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- **Grønborg, Kristian Nitzsch**
2970 Hørsholm (DK)
- **Kristensen, Lars**
2970 Hørsholm (DK)
- **Østergaard, Iben Bjerre**
2970 Hørsholm (DK)
- **Pedersen, Rasmus Klercke**
2970 Hørsholm (DK)

(71) Applicant: **VKR Holding A/S**
2970 Hørsholm (DK)

(74) Representative: **AWA Denmark A/S**
Strandgade 56
1401 Copenhagen K (DK)

(72) Inventors:
• **Bertram, Jacob**
2970 Hørsholm (DK)

(54) **A SKYLIGHT WINDOW**

(57) A skylight window comprising a window frame, a window sash, a weather shield, and an IGU, wherein a first sash side member includes a supporting section which is adhered to the exposed exterior major surface of the IGU.

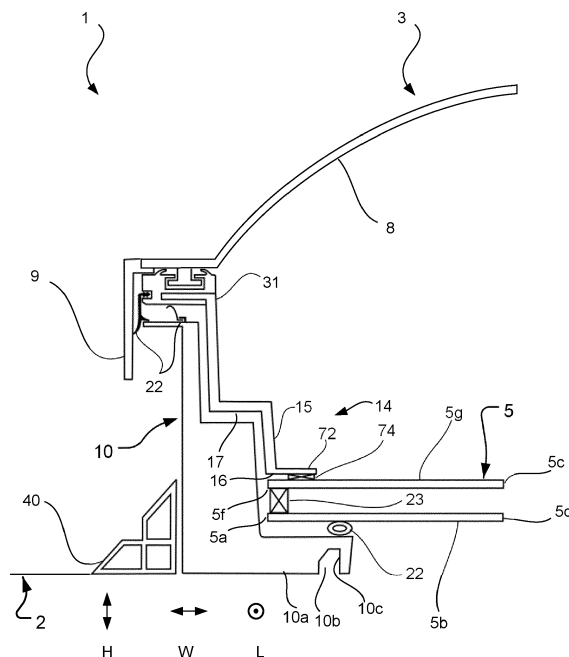


Fig. 3

Description

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

a window frame having four frame side members, a window sash having four sash side members supporting an insulating glazing unit (IGU) having multiple layers of glazing, said window sash being movable in relation to the window frame between an open and a closed position of the skylight window, and a weather shield attached to the sash so as to protect a window portion of the skylight window, the window portion comprising the sash, frame and IGU, a first of the frame side members being associated with a first of the sash side members, each of said first frame and sash side members extending in a respective longitudinal direction substantially in parallel with a first peripheral side of the IGU, said IGU having 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 and extending away from and at a right angle to said exterior major surface of the IGU, 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.

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.

[0007] 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.

[0008] 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.

[0009] According to the invention, these and further objects are met by a skylight window according to the introduction, characterized in that said first sash side member includes includes a first leg, which extends in the exterior direction away from the exposed exterior major surface of the IGU, and a supporting section which is adhered to said exposed exterior major surface of the IGU.

[0010] This removes the need for the first sash side member to be adhered to the exposed interior major surface of the IGU or a peripheral side of the IGU resulting in less material at these locations. Less material along the exposed interior major surface and a peripheral side of the IGU may allow the IGU to be positioned deeper or lower in the window structure, as well as closer to the window frame, which may improve the insulating properties of the skylight as the relative area of the IGU may be increased. An increase in relative area of the IGU may further improve light inflow and view through the skylight. This also reduces the area of sash, and so the likelihood of thermal bridges through which heat energy can escape (or enter) from the interior of the building.

[0011] The adherence between the IGU and the supporting section may be the only point of contact between the IGU and the supporting section. Additionally, the ad-

herence between the IGU and the supporting section may be the only point of contact between the IGU and the first sash side member.

[0012] In an embodiment according to the present invention, the supporting section carries the IGU in said open position of the skylight window.

[0013] This may remove the need for additional supporting sections attached to a peripheral side or exposed interior major surface of the IGU for carrying the IGU. This may have the advantage of enabling the IGU to be carried solely by a supporting section attached to its exposed exterior major surface. A knock-on effect of this may be that no supporting section or sash is required around the peripheral sides or exposed interior major surface of the IGU, allowing for a more compact skylight window with less sash. A more compact skylight window may facilitate a better integration in a roof structure and/or an installation that is more flush with the exterior side of the roof structure, as well as a better view out of the window. A better and/or more flush integration in a roof structure may have the effect of improving the insulation properties as more of the skylight may be embedded in the roof structure. A further advantage may be that there is less or no material around the peripheral sides or along the exposed interior major surface of the IGU with different thermal expansion properties, that have to be taken into account when considering the insulation and/or weatherproofing or sealing properties of the skylight.

[0014] The term "carries" may be understood as the supporting section carrying a substantial load exerted on it by the IGU. A substantial load may be 10, 20, 30, 40, 50, 60, 70, 80, 90, 95, 99% or more of the total load exerted by the IGU.

[0015] In an embodiment, the supporting section is adhered to said exposed exterior major surface of the IGU by means of adhesive. The adhesive may be silicone based eg. a Silane-terminated polyurethane (SPUR) adhesive or a silyl modified-polymer (SMP) adhesive etc. Additionally or alternatively, the supporting section may be adhered to the exposed exterior major surface by means of suction cups. The suction cups may work by providing at least a partial vacuum. The supporting section may be adhered to the IGU by means of mechanical attachment devices such as screws, fasteners or the like. The mechanical attachment devices may be inserted through one or more layers of glazing of the IGU.

[0016] In an embodiment, the adhesive is provided by means of adhesive tape.

[0017] This may improve the ease of assembly of the skylight as the adhesive tape may be provided in pre-applied state, where a covering strip or the like simply has to be removed from the adhesive tape, when the supporting section is to be attached to the IGU.

[0018] In an embodiment, the substantially only attachment of the first sash side member to the IGU is an adherence provided by the supporting section being adhered to said exposed exterior major surface of the IGU.

[0019] This may provide a skylight where the sash ex-

tends only above the exposed exterior major surface of the IGU there is no sash or supporting section extending beyond the exposed exterior major surface of the IGU towards the exposed interior major surface of the IGU.

5 This may further facilitate the insulation advantages associated with no sash or supporting section attached or extending around the peripheral sides or exposed interior major surface of the IGU explained above. The supporting section may be adhered to the exposed exterior major surface of the IGU through a bottom surface of the supporting section. The supporting section may be a non-integral part attached to another part of the first sash side member.

10 **[0020]** Additionally or alternatively, the supporting section may constitute or comprise, or be part of a thermal break.

15 **[0021]** In an embodiment according to the present invention, the supporting section comprises or constitutes a thermal break.

20 **[0022]** The thermal break may be made from a material of a lower thermal conductivity than other parts of the first sash side member. This may have the advantage of improving the insulation properties of the skylight as a lower thermal conductivity through the supporting section or sash member may be achieved. Thermal breaks may also be used for interconnecting the window frame and the sash. The thermal break may be made substantially made from or comprise a polymer or foam.

25 **[0023]** In an embodiment according to the present invention, the first sash side member includes a further supporting section provided as a safety device catching the IGU in case said adherence fails in said open position of the skylight window.

30 **[0024]** This has the advantage of preventing the IGU from taking or causing damage in the case said adherence fails by preventing or stopping a potential fall of the IGU.

35 **[0025]** The safety device may be provided as a safety clip. The safety device may be mechanically attached to the first sash side member.

40 **[0026]** In an embodiment according to the present invention, the first sash side member comprises a first leg, said first leg extending only above the exposed exterior major surface of the IGU, where said first leg may be connected to a second leg.

45 **[0027]** This may have the effect of providing a skylight window with no sash extending along a peripheral side or along the exposed interior major surface of the IGU. This has the effect of allowing the IGU to be placed lower in the skylight window and extend further towards the frame side member of the skylight window compared to when a sash extending along the exposed interior major surface and a peripheral side of the IGU is provided.

50 **[0028]** In an embodiment according to the present invention, the first sash side member comprises a first leg and the first sash side member may be in the form of a stepped profile.

55 **[0029]** The stepped profile may provide a labyrinth like

structure between the sash and frame 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 sash side member. Furthermore, insulating sealing members may conveniently be positioned between the first sash and frame side members at respective corners of the stepped configurations, e.g. as described in the above.

[0030] A second aspect of the invention concerns a method of manufacture of a skylight window according to the first aspect of the invention, the method comprising the steps of:

applying an adhesive on a bottom surface of the supporting section and/or along a periphery of the exposed exterior major surface of the IGU, and bringing said bottom surface into contact with the exposed exterior major surface of the IGU so as to adhere the supporting section to the exposed exterior major surface of the IGU.

[0031] This provides a skylight with a sash attached to the exposed exterior major surface of the IGU with the advantages as described above for the first aspect of the invention.

[0032] The method may further comprise a step of holding said bottom surface of the supporting section in contact with the exposed exterior major surface of the IGU until the adhesive has cured.

[0033] Additionally or alternatively, a holding element for holding said bottom surface of the supporting section in contact with the exposed exterior major surface of the IGU until the adhesive has cured, may be provided. This may be in the form of a different adhesive such as an adhesive tape, suction cups, clamps etc. The holding element adhesive may be a fast curing adhesive which cures faster than the adhesive securing the supporting section to the exposed exterior major surface of the IGU.

[0034] Additionally or alternatively, the method may comprise the step of applying the holding element adhesive to said bottom surface of the supporting section or the exposed exterior major surface prior to the step of bringing said bottom surface into contact with the exposed exterior major surface of the IGU.

[0035] It is preferred that all four sash side members have the structure as described for the first sash side member and that the corresponding or associated four frame side members are also adapted accordingly.

[0036] In general in this specification, in relation to the 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.

[0037] 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.

[0038] 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.

[0039] As mentioned above, skylight windows for inclined roofs are typically built into the roof structure. This means that the frame and sash, i.e. most of the frame and 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 sash are to a large extent not decisive for the total heat loss through the window. However, in skylight windows where the frame and 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 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 $W/(m^2K)$, especially compared to the thermal conductivity of the frame and sash. Thus, the inventors have realized that it is important to minimize the area of the sash and frame through which heat energy will escape.

[0040] 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 one or, preferably 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.

[0041] 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.

[0042] The skylight window may be hinged to open in the exterior direction i.e. away from the interior of the building. Hinges may be linear displacement mechanisms or multi-link mechanisms. The sash may be made movable in relation to the window frame by the sash being top-hung, i.e. being rotatable about an axis extending along one of the sash side members. This may be achieved using a rotary hinge positioned at this sash side member and connecting this sash side member with an associated, adjacent frame side member. Alternatively or additionally, the sash may be parallel-displaceable so that all four 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 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 sash in relation to the frame.

[0043] 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.

[0044] 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.

[0045] 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.

[0046] The four frame side members may together

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

[0047] The weather shield may be provided as a unitary structure, which is detachably attached to the sash. The weather shield may be attached detachably to the sash, providing for access to clean the IGU; this may also be of advantage during installation 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.

[0048] 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.

[0049] The weather shield may comprise a weather shield pane that may be surrounded by a weather shield skirt that may extend 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. The weather shield may be understood as a transparent cover member, preferably a dome of glass or a clear polymer.

[0050] The frame may enclose the sash in the closed position of the skylight window.

[0051] Respectively associated frame and sash side members may be positioned to be substantially parallel to each other in both the open and closed positions of the skylight window.

[0052] The outer side of the first frame side member may be substantially flat. The outer side of the first frame side member may be adapted for receiving a curb flange or a cant strip.

[0053] The first sash and/or frame side member may extend substantially along an entire length of said first peripheral side or side surface of the IGU.

[0054] 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.

[0055] The first sash side member may in general in all embodiments have a substantially uniform cross sec-

tion along a length of the first 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 sash and frame side members may similarly have substantially uniform cross sections in the same manner.

[0056] Generally, one or more of the frame and/or 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 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 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 sash side member, see further below, which may have the advantage that the sash and frame may be made of a less strong, but better insulating material, e.g. PVC instead of steel.

[0057] The first leg of the first 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. In 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 the upper resting surface of the second or third leg in cases where the adherence of the supporting section to the exposed exterior major surface of the IGU is not the substantially only attachment of the first sash side member to the IGU. The fixation member may extend substantially along an entire length (in the longitudinal direction) of the first sash side member and/or the first peripheral side of the IGU. Similar fixation members may be attached to similar grooves of the one, two or three of the other sash side members along the other three peripheral sides of the IGU.

[0058] The sash side members may be interconnected at the corners of the respective sash by corner keys. The corner keys may be attached to respective 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 sash members from moving out of alignment with interconnected sash members respectively.

[0059] A chain drive, hinge or the like may be provided connecting the sash and frame for assisting in opening and closing the skylight window.

[0060] In this specification, generally one or more or all individual ones of the legs mentioned herein of the sash and frame 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.

[0061] In an embodiment of the present invention, said second leg extends as far as or farther than said secondary leg in said inward direction.

[0062] 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.

[0063] In an embodiment, an upper part of a reveal panel or lining panel is received in said recess, said first surface of said recess abutting said inwardly facing interior surface of said reveal panel or lining panel.

[0064] 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.

[0065] This allows for positioning the IGU deeper or lower in the window structure. This reduces the area of the sash and frame through which heat energy escapes (or enters) from the interior of the building. Furthermore, improved light inflow and view through the skylight win-

dow are achieved.

[0066] The third leg of the first 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 sash side member without compromising structural integrity of the first 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 sash and frame through which heat energy escapes from (or enters) the interior of the building.

[0067] 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 sash side member. Accordingly, the third leg may affect stiffness, strength, moment of inertia and/or like structural properties of the first sash side member, including providing greater resistance to bending. Improved structural properties mean that the sash can hold a larger IGU or an IGU having a plurality of glazing layers.

[0068] Thus, by improving the structural properties of the 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 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.

[0069] Furthermore, due to the improved structural properties of the first 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.

[0070] The third leg may comprise the only or substantially the only supporting surface or supporting point of the first sash side member resting on the frame in the closed position of the skylight window. Similarly, in one or more of the remaining three sash side members a corresponding third leg may comprise the only or substantially the only supporting surface or supporting point of the respective 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 sash and frame in the closed position of the skylight window, which contact surfaces are not carrying any substantial amount of the weight of the sash in the closed position of the skylight window, may include sealing members between associated sash and frame side members. An insignificant

amount of a weight of the 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 sash the sash imposed by the first 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 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 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.

[0071] 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 an indirect contact point between sash and frame, which may also carry part of the weight of the sash in both the closed and especially in the open position of the skylight window.

[0072] 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. 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 sash and frame. This abutment element(s) may be provided at a corner (corners) of the first sash and/or frame side member.

[0073] 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.

[0074] 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.

[0075] 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.

[0076] 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.

[0077] 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.

[0078] The third leg may be positioned with a major part thereof being located beneath the first leg.

[0079] 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.

[0080] 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.

[0081] 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 substantially 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 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 sur-

face 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.

[0082] 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.

[0083] 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.

[0084] In an embodiment of the invention said first 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.

[0085] 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.

[0086] 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.

[0087] 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.

[0088] 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.

[0089] An angle between the first and fourth legs may be 70 to 110 degrees or 80 to 100 degrees or substantially 90 degrees.

[0090] The fourth leg is preferably attached to or formed integrally with the first leg.

[0091] The fourth leg may extend along, preferably along a substantially entire length of, the first peripheral side of the IGU.

[0092] The fourth and second legs may extend substantially in parallel.

[0093] In a cross-section perpendicular to the length dimension or to the longitudinal direction the fourth leg may be substantially 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.

[0094] The fourth leg may have a height in the height dimension less than the thickness of the IGU and/or substantially equal to the height of the second leg.

[0095] 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.

[0096] 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.

[0097] Hereby the IGU extends relatively far in the width dimension, which reduces heat transmission through the frame and 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.

[0098] 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.

[0099] In another development of the embodiment comprising a third leg, the third leg has an oblong shape in the height dimension.

[0100] 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.

[0101] 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 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 sash side member, which surface faces substantially away from said interior major surface of the IGU.

[0102] In an embodiment, the cross-sectional shape of the first frame side member and the first 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 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 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.

[0103] A stepped configuration of adjacent surfaces of the first sash and frame side members may thus be achieved by means of the stepped profile of the first 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 sash and frame 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 sash side member. Furthermore, insulating seal-

ing members may conveniently be positioned between the first sash and frame 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 sash corresponding to the weight of the IGU and sash to be utilized in compressing the sealing elements place between the frame side member and sash, to ensure optimal sealing.

[0104] 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 sash side member. Said side surface of the third leg of the first 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 sash and frame side members in the longitudinal direction.

[0105] 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.

[0106] 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 sash side member rests in the closed position of the window.

[0107] The tertiary leg may in the closed position of the window be positioned below or immediately below the third leg of the first sash side member. A width of the tertiary leg may be 0.3 to 1 of a width of the third leg.

[0108] 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.

[0109] 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.

[0110] An angle between the secondary and tertiary legs may be 70 to 110 degrees or 80 to 100 degrees or substantially 90 degrees.

[0111] The tertiary leg is preferably attached to or formed integrally with the secondary leg.

[0112] The tertiary leg may extend along, preferably along a substantially entire length of, the first peripheral side of the IGU.

[0113] The tertiary and third legs may extend substantially in parallel in the closed position of the window.

[0114] The tertiary leg may project from the secondary leg substantially inwardly and/or in the width dimension.

[0115] 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.

[0116] In a cross-section perpendicular to the length dimension or to the longitudinal direction the tertiary leg may be substantially 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.

[0117] 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.

[0118] In the development of the embodiment comprising a third leg, an abutment element may be provided as part of said third leg of the first 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.

[0119] The abutment element may extend along substantially a total length of the first frame and/or sash frame 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.

[0120] 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 sash in the frame during a closing movement. Accordingly or alternatively, the supporting surface of the third leg of the 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 sash side member are held by the abutment element both in the width dimension (outwardly) and in the height dimension (downwardly). Holding the sash in the width dimension helps centering and embedding the sash in the frame in the closed position of the skylight window, especially if all sash and frame side members are provided with a similar configuration.

[0121] 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.

[0122] The abutment element may form a seal covering an opening or slot that would otherwise be provided between the third leg of the first sash side member and the tertiary leg of the first sash frame side member in the closed position of the skylight window.

[0123] 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 sash side members. In this case, abutment elements with inclined surfaces in the manner described will help positioning and centering of the sash within the frame during closing of the skylight window.

[0124] The abutment element(s) may form the only or substantially the only resting point or resting surface of the sash or of one or more of the 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 sash and frame in the closed position of the skylight window may include sealing members between associated sash and frame side members, but these sealing members preferably only carry an insignificant amount of the 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 sash side members to the associated frame side member are established by the abutment element(s) and potential sealing members. Generally, a 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 sash and frame, which may also carry part of the weight of the sash in both the closed and especially in the open position of the skylight window.

[0125] In another embodiment a second, third and/or fourth sash side member is/are substantially similar and/or identical in shape and/or form and/or size and/or structure to the first sash side member.

[0126] 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.

[0127] 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 sash side member. Alternatively or additionally, all frame and/or sash side members, respectively, may be substantially identical to each other.

[0128] Thus, two or more of the four respective frame and 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 sash during opening and closing of the skylight window. Also, safe sealing may be provided between the sash and frame, simple mounting may be achieved and the structural properties of the frame and/or sash are the same on all sides of the skylight window.

[0129] In case the first sash side member comprises the above described fourth leg, the weather shield may be attached to the fourth leg. In case all four sash side members comprise the above described fourth leg, the weather shield may be attached to each of the fourth legs.

[0130] 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.

[0131] 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.

[0132] Hereby the third leg, which is typically the only or the most visible element of the first 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.

[0133] The cover leg may extend in the longitudinal direction along substantially an entire length of the first leg and/or the first sash side member.

[0134] 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 of the first sash side member is inserted or embedded when the sash moves to the closed position of the skylight window.

[0135] 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.

[0136] 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.

[0137] 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.

[0138] 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.

[0139] The skylight window may be positioned so that a major part of or the entire frame and/or the entire sash are positioned above an upper roof surface level.

[0140] First and second 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.

[0141] According to the second aspect of the invention, the skylight window comprises:

a window frame having four frame side members, a window sash having four sash side members supporting an insulating glazing unit (IGU) having multiple layers of glazing, said window sash being movable in relation to the window frame between an open and a closed position of the skylight window, and a weather shield attached to the sash so as to protect a window portion of the skylight window, the window portion comprising the sash, frame and IGU, a first of the frame side members being associated with a first of the sash side members, each of said first frame and sash side members extending in a respective longitudinal direction substantially in parallel with a first peripheral side of the IGU, said IGU having 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,

said first frame side member having a primary leg, which in said closed position is positioned next to and extends along an outwardly facing surface of said first peripheral side of the IGU, and a secondary leg, which in said closed position extends next to and along a part of said interior major surface of the IGU, said secondary leg having a bottom surface facing in a direction away from the interior major surface of the IGU, which bottom surface comprises a recess configured to receive an upper part of a reveal panel or lining panel in said installed position of the skylight window, said recess comprising a first surface for abutting an inwardly facing interior surface of said reveal panel or lining panel when received in said recess,

where said first peripheral side of the IGU is located, in said outward direction, beyond said first surface of said recess.

[0142] As a result, the major surfaces of the IGU may be bigger in a skylight window according to the invention compared to prior art skylight windows of similar size, fitting a similarly sized skylight window aperture in the roof in which the skylight window is to be installed. Since the IGU more often than not insulates better than the sash and frame, this may provide improved overall insulation properties of the skylight window. Furthermore, the visible area of the total area of the skylight window, which can be seen through, may be increased, which provides improved view through the skylight window as well as increased inflow of daylight.

[0143] Furthermore, the positioning of the IGU may contribute to hiding parts of the window when seen through the IGU from an interior of a building in the installed position of the skylight window. E.g. positioning the IGU such that it is the only component extending into the opening in the roof structure visible from the interior of the building.

[0144] Said recess may comprise a second surface positioned opposite from said first surface for abutting an outwardly facing exterior surface of said reveal panel or lining panel when received in said recess. A distance between these first and second surfaces defines a width of the recess, which width usually corresponds to a width of an upper part of said lining panel in order to accommodate the lining panel upper part suitably in the recess. Said first peripheral side of the IGU may extend a distance of at least 0.5, 1, 1.5, 2, 2.5 or 3 times said width of said recess beyond said first surface of said recess.

[0145] The first and/or second surface of the recess may extend substantially in the height dimension and may be substantially linear.

[0146] The reveal panel or lining panel may alternatively be denoted an aperture panel or a window opening panel. It may serve the purpose of providing improved sealing and insulation towards the interior of the building.

It may act as a barrier. It may provide a aesthetically pleasing transition between the skylight window and the roof structure as well as the interior of the building.

[0147] In an embodiment, a transparent central area of the IGU extends, in said outward direction, beyond said first surface of said recess.

[0148] As is known to the skilled person, IGUs typically comprise a transparent central area surrounded with non-transparent areas at peripheries of the IGU where the glazing panels are attached to each other using sealing members and/or supporting members that typically extend along each peripheral side of the IGU.

[0149] In an embodiment, said first peripheral side of the IGU is located at, and a transparent central area of the IGU potentially extends, a distance in said outward direction from said first surface of said recess equal to or above 5, 10, 15, 20, or 25 percent of an extent in the outward direction of the secondary leg between said first surface of said recess and an outwardly outermost surface of said secondary leg.

[0150] This increases the relative area of IGU in regards to the skylight window. The IGU is typically the best insulating component of a skylight window, this improves the insulation properties of the skylight.

[0151] In an embodiment an upper part of a reveal panel or lining panel is received in said recess, said first surface of said recess abutting said inwardly facing interior surface of said reveal panel or lining panel.

[0152] This may have the advantage of improving insulation properties by providing another barrier of material. It may further provide a more aesthetically pleasing transition between the roof structure and the skylight window.

[0153] In an embodiment said first sash side member has a first leg, which extends substantially in the upward direction.

[0154] This may protect the IGU and provide potential surface for sealing elements to be placed and seal between the first sash and frame side member.

[0155] In an embodiment, said first leg extends next to said outwardly facing surface of said first peripheral side of the IGU, and wherein the primary leg in said closed position extends next to and along an outwardly facing surface of said first leg. Hereby, the first leg is positioned between the outwardly facing surface of said first peripheral side of the IGU and the primary leg.

[0156] This may have the effect of guiding the sash side member when closing the skylight window. It may further provide a surface for placing an abutment element for aiding in the positioning of the sash and IGU in the closed position to ensure they are properly positioned in said window in the closed position to ensure optimal sealing. It may also be possible to place sealing elements between the first and primary legs.

[0157] Said outwardly facing surface of said first peripheral side of the IGU may extend substantially in the upward direction.

[0158] In an embodiment, said first leg does not extend

to cover any part of said exterior major surface of said IGU.

[0159] This has the advantage of not blocking light from entering through the exterior major surface of the IGU and into the interior of the building. It may thus improve the inflow of light into the interior of the building.

[0160] In an embodiment, the first sash side member further comprises a second leg, which may potentially project from a lower end of said first leg so as to extend along part of said interior major surface of the IGU to support the IGU, said second leg potentially resting on an upper abutment surface of said secondary leg in said closed position of said window. The secondary leg may in said closed position extend next to, on an inward side of, and along said second leg of said first sash side member.

[0161] This may have the effect of ensuring correct positioning of the sash and IGU in the closed position of the window. The second leg may further protect the IGU. It may also allow further placement of sealing elements to improve sealing and insulation properties.

[0162] In an embodiment, said first sash side member further has a third leg projecting from an upper end of said first leg and extending in said outward direction and, optionally, a fourth leg projecting from said third leg and extending substantially in said upward direction and, optionally, a fifth leg projecting from said fourth leg substantially in said outward direction.

[0163] The provision of additional legs may allow the physical properties of the different legs to be tailored to their specific purpose, which may be to support the IGU, provide an abutment surface, provide a mounting surface, support a weather shield etc. For example, if a leg is supporting the IGU it may be provided with a higher strength and/or stiffness and/or smaller or larger size compared to other legs. A leg provided to aid the sealing and/or positioning of the sash and IGU may be provided with grooves or the like adapted to accommodate sealing and/or abutment elements.

[0164] The weather shield may be attached to said fifth leg.

[0165] In an embodiment, said exterior major surface of the IGU is positioned at a distance of less than 80 % of a total height of the first leg from a lower end of said first leg.

[0166] This may allow the IGU to be positioned closer to one of the main areas of thermal energy transfer between the exterior and interior of the building i.e. the interface between the exterior and interior of the building. As the IGU is typically the best insulating component of a window, this may improve the insulation properties of the skylight window. By the IGU being positioned at the lower end of the first leg, it may also provide a more compact skylight window.

[0167] In an embodiment said frame and sash side members comprise or are made substantially of one or more plastic polymer materials, preferably said frame side members comprise or are made substantially of

polyurethane, and/or preferably said sash side members comprise or are made from a thermoset plastic polymer material comprising fibers.

[0168] This may provide a skylight window that is more cost effective to manufacture.

[0169] In an embodiment the skylight window is installed potentially in or on a flat or inclined roof of a building to cover a roof opening of the roof, said interior major surface of the IGU facing an interior of the building.

[0170] This may improve the light inflow and/or insulation properties of the building.

[0171] Said first sash and frame side members may form a first pair of side members, and the remaining three said sash and frame side members similarly may form respective pairs of side members, one or more of which being provided in a manner similar or identical to said first pair of side members as defined in any one of the embodiments disclosed herein. Hereby, the IGU may similarly be extended in one or more of the other three outward directions, which may further add to the above advantages of the invention.

[0172] It is preferred that all four sash side members have the structure as described for the first sash side member and that the corresponding or associated four frame side members are also adapted accordingly.

[0173] According to the third aspect of the invention, the skylight window comprises:

a window frame having four frame side members, a window sash having four sash side members supporting an insulating glazing unit (IGU) having multiple layers of glazing, said window sash being movable in relation to the window frame between an open and a closed position of the skylight window, and a weather shield attached to the sash so as to protect a window portion of the skylight window, the window portion comprising the sash, frame and IGU, a first of the frame side members being associated with a first of the sash side members, said first frame and sash side members extending in a longitudinal direction along a first peripheral side of the IGU, said IGU having 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, said first frame side member having a primary leg, which in said closed position is positioned next to and extends along an outwardly facing surface of

said first peripheral side of the IGU, and a secondary leg, which in said closed position extends next to and along a part of said interior major surface of the IGU, a height direction extending from the exposed interior major surface towards the exposed exterior major surface, where said primary leg extends as far as or farther in said upward direction than a location of said exterior major surface of the IGU.

[0174] This allows for positioning the IGU deeper or lower in the window structure i.e. closer to an interior of the building in an installed position of the skylight window. This reduces the area of the sash and frame 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.

[0175] Said primary leg may be plate-shaped and/or may extend substantially in an up-down or vertical direction.

[0176] In an embodiment of the present invention, said first sash and/or frame side member(s) provide an inwardly facing interior surface located below the interior major surface of the IGU, an angle formed between said inwardly facing interior surface and said interior major surface of the IGU at an interior corner formed between said surfaces being equal to or less than 110 degrees, preferably equal to or less than 105, 100, 95, 90, 85 or 80 degrees.

[0177] This may provide improved inflow of light as the angling of the inwardly facing interior surface may reduce the amount of light blocked

[0178] In an embodiment said frame and sash side members comprise or are made substantially of one or more plastic polymer materials, preferably said frame side members comprise or are made substantially of polyurethane, and/or preferably said sash side members comprise or are made from a thermoset plastic polymer material comprising fibers.

[0179] This may provide a skylight window that is more cost effective to manufacture.

[0180] Preferably said sash side members comprise or are made from HELO, a thermoset plastic polymer material comprising fibers.

[0181] In an embodiment, said primary leg extends at least 5, 10, 15, 20, 30, 40, 50, 70, 90, or 100 percent of a distance between said exterior and interior major surface of the IGUs in said upward direction from said exterior major surface of the IGU.

[0182] This has the effect of facilitating the IGU being positioned deeper or lower in the skylight window structure, that is closer to an interior of the building in an installed position of the skylight window. This reduces the area of sash and/or frame through which thermal energy may transfer between the interior and the exterior of the building thus improving the insulation properties.

[0183] In an embodiment, said first leg extends at least 50, 60, 70, 80, 90 or 100 % of a distance between said

exterior and interior major surface of the IGUs in said upward direction from said exterior major surface of the IGU.

[0184] In an embodiment said first sash side member has a first leg, which extends substantially in the upward direction.

[0185] This may facilitate a deeper or lower mounting of the IGU supported by the first sash side member.

[0186] It may also protect the IGU and provide potential surface for sealing elements to be placed and seal between the first sash and frame side member.

[0187] In an embodiment, said first leg extends next to said outwardly facing surface of said first peripheral side of the IGU, and wherein the primary leg in said closed position extends next to and along an outwardly facing surface of said first leg. Hereby, the first leg is positioned between the outwardly facing surface of said first peripheral side of the IGU and the primary leg.

[0188] This provides a spacing in an upward/downward direction which allows the IGU to be placed deeper or lower in the skylight window structure.

[0189] It may also have the effect of guiding the sash side member when closing the skylight window. It may further provide a surface for placing an abutment element for aiding in the positioning of the sash and IGU in the closed position to ensure they are properly positioned in said window in the closed position to ensure optimal sealing. It may also be possible to place sealing elements between the first and primary legs.

[0190] Said outwardly facing surface of said first peripheral side of the IGU may extend substantially in the upward direction.

[0191] In an embodiment, said first leg does not extend to cover any part of said exterior major surface of said IGU.

[0192] This has the advantage of not blocking light from entering through the exterior major surface of the IGU and into the interior of the building. It may thus improve the inflow of light into the interior of the building.

[0193] In an embodiment, said first sash side member further has a third leg projecting from an upper end of said first leg and extending in said outward direction and, optionally, a fourth leg projecting from said third leg and extending substantially in said upward direction and, optionally, a fifth leg projecting from said fourth leg substantially in said outward direction.

[0194] The provision of additional legs may allow the physical properties of the different legs to be tailored to their specific purpose, which may be to support the IGU, provide an abutment surface, provide a mounting surface, support a weather shield etc. For example, if a leg is supporting the IGU it may be provided with a higher strength and/or stiffness and/or smaller or larger size compared to other legs. A leg provided to aid the sealing and/or positioning of the sash and IGU may be provided with grooves or the like adapted to accommodate sealing and/or abutment elements.

[0195] The weather shield may be attached to said fifth

leg.

[0196] In an embodiment, said exterior major surface of the IGU is positioned at a distance of less than 80 % of a total height of the first leg from a lower end of said first leg.

[0197] This may allow the IGU to be positioned closer to one of the main areas of thermal energy transfer between the exterior and interior of the building i.e. the interface between the exterior and interior of the building. As the IGU is typically the best insulating component of a window, this may improve the insulation properties of the skylight window. By the IGU being positioned at the lower end of the first leg, it may also provide a more compact skylight window.

[0198] In an embodiment, said primary leg at a lower end thereof is connected to an outer end of said secondary leg.

[0199] This has the effect of providing a frame side member that may be provided in a shaped profile, such as a stepped profile.

[0200] In an embodiment, a lower end of said primary leg is positioned below said interior major surface of the IGU.

[0201] This may have the effect of providing an abutment surface for the IGU. The abutment surface may be in the form of an abutment element. The primary leg positioned below said interior major surface of the IGU may also provide a surface for the IGU and/or sash to seal against. To this end the primary leg may comprise one or more sealing elements.

[0202] In an embodiment, an insulating member, such as a block of insulating foam, is positioned between said first leg and said primary leg.

[0203] The insulating member may be positioned in a corner of e.g. approximately 90 degrees formed between the primary and secondary legs.

[0204] Said primary leg of the sash member may be positioned right beside the insulating member, i.e. with no further elements between them. Similarly, the above-mentioned potential third leg of the sash member may be positioned right above the insulating member.

[0205] The insulating member may extend upwardly from the secondary leg to more than half a height of the primary leg.

[0206] In this way insulation properties may be further improved.

[0207] In an embodiment the skylight window is installed potentially in or on a flat or inclined roof of a building to cover a roof opening of the roof, said interior major surface of the IGU facing an interior of the building.

[0208] This may improve the light inflow and/or insulation properties of the building.

[0209] According to the fourth aspect of the invention the skylight window comprises:

a window frame having four frame side members, a window sash having four sash side members supporting an Insulating Glazing Unit (IGU) having mul-

multiple layers of glazing, said window sash being movable in relation to the window frame between an open and a closed position of the skylight window, a weather shield attached to the sash so as to protect a window portion of the skylight window, the window portion comprising the sash, the frame and the IGU, a first of the frame side members being associated with a first of the sash side members, said first frame and sash side members extending in a respective longitudinal direction substantially in parallel with a respective first peripheral side of the IGU, said IGU having an exposed interior major surface for facing an interior of said building in an installed position of the skylight window, said IGU further having an exposed exterior major surface facing in an opposite direction towards an exterior in said installed position of the skylight window, where said weather shield extends across substantially the entire exposed exterior major surface, wherein, in a closed position of said skylight window, said first sash side member having a first leg connected to a supporting section of the first sash side member supporting the IGU, the first leg extending in said longitudinal direction and extending substantially in a height direction substantially perpendicularly to at least one of said major surfaces of the IGU, said first leg having a thickness in a width direction extending perpendicularly to said length and height directions, characterized in that at least a portion of said first leg of the first sash side member is generally plate-shaped, consisting of one single section of substantially solid material having a said thickness less than 1 cm.

[0210] The term "plate-shaped" may be understood as the first sash side member being generally flat.

[0211] The term "substantially solid material" may be understood as no cavities and/or hollow spacings are comprised in the material structure.

[0212] Coatings on the material can still be allowed, however, as long as there is no substantial cavity between the different material layers. The term "substantial cavity" may be understood as any cavity being created between two material layers exceeding e.g. 1mm.

[0213] In other words, said portion of the first leg does not include other sections, which surround or extend in parallel with said single section so that a core spacing is formed between them within said first leg as it is known from the extruded sash and frame profiles, made for example from aluminium or polymer, which are used in many traditional windows.

[0214] The portion of said first leg having a thickness less than 1 cm of the first leg may correspond to any estimable part that comprises the first leg.

[0215] The term "thickness" of said first leg refers to the extent that the first leg extends in the direction of the

width dimension, being perpendicular to the height and length dimensions, as defined previously.

[0216] The first leg having a thickness less than 1 cm may have the advantage of allowing the IGU to extend closer to the frame side members as the thickness of material extending along the peripheral sides of the IGU is reduced. This may have the effect of improving the insulation properties of the skylight as the relative area of the superior insulating IGU is increased compared to other parts of the skylight. Moreover, this will lead to a more lightweight structure that can potentially be easier to manufacture and lead to cost savings with regards to the material use. Furthermore, the small thickness of the first leg will lead to a better appearance for the window, having an aesthetic superiority compared to conventional thicker window sash. Eventually, that will also lead to improved daylight conditions, as the daylight inlet may be increased due to the increase of the glazing area that the IGU covers. The thinner leg of the first sash side member may also facilitate the placement of two skylight windows side by side, due to their slimmer structure.

[0217] In some embodiments, the first leg of the sash may have a height to thickness ratio of at least 4:1. That means that the leg's height is substantially larger than the leg's width, which can also be perceived as a particularly thin oblong element. The height to thickness ratio may also be 5:1, 6:1, 7:1 etc. If the first leg extends between the interior major surface of the IGU and the exterior major surface of the IGU, i.e. along the outer side of the IGU at the peripheral side, having a thin first leg means that the IGU can come closer to the frame. This in turn means that the excellent insulating properties of the IGU can be exploited and potentially also that the light admitting area of the IGU, i.e. the area not covered by other parts of the skylight window, can become relatively bigger. In an embodiment the distance between a peripheral side of the IGU and an inner side of a frame side member extending substantially in parallel with said peripheral side of the IGU and facing towards the IGU is less than 20 mm, preferably less than 15 mm.

[0218] Reducing the thickness of the material extending along and/or on top of the peripheral sides of the IGU may also lead to significant cost savings with regards to the manufacturing of the window sash and the associated material costs.

[0219] In an embodiment the sash side members are connected to the exterior major surface of the IGU and extending away from the interior major surface of the IGU, i.e. not extending below the exterior major surface of the IGU in the mounted state. In this way the IGU will be positioned as deep as possible in relation to the roof structure, thereby potentially improving the insulating properties of the window.

[0220] The sash side member may further comprise a second leg and possibly further legs in order to allow a more complex structure. The second and/or possible further legs may also be substantially plate-shaped.

[0221] In an embodiment, the legs form a stepped pro-

file, when the cross-section perpendicular to the longitudinal direction. An upper surface of the second leg may be denoted a step surface. A step profile may be achieved by making the sash side member with two, three or more legs where each leg is substantially perpendicular to an immediately preceding leg and/or an immediately following leg.

[0222] A stepped configuration of adjacent surfaces of the first sash and frame side members may thus be achieved by means of the stepped profile of the first 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 of a potential between the sash and frame 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 sash side member. The sealing between the stepped profile of the sash and frame side member may further be aided by the load transfer of the load exerted by the IGU through the sash. Furthermore, insulating sealing members may conveniently be positioned between the first sash and frame 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 increased.

[0223] Such a step may also be used for supporting a screening device, such as a roller blind.

[0224] In an embodiment a second, third and/or fourth sash side member is/are substantially similar and/or identical in shape and/or form and/or size and/or structure to the first sash side member.

[0225] The skylight window may comprise one or more thermal breaks being located in the sash side member. Thermal breaks are manufactured from a material of a lower thermal conductivity than other parts of the first sash side member. This may have the advantage of improving the insulation properties of the skylight window as a lower thermal conductivity through the supporting section or sash member may be achieved. The thermal break may be substantially made from or comprise a polymer or foam. The thermal breaks may be located on the sash side member, so that possible thermal bridges are avoided. In an embodiment a thermal break is provided at an exterior edge of the first leg located above the exterior major surface of the IGU when seen in the height direction, i.e. on the exterior side of the IGU.

[0226] In an embodiment at least some of the legs are attachable/detachable to/from each other. This would for example allow the first leg to be replaced with one of another height, so that the window sash has an adjustable height that could be used for different installation depth. In particular, the window sash will be able to adjust its height also based on the number of layers of glazing

included in the IGU. For example, an IGU comprising two layers of glazing may require a shorter sash height than an IGU with three layers of glazing. In addition, the sash may also be adjusted for different frame sizes.

[0227] In an embodiment, the sash side member may comprise one or more recesses that may be adapted for securing one or more sealing elements (e.g. gaskets), said recesses may lead to a larger thickness of the sash side member in some limited areas, but the thickness should preferably not exceed 3 cm. The recesses may be in the form of an indentation on any of the legs of the first sash side member. Apart from securing the sealing elements, the recesses may also secure centering blocks that may be attached to the sash in order to carry load so that the sealing elements are not too heavily deformed and thus, damaged. The recesses may also be formed between projections, such as feathers extending in the longitudinal direction, and may include barbs or like elements designed to prevent the sealing elements from coming loose unintentionally.

[0228] In an embodiment, the first leg may comprise or substantially consists of metal, such as steel or aluminium and/or polymer. The metal structure may make the sash extremely resistant to high temperatures, which may arise due to high solar gains. Alternatively, the first leg may comprise or substantially consist of a polymer, which may be fibre reinforced, one example being a thermoset plastic polymer material comprising glass fibers, also known as a HELO profile. A thermal break may be comprised on the sash side member along with a metal discontinuity, having a different thermal conductivity, which will eventually lead to lower thermal losses through the sash.

[0229] The sash side members may be separate members or may be formed as one continuous member.

[0230] According to the fifth aspect of the invention the skylight window comprises:

a window frame having four frame side members, a window sash having four sash side members attached to an insulating glazing unit (IGU) having multiple layers of glazing, said window sash being movable in relation to the window frame between an open and a closed position of the skylight window, and a weather shield attached to the sash so as to protect a window portion of the skylight window, the window portion comprising the sash, frame and IGU, each frame side member being associated with a respective sash side member, each of said frame and sash side members extending in a respective longitudinal direction substantially in parallel with a respective peripheral side of the IGU, said IGU having 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,
 where said weather shield extends across substantially the entire exposed exterior major surface, said frame side members comprising at least one sealing element,
 characterized in that in said closed position of the skylight window, said exposed interior major surface of the IGU abuts on said sealing element.

[0231] That is, sealing between the IGU and the frame is achieved by a sealing element sealing directly against the IGU. Typically, in skylights of the prior art, sealing between the IGU and the frame of the skylight in the closed position is achieved by a sealing element sealing against the skylight sash and the frame. By sealing directly between the IGU and the frame, this removes the need for a sash side member to seal against a frame side member. This may have the effect of eliminating the need for a sash side member to extend along the exposed interior major surface of the IGU. The absence of a sash extending along the exposed interior major surface of the IGU reduces the area of sash through which thermal energy can be transferred between the interior of the building and the exterior. The absence of a sash side member extending along the exposed interior major surface of the IGU may also allow the IGU to be positioned deeper in the skylight window, thus providing a more compact skylight which may improve the view through the skylight from the interior of the building. A further advantage of not having a sash extending along the exposed interior major surface of the IGU may be that there is less or no material below the IGU with different thermal expansion properties, that has to be taken into account when considering the insulating and/or weatherproofing or sealing properties of the skylight.

[0232] With no sash side member extending along the exposed interior major surface of the IGU, it may eliminate the need for a sash side member that is attached to a peripheral side of the IGU. The absence of a sash side member attached to a peripheral side of the IGU, may have the advantage of enabling the IGU to extend closer to the frame side member i.e. for the IGU to be placed closer to the frame side member. This may have the effect of increasing the relative area of the IGU relative to the rest of the skylight and thus improving the thermal insulation properties of the skylight window, given the superior insulation properties of the IGU relative to other components of the skylight.

[0233] Due to the high temperatures that may occur inside the skylight window between the IGU and the weather shield, the sealing element needs to be suffi-

ciently tall in a height dimension perpendicular to a glazing pane of the IGU in the closed position of the Skylight to function as intended throughout the operating temperature range, as the IGU and frame may expand differently as they may comprise materials having different coefficients of thermal expansion.

[0234] In an embodiment, one or more frame side members may comprise a sealing recess adapted for securing a sealing element.

[0235] In an embodiment, one or more frame side members may comprise a drain channel for draining condensate or the like. The drain channel may be located adjacent to the sealing element. The drain channel may be located between the sealing element and the frame.

[0236] In an embodiment in said closed position of said skylight window, a periphery of the exposed interior major surface of the IGU abuts on said sealing element.

[0237] This may provide a better view through the window as only a periphery of the skylight window is potentially blocked by a sealing element.

[0238] In an embodiment, a primary leg of a first frame side member extends in a longitudinal direction substantially in parallel with a peripheral side of the IGU.

[0239] This may improve support of the IGU. It may further provide a mounting surface for hinges, motors or the like to facilitate opening of the window.

[0240] In an embodiment, said first frame side member comprises a secondary leg which may be connected to the primary leg.

[0241] In a development of the previous embodiment, said first frame side member may comprise a tertiary leg which may be connected to the secondary and/or primary leg. The frame side member may further comprise a quaternary leg which may be connected to the tertiary and/or secondary and/or primary leg.

[0242] The different legs may be shaped to accommodate the IGU in a compact manner. This may be achieved by a leg of the frame side member shaped to allow the IGU to extend as close to the frame side member as possible and still provide the necessary space above and around the IGU to facilitate opening thereof.

[0243] In an embodiment, said exposed interior major surface of the IGU abuts on said sealing element on the secondary leg of the first frame side member which extends along the exposed interior major surface of the IGU.

[0244] Additionally or alternatively, said exposed interior major surface of the IGU abuts on said sealing element on the tertiary and/or quaternary leg of the first frame side member which extends along exposed interior major surface of the IGU.

[0245] This may have the advantage of allowing the leg extending along the exposed interior major surface of the IGU to be adapted to accommodate the sealing element and seal against the IGU.

[0246] In an embodiment, said exposed interior major surface of the IGU abuts on said sealing element by compressing said sealing element.

[0247] The IGU may compress said sealing element

by substantially 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85 % measured between an uncompressed state and a compressed state in a height dimension. The height dimension being equivalent to the height dimension defined for the sash and frame side members.

[0248] In an embodiment, the secondary leg of the first frame side member forms a lining below the exposed interior major surface of the IGU.

[0249] This may have the advantage of improving the insulation properties of the skylight. The lining may also improve the sealing properties of the skylight window.

[0250] 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.

[0251] The skylight window may 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.

[0252] In an embodiment, the first sash side member may comprise a first leg which may be connected to a second leg that may be connected to a third leg.

[0253] This may provide a sash with legs that may be adapted, shaped and/or positioned to perform a specific purpose, such as e.g. supporting the IGU, providing a step surface, abutting a frame side member, providing a mounting surface etc.

[0254] The third leg may be connected to a fourth leg.

[0255] A leg of the sash side member may comprise a mounting surface for a hinge or the like to facilitate opening and closing of the skylight.

[0256] In an embodiment, the first sash side member and/or the first frame side member has a stepped profile.

[0257] This may have the effect of contributing to preventing dirt and/or water and/or other contaminants from entering the interior of the building from the exterior of the building due to the steps of the stepped profile. It may act similar to a labyrinth seal.

[0258] In an embodiment, in a closed position of said skylight window, substantially the entire periphery of the exposed interior major surface of the IGU abuts on said at least one sealing element.

[0259] This may have the effect of providing a consistent seal between the IGU and the window frame.

[0260] In an embodiment, said sealing element is a continuous, uninterrupted sealing element.

[0261] This may have the effect of improving the sealing properties, as leaks that may occur at joinings between discontinuous and sealing elements may be prevented.

5 **[0262]** In an embodiment, the sash comprises at least one abutment element to prevent the at least one sealing element from carrying substantial load and/or prevent the at least one sealing element from being damaged.

10 **[0263]** The term "damaged" may be understood as the sealing element being excessively compressed. This may cause cracks or the like to form in the sealing element resulting in a reduced sealing performance and/or leaks. Excessive compression of the sealing element may result from the sealing element carrying a substantial load. A substantial load may be more than 30, 40, 50, 60, 70, 80, 90, 95, 99% of the load exerted through the sash.

15 **[0264]** In an embodiment, the sealing element is positioned on an upper surface of a frame side member, said upper surface facing the exposed interior major surface of the IGU in a closed position of the skylight window.

[0265] When the frame side member has a stepped profile, the top surface may be the step surface.

20 **[0266]** The supporting section comprises an interior surface facing towards an interior of the building in an installed position of the skylight window. The interior surface of the supporting section extends in the width or lateral direction above the exposed exterior major surface of the IGU. glued to the exposed exterior major surface of the IGU

25 **[0267]** In an embodiment, the exposed exterior major surface of the IGU comprises a masking and/or priming, said masking and/or priming is preferably located on the periphery of the exposed exterior major surface of the IGU. The masking or priming may be positioned at the areas of attachment of the IGU with the supporting section. Alternatively, it may be positioned along the entire exposed exterior major surface of the IGU. The masking or priming, both possibly being achieved with one material provide good adhesion at the areas of attachment. The masking may have the further purpose of contributing to the aesthetic value of the window and the pane sealing from solar radiation. Such masks are generally non-transparent for UV-A and UV-B light, in some cases even totally lightproof. The mask may be a ceramic coating, UV hardening lacquer, a one- or two-component lacquer or any other suitable material. The masking not only protects the pane sealing from deterioration caused particularly by exposure to UV-A and UV-B light, it may also serve an aesthetical purpose in that it conceals the pane sealing. The masking may be provided as a strip along the border of a pane of the IGU. The masking may be made by printing and may be applied by a serigraphic technique, as a dual-component hot-setting lacquer or another lacquer for cold or hot use.

30 **[0268]** Materials capable of reflecting, absorbing or accumulating heat may be used as masking or priming or coating for improving the performance of the window un-

der different climatic conditions.

[0269] If disposed on the exposed exterior major surface of the IGU, the masking material should be of a quality making it resistant to wear caused by solar radiation, wetting, grinding effects caused by wind-born material, vegetation, animal activity etc. This may be achieved by using an enamel, which is a coating that is burned into the glass surface during the tempering thereof.

[0270] The use of spots may give an increased frictional resistance thereby promoting the attachment of the pane to the sash. When attaching the pane by encasement in a frame or sash, this increased frictional resistance allows the achievement of a satisfactory attachment based only on the adhesion of the frame or sash material. The use of glue, which may be sensitive to solar radiation etc., may thus be unnecessary. The increased frictional resistance and the advantages thereof may, however, also be achieved in other ways, e.g. by using a coarser masking material.

[0271] An opaque or coloured masking may be applied to hide spacer members, gaskets, sealing elements and the like, which might otherwise blur the image.

[0272] The masking may be supplemented by a series of hot wires to minimize the formation of condensation.

[0273] In an embodiment, the supporting section of the first sash side member abuts on a sealing element, said sealing element is positioned above and/or in abutment with the exposed exterior major surface of the IGU.

[0274] In another embodiment, the exposed exterior major surface of the IGU comprises a coating and/or adhesive, such as an aluminium or white-colored tape. The coating and/or adhesive may preferably be located on the periphery of the exposed exterior major surface of the IGU. The purpose of the coating or adhesive may be to protect against the UV-A and UV-B light and/or the heat.

[0275] 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.

[0276] 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.

[0277] 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.

[0278] 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.

Detailed description

[0279] In the enclosed drawings, which show non-binding examples of embodiments of the present invention,

Fig. 1 is a perspective view from above of an em-

bodiment of a skylight window according to the present invention installed in a roof,
 Fig. 2 is a cross-sectional view showing another embodiment of the first sash side member of the skylight window with a flat weather shield,
 Fig. 3 is a cross-sectional view similar to that of Fig. 2 where the skylight window comprises a dome-shape weather shield,
 Fig. 4 is a cross-sectional view of a different embodiment of a skylight window, and
 Fig. 5 is a cross-sectional view of another embodiment of a skylight window comprising a flat weather shield.

[0280] Fig. 1 shows 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 in the roof. The skylight window 1 comprises a weather shield 3 and a window portion 4, which includes a transparent insulating 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.

[0281] 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.

[0282] 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.

[0283] As is seen in Figs 2-4, 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 an 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.

[0284] The frame 7 comprises four frame side members of which two 10, 11 are visible in Fig. 1, and one 10 is visible in Figs 2-4. Each frame side member is associated with one of four corresponding sash side members of which one 14 is visible in Figs 2-4. 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 IGU, so that the sash fits into the frame and the frame 7 encloses the sash 6 in the closed position of the skylight window 1.

[0285] The slightly curved weather shield pane 8 as seen in Fig. 1 extends over an entire roof opening (not shown), which opening the skylight window 1 is positioned to cover.

5 **[0286]** 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.

10 **[0287]** 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.

[0288] The window sash 6 supports the IGU 5 and is connected to the window frame 7 via hinges (not shown) so that it is movable in relation to the frame 7 between an open (not shown) and a closed position of the skylight window 1. The window is shown in the closed position in all of the figures.

20 **[0289]** Fig. 2 illustrates a cross-section of an example of a skylight window 1 according to the present invention installed in a roof 2 of a building (of which only the roof 2 is shown) and comprising a weather shield 3, in this example in the form of a flat pane. The first sash side member 14 comprises a second leg 15 which in turn comprises a supporting section 72 which is adhered to the exposed exterior major surface 5g of the IGU 5.

25 **[0290]** In this way, the supporting section 72 carries the IGU 5 in the open position of the skylight window 1. As shown in the Figures, the adherence provided by the supporting section 72 being adhered to the exposed exterior major surface 5g of the IGU 5 may be the substantially only attachment of the first sash side member 14 to the IGU 5. It is, however, also possible that other attachments of the first sash side member 14 to the IGU 5 are provided. Similarly it should be noted that the supporting section 72 need not carry the IGU 5 in the open position of the skylight window 1 and other elements may be provided for this purpose.

30 **[0291]** An adhesive 74 is provided between the exposed exterior major surface 5g of the IGU 5 and the supporting section 72 to facilitate the adhesion. The adhesive used is a Silane-terminated polyurethane (SPUR), but a silyl modified-polymer (SMP) adhesive or any other suitable adhesive may also be used. In some cases, the adhesive is provided as an adhesive tape. This allows the adhesive tape to be pre-applied to the supporting section 72 with a covering strip remaining on the side meant for adhering to the exposed exterior major surface 5g of the IGU 5, such that the covering strip may simply be removed from the adhesive tape when it is time to adhere the supporting section 72 to the exposed exterior surface of the IGU 5g. This may allow the sash side member(s) to be prepared for adhesion to the IGU in advance of assembly of the skylight window and so allow optimisation of the production and assembly process. In this way sash side members may be provided ready-to-assemble in a kit or packaging e.g. during transportation

or storage.

[0292] The supporting section 72 constitutes a thermal break and is made of a material with a lower thermal conductivity than the rest of the first sash side member 14. The sash side member may for example be made or substantially made of aluminium and the thermal break of a glass fibre reinforced polyurethane (PUR).

[0293] The first sash side member 14 may include a further supporting section (not shown) which is provided as a safety device that will catch the IGU in case the adherence between the supporting section 72 and the IGU 5 fails in the open position of the skylight window 1. The further supporting section may comprise a cushioning element to dampen any impact that may occur.

[0294] In the examples shown the first leg 15 of the first sash side member 14 extends only above the exposed exterior major surface 5g of the IGU. The first leg 15 is connected to the second leg 16 as seen in Figs. 2 and 3. The first leg (as seen in the examples) or second leg may further be connected to a third leg third leg 17 which may in-turn be connected to a fourth leg 31.

[0295] In Figs. 2 and 3 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. The lower end of the primary leg is positioned below the interior major surface 5b of the IGU 5. 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 and an associated stepped structure of the first frame side member 10. The potential gap between the first frame and sash side members 10 and 14 respectively is in the form of a labyrinth acting to prevent contaminants, precipitation and/or dirt can pass between the interior and exterior of the building in which the skylight window 1 is installed. The stepped profile further provides the possibility of placing sealing elements at the corners thereof or between the parallel surfaces of the sash and frame side member. In this way the load exerted by the sash 6 through the first sash side member 14 can be utilized to compress a one or more sealing elements placed on the stepped profile and so ensure optimum sealing.

[0296] In the examples shown, the frame side member 10 comprises a sealing element 22 located on an upper surface thereof. The sealing element 22 extends along an upper surface of the other three frame side members. The sealing element 22 need not, however, be provided in the form of a single continuous sealing element 22, but may be provided as several separate sealing elements. As can be seen, the exposed interior major surface 5b of the IGU 5 directly abuts the sealing element 22.

[0297] As a consequence, there is no need for a sash side member to seal against the sealing element 22 and

the sash side member can be omitted beneath the exposed interior major surface 5b of the IGU 5 as in the example shown. With no sash 6 extending along the exposed interior major surface 5b the IGU 5 is positioned deeper in the skylight window 1. With the sash side member 14 attached to the exposed exterior major surface 5g of the IGU 5 it is not necessary for the sash side member 14 to extend along the peripheral side 5a of the IGU 5, which allows the IGU 5 to extend closer to the frame side member 10 providing a larger area of IGU 5 relative to the skylight window 1. This allows more inflow of light into the interior of the building and improves the insulation properties of the skylight window 1 as the area of the IGU 5, which typically has superior insulating properties compared to the other window components, is increased. Also, the IGU 5 is positioned closer to the interior of the building than otherwise, bringing it closer to the main location of thermal energy transfer between the exterior and interior of the building. This further improves the insulation properties as less thermal energy will be transferred through the other components of the skylight window 1 having inferior thermal insulating properties.

[0298] In the example shown, it is a periphery of the IGU 5 that abuts the sealing element 22. This, however, need not be the case. It is also possible that a more central part of the IGU 5 abuts the sealing element 22. Although not shown, substantially the entire periphery of the exposed interior major surface 5b of the IGU 5 may abut on the at least one sealing element 22 such that the exposed interior major surface 5b of the IGU 5 abuts a sealing element 22 on its four sides providing a tight seal. The sealing element 22 in the example is a continuous, uninterrupted sealing element 22 extending along an upper surface of the four frame side members.

[0299] In the examples shown, the primary leg 25 of the first frame side member 10 extends in a longitudinal direction substantially in parallel with the peripheral side 5a of the IGU 5. The first frame side member 10 further comprises a secondary leg 26 which is connected to the primary leg 25. The secondary leg 26 here extends along the interior major surface 5b of the IGU 5, substantially perpendicular to the primary leg 25. The sealing element 22 is located on this secondary leg 26 and the exposed interior major surface 5b of the IGU 5 abuts on the sealing element 22. By abutting on the sealing element 22, the element 22 is compressed under the load exerted by the IGU 5 facilitating sealing there between. The secondary leg 26 may further form a lining (not shown) below the exposed interior major surface 5b of the IGU 5 in so doing, improving the insulation and sealing properties of the skylight window 5.

[0300] Although not shown, the sash 6 may comprise at least one centering block to prevent the at least one sealing element 22 from carrying substantial load and from being damaged as well as assisting in assuring the sash is positioned correctly in the skylight window 1 in the closed position thereof. The centering block may be made from the same materials as the sash such as pol-

ymers like chlorinated PVC etc. or metals like aluminium. The centering block may be positioned substantially half-way along the length of a sash side member. In some cases, each sash side member may comprise a centering block.

[0301] In Fig. 2, the second leg 16 projects from a surface 15b of the first leg 15 in the width dimension, which surface 15b extends substantially in the height dimension and a third leg 17 projects from the surface 15c of the first leg 15, which surface 15c extends substantially in the height dimension and is substantially perpendicular to the interior major surface 5b of the IGU.

[0302] As shown in Fig. 2, an angle between the first 15 and second 16 legs and between the second and third legs 17 is substantially 90 degrees, respectively.

[0303] The first leg 15 is formed integrally with the second leg 16, and the third leg is formed integrally with the first leg 15.

[0304] 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.

[0305] The first 15 and a fourth 31 legs project in substantially opposite directions from the second 16 and third leg 17, these opposite directions both being substantially in the height dimension.

[0306] In relation to the sash side member 14 as shown in Fig. 2, 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 as shown in Fig. 1, and the outward direction is a direction opposite to the inward direction. This also applies to the other figures.

[0307] 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 accommodates 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 accommodating 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 an opening in the roof, which allows daylight to reach the interior of the building.

[0308] The recess 10b 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.

[0309] 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 50a of the lining panel 50 in order to accommodate the lining panel upper part 50 in the recess 10b.

[0310] The weather shield 3 is here provided as a unitary structure, which is separate from but connected 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. 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. upwards in Fig. 1, in relation to the window portion 4. In other embodiments, a flat pane may be used for the weather shield 3 as seen in Fig. 2. The weather shield pane 8 is transparent and here comprises only one single layer of glazing made for example of hardened glass.

[0311] The first leg 15 projects in an upwards direction away from the exterior major surface 5g of the IGU 5. The direction away from the exterior major surface 5g of the IGU 5, in which direction the first leg 15 projects, extends substantially in the height dimension and extends upwards, i.e. towards the exterior the building in the installed position of the skylight window 1.

[0312] As seen in Fig. 2, in a cross section perpendicular to the length dimension or longitudinal direction L all legs 15, 16, 17, 25, 26 may each be substantially shaped as a rectangle. In this embodiment the first leg 15 of the sash side member is extending in the height direction, 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 slightly inclined with about 5 degrees with respect to the height dimension. This inclination is in an outward and upward direction in Fig. 2. The third leg 17 comprises a lower supporting surface 17a facing an upper surface 25c of the primary leg 25 and extends at an angle of about 90 degrees in relation to the height dimension. The surfaces 15c, 25b extend substantially in parallel in the closed position of the window 1.

[0313] 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 re-

cesses may also be provided for accommodating hinges and the like.

[0314] 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.

[0315] The third leg 17 shown in Fig. 2 has an oblong shape in the width dimension so that the width of the third leg 17 is more than 4 times wider than the height thereof. The third leg 17 extends in the width dimension more than the second leg 16. The height of the third leg 17 is about double the height of the second leg 16.

[0316] The skylight window 1 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.

[0317] Fig. 3 shows the same cross sectional view as Fig. 2, but for a different embodiment of the invention. The weather shield 3 is here dome-shaped, whereas it was flat in Fig. 2.

[0318] 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.

[0319] 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 5 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. As seen in Fig. 4, the IGU 5 may in a conventional manner comprise three layers of glazing 5c, 5d, 5e or two layers of glazing 5c and 5d as seen in Figs. 2 and 3, 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 5d. 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. 4.

[0320] 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.

[0321] The first leg 15 extends about 100 % of the distance between said exterior and interior major surface of

the IGUs 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 in the embodiment shown in Fig. 3.

[0322] In Fig. 3 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 over the exterior major surface of the IGU 5 in this embodiment. In the latter context, a fixation member 30 mentioned below is not considered part of the sash side member 14.

[0323] 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.

[0324] In the embodiment shown in Fig. 3, the sash side member 14 has a fourth leg 31 projecting from an upper end 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 Fig. 3.

[0325] In Fig. 3, 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 upper resting surface 16a of the second leg 16.

[0326] The fourth leg 31 has an oblong shape in the width dimension and extends more than 4 times longer in the width dimension than in the height dimension. The extent in the length dimension of the fourth leg 31 is substantially 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.

[0327] In Fig. 3, an angle between the first 15 and fourth 31 leg is substantially 90 degrees.

[0328] The fourth leg 31 is formed integrally with the first leg 15.

[0329] The fourth and second legs 31, 16 extend or project substantially in parallel.

[0330] In the cross section shown in Fig. 3, the fourth leg 31 is substantially shaped as a rectangle, a surface 31 b of the fourth leg 31 extending substantially along an upper surface 25c of the primary leg 25 being parallel to the upper surface 25c.

[0331] The fourth leg has an overall or total height in the height dimension less than the thickness of the IGU 5.

[0332] The skirt 9 of the weather shield 3 is attached to each of the fourth legs of the four sash side members as seen in Fig. 1.

[0333] In Fig. 3, the sealing element 78 is made of an elastic, plastic and sealing material.

[0334] Similar sealing elements are provided in a similar manner on the remaining frame side members. The sealing elements form the only or substantially the only resting point or resting surface of the sash 6 (including the IGU 5 and the weather shield 3) on the frame 7 in the closed position of the skylight window 1.

[0335] Roofing felt (not shown) may in a conventional manner be positioned to seal between outer surfaces of

the frame 7 and of the roof 2. 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.

[0336] In Fig. 2, the first leg has a thickness in a width direction extending perpendicularly to said length and height directions which is denoted with T. The first leg 15 of the first sash side member is generally plate-shaped, consists of one single section of substantially solid material and at least a portion of the first leg has a said thickness less than 1 cm. The legs of the first sash side member 14 may be attachable or detachable from each other. The first leg 15 may comprise metal. The sash is made from a thermoset plastic polymer material comprising fibers, but could also comprise metal such as aluminium. This provides a significantly thinner sash which allows the IGU to be placed lower in the window structure and extend closer to the frame side member. The first leg having a thickness of less than 1 cm allows the distance between the peripheral side 5f of the IGU and the inner side surface 25b of the first frame side member 10 facing towards the IGU, to be less than 20 mm.

[0337] Fig. 5 shows the IGU 5 being supported by the first sash side member 14 and the skylight having 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.

[0338] The first frame side member 10 extends in a length or longitudinal direction L, along the side surface 5f of the interior pane in the closed position of the IGU 5.

[0339] The first sash side member 14 has a supporting section 72, the supporting section 72 being positioned above the exterior major surface 5g. The supporting section 72 carries substantially the whole or 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 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.

[0340] The supporting section 72 is adhered to the exterior major surface 5g of the IGU. The supporting section 72 comprises an interior surface 72i which is positioned towards the IGU in a closed position of the skylight window 1. The interior surface 72i is adhered to the exterior major surface 5g of the IGU by means of glue.

[0341] The first frame side member 10 in Fig. 5 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. A sealing element 22 is provided between the supporting section 112 and the interior major surface 5b.

[0342] 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.

[0343] 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.

[0344] A fastener (not shown) inserted through the pre-formed hole 45 would fasten the skylight window 1 to the roof 2. Fig. 5 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 41 c, 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 a roof of a building, the skylight window comprising:

a window frame (7) having four frame side members,

a window sash (6) having four sash side members supporting an insulating glazing unit (IGU) having multiple layers of glazing, said window sash (6) being movable in relation to the window frame between an open and a closed position of the skylight window, and

a weather shield (3) attached to the sash so as to protect a window portion (4) of the skylight window, the window portion (4) comprising the sash, frame and IGU,

a first of the frame side members being associated with a first of the sash side members, each of said first frame and sash side members extending in a respective longitudinal direction substantially in parallel with a first peripheral side of the IGU,

said IGU having an exposed interior major surface (5b) 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 (5g) for facing in an exterior direction, which is opposite of said interior of said building in said installed position of the skylight window and extending away from and at a right angle to said exterior major surface of the IGU, 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,

characterized in that

said first sash side member (14) includes a first leg, which extends in the exterior direction away from the exposed exterior major surface of the IGU, and a supporting section (72), which is adhered to said exposed exterior major surface of the IGU and/or the supporting section comprising an interior surface facing towards an interior of the building in an installed position of the skylight window, said interior surface of the supporting section is glued to the exposed exterior major surface of the IGU.

2. A skylight window according to claim 1, wherein said supporting section carries the IGU in said open position of the skylight window.
3. A skylight window according to claim 1, wherein the supporting section is adhered to said exposed exterior major surface of the IGU by means of adhesive.
4. A skylight window according to any of the preceding claims, wherein the substantially only attachment of the first sash side member to the IGU is an adherence provided by the supporting section being adhered to said exposed exterior major surface of the IGU.
5. A skylight window according to any of the preceding claims, wherein the first sash side member includes a further supporting section provided as a safety device catching the IGU in case said adherence fails in said open position of the skylight window.
6. A skylight window according to any of the preceding

claims, wherein the weather shield comprises a transparent cover member, preferably a dome of glass or a clear polymer.

7. A skylight window according to any of the preceding claims, wherein the exposed exterior major surface of the IGU comprises a masking and/or priming, said masking and/or priming is preferably located on the periphery of the exposed exterior major surface of the IGU.
8. A skylight window according to any of the preceding claims, wherein the supporting section of the first sash side member abuts on a sealing element, said sealing element is positioned above and/or in abutment with the exposed exterior major surface of the IGU.
9. A skylight window according to any of the preceding claims, wherein the exposed exterior major surface of the IGU comprises a coating and/or adhesive, said coating and/or adhesive is preferably located on the periphery of the exposed exterior major surface of the IGU.
10. A method of manufacture of a skylight window according to any one of the previous claims, comprising the steps of:
 - applying an adhesive on a bottom surface of the supporting section and/or along a periphery of the exposed exterior major surface of the IGU, and
 - bringing said bottom surface into contact with the exposed exterior major surface of the IGU so as to adhere the supporting section to the exposed exterior major surface of the IGU.
11. A skylight window according to claims 1 to 9, where said first peripheral side of the IGU is located, in said outward direction, beyond said first surface of said recess.
12. A skylight window according to claims 1 to 9 and 11 for being installed in a roof of a building, the skylight window where said first frame side member having a primary leg, which in said closed position is positioned next to and extends along an outwardly facing surface of said first peripheral side of the IGU, and a secondary leg, which in said closed position extends next to and along a part of said interior major surface of the IGU, wherein said primary leg extends as far as or farther in said upward direction than a location of said exterior major surface of the IGU.
13. A skylight window according to claims 1 to 9 and 11 to 12 for being installed in a roof of a building, the skylight window, where said weather shield extends

across substantially the entire exposed exterior major surface, wherein, in a closed position of said skylight window,

said first sash side member having a first leg connected to a supporting section of the first sash side member supporting the IGU, the first leg extending in said longitudinal direction and extending substantially in a height direction substantially perpendicularly to at least one of said major surfaces of the IGU, said first leg having a thickness in a width direction extending perpendicularly to said length and height directions, 5
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where at least a portion of said first leg of the first sash side member is generally plate-shaped, consisting of one single section of substantially solid material having a said thickness less than 1 cm.

14. A skylight window according to claims 1 to 9 and 11 to 13 for being installed in a roof of a building, the skylight window, where each frame side member being associated with a respective sash side member, each of said frame and sash side members extending in a respective longitudinal direction substantially in parallel with a respective peripheral side of the IGU, where said weather shield extends across substantially the entire exposed exterior major surface, said frame side members comprising at least one sealing element, wherein in said closed position of the skylight window, said exposed interior major surface of the IGU abuts on said sealing element. 20
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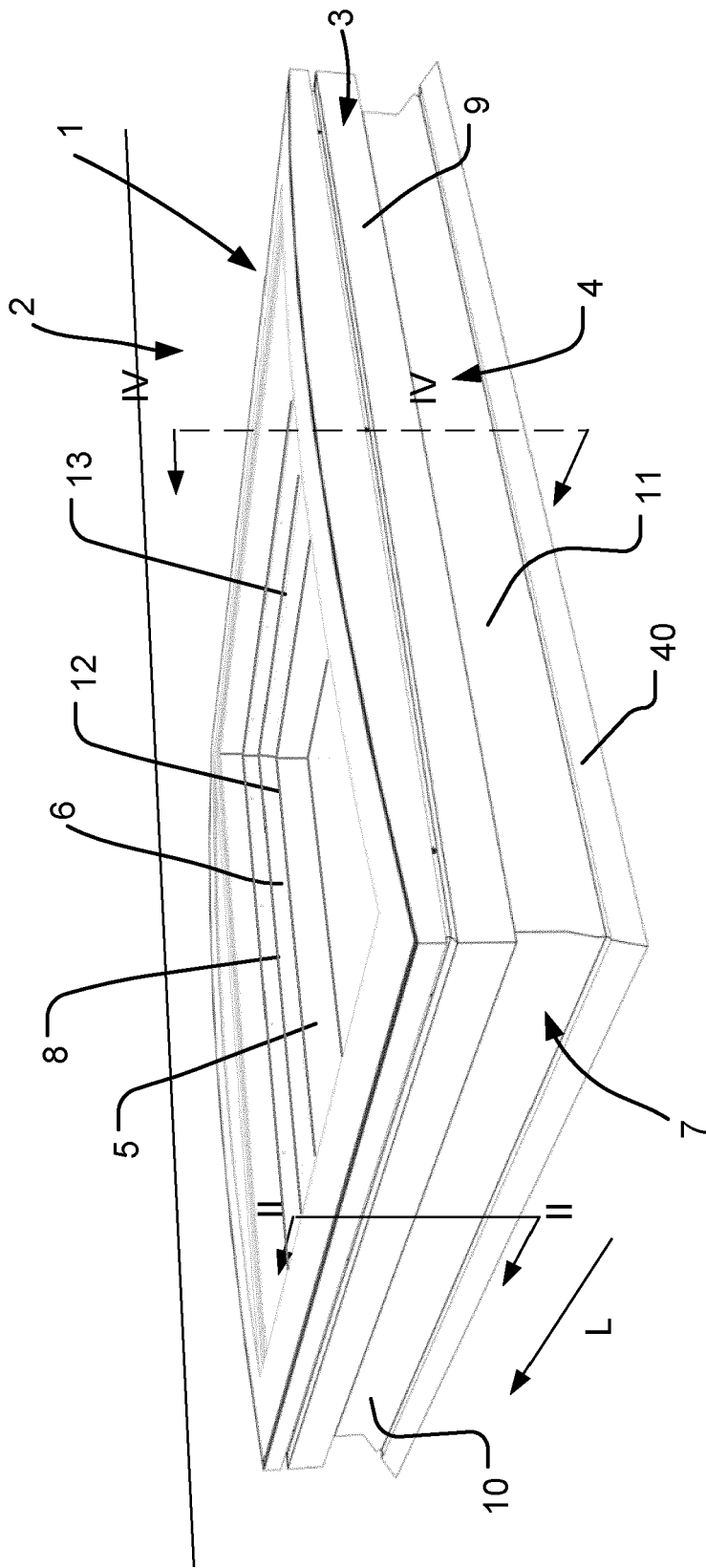


Fig. 1

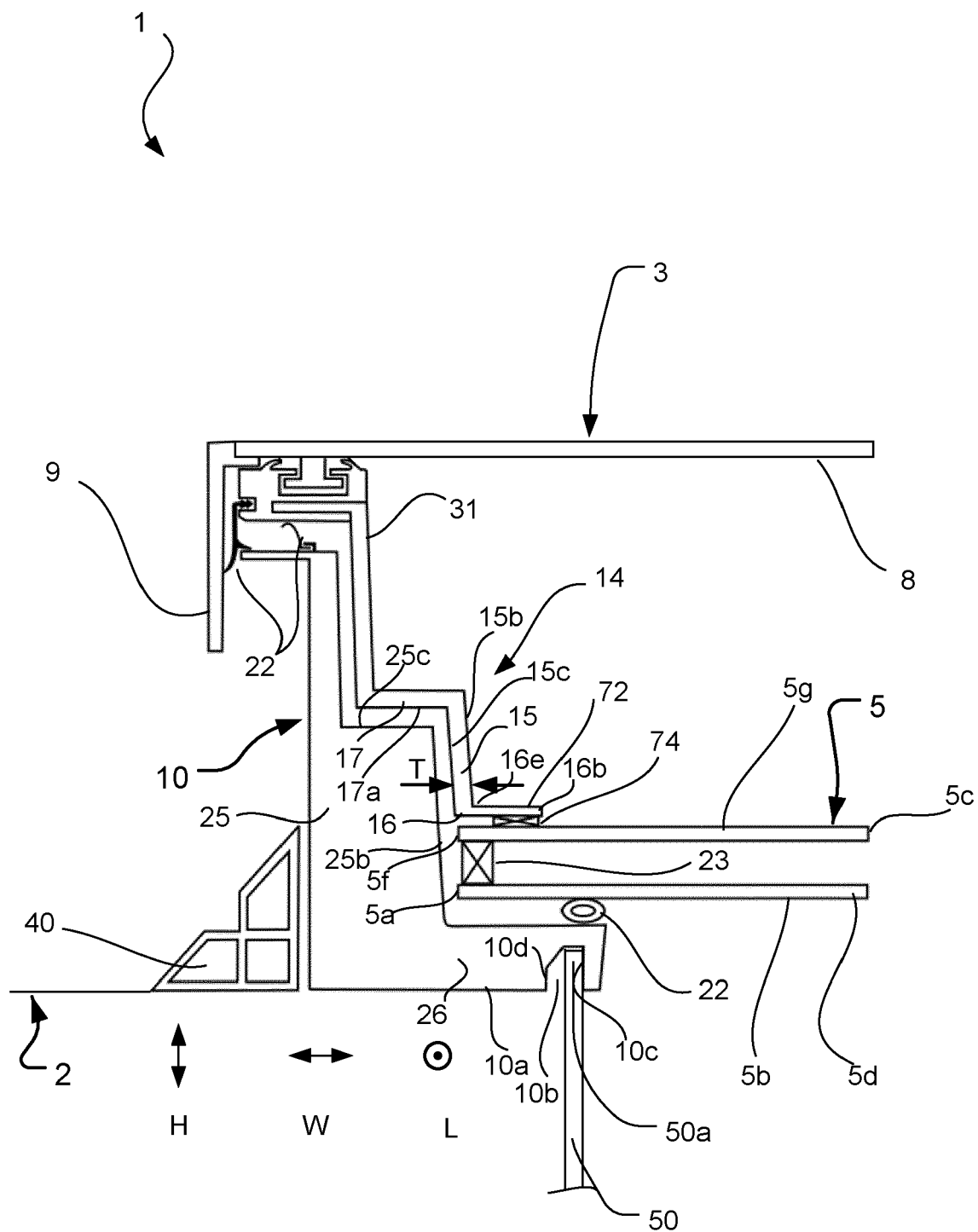


Fig. 2

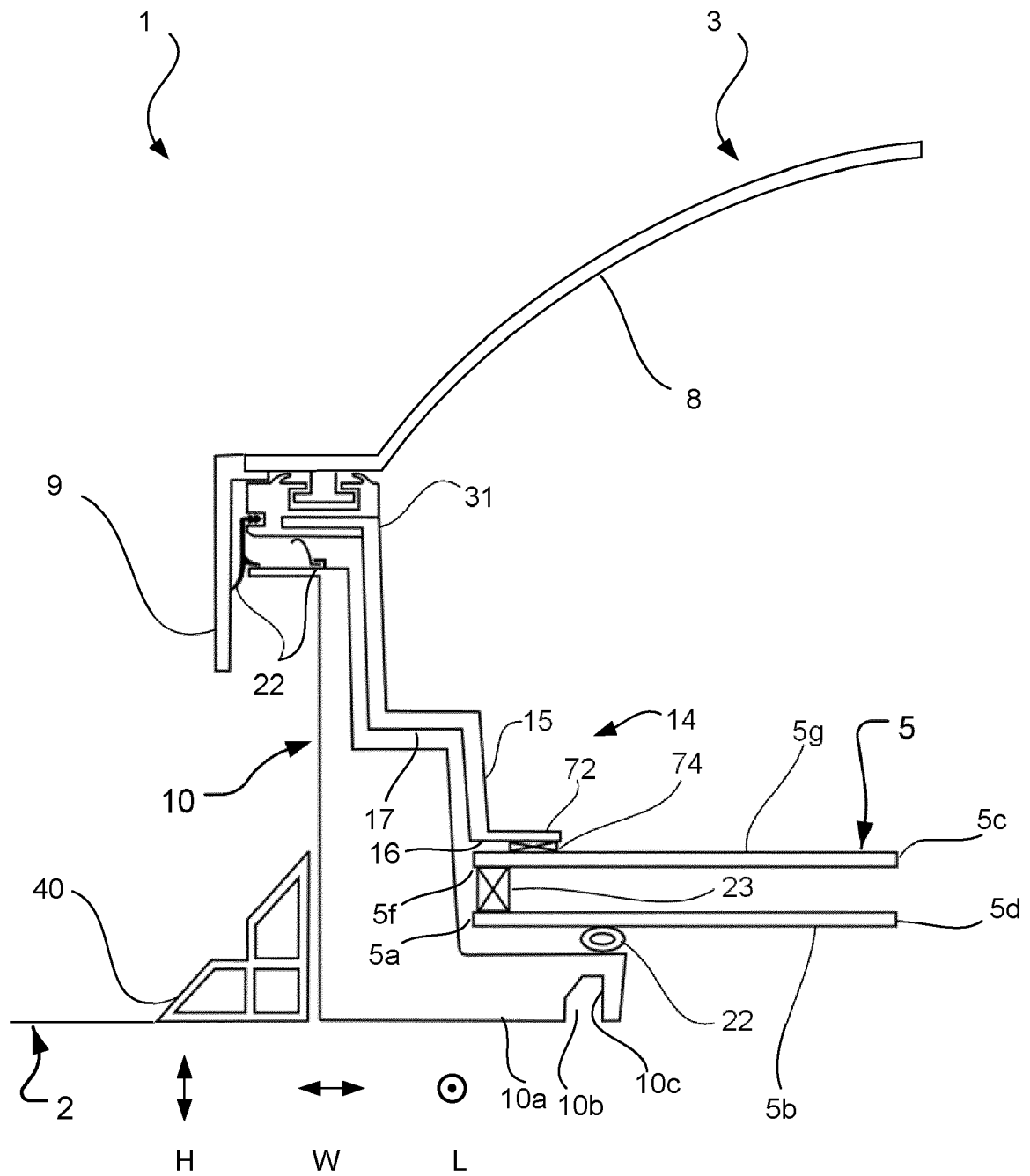


Fig. 3

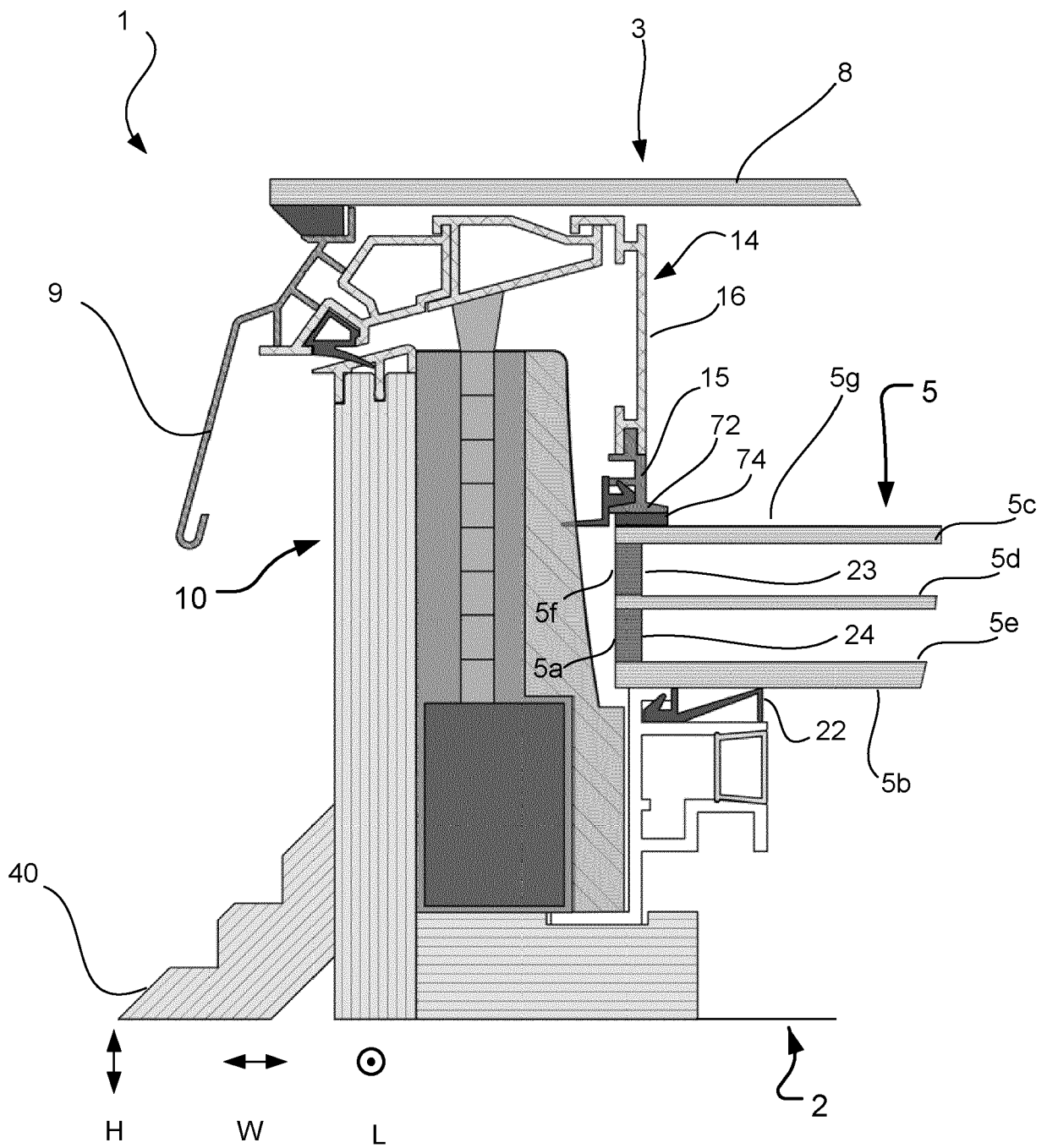


Fig. 4

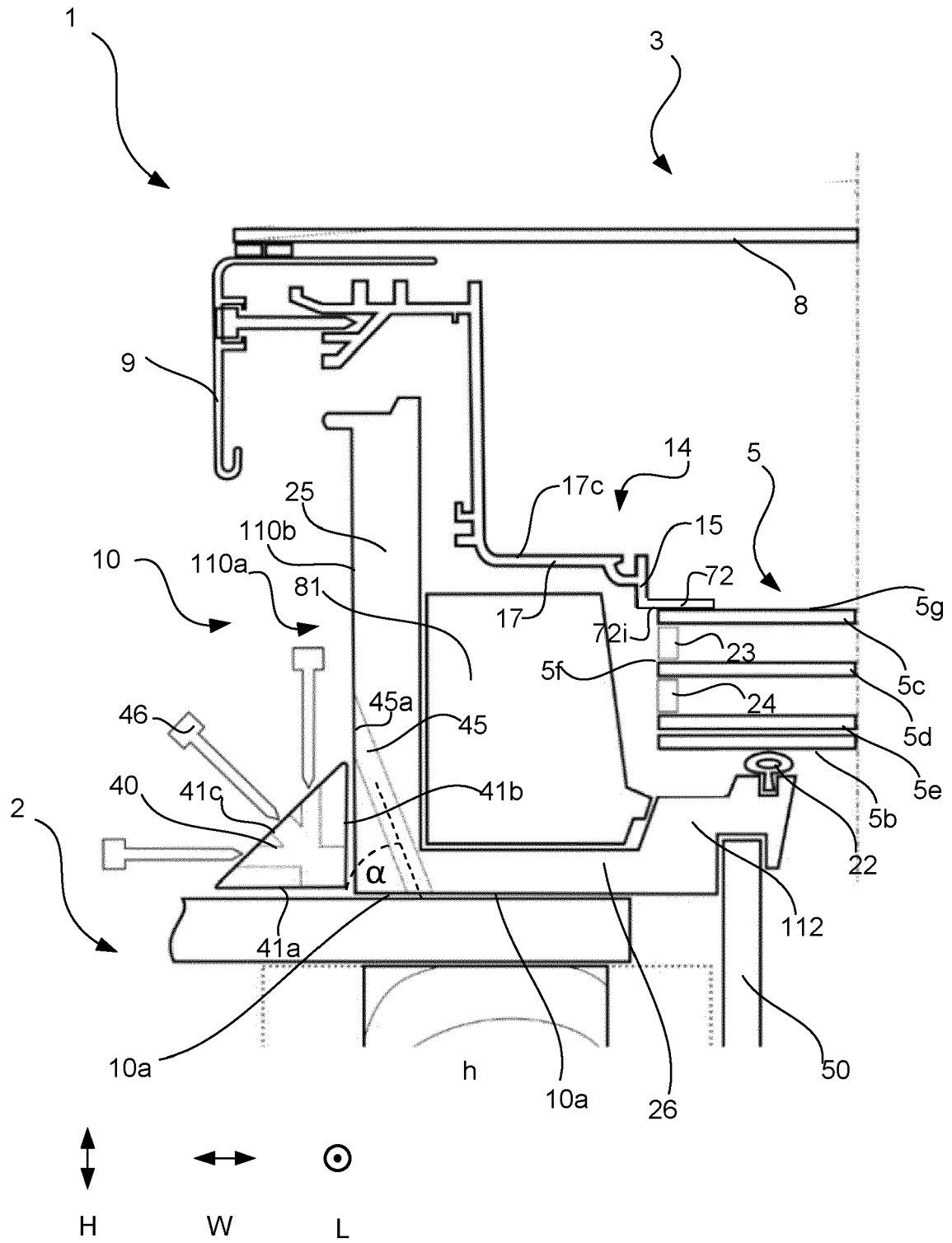


Fig. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 15 5242

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 July 2020	Examiner Leroux, Corentine
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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The members are as contained in the European Patent Office EDP file on
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03-07-2020

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