(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 615 236 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.07.2013 Bulletin 2013/29

(51) Int Cl.:
E06B 7/02 *(2006.01)* ***E06B 7/10*** *(2006.01)*
F24F 7/013 *(2006.01)* ***F24F 13/18*** *(2006.01)*

(21) Application number: **12195354.1**

(22) Date of filing: **03.12.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **13.01.2012 DK 201270023**

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

(72) Inventors:
- **Nielsen, Thomas Nør**
  8700 Horsens (DK)
- **Isaksen, Kaj**
  7120 Vejle Øst (DK)
- **Klein, Steen**
  7100 Vejle (DK)

(74) Representative: **Carlsson, Eva et al**
Awapatent A/S
Rigensgade 11
1316 Copenhagen K (DK)

(54) **A window having interchangeable interface means and a method of providing a window**

(57) The present invention relates to a window, such as a roof window or skylight, and a method of providing such a window, comprising a frame (1), a sash (29), a cladding (20-25) and a pane (28), and also comprising interface means (5, 105; 15, 17, 18; 105; 205; 58) for positioning along a circumference of the window, the interface means being adapted to be positioned on the frame, the sash and/or the cladding, where the interface means comprise climate regulating elements that provide sound insulation and/or thermal insulation and/or moisture insulation, and the interface means are immediately interchangeable with other interface means.

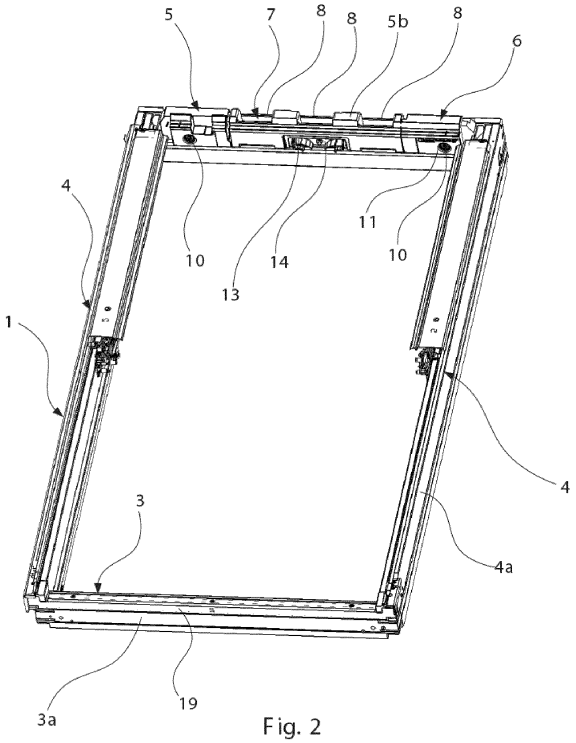

Fig. 2

EP 2 615 236 A2

Description

[0001] The present invention relates, in a first aspect, to a window and, in a second aspect, to a method of providing a window.

[0002] More specifically, the first aspect of the invention relates to a window, such as a roof window or skylight, comprising a frame, a sash, a cladding and a pane, and also comprising interface means for positioning along a circumference of the window, the interface means being adapted to be positioned on the frame, the sash and/or the cladding.

[0003] The frame comprises a top frame member, a bottom frame member and two side frame members, the sash comprises a top sash member, a bottom sash member and two side sash members, and the cladding comprises top frame cladding, side frame cladding, bottom frame cladding, top sash cladding, side sash cladding, and bottom sash cladding.

[0004] In this specification, an internal frame face or sash face, respectively is a face facing another frame or sash face, whereas an external frame face or sash face, respectively, is a face opposite the internal frame face or sash face of the same frame or sash member, respectively,, the frame and sash each comprising a top member, a bottom member and two side members.

[0005] An upper frame face or sash face, respectively, is a face facing the exterior in a mounted condition of the window, and a lower frame face or sash face, respectively, is a face facing the interior in a mounted condition of the window.

[0006] An interior cladding face is a face facing a frame or sash member of the window, whereas an external cladding face is a face facing the exterior in a mounted condition of the window. Windows of the kind mentioned in the introduction are well known in the prior art. Such windows are marketed and sold in a variety of markets having immensely different climate challenges. In some markets, there are furthermore substantial seasonal variations in the climate. Factors such as ambient temperature, humidity, wind etc. influence the indoor climate, which should normally be as stable and comfortable as possible. Although some differentiation is possible in existing windows, there is still room for improvement as to flexibility in the choice of optimum properties of the window in regard to the outdoor and indoor.

[0007] It is an object of the present invention to provide a window of the kind mentioned in the introduction, the window avoiding or mitigating at least some of the disadvantages of the prior art.

[0008] This and further objects are met by a window of the kind mentioned in the introduction, where the interface means comprise climate regulating elements that provide sound insulation and/or thermal insulation and/or moisture insulation, and the interface means are immediately interchangeable with other interface means.

[0009] In this specification, a climate regulating element is an element that enables the climate, for instance temperature, air humidity, sound level etc., in a room, into which the window leads, to be influenced in relation to a surrounding climate.

[0010] Easily interchangeable interface means provide for easy customization of the window. From a manufacturer's point of view, that is advantageous since a versatile product range may be obtained with a lean range of product parts. From a user's point of view it is beneficial since the window is able to be adapted to meet his or her needs, and in some cases even after installation.

[0011] In an embodiment of the first aspect of the invention, the frame comprises a top frame member, a bottom frame member and two side frame members, and the interface means are adapted to be positioned on an internal face of the top frame member, which interface means comprises ventilation means, which ventilation means include at least one ventilation passage extending from a first face of the interface means to a second face of the interface means, which first and second faces are adjacent to a third face of the interface means, which third face abuts the internal face of the top frame member in a mounted position of the interface means, the ventilation passage(s) providing an overall cross sectional flow area of 5-35 cm^2, preferably 15-25 cm^2. This may particularly be interesting for users often experiencing unpleasantly high levels of humidity indoors or otherwise with a need of ventilation in situations where the window cannot be opened or where an open window is not desirable.

[0012] Interface means in this position are particularly easy to interchange, since they are easily accessible, even after installation of the window in a surrounding building structure.

[0013] In an embodiment of the first aspect of the invention, the interface means comprise insulating means adapted to be positioned on an internal face of the top frame member. This provides for a window with enhanced insulation properties. The interchangeability of the insulating means enables the insulation properties of the window to be customized to the user's needs. In geographical regions with high contrasts between outdoor temperature and desired indoor temperature insulation means providing excellent insulation properties may be desired, whereas users in geographical regions experiencing smaller contrasts in temperature may be content with insulation means with less excellent insulation properties.

[0014] It is understood that embodiments comprising both ventilation means and insulating means as well as embodiments comprising only one of ventilation means and insulating means are envisaged.

[0015] In an embodiment, the ventilation means comprise mechanical means, such as one or more fans, for generating an air current through the ventilation passage. This may be particularly beneficial in cases where passive ventilation caused by natural convection in the air does not result in an air renewal of a satisfactory extent.

[0016] In an embodiment, the top frame member and the interface means comprise mutually mating mounting means for mounting the interface means on the internal face of the top frame member, and other interface means also comprise mounting means adapted to mate with the mounting means of the top frame member so as to provide immediate interchangeability of interface means. By keeping certain features, such as the mating mounting means, fixed in relation to each other and varying other features around it, such as ventilation and insulation properties, a high degree of customizability of the window is obtained.

[0017] Turning now to another embodiment of the invention wherein the frame comprises a top frame member, a bottom frame member and two side frame members, the interface means are adapted to be positioned on an external face of a side frame member and/or on an external face of the bottom frame member. More specifically, in an embodiment the interface means comprise markings indicating at least two installation levels of the window in relation to a surrounding building structure. This enables the window frame to be mounted in a surrounding building structure, such as a roof, in different levels corresponding to the respective markings. A low installation level of the window frame provides for enhanced insulation properties of the installation in relation to a higher installation level.

[0018] Turning now to yet another embodiment of the invention, the interface means are adapted to be positioned on and preferably substantially cover the external face of the side frame member of the window, and/or the interface means are adapted to be positioned on the external face of the bottom frame member, abutting a second face of the bottom frame member, the second face being adjacent to the external face and extending with an angle to the external face, the angle being 50°-130°, preferably substantially right, and/or the interface means are adapted to be positioned on and preferably substantially cover the external face of the top frame member of the window.

[0019] In that the interface means comprise climate regulating elements that provide sound insulation and/or thermal insulation and/or moisture insulation, the extra insulation provide for a window with enhanced insulation properties. As to the bottom frame member, the second face prolongs an upper part of the bottom frame member in the form of a projection, which results in increased strength of the frame construction. The resulting recess below the projecting upper part of the bottom frame is able to accommodate the insulation element, resulting in a frame construction with both increased strength and insulating properties.

[0020] In yet other embodiments, the cladding comprises top frame cladding, side frame cladding, bottom frame cladding, top sash cladding, side sash cladding, and bottom sash cladding, the frame comprises a top frame member, a bottom frame member and two side frame members, and the sash comprises a top sash member, a bottom sash member and two side sash members, and the interface means are adapted to be positioned on an internal face of a bottom frame cladding member so as to abut against an external face and/or upper face of the bottom frame member, and/or the interface means are adapted to be positioned on an internal face of a side frame cladding member so as to abut against an external face and/or an upper face of a side frame member, and/or the interface means are adapted to be positioned on an internal face of a top frame cladding member so as to abut against an external face and/or upper face of the top frame member, and/or the interface means are adapted to be positioned on an internal face of a bottom sash cladding member so as to abut against an external face and/or upper face of the bottom sash member, and/or the interface means are adapted to be positioned on an internal face of a side sash cladding member so as to abut against an external face and/or upper face of a side sash member, and/or the interface means are adapted to be positioned on an internal face of a top sash cladding member so as to abut against an external face and/or upper face of the top sash member. Particular embodiments of these will be elaborated in further detail below.

[0021] In an embodiment, the interface means adapted to be positioned on an internal face of the bottom frame cladding member so as to abut against an external and/or upper face of the bottom frame member and the interface means adapted to be positioned on an internal face of the side frame cladding member so as to abut against an external and/or upper face of the side frame member are integrally formed and preferably generally forms a U-shape; the base of the U-shape being positioned on the internal face of the bottom frame cladding member so as to abut against the external and/or upper face of the bottom frame member, and the legs of the U-shape being positioned on the internal face of the side frame cladding member so as to abut against the external and/or upper face of the side frame member. The integrated and U-shaped construction provides for easy handling with respect to mounting, since the risk of losing or dropping parts of the interface means is reduced, when they are integrally formed.

[0022] The strip may be made from an elastic material is used as interface means, the strip at least partially having a substantially tube-shaped longitudinal bead adapted to abut against an external and/or lower surface of the bottom sash member in a closed condition of the window so as to form a gasket. This particular configuration of the interface means provides for good insulation properties, particularly against moisture penetration, however also against sound ingress and thermal transmission.

[0023] The bottom frame cladding may comprise at its external face a folded flange for receiving a mating flange of the strip. This provides for more secure and easier mounting of the gasket as well as better insulation properties.

[0024] In an embodiment, the interface means cover at least a major portion of the internal face of the cladding so as to provide a good insulating effect. This may be the case for the gasket-type interface means discussed above. Also, in some embodiments, the interface means may be made of a foam material so as to form a sound reducing impediment against sound ingress through the window and/or a thermal barrier ensuring good or thermal insulating properties.

[0025] In yet other embodiments, the interface means comprise a glass rim profile that overlaps a joint between at least one sash member and a rim of the pane, said glass rim profile being attached to an upper surface of the sash member, and the interface means are arranged between the glass rim profile and the upper surface of the sash member. This breaks the thermal bridge, which may otherwise exist between the sash frame and the glass rim profile, which is typically made of metal, and gives a surprisingly big improvement of the in-sulating properties of the window.

[0026] The joint between different components of the sash have been found to be particularly important and it is therefore preferred that the interface means extend over the joint between the sash member and the rim of the pane. In this way it may also contribute to sealing the joint, and it may therefore be advantageous to use an insulating material also having hydrophobic properties.

[0027] To make sure that the thermal bridge is broken entirely, it is preferred that the interface means extends substantially over the entire width of the glass rim profile, but it is also possible to provide a sealing compound between the pane and the outermost edge of the glass rim profile.

[0028] Preferably, a strip made from an elastic material is used as interface means, which provides for a reliable and easily manageable solution. Other types of material may, however, also be used, including particularly materials applied in a soft, semi-liquid state, which may also have adhesive properties and hence potentially contribute to the attachment of the glass rim profile.

[0029] When using a strip of an elastic material, it preferably has a longitudinal bead, which is pressed into a longitudinal groove in either the upper side of the sash member or the glass rim profile for attachment. Likewise, a projection on the interface means may be forced into one or more grooves or recesses in the glass rim profile for attachment thereto.

[0030] To improve the insulation even further and/or contribute to the attachment, the interface means may embrace a flange of the glass rim profile as will be explained in detail below. The interface means may be permanently attached to the glass rim profile or to the sash member, but a releasable attachment may easy repair and maintenance. A sealing compound may be provided between the pane and the glass rim profile. In a second aspect of the invention, a method of providing a window with improved climate regulating properties is provided, the method comprising the steps of: providing a frame, a sash, cladding and a pane, providing interface means in the form of climate regulating elements, positioning the interface means on an internal and/or an external and/or upper face of the frame, and/or on an internal face of the cladding, and/or on an external and/or upper face of the sash, where the interface means are immediately interchangeable with other interface means. Embodiments of the invention will now be discussed by way of example and with reference to the appended figures, where:

Fig. 1 is a schematic representation of a frame of a window ready for having interface means positioned on it,

Fig. 2 is a schematic representation of a frame of a window comprising interface means positioned on an inner face of the top frame member,

Fig. 3 shows the interface means of Fig. 2 positioned on the inner face of the top frame member in closer detail and with top frame cladding mounted,

Fig. 4 shows the interface means of to Fig. 3 detached, reversed and on a larger scale,

Fig. 5 is a schematic representation of interface means of a different design for positioning on an inner face of a top frame member and comprising ventilation means, the interface means being shown in a disassembled state,

Fig. 6 is a schematic representation of the interface means of Fig. 5 shown in an assembled state,

Fig. 7 is a schematic representation of interface means for positioning on an external face of a frame member comprising markings indicating at least two installation levels of the window,

Fig. 8 is a perspective view of a window according to the invention in assembled state comprising cladding and seen from below and from the interior,

Fig. 9 is a perspective view of a window according to the invention in assembled state comprising cladding and seen from above and from the exterior,

Fig. 10 is a schematic representation of a bottom frame cladding,

Fig. 11 is a schematic representation of a detail of the bottom frame cladding of to fig. 10,

Fig. 12 shows, on a larger scale, a schematic representation of the profile of interface means for being positioned on the bottom frame member abutting the bottom frame cladding,

Fig. 13 is a cross sectional view of one side of a window comprising interface means in the form of a glass rim profile, and

Fig. 14 shows another embodiment comprising interface means in the form of a glass rim profile.

[0031] Fig. 1 schematically depicts a frame 1 of a roof window including a top frame member 2, a bottom frame member 3 and two side frame members 4. Embodiments of the invention comprising other types of windows are also conceivable. The top frame member 2 has an inter-

nal face 2a ready for receiving interface means. The bottom frame member 3 has an external face 3a, and the side frame members 4 have external faces 4a, all of which are also ready for receiving interface means of different types.

[0032] Figs 2 and 3 schematically shows a window frame 1 comprising one embodiment of interface means 5 positioned on the internal face 2a of the top frame member 2; in Fig. 2 the top frame cladding is removed for a better view of the interface means. The interface means 5 comprises insulating means 6. The insulating means 6 are made principally of an insulating material, such as expanded polystyrene (EPS).

[0033] The insulating means 6 forms the bulk of the interface means 5, which also include ventilation means 7. Although not depicted, interface means comprising only one of insulating means and ventilating means are conceivable. In the latter case, the bulk of the interface means may be diminutive or be essentially made of material with poor insulating properties.

[0034] The ventilation means 7 include three ventilation passages 8 extending between a first face 5a (not visible in Fig. 2) of the interface means 5 and a second face 5b of the interface means 5, which first and second faces (5a, 5b) are adjacent to a third face 5c (not visible in Fig. 2) of the interface means 5, which third face 5c abuts the internal face 2a of the top frame member 2 in a mounted position of the interface means 5. This enables the ventilation passages 8 to allow an air current to flow across the interface means 5. Other shapes of the interface means and the arrangement of ventilation passages are conceivable. Also other numbers of ventilation passages are conceivable, such as one, two, four or more, as is branched ventilation passages. The cross sectional shape of the ventilation passages 8 in Fig. 2 are substantially rectangular; however other cross sectional shapes of ventilation passages are conceivable, such as polygonal, rounded or substantially circular.

[0035] The ventilation passages 8 altogether provide an overall cross sectional flow area of approximately 20 cm^2, which has proven beneficial as to provide a desired amount of air renewal by passive ventilation, i.e. by convection of air, in the room into which, the ventilation passages lead via the window. However, other sizes of cross sectional flow areas are conceivable.

[0036] Fig. 4 shows the interface means of Fig. 2 and 3 on a larger scale.

[0037] Interface means 105 of another type comprising ventilating means 107 is schematically depicted in Figs 5 and 6. There are provided four substantially cylindrical ventilation passages 108, however, other numbers of ventilation passages are conceivable. The substantially cylindrical design of the ventilation passages 108 is advantageous in relation to forced air renewal, since the cylindrical shape allows for positioning of fans (not shown) in the ventilation passages 108.

[0038] Interface means comprising ventilation passages of miscellaneous shape and/or for passive or forced ventilation, respectively, are conceivable.

[0039] As indicated in Fig. 5, the interface means 105 also comprises a recess 109 for accommodating equipment, such as for instance a power supply and/or control means for powering and/or controlling any fans provided in the ventilation passages 108.

[0040] The bulk of the interface means 105 is made from an insulating material 106 resulting in combined insulating and ventilating properties of the interface means 105. However, other embodiments of the interface means may merely serve as a retainer essentially without insulating properties simply for retaining and positioning the ventilation passages and possibly any fans in relation to the top frame member.

[0041] Mounting means 10, 11, 111, 12 for positioning interface means 5, 105 on the internal face 2a of the top frame member 2 are provided. In Figs 1 and 2 the mounting means are embodied by screws 10 and matching screw holes 11, 12 provided in the interface means 5 and top frame member 2, respectively. The screws 10 indicated have rather large heads and slots so as to be operated without the use of a screw driver but simply by the use of an edge of a coin or the like. This enables quick and easy mounting and dismounting of the interface means. The use of screws operable by a screw driver is however envisaged as is the use of other kinds of mounting means, such as for instance Velcro® or other hook-and-loop fasteners, which would also enable quick and easy mounting and dismounting of the interface means.

[0042] Interface means for being positioned on an internal face 2a of the top frame member 2 are configured to be immediately interchangeable. This is obtained partly by their mounting means and partly by their overall shape. When comparing the interface means 5, 105 of Figs 4 and 6 it is seen that the screw holes 11, 111 are positioned so as be aligned with the same set of screw holes 12 in the top frame member 2. Hence, only one set of screw holes 12 in the top frame member 2 is sufficient for mounting any one of a range of interface members adapted to be mounted in that position. This is beneficial from a manufacturer's point of view and from a user's point of view, since the limited number of mounting means simplifies and eases both the manufacturing and mounting process. Also, the overall shape of the interface means 5, 105 shares similarities, for instance the recess 13, 113 for accommodating the striking plate 14 of the window, which recess 13, 113 also assists in correct positioning of the interface means correctly. The uniform design of the interface means 5, 105 notwithstanding their individual differences in insulating and ventilation properties enable the interface means to be immediately interchangeable.

[0043] Another type of interface means 15, 17, 18 is adapted to be positioned on an external face 4a of a side frame member 4 and/or on an external face 3a of the bottom frame member 3 and/or an external face of the top frame member.

[0044] In one embodiment, cf. Fig. 7, these interface

means comprise markings 15 indicating two installation levels of the window 1 in relation to a surrounding building structure. The markings 15 comprise two lines 15a, 15b, which is of different colour, for instance blue and red, to be easily distinguished from each other. Markings in identical colour, other styles of markings such as broken lines, dot-and-dash-lines and combinations thereof are conceivable. Also more than two markings are envisaged corresponding to more than two installation levels. The markings 15 extend across the entire face 4a. However, embodiments comprising markings only extending across part or parts of the face 4a are conceived. Although depicted in Fig. 7 as provided only on the outer face 4a of side frame member 4, the markings may in addition thereto or alternatively be provided on the outer face 3a of the bottom frame member 3. The respective markings 15a, 15b are associated with respective grooves for use with mounting brackets 16 for installation of the frame 1 in a desired level in a surrounding building structure.

[0045] Yet another type of interface means 17 is adapted to be positioned on the external face 4a of the side frame member 4. These interface means 17 (not depicted) comprise insulating means. In a preferred embodiment, the bulk part of the interface means 17 are made from an insulating material, such as expanded polystyrene (EPS). The interface means 17 are essentially rectangular and covers substantially the entire external face 4a of a side frame member 4. It is mounted on the external face 4a of the side frame member 4 by means of glue or the like. Other shapes, extents and ways of mounting the interface means 17 are conceivable, such as polygonal or partly rounded cross sectional shapes, extents so as to only cover part of the external face 4a, mounting by means of Velcro® or the like, and/or combinations of any of the above. Also, positioning of the interface means 17 on an outer face of one or more of the other frame members, in addition or alternatively to the outer face 4a of the side frame member 4, is conceivable. The thickness of individual interface means 17 may vary so that a proper interface means may be chosen for the particular window and for the particular environment in question.

[0046] Yet another type of interface means 18 (not depicted) is adapted to be positioned on an external face 3a of the bottom frame member 3. These interface means comprise insulating means and are adapted to abut a second face 3b, c.f. Fig. 7, of the bottom frame member 3. The second face 3b is adjacent to the face 3a and extends with a substantially right angle A to the external face 3a. Hence, a projection 19 is formed on the upper part of the bottom frame member 3. The projection 19 projects from the bottom frame member 3 in direction away from the top frame member 2. The projection 19 is integral with the rest of the bottom frame member 3, but may alternatively be envisaged as a separate part attached to the bottom frame member. The projection 19 provides increased strength and stability to the frame construction, and the interface means 18 (not depicted) positioned below the projection 19 provides the frame construction with enhanced insulation properties. The interface means 18 preferably covers substantially the entire face 3a and has a thickness (t) essentially identical to that of the projection 19 as this provides for a good insulation effect. However, other embodiments are envisaged, such as a thicker or slimmer interface means extending over just part or parts of the face 3a.

[0047] As may best be seen in Fig. 8, showing a window from what would be the interior in a mounted condition of the window, and from Fig. 9, showing the window from what would be the exterior in a mounted condition of the window, the window comprises cladding, more specifically top frame cladding 20, side frame cladding 21, bottom frame cladding 22, top sash cladding 23, side sash cladding 24, and bottom sash cladding 25.

[0048] In alternative embodiments, the interface means are adapted to be positioned on an internal face (not visible in the figures) of a side frame cladding member 21 so as to abut against an external face 4a and/or upper face (hidden behind cladding in Fig. 9) of a side frame member 4, and/or the interface means are adapted to be positioned on an internal face (not visible in the figures) of a top frame cladding member 20 so as to abut against an external face and/or upper face of the top frame member, and/or the interface means are adapted to be positioned on an internal face of a bottom sash cladding member so as to abut against an external face and/or upper face of the bottom sash member, and/or the interface means are adapted to be positioned on an internal face of a side sash cladding member so as to abut against an external face and/or upper face of a side sash member. The provision of such interface means may be carried out in any manner immediately apparent to a person skilled in the art, and may for instance be formed of pre-fabricated elements of an insulating material which is chosen according to the particular need, for instance in different climate zones, and adhered to the cladding member and/or the frame or sash member. As an alternative, such interface means may be in the form of a film or coating adhered to the cladding.

[0049] Referring now in particular to Figs 10 to 12, an embodiment which is adapted to provide a particularly efficient insulation, the interface means 205 are adapted to be positioned on an internal face (not visible on the figures) of a bottom frame cladding member 22 so as to abut against an external and/or upper face of the bottom frame member.

[0050] The bottom frame cladding member 22 is formed as an elongate element being provided at a respective end with an end element 26 of another material, for instance a sealing material, having protruding portions 26a-26c to seal against the sash 29 and/or pane 28. The bottom frame cladding member 22 has a number of apertures 27, here three, to receive fastening means (not shown), typically in the form of screws, to fasten the bottom frame cladding member 22 to the bottom frame member 3. At a lower edge of the bottom frame cladding mem-

ber 22, a portion 22a is folded over relative to the remaining portion 22b of the bottom frame cladding member 22. The folded portion 22a acts as reception means for supplemental interface means 205 shown in detail in Fig. 12.

[0051] Although not shown in the drawings, the interface means 205 generally forms a U-shape, the base of the U-shape being positioned on the internal face of the bottom frame cladding member 22 so as to abut against the external and/or upper face of the bottom frame member, and the legs of the U-shape being positioned, for instance, on the internal face of the side frame cladding member so as to abut against the external and/or upper face of the side frame member, but other positions are also conceivable. Of the interface means 205 in the form of a sealing strip having a cross-sectional appearance as shown in Fig. 12, a first depending portion 230 forms the engagement means to be received in the slot formed by the folded portion 22a. A straight portion 231, a curved portion 232 and a bottom portion together encapsulate a hollow 233 and form the transition to a bottom portion 240 extending, in the mounted position, below the bottom edge of the bottom frame cladding member 22 at the folded portion 22a. Two walls 235 and 236 define a second hollow 237 forming a substantially tube-shaped longitudinal bead adapted to abut against an external and/or lower surface of the bottom sash member in a closed condition of the window so as to form a gasket. At the end opposite portions 230-234, the strip 205 forming the interface means comprises a transition portion 238 and a flange portion 239. The strip 205 may be made from any elastic material and may for instance be formed by extrusion.

[0052] At the ends of the bottom frame cladding member 22, the portions 239 and 230-234 may be cut away, such that a side sealing strip is formed by the legs of the U-shape formed only of portions 235-238 and 240 (in part).

[0053] Figs 13 and Fig. 14 show a further preferred embodiment of a window according to the invention comprising a pane 28 defining plane, a frame 1 having a top member 2, a bottom member 3 and two side members 4 defining a frame plane, and a sash 29 having a top sash member 41, a bottom sash member 42 and two side sash members 43 defining a sash plane. In the embodiment shown, the window is centre-hung in that the sash 29 is connected to the frame 1 by a pivot hinge 44 (see Fig. 1) provided between side members of the frame 1 and sash 29, respectively, to be openable by tilting the sash 29 of the window about the pivot hinge axis defined by the pivot hinge. The pivot hinge comprises two parts, namely a frame part and a sash part.

[0054] The hinges used are preferably of the type described in the applicant's earlier patent applications W09928581 and GB1028251, where a curved member and a tap on one hinge parts travels in a curved guide track in the other during opening and closing of the window. The radius of curvature entails that when using such hinges, the hinge axis lies at a small distance above the actual hinge parts and as the sash frame is turned first the curved member and then the tap comes out of the track. In combination this provides a pattern of movement which allows easy operation of a centre-hung window and allows the sash frame to be turned substantially entirely around.

[0055] As used in this description, a closed position of the window means a position in which the frame plane and the sash plane coincide, that is form an angle of 0 degrees with each other. Similarly an open position of the window as used herein generally means a position in which the sash 29 is tilted about the pivot hinge axis such that the frame plane and the sash plane no longer coincide.

[0056] A longitudinal axis of the window is defined as extending perpendicular to and between the top frame member 2 and the bottom frame member 3, a transversal axis of the window is defined as extending perpendicular to and between the respective side frame members 4 and thereby perpendicular to the longitudinal axis, and a depth axis of the window is defined as extending perpendicular to both the longitudinal axis and the transversal axis. The pivot hinge axis and the transversal axis are parallel.

[0057] The window furthermore comprises a lock of a type known per se for locking the frame 1 and sash 29 to each other as well as a generally circumferentially extending sealing provided on the sash 29 for sealing the gap between the sash 29 and the frame 1 in the closed position of the window. The sealing comprises at least one, preferably at least two sealing strips.

[0058] Notwithstanding the centre-hung window shown in Fig. 1 the window according to the invention may in other embodiments be top-hung, with or without an intermediate frame structure, have the hinge axis somewhere between the top and the centre, be side-hung or for that matter even be bottom-hung.

[0059] The sash 29 and frame 1 of the window according to the invention may for example be made of wooden members or members made of cast or extruded polyurethane (PUR).

[0060] Turning now to Fig. 13 a glass rim profile 45 is provided on the side member 43 of the sash and it is to be understood that the other side of the window is identical thereto but mirror inverted.

[0061] The glass rim profile 45 has a longitudinal extension corresponding substantially to the longitudinal extension of the side sash member 43 and a side rim 46 of the pane 28. It is preferred that the glass rim profile 45 extends essentially along the entire length of the side rim 46 so as to retain the pane 28 in the sash 29 and to keep out precipitation, but embodiments with interruptions or variations in the profiling of the glass rim profile are also imagined.

[0062] The glass rim profile 45 comprises an essentially L-shaped portion with a first wall 47 and a second wall 48, the two walls 47, 48 being substantially perpendicular to each other. A flange 49 extends from the end

of the first wall 47 opposite the second wall 48 essentially parallel to and in the same direction as the second wall 48.

[0063] An essentially arc-shaped portion extends from the second wall 48, the arch-shaped portion comprising a first arc wall 50, an apex 52 and a second arc wall 51. The first arc wall 50 and second arc wall 51 are substantially parallel to the first wall 47 of the "L"-shape. The apex 52 peaks at approximately the same level as the first wall 47 of the "L"-shape.

[0064] From the second arc wall 51 a slightly arc-shaped, almost flat portion 53 extends away from the arc-shaped portion essentially parallel to the second wall 48.

[0065] The slightly arced, almost flat portion 53 ends in a folded back portion 54, which is folded back so as to extend below the slightly arc-shaped portion 53. The bottommost part of the folded back portion 54 is at essentially the same level as the underside of the second wall 48. The slightly arc-shaped, almost flat portion 53 is, in cooperation with a flange 55 and the folded-back portion 54, adapted to retain, in a mounted position, the pane 28 against the side sash member 43. The folded-back portion 54 is also adapted to abut the pane 28 and form a close and essentially watertight transition. Also, the folded back portion 54 provides for a gentle abutment face of the glass rim profile 45 for the pane 28 so that scratches and cracks along the side rim 46 are avoided or at least mitigated.

[0066] The underside of the second wall 48 is adapted to abut, in a mounted condition, an upward-facing face 56 of the side sash member 43. It may be fastened in this position by means of screws or similar fastening means projecting through holes in the profile.

[0067] Together, the first wall 47, the second wall 48 and the first arc wall 50 form a channel 57. Although part of the channel is, in a mounted condition, covered by a sash striking bead covering and a frame striking bead covering, the channel 57 is adapted to be able to drain off any of precipitation falling onto it. Thus, when mounted, the glass rim profile 45 serves as part of a weather shielding of the side sash member 43.

[0068] The fact that the underside of the second wall 48 and the underside of the folded back portion 54 are at substantially the same level, enables, in a mounted condition, the upper face 28a of the window pane 28a to be at substantially the same level as the upward-facing face 56 of the side sash member 43. This has the effect that cold outside air and any precipitation is kept at a substantially uniform level relatively far away and efficiently spaced from the warmer air inside. This is beneficial for reducing thermal transport through the sash structure.

[0069] In Fig. 13 the insulating material of the interface means is in the form of a rubber strip 58 with an upwards facing bead projecting into the space between the first arc wall 50 and the second arc wall 51 to keep the strip in place. When the glass rim profile was fastened to the side sash member 43, the strip was slightly deformed at the joint between the sash frame member 43 and the pane 28. It was thereby forced slightly into a space 59 between the side sash member 43 and the side rim of the pane 43 and into contact with their respective surfaces, thus providing excellent insulation and sealing. In this embodiment the insulating strip projects only a small distance over the side rim 46 of the pane and a strip 60 of a sealing compound, such as a strip of butyl rubber or the like, has been applied to the pane underneath the slightly arced portion 53 of the glass rim profile extending over the rim of the pane. In this embodiment a small flange extends essentially perpendicular to the portion 53 to come into engagement with the sealing compound.

[0070] In Fig. 14 the insulating strip 58' is of a more complex design, which makes the use of a sealing compound superfluous. As may be seen, this insulating strip extends over the entire width of the glass rim profile 45' and at the end 61 extending over the rim 46 of the pane it has a serrated cross sectional shape as is common with rubber strips used for sealing purposes. Here the tips of the serrated profile are shown in their original state, but it is to be understood that in the mounted state they will be compressed against the upper surface of the pane 28. As there is no longer a separate sealing strip, the small flange 55 is no longer found on the glass rim profile either.

[0071] Other differences between the insulating strips in Figs. 13 and 14 are that the strip in Fig. 14 has a part 62, which fills the space between the first and second arc wall 50', 51' entirely, which leads to improved insulation, and that it has a part 63, which embraces the first wall 47' of the glass rim profile. This embracement not only keeps the strip in place in relation to the glass rim profile 45', but the flange 64 projecting over the upper edge of the first wall also serves as a drip nose, preventing water in the channel 57' from overflowing the first wall. When the sash unit is used in a window in the way shown in Fig. 3, the embracement also prevents direct contact between the sash hinge part and the glass rim profile. Yet another difference is that the strip 58' in Fig. 14 has a bead 65 projecting into a corresponding groove in the upper sash surface 56, either loosely to simply keep the strip in place or being forced into the groove for proper attachment.

[0072] Any material or combination of materials suitable for insulation may be chosen for the insulation strip 58, 58', including even mineral wool. It is, however, preferred to use materials having both sealing and insulating properties such as ethylene propylene (EPDM) or nitrile (NBR). Though described as a strip of material above it is to be understood that other materials may also be used including soft materials applied in a semi-liquid state.

[0073] The glass rim profile 45, 45' is made of a metal, metal alloy or combinations thereof in order to provide sufficient strength for assisting in retaining the pane 28 in the sash 29.

[0074] In the embodiments shown the glass rim profiles are unitary elements, but they may also comprise two

separate elements, namely a glass retaining element and a sealing element. The glass retaining element is adapted to serve the purpose of retaining the pane 28 in the sash 29, while the sealing element 66 is adapted to provide insulation and weather shielding. Thus, the twofold task of the glass rim profile, which in the shown embodiments was carried out by one integrated glass rim profile, may be divided between the two elements.

[0075] The glass retaining element may have a clip-like cross sectional shape and its longitudinal extension can be much shorter than that of the unitary glass rim profiles described above. Preferably, the longitudinal extension is in the range of a few centimetres and is will usually be expedient to use two or more glass retaining elements at each side of the pane in order to provide sufficient strength. In a mounted condition, the glass retaining elements are distributed along the longitudinal direction of the side sash member, preferably evenly distributed.

[0076] The sealing element preferably extends along the entire side rim 46 of the pane 28 and has a cross sectional shape adapted to mate that of the striking bead covering in order to provide for a weather shielding effect and an essentially water repellent transition between the two elements.

[0077] The sealing element 66 is preferably made from a non-metallic material, so that thermal transport is mitigated. Any material or combination of materials having good properties as to heat insulation and avoiding thermal transport are suitable, for instance a polymer or combinations of polymers.

[0078] In a few embodiments of a glass rim profile and associated insulation and sealing have been shown and described as used on a centre-hung window, but it is to be understood that the invention may also be used on other windows. The shape and design of glass rim profiles and insulating strips may be varied accordingly. Likewise, different combinations of features mentioned as alternatives above are also covered by the invention as defined by the scope of the claims.

[0079] Furthermore, the pane 28 shown in the drawings comprise two layers of glass; as an obvious modification, three-glass panes may be utilised to increase the insulating properties even further.

[0080] Likewise, a number of further interface means in the form of supplemental sealing strips may be provided; such sealing strips may be chosen according to the particular field of application, and be dimensioned to meet the varying demands.

[0081] The invention is not delimited to the embodiments described in the above and shown in the drawings but various modifications and combinations may be carried out without departing from the scope of the claims.

Claims

1. A window, such as a roof window or skylight, comprising a frame (1), a sash (29), a cladding (20-25) and a pane (25), and also comprising interface means (5, 105; 15, 17, 18; 105; 205; 58) for positioning along a circumference of the window, the interface means being adapted to be positioned on the frame, the sash and/or the cladding,
characterized in that the interface means comprise climate regulating elements that provide sound insulation and/or thermal insulation and/or moisture insulation, and the interface means are immediately interchangeable with other interface means.

2. A window according to claim 1, wherein the frame comprises a top frame member (2), a bottom frame member (3) and two side frame members (4), and the interface means (5; 105) are adapted to be positioned on an internal face (2a) of the top frame member (2), which interface means (5; 105) comprises ventilation means (7; 107), which ventilation (7; 107) means include at least one ventilation passage (8; 108) extending from a first face (5a; 105a) of the interface means to a second face (5b; 105b) of the interface means, which first and second faces (5a, 5b; 105a, 105b) are adjacent to a third face (5c; 105c) of the interface means (5; 105), which third face (5c; 105c) abuts the internal face (2a) of the top frame member (2) in a mounted position of the interface means, the ventilation passage(s) (8; 108) providing an overall cross sectional flow area of 5-35 cm^2, preferably 15-25 cm^2.

3. A window according to claim 2, wherein the ventilation means comprise mechanical means, such as one or more fans, for generating an air current through the ventilation passage (108).

4. A window according to any of the claims 2 to 3, wherein the top frame member (2) and the interface means (5; 105) comprise mutually mating mounting means (10, 11;111, 12) for mounting the interface means (5, 105) on the internal face (2a) of the top frame member (2), and wherein other interface means (5; 105) also comprise mounting means (11; 111) adapted to mate with the mounting means (12) of the top frame member (2) so as to provide immediate interchangeability of interface means (5; 105).

5. A window according to claim 1, wherein the frame (1) comprises a top frame member (2), a bottom frame member (3) and two side frame members (4), and interface means (15; 17; 18) are adapted to be positioned on an external face (4a) of a side frame member (4) and/or on an external face (3a) of the bottom frame member (3) and/or an external face of the top frame member (2).

6. A window according to claim 5, wherein the interface means (15) comprise markings (15a, 15b) indicating

at least two installation levels of the window (1) in relation to a surrounding building structure.

7. A window according to claim 5, wherein the interface means (17; 18) are adapted to be positioned on and preferably substantially cover the external face (4a) of the side frame member (4) of the window, and/or wherein the interface means are adapted to be positioned on the external face (3a) of the bottom frame member (3), abutting a second face (3b) of the bottom frame member (3), the second face (3b) being adjacent to the external face (3a) and extending with an angle to the external face, the angle being 50°-130°, preferably substantially right, and/or wherein the interface means are adapted to be positioned on and preferably substantially cover the external face of the top frame member of the window.

8. A window according to claim 1, wherein the cladding comprises a top frame cladding (20), a side frame cladding (21), a bottom frame cladding (22), a top sash cladding (23), a side sash cladding (24), and a bottom sash cladding (25), and the frame comprises a top frame member (2), a bottom frame member (3) and two side frame members (4), and the sash comprises a top sash member (41), a bottom sash member (42) and two side sash members (43), and the interface means are adapted to be positioned on an internal face of a bottom frame cladding member so as to abut against an external and/or upper face of the bottom frame member, and/or the interface means are adapted to be positioned on an internal face of a side frame cladding member so as to abut against an external face and/or upper face of a side frame member, and/or the interface means are adapted to be positioned on an internal face of a top frame cladding member so as to abut against an external face and/or upper face of the top frame member, and/or the interface means are adapted to be positioned on an internal face of a bottom sash cladding member so as to abut against an external face and/or upper face of the bottom sash member, and/or the interface means are adapted to be positioned on an internal face of a side sash cladding member so as to abut against an external face and/or upper face of a side sash member, and/or the interface means are adapted to be positioned on an internal face of a top sash cladding member so as to abut against an external face and/or upper face of the top sash member.

9. A window according to claim 8, wherein the interface means (205) adapted to be positioned on an internal face of a bottom frame cladding member so as to abut against an external and/or upper face of the bottom frame member and the interface means adapted to be positioned on an internal face of a side frame cladding member so as to abut against an external and/or upper face of a side frame member are integrally formed, and preferably generally forms a U-shape, the base of the U-shape being positioned on the internal face of the bottom frame cladding member so as to abut against the external and/or upper face of the bottom frame member, and the legs of the U-shape being positioned on the internal face of the side frame cladding member so as to abut against the external and/or upper face of the side frame member.

10. A window according to claim 8 or 9, wherein a strip made from an elastic material is used as interface means (205), the strip at least partially having a substantially tube-shaped longitudinal bead adapted to abut against an external and/or lower surface of the bottom sash member in a closed condition of the window so as to form a gasket.

11. A window according to claim 8-10, wherein the interface means cover at least a major portion of the internal face of the cladding.

12. A window according to claim 1, wherein the interface means comprise a glass rim profile that overlaps a joint between at least one sash member and a rim of the pane, said glass rim profile being attached to an upper surface of the sash member, and the interface means are arranged between the glass rim profile and the upper surface of the sash member.

13. A window according to claim 12, wherein the interface means extends over the joint between the sash member and the rim of the pane, preferably substantially over the entire width of the glass rim profile.

14. A window according claim 12 or 13, where a strip made from an elastic material is used as interface means, the strip having a longitudinal bead, which is pressed into a longitudinal groove in either the upper side of the sash member or the glass rim profile, and/or the interface means embraces a flange of the glass rim profile, and/or interface means are permanently attached to the glass rim profile, and/or a sealing compound is provided between the pane and the glass rim profile.

15. Method of providing a window with improved climate regulating properties, comprising the steps of:

providing a frame (1), a sash (29), a cladding (20-25) and a pane (28),
providing interface means (5, 105; 15, 17, 18; 105; 205; 58) in the form of climate regulating elements,
positioning the interface means (5, 105; 15, 17, 18; 105; 205; 58) on an internal (2a) and/or external and/or upper face (3a; 4a) of the frame

(1), and/or on an internal face of the cladding (20-25), and/or on an external and/or upper face of the sash (29),
wherein the interface means are immediately interchangeable with other interface means.

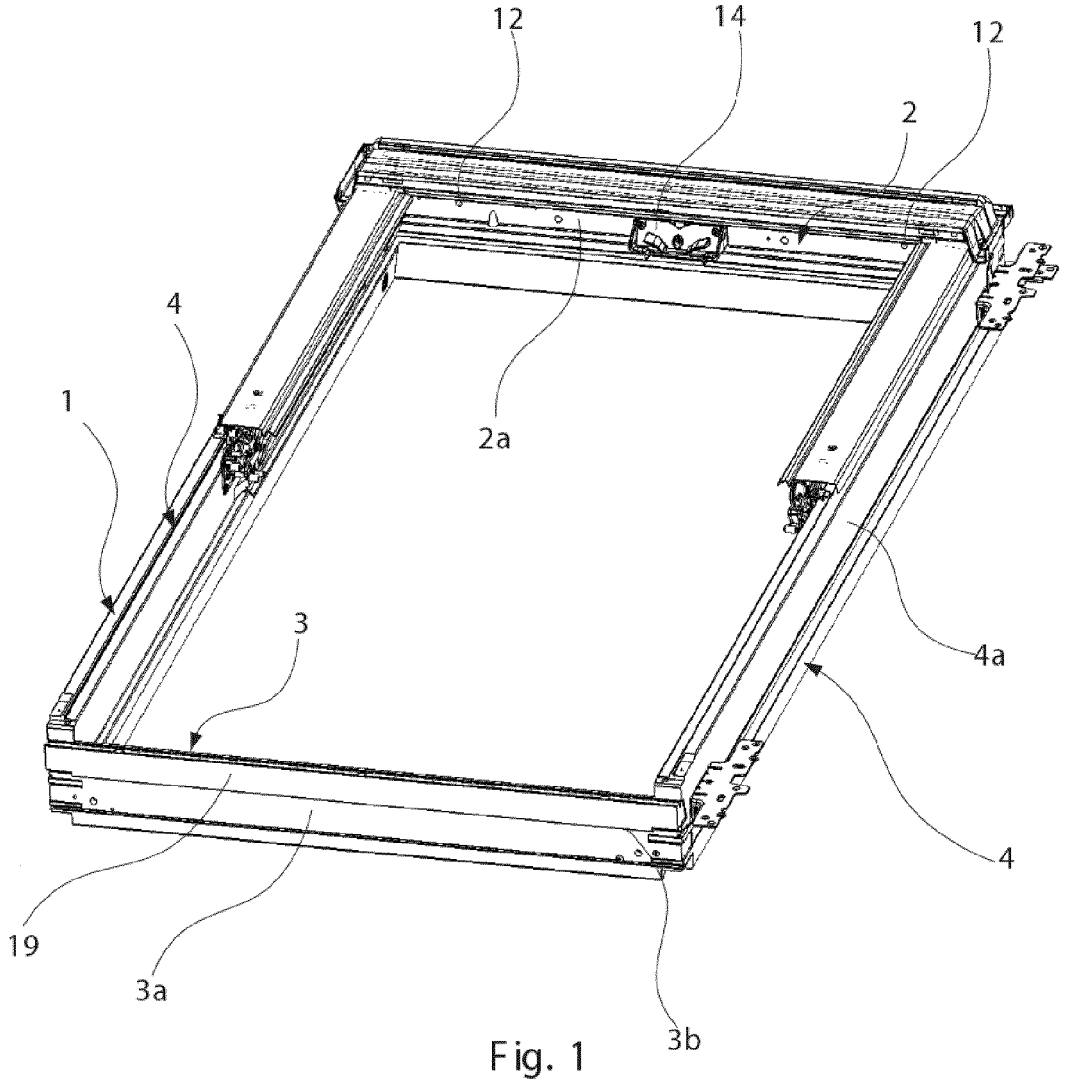

Fig. 1

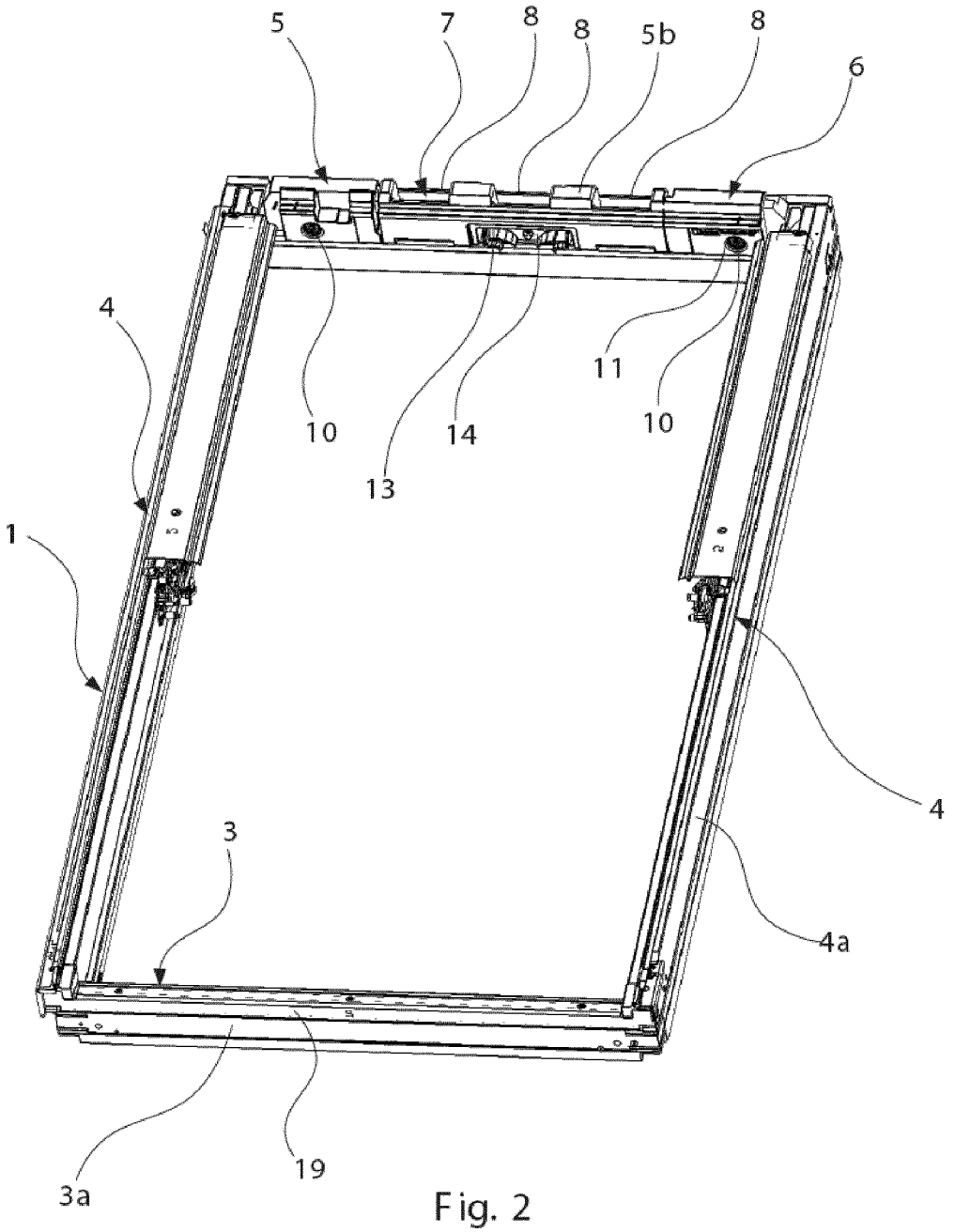

Fig. 2

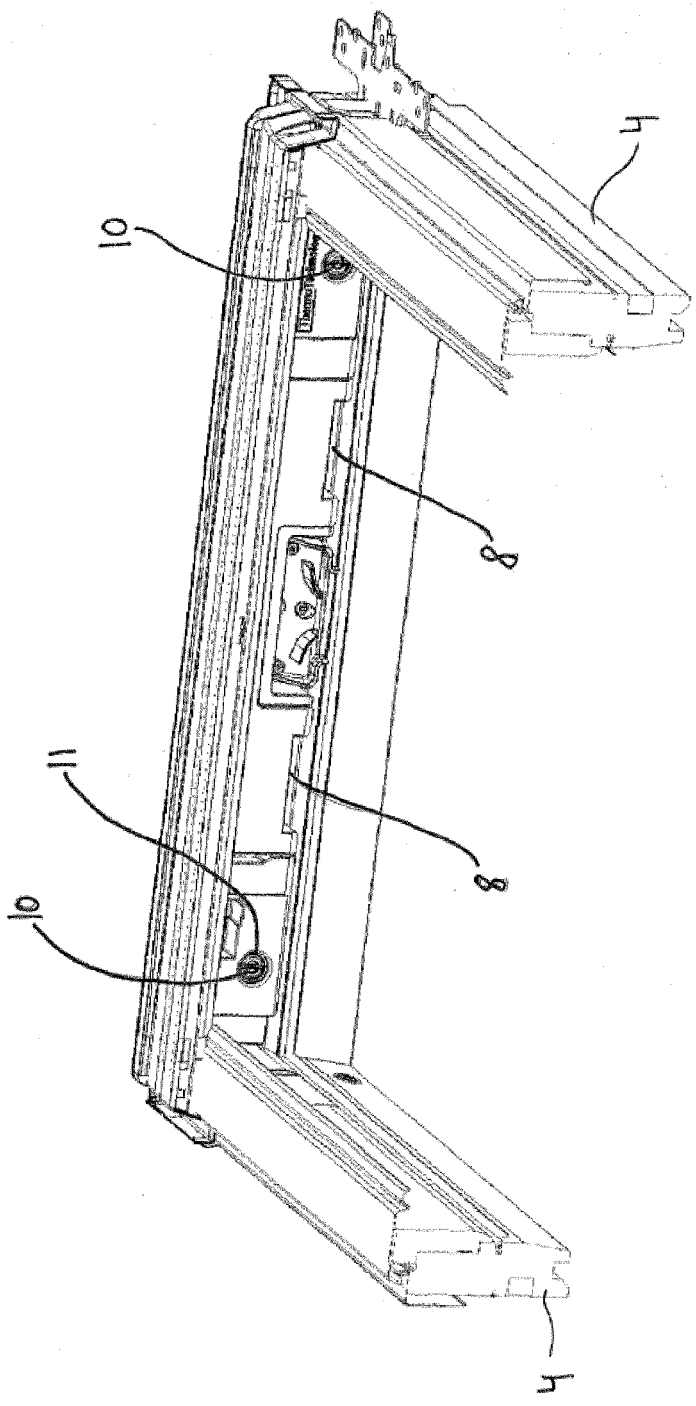

Fig. 3

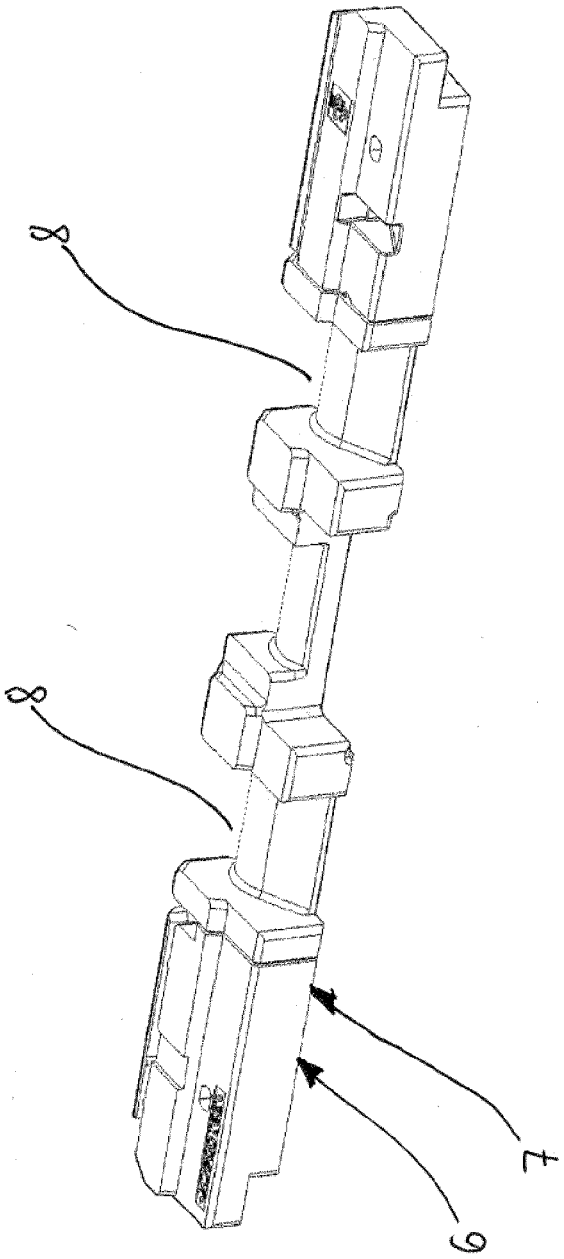

Fig. 4

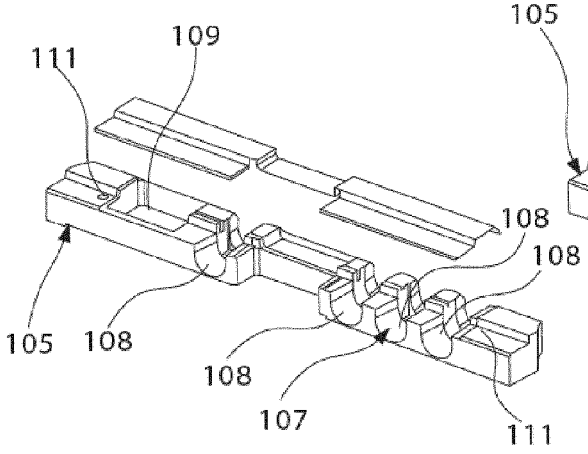

Fig. 5

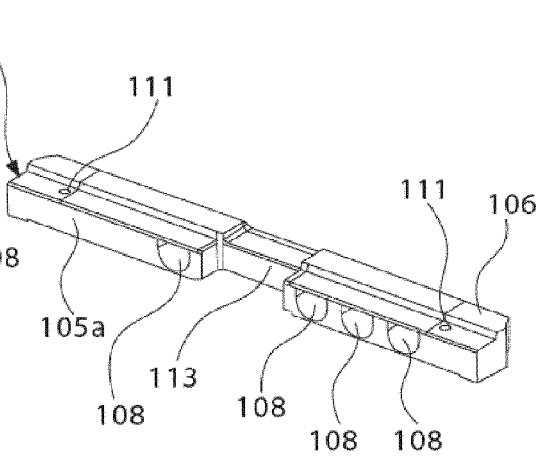

Fig. 6

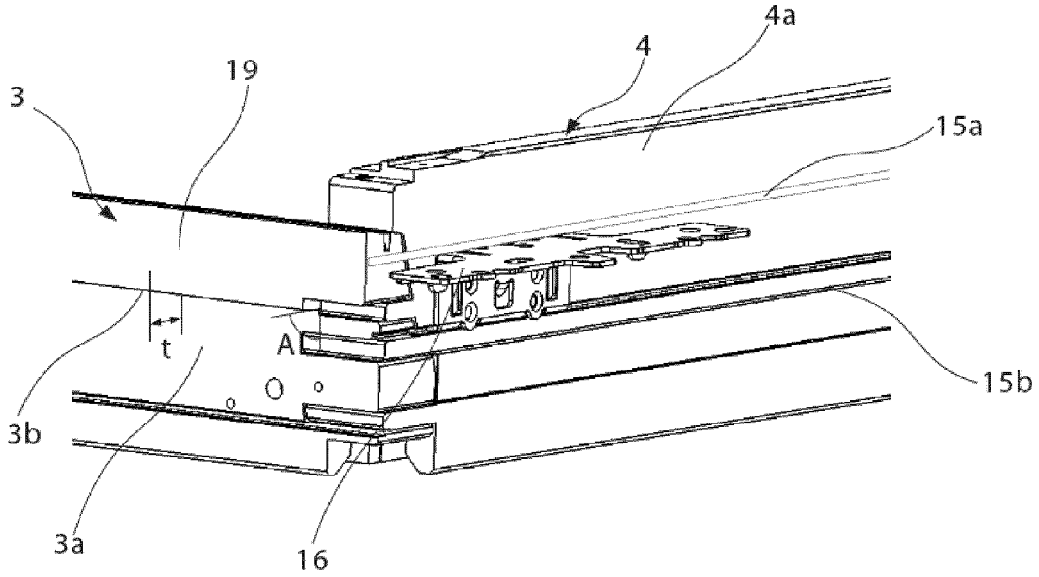

Fig. 7

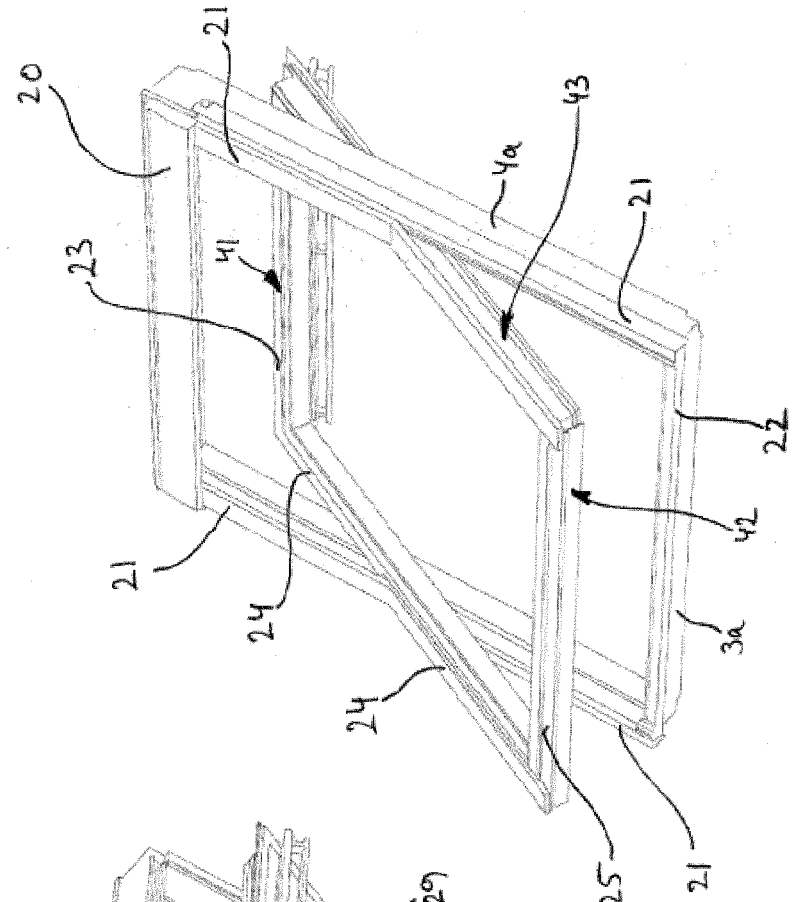

Fig. 9

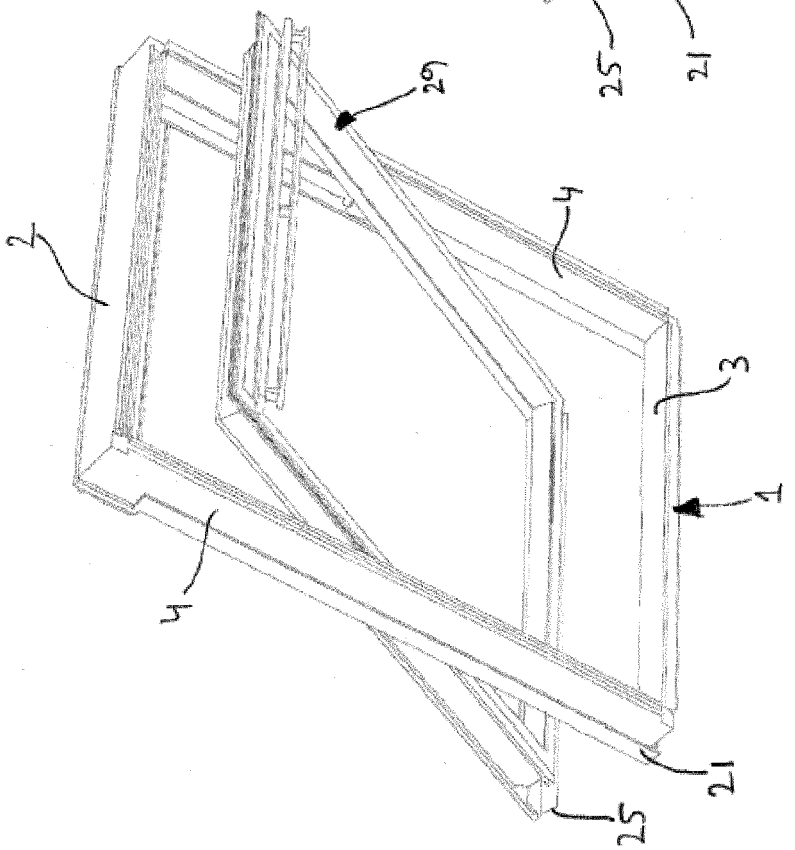

Fig. 8

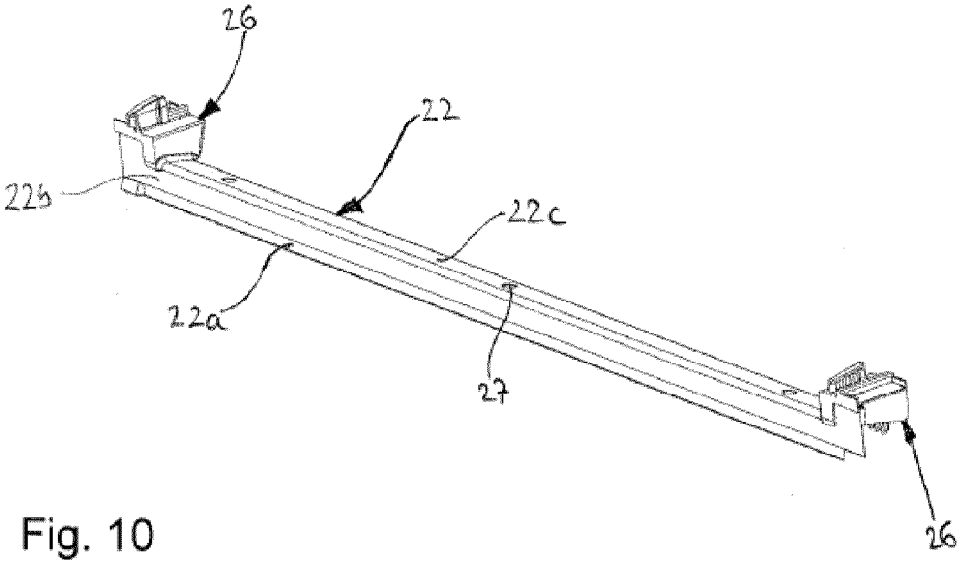

Fig. 10

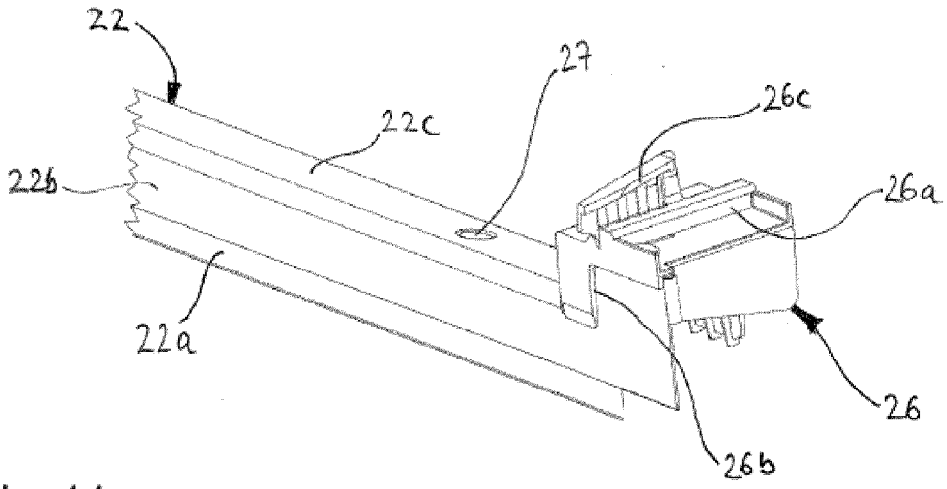

Fig. 11

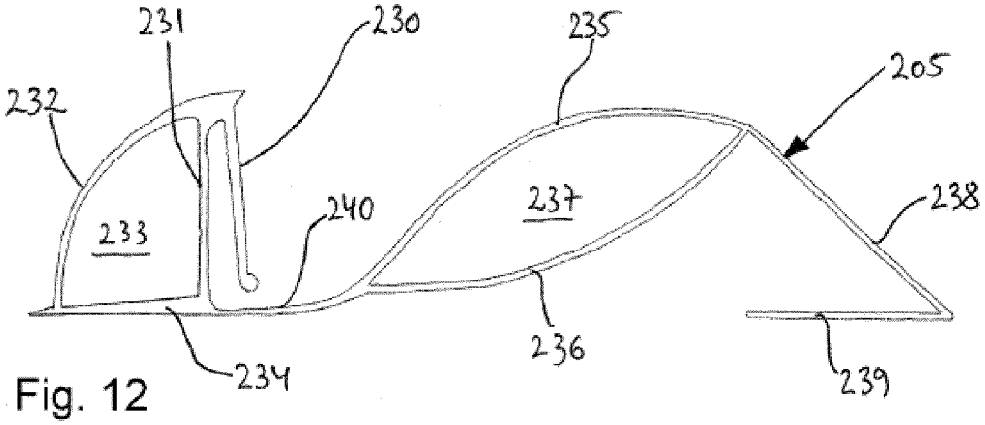

Fig. 12

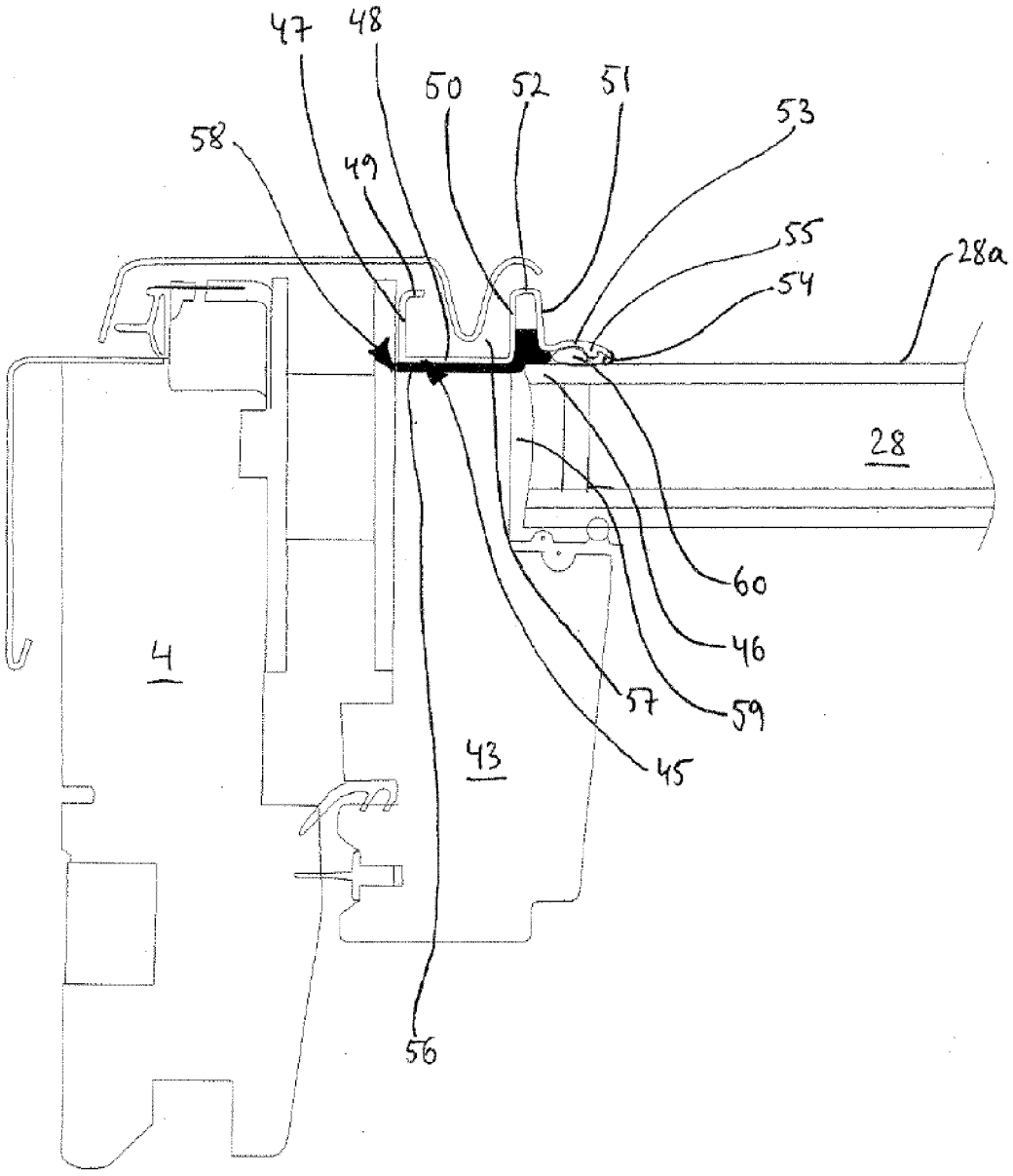

Fig. 13

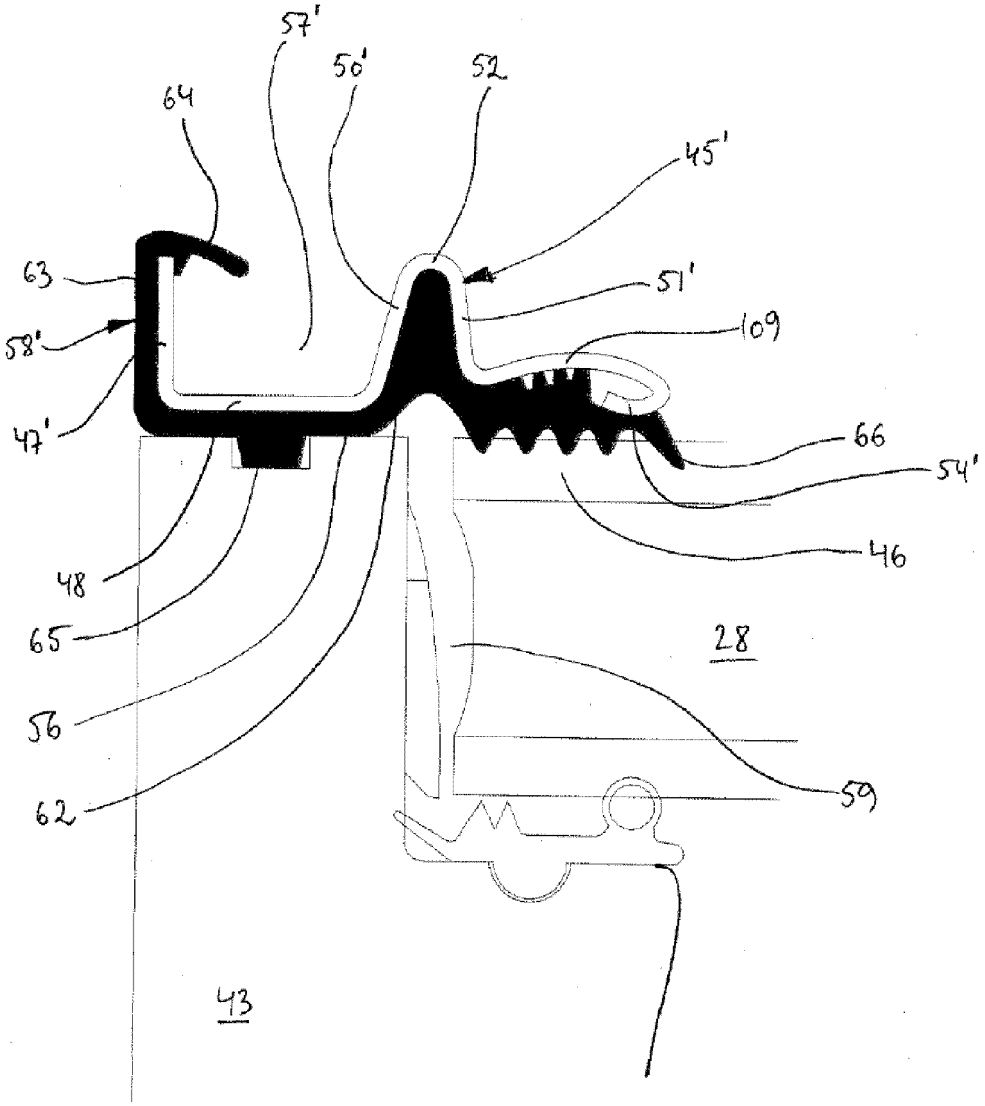

Fig. 14

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 9928581 A **[0054]**
- GB 1028251 A **[0054]**