an inner corner of the frame side member 10.

[0198] In this embodiment, the third leg 17 comprises the only supporting point of the sash side member 14, which rests on the frame 7 in the closed position of the skylight window 1. Similarly, corresponding third legs of the remaining three sash side members each comprises only one supporting point for the respective sash side member on the frame 4 in the closed position of the skylight window 1, except for the contact provided by the hinges.

[0199] Other contact points or contact surfaces between the sash 6 and frame 7 in the closed position of the skylight window 1, which contact surfaces are not carrying any substantial amount of the weight of the sash 6 (and IGU and weather shield 3) in the closed position of the skylight window 1, may include not shown sealing members between associated sash and frame side members. These sealing members may be attached in holding members 18, 19, 20 of the sash side member 14 as shown in Fig. 3. As is best seen in Fig. 3, the IGU 5 in a conventional manner comprises three layers of glazing 5c, 5d, 5e positioned at a respective distance from each other to form respective spacings or cavities between them. These spacings are in a conventional manner filled with a gas to improve insulation. The lowermost surface 5b constituting the exposed interior major surface is a lower major surface of the lowermost glazing layer 5e. Sealing and supporting members 23, 24 are provided at the peripheral side 5a of the IGU 5 between the layers 5c, 5d, 5e of glazing so that outer sides of the layers 5c, 5d, 5e and the sealing and supporting members 23, 24 define a side or lateral surface 5f of the IGU 5 together with the end surfaces of the glazing layers. This side surface is substantially plane and extends substantially in the height dimension shown in Fig. 3.

[0200] The IGU 5 has a rectangular shape and has further second to fourth peripheral sides that each extends along a corresponding respective sash and frame side member in a similar manner as described above for the sash side member 14.

[0201] The first leg 15 is positioned adjacent to the side surface 5f of the first peripheral side 5a of the IGU 5. The second 16 and third 17 legs are positioned adjacent to the interior major surface 5b of the IGU 5. The first leg 15 extends along the side surface 5f, the latter having an angle to the interior major surface 5b of the IGU 5 of approximately 90 degrees.

[0202] As can be seen in Fig. 3, the first leg 15 extends more than 3 times longer in the height dimension than in the width dimension. The second leg 16 extends more than 3 times longer in the width dimension than in the height dimension. The third leg 17 extends more than 3 times longer in the height dimension than in the width dimension. The second leg 16 extends about 2 times longer in the width dimension than the first leg 15 and about 3 times longer in the width dimension than the third leg 17. The extent in the length dimension of the legs 15, 16, 17 is substantially equal to the extent of the first peripheral side 5a of the IGU 5 in the length dimension, but preferably slightly longer in order to allow them to be interconnected at the corners of the sash. The extents measured in this context are a total or largest extent of the leg 15, 16, 17 in question in the relevant dimension. The second leg 16 projects from a surface 15b of the first leg 15, which surface 15b extends substantially in the height dimension and faces the IGU 5, and the third leg 17 projects from a surface 16d of the second leg 16, which surface 16d extends substantially in the height dimension and is substantially perpendicular to the interior major surface of the IGU.

[0203] An angle between the first 15 and second 16 legs and between the second and third legs 17 is substantially 90 degrees, respectively.

[0204] The first leg 15 is formed integrally with the second leg 16, and the second leg is formed integrally with the third leg 17.

[0205] The inner or distal end 16b of the second leg 16 is positioned oppositely from an outer or proximal end 16e of the second leg 16, said outer end 16e being connected to the first leg 15 at a location from which the second leg 16 projects.

[0206] The first 15 and third 17 legs project in substantially opposite directions from the second leg 16, these opposite directions both being substantially in the height dimension.

[0207] The first leg 15 extends about 100 % of the distance between said exterior and interior major surface of the IGUs in the in the height direction from the exterior major surface of the IGU, i.e. having a height which is about twice the thickness of the IGU.

[0208] The first leg 15 does not extend to cover said exterior major surface of said IGU. No part of the sash 14 and frame 10 extends along the exterior major surface of the IGU 5. In the latter context, the fixation member 30 mentioned below is not considered part of the sash side member 14.

[0209] The first frame side member 10 comprises a primary leg 25 with a surface 25b extending next to and along a side surface 15c of the first leg of the sash side member 14, said side surface 15c facing substantially

away from the first peripheral side 5a of the IGU 5. The primary leg at a lower end thereof is connected to an outer end of a secondary leg 26 extending along a surface 16f of the second leg 16 of the sash side member 14, which surface 16f faces substantially away from the interior major surface 5b of the IGU 5. The lower end of the primary leg is positioned below the interior major surface 5b of the IGU 5. The second leg 16 extends as far as or somewhat farther than the secondary leg 26 inward in the width direction. A stepped configuration of adjacent surfaces of the first sash side member 14 and first frame side member 10 is thus achieved by means of the stepped configuration of the first sash side member 14 as described and an associated stepped structure of the first frame side member 10. This stepped structure provides a labyrinth type structure acting to prevent dirt, water and contaminants from entering the interior of the building from an exterior of the building.

[0210] In a cross section perpendicular to the length dimension or longitudinal direction L all legs 15, 16, 17, 25, 26, 27 may each be substantially shaped as a rectangle. However, in this embodiment the first leg 15 of the sash side member is substantially shaped as a trapezoid or a trapezium, a surface 15c of the first leg 15 in the closed position of the window 1 extending along the surface 25b of the primary leg 25, both surfaces being inclined with about 5 degrees with respect to the height dimension. This inclination is in an outward and upward direction in Fig. 3. A surface 15d of the first leg 15 extends along an upper surface 26b of the secondary leg 26 extends substantially in the width dimension. The surface 26b is substantially parallel to the surface 15d in the closed position of the window. The surface 15d of the first leg 15 connects the two surfaces 15b, 15c of the first leg 15. The third leg 17 comprises a side surface 17b facing a surface 26a of the secondary leg 26 and extends at an angle of about 5 degrees in relation to the height dimension. The surfaces 15c, 25b, 17b, 26a extend substantially in parallel in the closed position of the window 1.

[0211] The second leg 16 comprises a first lateral side surface 16g facing and attached to the first leg 15 and extending substantially in the height dimension. The opposite, substantially parallel side surface 16d faces and is attached to the third leg 17.

[0212] In this embodiment, all sash and frame side members each have a substantially uniform cross section along a length of these in the longitudinal direction L, except possibly for holes being provided for the attachment of a locking assembly, hinges or the like. Local recesses may also be provided for accommodating hinges and the like.

[0213] A base structure of the frame and sash side members is substantially of fiber-reinforced PVC. This base structure is a grid or hollow core structure with several hollow inside spacings or cavities surrounded by thin layers or plates of PVC, which plates are connected to each other at corners thereof such as to form a shell structure surrounding the spacings. Two of the core spacings of the first frame side member each comprise an insulating stiffening filler member 25a, 25b, see Fig. 3, which consist of a foamed polymer material. The plates of material of the sash side member 14 and the frame side member 10 are extruded each in one piece, these pieces subsequently respectively being attached to the other of the sash and frame side members, respectively, at ends thereof to form the sash 6 and frame 7.

[0214] The first leg 15 comprises on the surface 15b two grooves 28, 29, the first groove 28 being positioned at a first distance from the interior IGU plane, the second groove 29 being positioned at a second, smaller distance from the interior major surface of the IGU. The first and second grooves 28, 29 are adapted for receiving a fixation member 30, which can be attached to or snap-locked to either one of the two grooves 28, 29, abutting the exterior major surface of the IGU 5 so as to hold the IGU 5 along said first peripheral side 5a thereof, especially in the upward direction. The fixation member 30 is positioned in the groove 28 in the shown embodiment. Hereby the IGU 5 may be exchanged with an IGU of smaller thickness by switching the fixation member 30 to the other groove 29. The fixation member 30 is manufactured of a plastic and sealing material and comprises a projection adapted to be in abutment with the upper or exterior major surface 5g of the IGU 5 such as to hold this in place against the upper resting surface 16a. The fixation member 30 extends substantially along an entire length (in the longitudinal direction L) of the first peripheral side 5a of the IGU 5. Similar fixation members are attached to similar grooves of the one, two or three of the other sash side members at the other three peripheral sides of the IGU 5.

[0215] The primary leg 25 extends about 50 percent of a distance between said exterior and interior major surface of the IGUs, i.e. the thickness of the IGU 5, in the upward direction from the exterior major surface 5g of the IGU 5.

[0216] A chain drive or the like (not shown) may be provided connecting the sash 6 and frame 7 for assisting in opening and closing the skylight window 1.

[0217] In this embodiment, the sash side member 14 has a fourth leg 31 projecting from an upper end 15e of the first leg 15 in the outward direction away from the IGU 5 in the width dimension. The fourth leg 31 is in the closed position of the window 1 positioned above the primary leg 25 of the frame side member 10 as shown in Figs 2 and 3. A width of the fourth leg 31 substantially corresponds to a width of the primary leg 25.

[0218] As is the case for the legs 15, 16, 17, the fourth leg 31 has a flat shape so that an upper surface thereof forms a further upper step surface similar to and potentially extending substantially in parallel with the step surface 16c of the second leg 16.

[0219] The fourth leg 31 has an oblong shape in the width dimension and extends more than 3 times longer in the width dimension than in the height dimension. The extent in the length dimension of the fourth leg 31 is sub-

stantially equal to about equal to or somewhat longer than the extent of the first peripheral side 5a of the window pane 5 in the length dimension.

[0220] An angle between the first 15 and fourth 31 is substantially 90 degrees.

[0221] The fourth leg 31 is formed integrally with the first leg 15.

[0222] The fourth and second legs 31, 16 extend or project substantially in parallel.

[0223] In the cross section shown the fourth leg 31 is substantually shaped as a rectangle or, more specifically, as a trapezoid or a trapezium, a surface 31b of the fourth leg 31 extending substantially along an upper surface 25c of the primary leg 25 being inclined with about 5 degrees with respect to the width dimension and being parallel to the upper surface 25c. This inclination is in the downward and outward direction in Fig. 3. The fourth leg 31 further comprises a first imaginary lateral side surface 31c facing and attached to (integral with) the first leg 15 and extending substantially in the height dimension, and an opposite, substantially parallel side surface 31d that faces in the outward direction. The upper surface 31a of the fourth leg 31 extends substantially in the width dimension and connects the two parallel surfaces 31d, 31c. Note that when the surfaces in question comprise slots, projections, indentations or the like, the dimension in which the surface is said to extend is an overall surface without taking such irregularities into account.

[0224] The fourth leg has an overall or total height in the height dimension less than the thickness of the IGU 5.

[0225] The skirt 9 of the weather shield 3 is attached to each of the fourth legs of the four sash side members.

[0226] As can be seen in Fig. 3, the IGU 5 extends in the width dimension from an inner surface 17c of the third leg 17 towards the first leg 15 to farther than half of an accumulated width of the first, second and third legs 15, 16, 17. This accumulated width is equal to a total extent of the legs 15, 16, 17 in the width dimension.

[0227] The interior major surface of the IGU is positioned at a distance of less than 40 % of the total height of the first leg 15 from said lower end 15a of said first leg 15, more specifically the lower surface 15d.

[0228] The third leg 17 has an oblong shape in the height dimension so that the height of the third leg 17 is more than 3 times longer than the width thereof. The third leg 17 extends in the height dimension more than 4 times a height of the second leg 16. The third leg 17 has a height of about 0.5 times a height of the first leg 15. The height of the third leg 17 is about equal to the width of the second leg 16.

[0229] The secondary leg 26 of the frame side member 10 comprises a side surface 26a, which extends substantially in the height dimension, but with a small inclination, and which faces, and is placed next to and extends along the side surface 17b of the third leg 17. The side surface 26a faces substantially in the outwards direction. The side surfaces 17b, 26a are substantially parallel to each other in the closed position of the window, are inclined with about 5 degrees in relation to the height dimension and extend in the length dimension along substantially a total extent of the sash and frame side members 10, 14 in the longitudinal direction L.

[0230] The frame side member 10 comprises a tertiary leg 27, which comprises the abutment element 78 with the corresponding upper resting surface 27a of the frame side member 10 on which the lower supporting surface 17a of the third leg 17 rests in the closed position of the window.

[0231] The tertiary leg 27 is in the closed position of the window 1 positioned below and partly to the outward side of the third leg 17. A width of the tertiary leg 27 is about half of a width of the third leg 17.

[0232] The tertiary leg 27 is also substantially plate-shaped and has a flat shape, an upper surface thereof on which the abutment element 78 is positioned forming a further step surface 27a similar to and potentially extending substantially in parallel with the step surfaces 25c, 26b of the primary 25 and secondary 26 legs.

[0233] The tertiary leg 27 has an oblong shape in the height dimension and extends more than 3 times longer in the height dimension than in the width dimension. The extent in the length dimension of the tertiary leg 27 is substantially equal to the extent of the first peripheral side 5a of the IGU 5 in the length dimension. The tertiary leg 27 projects from a surface of the secondary leg 26, said surface extending in the width dimension and facing inwardly.

[0234] An angle between the secondary leg 26 and the inward direction in which the tertiary leg 27 extends is substantially 90 degrees.

[0235] The part of the tertiary leg 27 that does not include the abutment element 78 is formed integrally with the secondary leg 26.

[0236] The tertiary leg 27 and third leg 17 extend substantially in parallel in the closed position of the window.

[0237] In the cross section shown in Fig. 2 the tertiary leg is substantially shaped as a trapezoid or a trapezium, an inwardly facing surface 27b of the tertiary leg 27 being inclined about 5 degrees with respect to the height dimension. This inclination is in the inward and upward directions. The tertiary leg 27 further comprises a lateral side surface 27c facing and attached (integral with) a lower part of the side surface 26a of the secondary leg 26 and extending substantially in the height dimension. The upper surface 27a of the tertiary leg 27 extends substantially in the width dimension and connects the two lateral side surfaces 27b, 27c thereof.

[0238] An inwardly facing interior surface 50 located below the interior major surface 5b is provided in the form of the surfaces 17c, 27b. An angle α (Fig. 2) formed between said inwardly facing interior surface 50 and the interior major surface 5b or the interior major surface of the IGU at an interior corner formed between said surfaces is about 90 or 95 degrees.

[0239] The tertiary leg 27 has a height in the height dimension less than the thickness of the IGU and less

than that of the first, third, primary and secondary legs 15, 17, 25, 26.

[0240] The abutment element 78 is provided as part of the tertiary leg 27 so that the abutment element 78 provides the upper resting surface 27a of the frame side member 10 on which the lower supporting surface 17a of the third leg 17 rests in the closed position of the skylight window 1.

[0241] The abutment element 78 extends along substantially a total length of the frame and sash frame side members 7, 6 and substantially along a total length of the third leg 17 and the lower supporting surface 17a of the third leg 17, these lengths being in the length dimension.

[0242] The abutment element 78 is a separate part attached to the remaining parts of the tertiary leg 27. The abutment element 78 comprises the resting surface 27a in the form of an abutment surface 27a, on which the supporting surface 17a of the third leg 17 rests in the closed position of the skylight window 1. The abutment surface 27a is in a position, in which the third leg 17 does not rest on it, inclined with an angle of about 15 degrees with respect to the height dimension and extends substantially linearly. When the sash side member 14 rests on the abutment element 78, the abutment element 78 is somewhat deformed since it to some extent gives in to the weight of the sash 6 as shown in Fig. 2. This inclined abutment surface 27a helps positioning and centering the sash 6 in the frame 7 during the closing movement. The supporting surface 17a of the third leg 17 comprises part of the outer side surface 17b of the third leg 17 as well as part of a lower surface 17d of the third leg 17, these outer and lower surfaces 17b, 17d of the third leg 17 forming a lower, outer corner of the third leg 17. Hereby the third leg 17 and thus the sash side member 14 are held by the abutment element 78 both in the width dimension (outwardly) and in the height dimension (downwardly). Holding the sash side member 14 in the width dimension helps centering the sash 6 in the frame 7 in the closed position of the skylight window 1, especially since all sash and frame side members are provided with a similar configuration.

[0243] The abutment element 78 forms a seal covering an opening or slot that would otherwise be provided between the third leg 17 and the tertiary leg 27 in the closed position of the skylight window 1.

[0244] The abutment element 78 is of an elastic, plastic and sealing material.

[0245] Similar abutment elements are provided in a similar manner on the remaining frame side members. The abutment elements form the only or substantially the only resting point or resting surface of the sash 6 (including the window pane 5 and the weather shield 3) on the frame 7 in the closed position of the skylight window 1.

[0246] Roofing felt (not shown) may in a conventional manner be positioned to seal between outer surfaces of the frame 7 and a roof opening in the roof 2, which opening the window 1 is positioned to cover. These outer surfaces of the frame 7 are here formed by a curb flange of the frame 7. In Fig. 3 a curb flange 40 is shown, which curb flange 40 has an overall triangular shape and forms part of the frame side member 10. Similar curb flanges are here provided at the remaining frame side members.

[0247] Fig. 4 is a cross-sectional side view showing a detail of the skylight window 1 according to Fig. 1 along the line IV-IV of Fig. 1, the cross sectional plane extending normal to the length dimension and being the same as in Fig. 2 except for showing the frame side member 18 opposed to the frame side member 10 and the sash side member 13 opposed to the sash side member 14. Note that the view of Fig. 2 only shows the elements of the window 1 which are visible or present in the cross-section, i.e. which are cut through, whereas in the view of Fig. 4 also elements behind the cross section are visible.

[0248] In Fig. 4 a conventional rotary hinge 21 of the window 1 is shown, which connects upper parts of the frame side member 18 and the sash side member 13 with each other so as to enable a rotary movement of the sash 6 (and IGU 5 and weather shield 3) in relation to the frame 7 along a rotary axis in a conventional manner. This rotary movement opens the window 1 in a conventional manner. If installed in an inclined roof the skylight window can be either top-hung, bottom-hung or side-hung

[0249] The rotary hinge 21 establishes a contact point between sash 6 and frame 7, which also carries part of the weight of the sash 6 in both the closed and especially in the open position of the skylight window 1.

[0250] Fig. 5 shows an alternative embodiment of the frame side member 10. In Fig. 5 as well as in the following figures the same reference numbers as in Figs 1-4 will be used for features having substantially the same function even if not they are not structurally identical.

[0251] This embodiment is different from the embodiment of Figs 1 to 4 only in that it includes a cover leg 32. The cover leg 32 covers the third leg 17 of the sash side member in the closed position of the skylight window 1 so as to hide the third leg 17 completely when seen from the interior of the building.

[0252] The cover leg 32 extends in the longitudinal direction along substantially the entire length of the first leg 17 and/or the sash side member 14.

[0253] The cover leg 32 extends from the inward surface 27b of the tertiary leg 27 of the frame side member. The cover leg 32 and the secondary 26 and tertiary 27 legs of the frame side member 14 establish a longitudinally extending groove 33 with the secondary leg 26 and the cover leg 32 defining sides thereof and the tertiary leg 27 defining a bottom thereof. The third leg 17 of the sash side member 14 is inserted in this groove 33 when the sash 6 moves to the closed position of the skylight window 1.

[0254] Fig. 6 shows an embodiment where the sash side member 14 comprises a first leg 15 extending in a substantially upwards direction with a second leg 16 projecting in an inwards direction from a lower end of the

first leg 17. The second leg 16 comprises a supporting section 72 which is adhered to the exposed exterior major surface 5g of the IGU 5 by an adhesive 74. The adhesive may for example be a silane-terminated polyurethane (SPUR) adhesive, but may a silyl modified-polymer (SMP) adhesive or any other suitable adhesive may also be used. The adhesive may also be provided as an adhesive tape. A third leg 17 projects from an upper end of the first leg 15 in an outwardly direction where a fourth leg 31 projects from an outer end of the third leg 17 in an upwards direction.

[0255] As may be seen, the legs of the sash side member 14 are here plate-shaped with not internal spacings as in the embodiments in Figs 1-5, which makes the sash side member comparatively slim.

[0256] The window is here provided with a curb flange 40 that can be attached and detached to suit the given installation scenario, such as installation in a flat or inclined roof, or installation of two or more skylight windows 1 closely adjacent to each other in which case there may not be room for the curb flange.

[0257] The exposed interior major surface 5b of the IGU 5 abuts a sealing element 22 on the frame side member 10. That is, sealing between the IGU 5 and the frame side member 10 is achieved by a sealing element 22 sealing directly against the IGU 5 and not against the sash side member as in Figs. 1-5. This allows the skylight window 1 to be provided without a sash side member extending along the exposed interior major surface 5b of the IGU 5. Thus the IGU 5 is positioned lower in the window structure i.e. closer to the interior of the building in which the window 1 is installed.

[0258] Fig. 7 shows another embodiment where a second leg 16 of the first sash side member 14 supports the IGU 5 at its exposed interior major surface 5b and the first leg 15 extends along the peripheral sides of the IGU.

[0259] The curb flange 40 depicted in Figs. 1-7 comprises a bottom flange surface 41a, a side flange surface 41b, and an inclined flange surface 41c, which inclined flange surface 41c connects said bottom 41a and side 41b flange surfaces, as seen in Figs. 2-7. The curb flange 40 is adapted for extending along a longitudinal extent of said first side frame member 10 in an installed position of the skylight window 1. The bottom flange surface 41a is positioned in abutment with an exterior surface of said roof 2 and said side flange surface 41b is positioned in abutment with said first side frame member 10, whereby the inclined flange surface 41c functions as a roofing felt mounting surface.

[0260] The curb flange 40 can be attached to and detached from the first frame side member 10. In the example shown this is achieved by screws (not shown) it may however also be achieved with nails, with clips, such that snaplock, or with other fasteners, that engage with one or more pre-defined holes in a groove or recess on the frame side member 10. It is also possible to attach the curb flange by means of an adhesive or a hook-and-loop type fastener.

[0261] The inclined flange surface 41c comprises a recess 71 extending in the longitudinal direction of the curb flange 40, for receiving countersunk fasteners or screws which thereby do not disturb the smooth inclined flange surface 41c. In use the roofing felt extends in plane with the exterior surface of the roof structure 2 and is allowed to continue upwards over the inclined flange surface 41c up to the frame side member 10. In this way a raised section is provided on the roofing felt, which contributes to preventing water from entering underneath the curb flange 40 and the frame 4.

[0262] The three curb flange surfaces 41a, 41b and 41c each form a side of the uniform triangular cross-section of the curb flange 40. With a substantially 90 degree angle between the side flange 41b and the bottom flange 41a surfaces this allows them to abut and lie substantially flush with the frame side member 10 and the outer surface of the roof 2, respectively. The first frame side member 10 may be provided with a recess (not shown) to connect to attachment projections in the form of fasteners or screws (not shown) on the curb flange 40.

[0263] The triangular shape of the curb flange 40 comprises a hollow profile which may be filled with air or foam. In this way the curb flange 40 can be manufactured to be lighter and thus easier to handle for the installer of the skylight window 1. In one example the curb flange is an extruded or roll formed profile. Such material working allows hollow profiles and efficient manufacture of the recess 71.

[0264] The curb flange 40 has a length corresponding to the length of first frame side member 10 in the installed position of the skylight window 1 as illustrated in Figs. 1-7. In some installation scenarios, with the curb flange 40 installed on all four sides of the window 1 the flanges together are able to carry at least half or substantially all of the weight of the skylight window 1. This facilitates a large array of possibilities for installing the skylight window 1, such as installation in positions where it is not possible to provide other structurally supporting (carrying) components for the skylight window 1. In the examples shown, the curb flange acts as a bracket, structurally supporting the skylight window 1. For example, the curb flange structurally supports 50 percent of the weight of the skylight window 1.

[0265] To improve the curb flange's 40 ability to structurally support the skylight window 1, it is made from a stiff material having a Young's modulus higher than 0.1 GPa.

[0266] To improve storage and transportation of the skylight window 1 it can be provided in a kit comprising a window frame having four frame side members, potentially a window sash having four sash side members, and four curb flanges 40.

[0267] In use, the curb flange 40 is attached to the first frame side member 10. Different positions of the curb flange relative to the frame side member may be selected according to a selected installation position of the skylight window 1 in the roof 2. In some roofs, a curb adapter (not

shown) is used to extend the frame side member. Since the curb flange 40 in prior art was integral with the frame, such curb adapter must be larger in size than the frame. However, the present removable curb flange 40 allows use of curb adapters of same size as the frame. Also the curb flange 40 can simply be attached to such curb adapter, since they are of similar size.

[0268] In Fig. 8, the IGU 5 is supported by a first sash side member 14 and the skylight has a weather shield 3, which is substantially flat here, with a weather shield skirt 9. The first leg 25 of the first frame side member 10 extends in the height direction and the second leg 26 of the first frame side member extends in the width direction. The second leg 26 extends from the first leg 25 in the width direction toward a frame opening 201. In this embodiment, part of the bottom surface 10a is positioned on the roof 2, whereby the window frame is supported by the roof 2, and part of the bottom surface 10a extends above the opening in the roof.

[0269] The first frame side member 10 and the first sash side member 14 extend in a length or longitudinal direction L, also shown in Fig. 2, along the side surface 5f of the interior pane in the closed position of the IGU 5.

[0270] The first sash side member 14 has a supporting section 72, the supporting section 72 being positioned below the interior major surface 5b. The supporting section 72 carries at least part of the weight of the IGU 5. The first sash side member 14 further has the first leg 15 connected to the supporting section 72. The first leg 15 extends in the longitudinal direction L and in the height direction H. The first leg 15 is generally plate-shaped and consists of only one single section of substantially solid material having a thickness in the width direction of less than 1 cm.

[0271] The first frame side member 10 in Fig. 8 is substantially L-shaped, the first leg 25 extending in the height direction H, and the second leg 26 extending from a lower portion of the first leg 26 in the width direction W toward the IGU. The first frame side member further has a supporting section 112, the supporting section 112 is connected to the second leg 26 and is positioned below the IGU 5 in the height direction H. In the closed position shown in Fig. 8, the supporting section 112 carries a structural load of the IGU 5 and the first sash side member 14. The supporting section 112 is connected to the second leg 26, and in an installed position of the skylight window 1 on the roof 2, the structural load from the IGU 5 and the first sash side member 14, is transferred from the supporting section 112 to the second leg 26 and further to the roof 2. A sealing element 22 is provided between the supporting section 112 and the interior major surface 5b.

[0272] The outer side 110a of the first leg 25 faces away from the frame opening 201 and the bottom surface 10a of the second leg 26 faces in the interior of the building, in the interior direction D. The major outer surface 110b of the outer side 110a is both perpendicular and adjacent to the bottom surface 10a of the second leg 26.

[0273] The first frame side member 10 has a pre-formed hole 45. The pre-formed hole 45 extends from the major outer surface 110b toward the bottom surface 10a in a direction inclined in relation to frame plane. In this embodiment, the pre-formed hole 45 is a through-hole. The pre-formed hole 45 forms an angle α with the frame plane. In this embodiment the angle α is approximately 70 degrees.

[0274] A fastener (not shown) inserted through the pre-formed hole 45 would fasten the skylight window 1 to the roof 2. Fig. 8 further shows a curb flange 40 positioned on the roof 2 adjacent to a lower portion of the outer side 110a of the first leg 25. An opening 45a of the pre-formed hole 45 in the major outer surface 110b is positioned above the curb flange 40. Fasteners 46 are shown to indicate the possible fastening of the curb flange 40 to the roof 2 and/or first frame side member 10. The curb flange 40 further comprises tracks acting as screw guides. The tracks extend in a height, width and inclined direction with regards to the frame plane and are in this embodiment in the form of through holes. Roofing felt (not shown) may be mounted to cover part of the roof 2, the inclined outer surface 41c, part of the major outer surface 110b and the joints between the roof 2 and curb flange 40 and the major outer surface 110b and the curb flange 40.

Claims

1. A skylight window (1) for being installed in or on a flat roof of a building, the skylight window (1) comprising:

   a window frame (7) having four frame side members and potentially a window sash (6) having four sash side members, the frame side members or the potential sash side members supporting an insulating glazing unit (5) , abbreviated IGU, having multiple layers of glazing, a first of the frame side members and a potential first sash side member extending in a longitudinal direction along a first peripheral side of the IGU, a weather shield (3) comprising a transparent weather shield pane (8) and a weather shield skirt (9) said weather shield pane being surrounded by the weather shield skirt, said skirt extending on an outer side of all four sides of the frame, wherein said weather shield is attached to the frame or to the potential sash so as to protect a window portion (4) of the skylight window, the window portion (4) comprising the frame, IGU and the potential sash,

   a curb flange (40) having a bottom flange surface (41a), a side flange surface (41b), and an inclined flange surface (41c), said inclined flange surface connecting said bottom and side flange surfaces,

wherein the IGU extends in a lateral direction, defining an IGU plane,
wherein the curb flange (40) is adapted for extending along a longitudinal extent of a first side frame member (10) in an installed position of the skylight window, said bottom flange surface being positioned for abutment with an outer surface of said roof and said side flange surface being positioned in abutment with said first side frame member, whereby said inclined flange surface is configured for functioning as a roofing felt mounting surface,
characterized in that
said curb flange (40) is configured for being attached to and detached from the first frame side member,
wherein the curb flange (40) may be attached to the first frame side member (10) in different positions in a height direction according to an installation position of the skylight window in the roof, the installation position defining the depth of the skylight window in the roof, the height direction being perpendicular to the lateral direction, and
that the inclined flange surface (41c) comprises a recess (71) extending in the longitudinal direction of the curb flange, adapted for receiving a countersunk fastener.

2. A skylight window according to any of the preceding claims where the curb flange (40) is substantially triangular in cross section, each of the three surfaces forming a side of the triangular cross section.

3. A skylight window according to any of the preceding claims, wherein the curb flange (40) comprises attachment projection(s) and/or fasteners such as nails, clips, screws to be inserted into one or more pre-defined holes in a first frame side member.

4. A skylight window according to any of the preceding claims, wherein the first side frame member (10) comprises a track or groove for connection to the attachment projection(s) on the curb flange.

5. A skylight window according to any of the preceding claims comprising a curb flange (40) installed on said four sides of said skylight window and where the flanges when installed, together are able to carry at least half or substantially all of the weight of the skylight window in the installed position.

6. A skylight window according to any of the preceding claims, wherein the curb flange (40) in the installed position of the skylight window can act as a bracket structurally supporting the skylight window on the roof.

7. A skylight window according to any of the preceding claims, wherein the IGU extends in a lateral direction, defining an IGU plane, and the four frame side members define a frame plane,

wherein the first frame side member (10) comprises a primary leg (25) extending substantially in a height direction, the height direction being perpendicular to the lateral direction, and a secondary leg (26) extending substantially in the lateral direction,
wherein the primary leg has an outer side, the outer side facing away from a frame opening, wherein the secondary leg has an interior side configured to face an interior of the building in an installed position of the skylight window frame, the outer side having a major outer surface,
the first frame side member comprises a pre-formed hole adapted for receiving a fastener, such as a screw or nail, the pre-formed hole extending from the major outer surface of the primary leg towards the interior side of the secondary leg in a direction which is inclined in relation to the frame plane.

8. A skylight window according to any of the preceding claims, wherein the curb flange (40) comprises a bottom flange surface, a side flange surface and an inclined flange surface, forming a substantial triangular shape, the inclined flange surface connecting the bottom and side flange surfaces,

the inclined surface comprising at least one pre-formed hole adapted for receiving a fastener, such as a screw or nail,
and the at least one pre-formed hole extending from the inclined flange surface (41c) towards the bottom flange surface (41 a) and/or the side flange surface (41b) in height direction and/or lateral direction and/or a direction which is inclined in relation to the frame plane.

9. A skylight window according to any of the preceding claims, wherein the curb flange (40) is an extruded or roll formed profile.

10. A method of installation of a skylight window according to any one of claims 1 to 9 in or on a flat roof of a building, comprising the steps of:

providing a kit, comprising a skylight window (1) comprising a window frame (7) having four frame side members, potentially a window sash (6) having four sash side members, and a curb flange (40) having a bottom flange surface, a side flange surface, and an inclined flange surface, said inclined flange surface connecting

said bottom and side flange surfaces, the frame side members or potentially the sash side members supporting an IGU, a first of the frame side members extending in a longitudinal direction along a first peripheral side of the IGU, wherein the curb flange can be attached to the first frame side member (10) in different positions according to an installation position of the skylight window in the roof, the curb flange in each said position extending along a longitudinal extent of said first side frame member,
attaching the curb flange to the first frame side member in one of said different positions selected according to a selected installation position of the skylight window in the roof so that the curb flange, said side flange surface being positioned in abutment with said first side frame member, and
positioning the curb flange so that said bottom flange surface is positioned in abutment with an outer surface of the roof so that the curb flange acts as a bracket contributing to structurally supporting the skylight window on the roof.

11. Use of a curb flange (40) in a skylight window (1) according to one or more of claims 1-9 for structurally supporting an installed skylight window on a roof, wherein said curb flange (40) is attached to a first frame side member (10) of the skylight window in a position selected from a number of different possible positions according to an installation position of the skylight window in the roof.

Patentansprüche

1. Dachfenster (1) zur Installation in einem oder auf einem Flachdach eines Gebäudes, wobei das Dachfenster (1) Folgendes umfasst:

einen Fensterrahmen (7), der vier Rahmenseitenglieder und möglicherweise einen Fensterflügel (6) mit vier Flügelseitenglieder aufweist, wobei die Rahmenseitenglieder oder die möglichen Flügelseitenglieder eine Isolierglaseinheit (abgekürzt IGE) (5) stützen, die mehrere Glasschichten aufweist, wobei sich ein erstes der Rahmenseitenglieder und ein mögliches erstes Flügelseitenglied in einer Längsrichtung entlang einer ersten Umfangsseite der IGE erstrecken,
einen Wetterschutz (3), der eine durchsichtige Wetterschutzscheibe (8) und eine Wetterschutzeinfassung (9) umfasst, wobei die Wetterschutzscheibe von der Wetterschutzeinfassung umgeben ist, wobei sich die Einfassung an einer Außenseite aller vier Seiten des Rahmens erstreckt, wobei der Wetterschutz an dem Rahmen oder dem möglichen Flügel angebracht ist, um einen Fensterabschnitt (4) des Dachfensters zu schützen, wobei der Fensterabschnitt (4) den Rahmen, die IGE und den möglichen Flügel umfasst,
einen Begrenzungsflansch (40) mit einer unteren Flanschfläche (41a), einer seitlichen Flanschfläche (41b) und einer geneigten Flanschfläche (41c), wobei die geneigte Flanschfläche die untere und die seitliche Flanschfläche verbindet,
wobei sich die IGE in einer seitlichen Richtung erstreckt und eine IGE-Ebene definiert,
wobei der Begrenzungsflansch (40) dazu ausgeführt ist, sich in einer installierten Position des Dachfensters entlang einer Längserstreckung eines ersten Seitenrahmenglieds (10) zu erstrecken, wobei die untere Flanschfläche zur Anlage an einer Außenfläche des Dachs positioniert ist und die seitliche Flanschfläche in Anlage an dem ersten Seitenrahmenglied positioniert ist,
wobei die geneigte Flanschfläche dazu ausgestaltet ist, als Dachpappenmontagefläche zu fungieren,
dadurch gekennzeichnet, dass
der Begrenzungsflansch (40) so ausgestaltet ist, dass er an dem ersten Rahmenseitenglied angebracht und von diesem gelöst werden kann,
wobei der Begrenzungsflansch (40) gemäß einer Installierungsposition des Dachfensters in dem Dach in verschiedenen Positionen in einer Höhenrichtung an dem ersten Rahmenseitenglied angebracht werden kann, wobei die Installierungsposition die Tiefe des Dachfensters in dem Dach definiert und die Höhenrichtung senkrecht zu der seitlichen Richtung verläuft, und
dass die geneigte Flanschfläche (41c) eine sich in der Längsrichtung des Begrenzungsflanschs erstreckende Aussparung (71) umfasst, die zur Aufnahme eines Senkbefestigungselements ausgeführt ist.

2. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Begrenzungsflansch (40) im Querschnitt im Wesentlichen dreieckig ist, wobei jede der drei Flächen eine Seite des dreieckigen Querschnitts bildet.

3. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Begrenzungsflansch (40) einen Anbringvorsprung/Anbringvorsprünge und/oder Befestigungselemente wie Nägel, Clips, Schrauben umfasst, die in ein oder mehrere vordefinierte Löcher in einem ersten Seitenrahmenglied einzuführen sind.

4. Dachfenster nach einem der vorhergehenden Ansprüche, wobei das erste Seitenrahmenglied (10) ei-

ne Spur oder Nut zur Verbindung mit dem/den Anbringvorsprung/Anbringvorsprüngen an dem Begrenzungsflansch umfasst.

5. Dachfenster nach einem der vorhergehenden Ansprüche, umfassend einen Begrenzungsflansch (40), der an den vier Seiten des Dachfensters installiert ist und bei dem die Flansche, wenn sie installiert sind, zusammen mindestens das halbe oder im Wesentlichen das gesamte Gewicht des Dachfensters in der installierten Position tragen können.

6. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Begrenzungsflansch (40) in der installierten Position des Dachfensters als eine Halterung wirken kann, die das Dachfenster an dem Dach strukturell unterstützt.

7. Dachfenster nach einem der vorhergehenden Ansprüche, wobei sich die IGE in einer seitlichen Richtung erstreckt und eine IGE-Ebene definiert und die vier Rahmenseitenglieder eine Rahmenebene definieren,

wobei das erste Rahmenseitenglied (10) einen Primärschenkel (25), der sich im Wesentlichen in einer Höhenrichtung erstreckt, wobei die Höhenrichtung senkrecht zu der seitlichen Richtung verläuft, und einen Sekundärschenkel (26), der sich im Wesentlichen in der seitlichen Richtung erstreckt, umfasst,
wobei der Primärschenkel eine Außenseite hat, wobei die Außenseite von einer Rahmenöffnung weg weist, wobei der Sekundärschenkel eine Innenseite hat, die dazu ausgestaltet ist, in einer installierten Position des Dachfensterrahmens einem Inneren des Gebäudes zugewandt zu sein, wobei die Außenseite eine Hauptaußenfläche hat, wobei das erste Rahmenseitenglied ein vorgeformtes Loch umfasst, das zur Aufnahme eines Befestigungselements wie einer Schraube oder eines Nagels ausgeführt ist, wobei sich das vorgeformte Loch von der Hauptaußenfläche des Primärschenkels zu der Innenseite des Sekundärschenkels in einer Richtung, die bezüglich der Rahmenebene geneigt ist, erstreckt.

8. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Begrenzungsflansch (40) eine untere Flanschfläche, eine seitliche Flanschfläche und eine geneigte Flanschfläche umfasst, die eine im Wesentlichen dreieckige Form bilden, wobei die geneigte Flanschfläche die untere und die seitliche Flanschfläche verbindet,

wobei die geneigte Fläche mindestens ein vorgeformtes Loch umfasst, das zur Aufnahme eines Befestigungselements wie einer Schraube oder eines Nagels ausgeführt ist,
und sich das mindestens eine vorgeformte Loch in Höhenrichtung und/oder seitlicher Richtung und/oder einer Richtung, die bezüglich der Rahmenebene geneigt ist, von der geneigten Flanschfläche (41c) zu der unteren Flanschfläche (41a) und/oder der seitlichen Flanschfläche (41b) hin erstreckt.

9. Dachfenster nach einem der vorhergehenden Ansprüche, wobei der Begrenzungsflansch (40) ein extrudiertes oder walzprofiliertes Profil ist.

10. Verfahren zur Installierung eines Dachfensters nach einem der Ansprüche 1 bis 9 in einem oder auf einem Flachdach eines Gebäudes, umfassend die folgenden Schritte:

Bereitstellen eines Satzes, der ein Dachfenster (1) umfasst, das einen Fensterrahmen (7), der vier Rahmenseitenglieder, möglicherweise einen Fensterflügel (6) mit vier Flügelseitenglieder und einen Begrenzungsflansch (40) mit einer unteren Flanschfläche, einer seitlichen Flanschfläche und einer geneigten Flanschfläche aufweist, wobei die geneigte Flanschfläche die untere und die seitliche Flanschfläche verbindet, wobei die Rahmenseitenglieder oder möglicherweise die Flügelseitenglieder eine IGE stützen, wobei sich ein erstes der Rahmenseitenglieder in einer Längsrichtung entlang einer ersten Umfangsseite der IGE erstreckt, wobei der Begrenzungsflansch gemäß einer Installierungsposition des Dachfensters in dem Dach in verschiedenen Positionen an dem ersten Rahmenseitenglied (10) angebracht werden kann, wobei sich der Begrenzungsflansch in jeder Position entlang einer Längserstreckung des ersten Seitenrahmenglieds erstreckt,
Anbringen des Begrenzungsflanschs an dem ersten Rahmenseitenglied in einer der verschiedenen Positionen, die gemäß einer gewählten Installierungsposition des Dachfensters in dem Dach ausgewählt ist, so dass der Begrenzungsflansch, die seitliche Flanschfläche in Anlage an dem ersten Seitenrahmenglied positioniert ist, und
Positionieren des Begrenzungsflanschs, so dass die untere Flanschfläche in Anlage an einer Außenfläche des Dachs positioniert ist, so dass der Begrenzungsflansch als eine Halterung fungiert, die zur strukturellen Stützung des Dachfensters an dem Dach beiträgt.

11. Verwendung eines Begrenzungsflanschs (40) in einem Dachfenster (1) nach einem oder mehreren der Ansprüche 1-9 zur strukturellen Stützung des Dach-

fensters an dem Dach, wobei der Begrenzungsflansch (40) in einer Position an einem ersten Rahmenseitenglied (10) des Dachfensters angebracht ist, die aus einer Zahl von verschiedenen möglichen Positionen gemäß einer Installierungsposition des Dachfensters in dem Dach ausgewählt ist.

Revendications

1. Puits de lumière (1) destiné à être installé dans ou sur un toit plat d'un bâtiment, le puits de lumière (1) comprenant :

un cadre de fenêtre (7) comportant quatre éléments latéraux de cadre et éventuellement un châssis de fenêtre (6) comportant quatre éléments latéraux de châssis, les éléments latéraux de cadre ou les éventuels éléments latéraux de châssis supportant une unité de vitrage isolante (5), abrégée UVI, comportant de multiples couches de vitrage, un premier des éléments latéraux de cadre et un éventuel premier élément latéral de châssis s'étendant dans une direction longitudinale le long d'un premier côté périphérique de l'UVI,
un dispositif de protection contre les intempéries (3) comprenant une vitre de protection contre les intempéries transparente (8) et une jupe de protection contre les intempéries (9), ladite vitre de protection contre les intempéries étant entourée par la jupe de protection contre les intempéries, ladite jupe s'étendant sur un côté extérieur de l'ensemble des quatre côtés du cadre, ledit dispositif de protection contre les intempéries étant fixé au cadre ou au châssis éventuel de façon à protéger une partie de fenêtre (4) du puits de lumière, la partie de fenêtre (4) comprenant le cadre, l'UVI et le châssis éventuel,
un rebord de costière (40) comportant une surface de rebord inférieure (41a), une surface de rebord latérale (41b) et une surface de rebord inclinée (41c), ladite surface de rebord inclinée reliant lesdites surfaces de rebord inférieure et latérale,
l'UVI s'étendant dans une direction latérale, définissant un plan d'UVI,
le rebord de costière (40) étant prévu pour s'étendre le long d'une étendue longitudinale d'un premier élément de cadre latéral (10) dans une position installée du puits de lumière, ladite surface de rebord inférieure étant positionnée pour être en appui contre une surface extérieure dudit toit et ladite surface de rebord latérale étant positionnée en appui contre ledit premier élément de cadre latéral, de sorte que ladite surface de rebord inclinée est configurée pour avoir la fonction d'une surface de support de feutre pour toiture,
caractérisé en ce que
ledit rebord de costière (40) est configuré pour être fixé au premier élément latéral de cadre et détaché de celui-ci,
le rebord de costière (40) pouvant être fixé au premier élément latéral de cadre (10) dans différentes positions dans une direction de hauteur selon une position d'installation du puits de lumière dans le toit, la position d'installation définissant la profondeur du puits de lumière dans le toit, la direction de hauteur étant perpendiculaire à la direction latérale, et
en ce que la surface de rebord inclinée (41c) comprend un renfoncement (71) s'étendant dans la direction longitudinale du rebord de costière, prévu pour recevoir une attache fraisée.

2. Puits de lumière selon l'une quelconque des revendications précédentes, le rebord de costière (40) étant sensiblement triangulaire en section transversale, chacune des trois surfaces formant un côté de la section transversale triangulaire.

3. Puits de lumière selon l'une quelconque des revendications précédentes, le rebord de costière (40) comprenant une ou plusieurs saillies de fixation et/ou des éléments de fixation tels que des clous, des attaches, des vis à insérer dans un ou plusieurs trous prédéfinis dans un premier élément latéral de cadre.

4. Puits de lumière selon l'une quelconque des revendications précédentes, le premier élément de cadre latéral (10) comprenant une piste ou une rainure pour un raccordement à la saillie ou aux saillies de fixation sur le rebord de costière.

5. Puits de lumière selon l'une quelconque des revendications précédentes comprenant un rebord de costière (40) installé sur lesdits quatre côtés dudit puits de lumière et les rebords, lorsqu'ils sont installés, pouvant supporter ensemble au moins la moitié ou sensiblement la totalité du poids du puits de lumière dans la position installée.

6. Puits de lumière selon l'une quelconque des revendications précédentes, le rebord de costière (40), dans la position installée du puits de lumière, pouvant constituer un support supportant structurellement le puits de lumière sur le toit.

7. Puits de lumière selon l'une quelconque des revendications précédentes, l'UVI s'étendant dans une direction latérale, définissant un plan d'UVI et les quatre éléments latéraux de cadre définissant un plan de cadre,

le premier élément latéral de cadre (10) com-

prenant une portion primaire (25) s'étendant sensiblement dans une direction de hauteur, la direction de hauteur étant perpendiculaire à la direction latérale, et une portion secondaire (26) s'étendant sensiblement dans la direction latérale, la portion primaire comportant un côté extérieur, le côté extérieur étant orienté à l'opposé d'une ouverture de cadre, la portion secondaire comportant un côté intérieur configuré pour être orienté vers un intérieur du bâtiment dans une position installée du cadre de puits de lumière, le côté extérieur comportant une surface extérieure principale,
le premier élément latéral de cadre comprenant un trou préformé conçu pour recevoir un élément de fixation, tel qu'une vis ou un clou, le trou préformé s'étendant de la surface extérieure principale de la portion primaire vers le côté intérieur de la portion secondaire dans une direction qui est inclinée par rapport au plan de cadre.

8. Puits de lumière selon l'une quelconque des revendications précédentes, le rebord de costière (40) comprenant une surface de rebord inférieure, une surface de rebord latérale, et une surface de rebord inclinée, définissant une forme sensiblement triangulaire, la surface de rebord inclinée reliant les surfaces de rebord inférieure et latérale,

la surface inclinée comprenant au moins un trou préformé prévu pour recevoir un élément de fixation, tel qu'une vis ou un clou,
et l'au moins un trou préformé s'étendant de la surface de rebord inclinée (41c) vers la surface de rebord inférieure (41a) et/ou la surface de rebord latérale (41b) dans la direction de hauteur et/ou la direction latérale et/ou une direction qui est inclinée par rapport au plan de cadre.

9. Puits de lumière selon l'une quelconque des revendications précédentes, le rebord de costière (40) étant un profilé extrudé ou un profilé laminé.

10. Procédé d'installation d'un puits de lumière selon l'une quelconque des revendications 1 à 9 dans ou sur un toit plat d'un bâtiment, comprenant les étapes de :

fourniture d'un kit, comprenant un puits de lumière (1) comprenant un cadre de fenêtre (7) comportant quatre éléments latéraux de cadre, éventuellement un châssis de fenêtre (6) comportant quatre éléments latéraux de châssis, et un rebord de costière (40) comportant une surface de rebord inférieure, une surface de rebord latérale et une surface de rebord inclinée, ladite surface de rebord inclinée reliant lesdites surfaces de rebord inférieure et latérale, les éléments latéraux de cadre ou éventuellement les éléments latéraux de châssis supportant une UVI, un premier des éléments latéraux de cadre s'étendant dans une direction longitudinale le long d'un premier côté périphérique de l'UVI, le rebord de costière pouvant être fixé au premier élément latéral de cadre (10) dans différentes positions selon une position d'installation du puits de lumière dans le toit, le rebord de costière, dans chaque dite position, s'étendant le long d'une étendue longitudinale dudit premier élément de cadre latéral,
fixation du rebord de costière au premier élément latéral de cadre dans l'une desdites différentes positions choisie selon une position d'installation choisie du puits de lumière dans le toit de sorte que le rebord de costière, ladite surface de rebord latérale étant positionnée en appui contre ledit premier élément de cadre latéral, et positionnement du rebord de costière de sorte que ladite surface de rebord inférieure soit positionnée en appui contre une surface extérieure du toit de sorte que le rebord de costière constitue un support contribuant à supporter structurellement le puits de lumière sur le toit.

11. Utilisation d'un rebord de costière (40) dans un puits de lumière (1) selon l'une ou plusieurs des revendications 1 à 9 pour supporter structurellement un puits de lumière installé sur un toit, ledit rebord de costière (40) étant fixé à un premier élément latéral de cadre (10) du puits de lumière dans une position choisie parmi un certain nombre de différentes positions possibles selon une position d'installation du puits de lumière dans le toit.

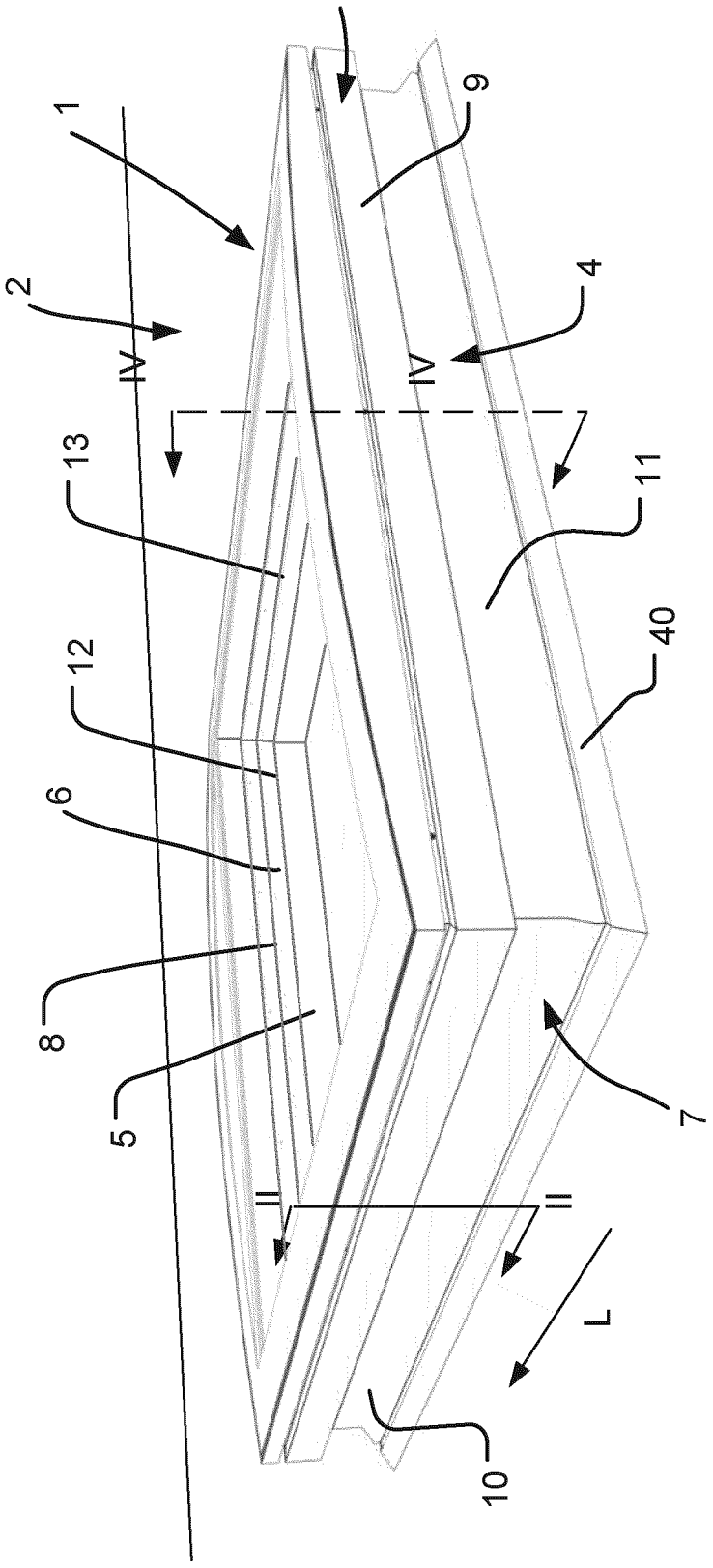


Fig. 1

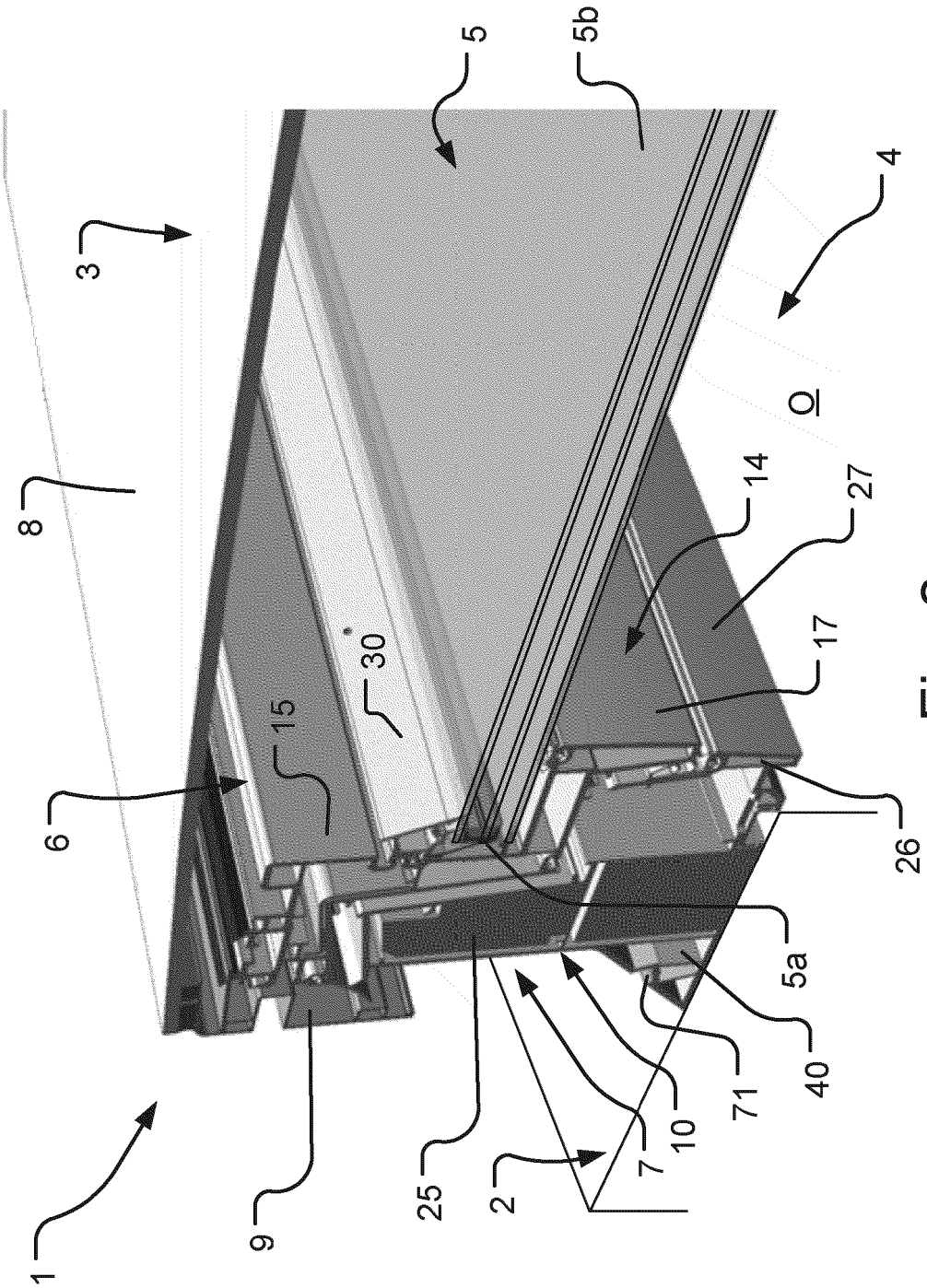


Fig. 2

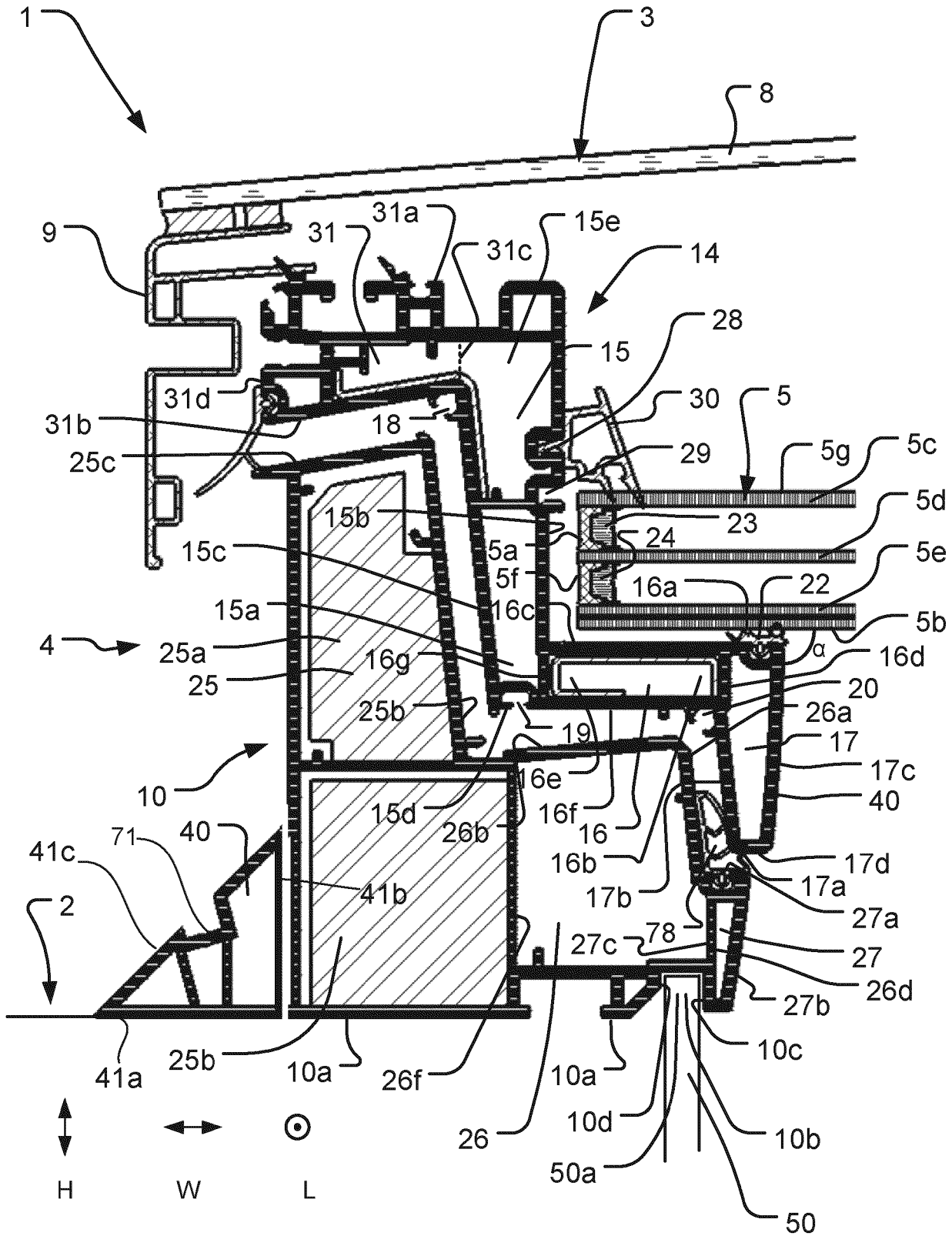

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Fig. 3

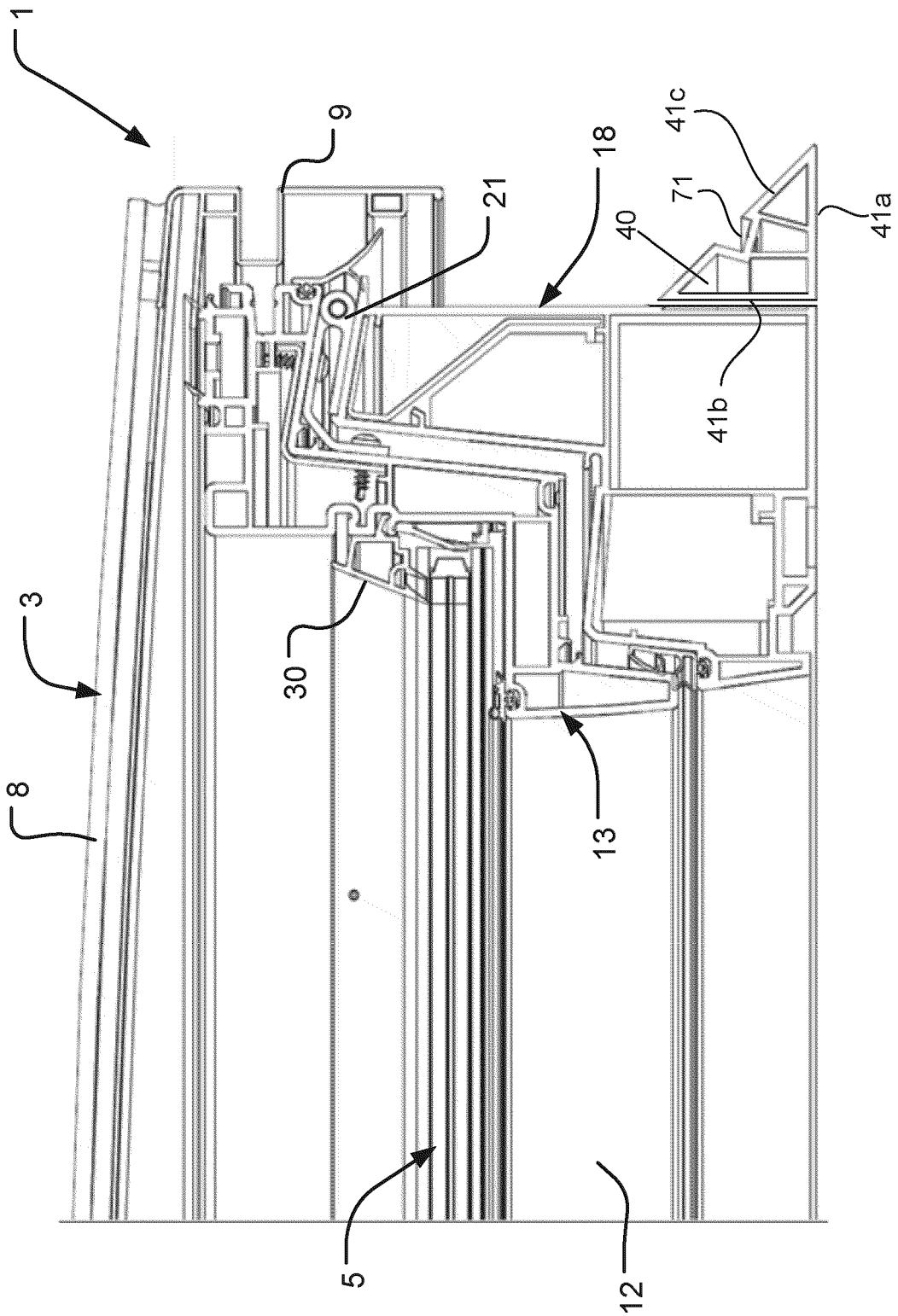


Fig. 4

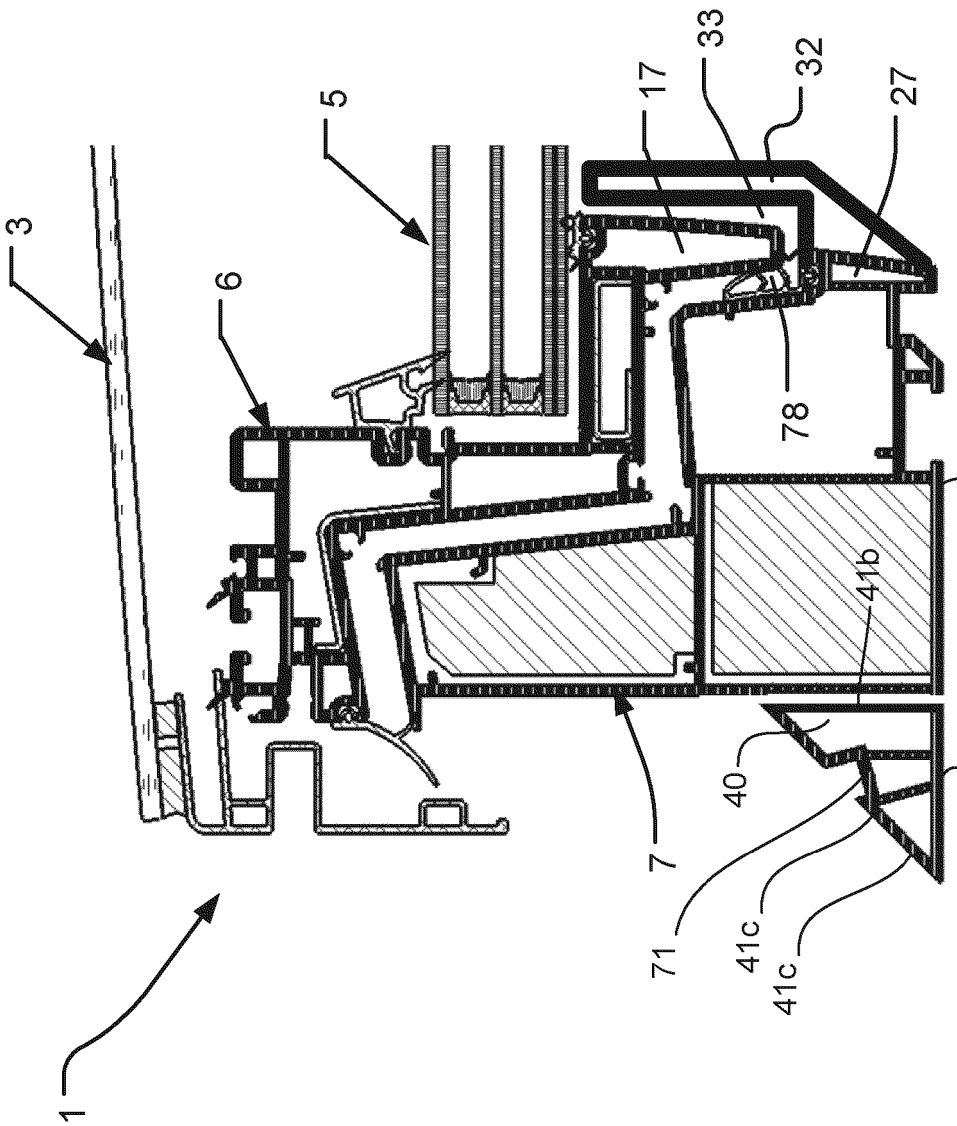


Fig. 5

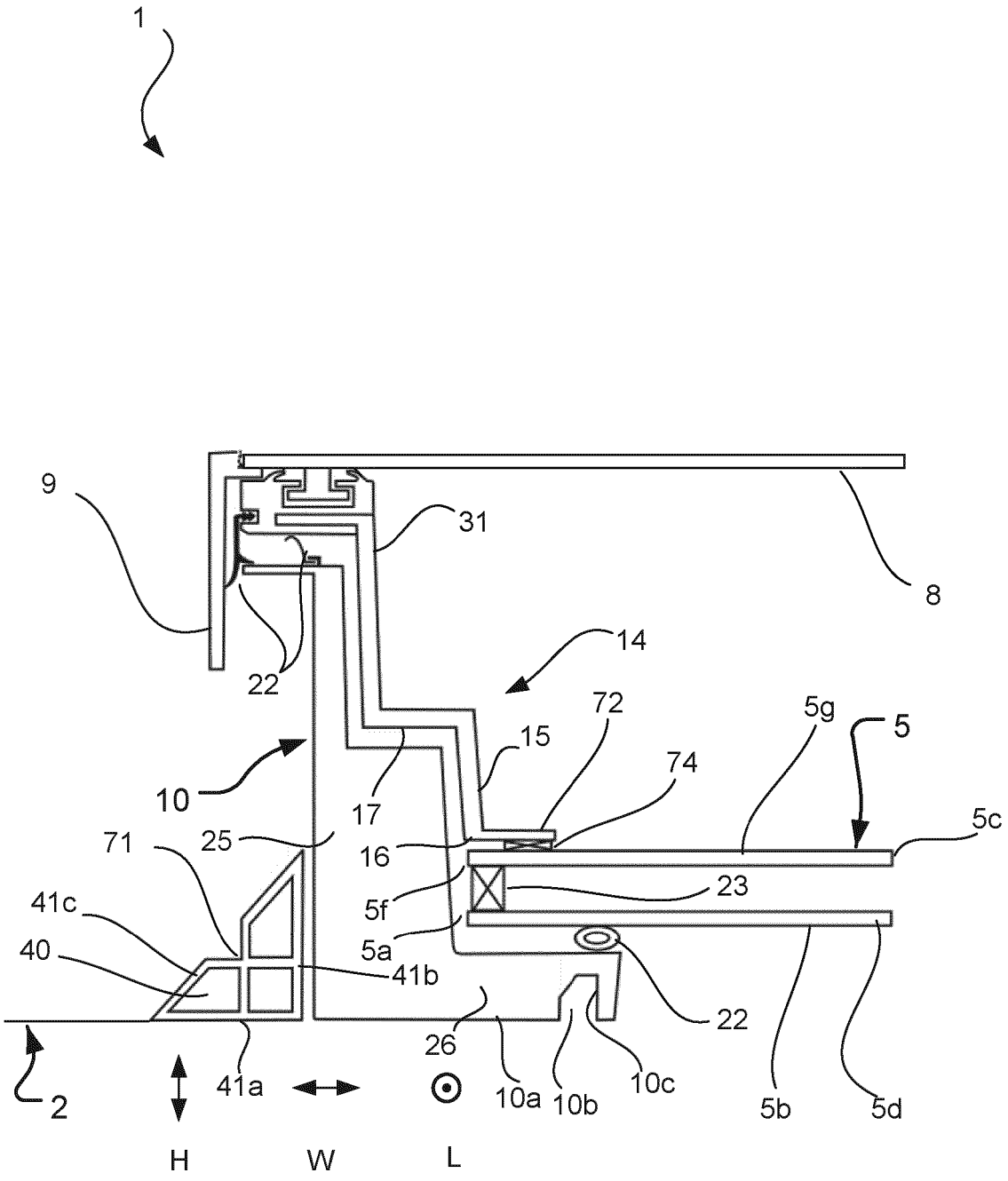

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Fig. 6

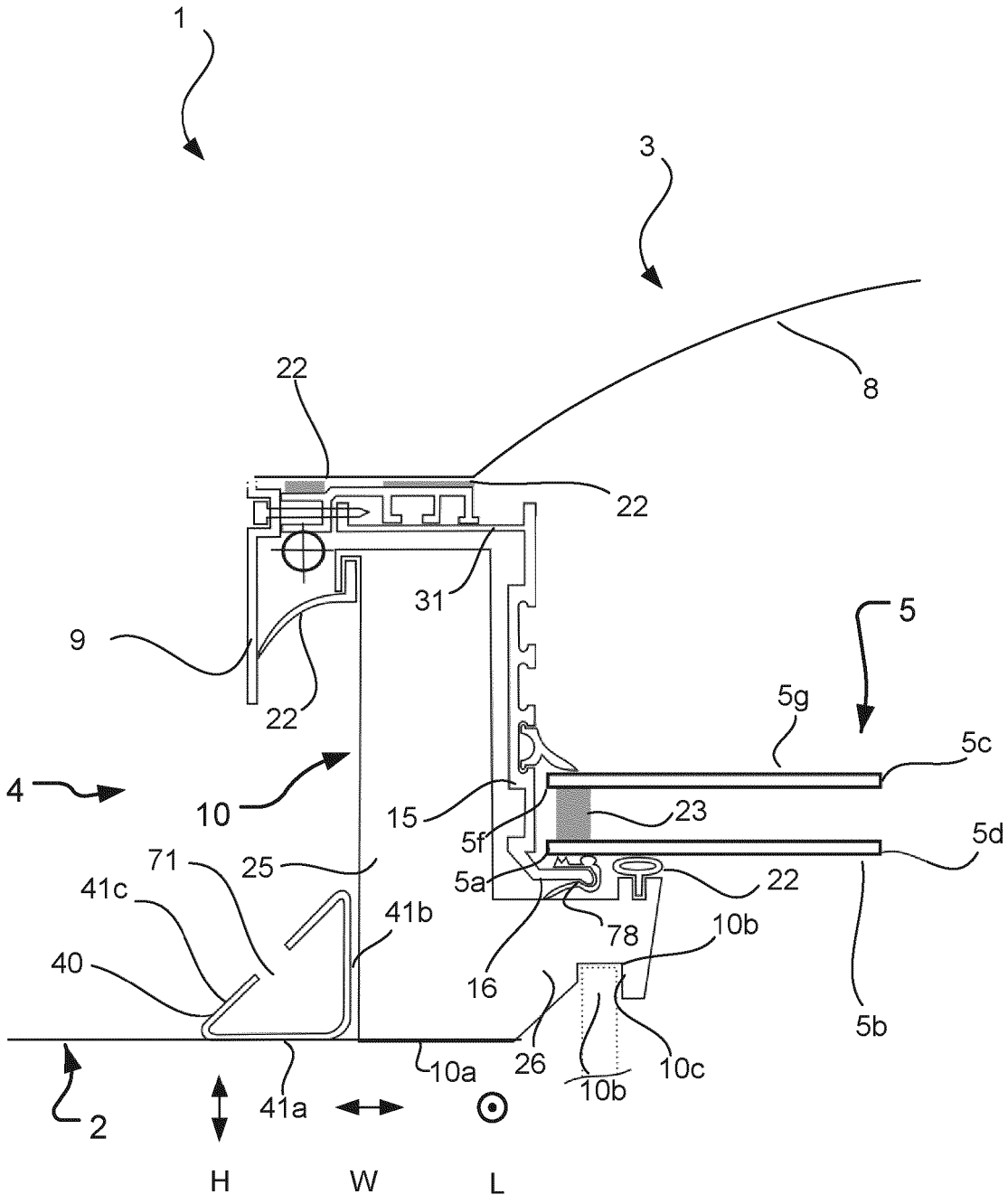

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Fig. 7

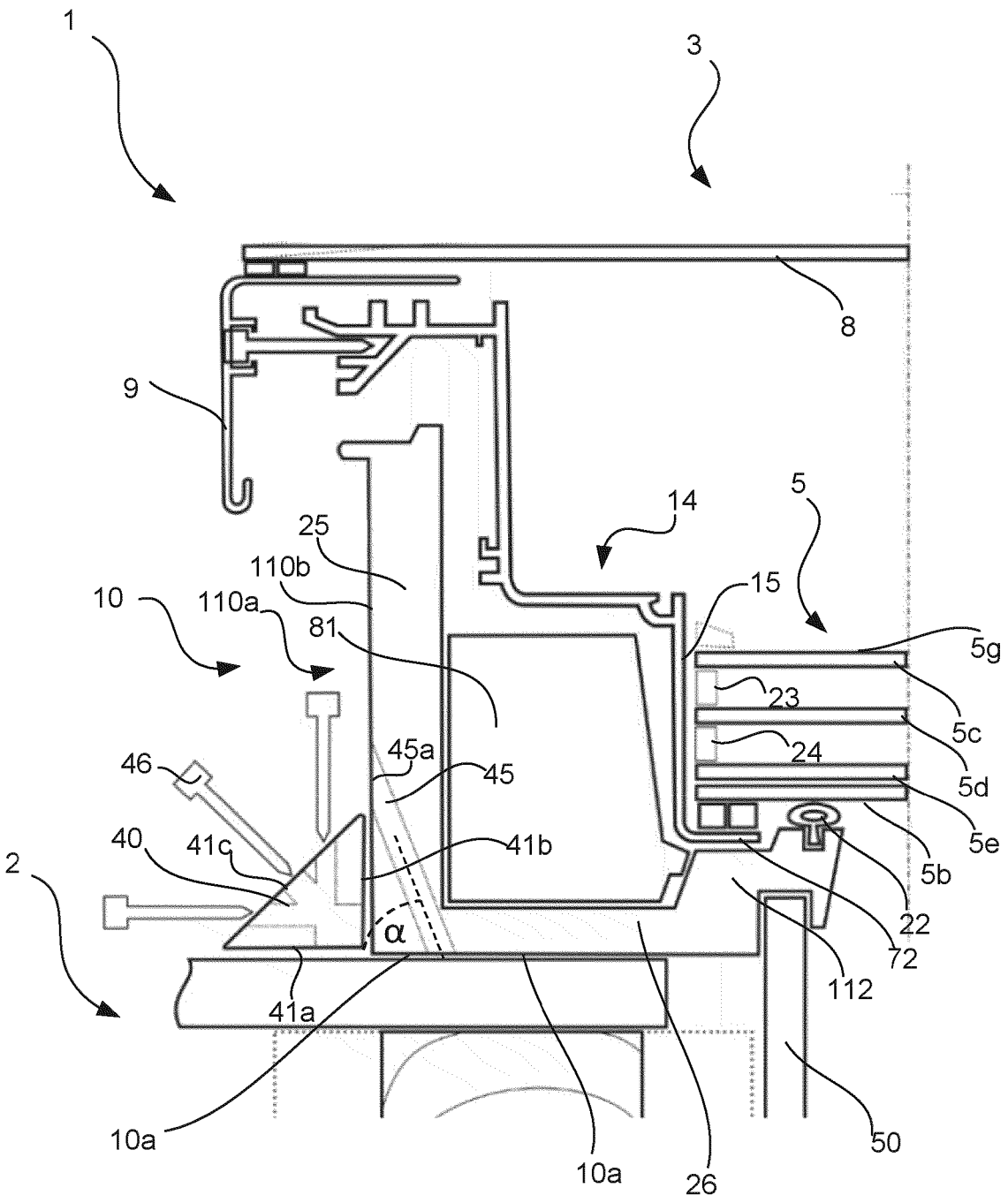

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Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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