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(54)

A ROOF WINDOW WITH A SASH, A STATIONARY FRAME AND AN INTERMEDIATE FRAME

(57) A roof window comprising a stationary frame (1) adapted to be built into a structure and having a top frame member (12), two side frame members (13, 14) and a bottom frame member (11), and defining a frame plane, a sash (2) having a top sash member (22), two side sash members (23, 24) and a bottom sash member (21), and defining a sash plane, an intermediate frame (4), at least one first hinge connection (5) for connecting the sash (2) and the intermediate frame (4) to the stationary frame (1), and at least one second hinge connection (6) for connecting the sash (2) to the intermediate frame (4). The top sash member (21) and the first hinge connection (5) is, when seen in a closed position of the sash (2), positioned such that a hinge axis (51) of the first hinge connection (5) and the top sash member (21) is positioned at a distance (A) from one another in a first direction (D1), such that a space (8) is provided between the top sash member (21) and the hinge axis (51) of the first hinge connection (5)

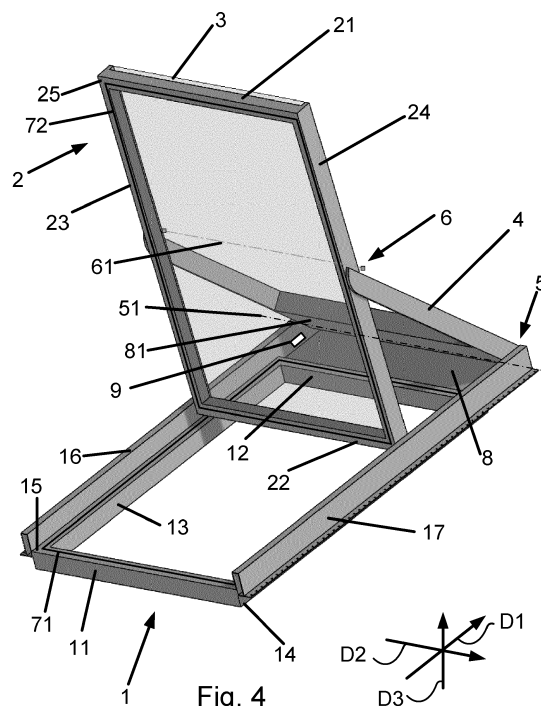


Fig. 4

Description

Technical Field

[0001] The present invention relates to a roof window comprising a stationary frame adapted to be built into a structure and having a top frame member, two side frame members and a bottom frame member, and defining a frame plane, a first direction extending between and perpendicular to the top frame member and the bottom frame member, a second direction extending between and perpendicular to the side frame members, and a third direction extending perpendicular to both the frame plane, the first direction and the second direction, a sash having a top sash member, two side sash members and a bottom sash member, and defining a sash plane, an intermediate frame, at least one first hinge connection for connecting the sash and the intermediate frame to the stationary frame, and at least one second hinge connection for connecting the sash to the intermediate frame, the sash being rotatable about the first hinge connection between a closed position and an open position, the sash plane being parallel with the frame plane in the closed position.

Background Art

[0002] EP 2 770 148 A2 describes a roof window of this type in which the rotation about the first hinge connection and the rotation about the second hinge connection, respectively, follows in opposite directions of rotation. The first hinge connection is arranged such that the hinge axis of the first hinge connection is arranged in line with the top sash member and within the outer delimitations of the top frame member. In a closed position the sash and stationary frame are arranged flush with one another seen from the outside of a building in which the window is mounted, i.e. such that the sash rests within the central opening in the stationary frame.

[0003] FR 2 581 119 A1 describes another roof window of this type in which the rotation about the first hinge connection and the rotation about the second hinge connection, respectively, follows in the same direction of rotation. The first hinge connection is arranged such that the hinge axis of the first hinge connection is arranged in line with the top sash member and within the outer delimitations of the top frame member. In a closed position the sash and stationary frame are arranged flush with one another seen from the outside of a building in which the window is mounted, i.e. such that the sash rests within the central opening in the stationary frame.

[0004] There is, however, a desire to provide a window which is simpler to open to a position of the sash providing access to the outside of a pane carried by the sash for cleaning purposes whilst causing a minimum of wear to the stationary parts of the window.

[0005] There is also a continuous desire and demand on the market for windows with improved insulating properties, which is normally expressed as the window having

an increased U-value. For this reason, and also as it is desired to avoid the intrusion of moisture through the window construction, there is also a continuous desire and demand on the market for windows with improved imperviousness both to air and to moisture when the sash is in the closed position.

Summary of Invention

[0006] Therefore, it is the object of the invention to provide a window of the type mentioned in the introduction which is simpler to open to a position of the sash providing access to the outside of a pane carried by the sash for cleaning purposes whilst causing a minimum of wear to the stationary parts of the window.

[0007] A further object of the invention is to provide a window of the type mentioned in the introduction which has improved insulating properties and which has an improved imperviousness both to air and to moisture when the sash is in the closed position.

[0008] According to the invention, this is obtained by a window of the type described in the introduction, in which the top sash member and the first hinge connection are, when seen in the closed position of the sash, positioned such that a hinge axis of the first hinge connection and the top sash member are positioned at a distance from one another in the first direction, such that a space is provided between the top sash member and the hinge axis of the first hinge connection.

[0009] By providing the top sash member and the first hinge connection such that they, when seen in the closed position of the sash, are positioned at a distance from one another in the first direction, a window is provided in which the sash may be rotated from the closed position to the open position about both the first hinge connection and the second hinge connection whilst being fully above or outside the frame plane as well as, where provided, a sealing arrangement provided on the stationary frame. This in turn provides for a window with which more space is provided for the rotation of the sash with respect to the intermediate frame. Thereby execution of the rotation of the sash with respect to the intermediate frame, especially in order to provide access to the outside of a pane carried by the sash for cleaning purposes, is simplified considerably. Also, wear on the stationary part of the window caused by contact with the sash during rotation is avoided. The space provided between the top sash member and the first hinge connection provides for a window with room for positioning an accessory in such a way that the accessory may be hidden from view.

[0010] In a presently preferred embodiment, the sash, during rotation of the sash with respect to the intermediate frame, is always located outside the frame plane of the stationary frame and in the closed position the sash is arranged on top of the stationary frame when seen in the third direction. Such a window allows for a reduced overall frame dimension while keeping an unchanged pane area, which in turn allows for an increased U-value

of the window. Furthermore, such a window comprises a larger area of contact between the sash and the stationary frame and thus an improved imperviousness both to air and to moisture when the sash is in the closed position. A further advantage lies in that such a window allows for a more simplistic and taut design of the window. By providing a window in which, in the closed position, the sash is arranged on top of the stationary frame when seen in the third direction, a window is obtained with which, in addition to the above-mentioned advantages, the forces arising from the impact between sash and stationary frame when closing the window may be distributed across the whole stationary frame. Thereby a more robust and durable window construction is obtained.

[0011] In an embodiment a sealing arrangement is provided at a surface of at least one of the sash and the stationary frame abutting the stationary frame and the sash, respectively, in the closed position. Thereby a window with a high imperviousness both to air and to moisture when the sash is in the closed position is provided. In a further development of this embodiment, the sealing arrangement is provided extending along substantially the whole circumferential extension of the at least one of the sash and the stationary frame. Thereby a window with a particularly high or even complete imperviousness both to air and to moisture when the sash is in the closed position is provided.

[0012] In an embodiment the stationary frame further comprises a first further side frame member and a second further side frame member, the first and second further side frame member extending beyond the top frame member opposite to the bottom frame member when seen in the first direction and wherein the first hinge connection is for connecting the sash and the intermediate frame to the first and second further side frame member of the stationary frame. Thereby a window with a more stable and sturdy structure and thus improved resistance to wear is provided.

[0013] In an embodiment the rotation of the sash and the intermediate frame with respect to the stationary frame about the first hinge connection and the rotation of the sash with respect to the intermediate frame about the second hinge connection, respectively, follow in the same direction of rotation. In this way, a window is provided which enables a rotation of the sash from the closed position all the way to a position in which the sash is rotated approximately 180 degrees with respect to the closed position in one continuous movement and thus in a very simple manner. Hence, it is possible to provide for a logical operation in that the first part of movement of opening the sash, for instance in a clockwise direction, is succeeded by a second part of movement of the sash only, also in the clockwise direction.

[0014] In a further embodiment the space provided between the top sash member and the first hinge connection is adapted for receiving a screening arrangement. This provides for an optimum utilisation of the space.

[0015] To this end, means for receiving a screening

arrangement may be provided in the space provided between the top sash member and the first hinge connection. Furthermore, means for attaching a screening arrangement to the roof window may be provided in the space provided between the top sash member and the first hinge connection. In this way, a window is provided with which suitable and/or desired a screening arrangement may be arranged and/or mounted on the window in a simple manner in such a way that it is hidden from view. Suitable screening arrangements include but are not necessarily limited to roller shutters, blinds, awnings, curtains and insect screenings. It is noted that in case an insect screening or net is provided it is also feasible to arrange the insect screening or net in or on the stationary frame, particularly as the sash in the closed position is arranged on top of the stationary frame when seen in the third direction and thus will not interfere with the insect screening or net and as the rotation of the sash takes place outside the frame plane.

[0016] Alternatively, or additionally, the space provided between the top sash member and the first hinge connection may be adapted for receiving a ventilation arrangement. In this way, a window is provided with which suitable and/or desired a ventilation arrangement may be arranged and/or mounted on the window in a simple manner in such a way that it is hidden from view. Suitable ventilation arrangements include but are not necessarily limited to air conditioners, heat exchangers and air filtering devices.

[0017] Whether mounting an accessory on the form of a screening arrangement or a ventilation arrangement in the space provided on the window, a further effect obtained is a more aesthetically appealing appearance of the window. Thus, a contribution to the fact that such a window allows for a more simplistic and taut design of the window is obtained.

[0018] In a still further embodiment the window further comprises a cover element adapted for closing the space towards the surroundings. Thereby a screening arrangement or a ventilation arrangement mounted in the space provided on the window may be protected from undesired outside influences, such as rain, snow, wind and dust or other impurities.

[0019] In a further development of the still further embodiment the cover element may comprise, or be, a solar panel. Thereby electrical energy for driving a screening arrangement or a ventilation arrangement mounted in the space provided on the window may be harvested in a simple and environmentally friendly manner.

[0020] In an embodiment the first hinge connection is positioned such that a hinge axis of the first hinge connection, when seen in the first direction, is arranged on a side of the top frame member opposite to the bottom frame member when seen in the first direction such as to extend outside the outer delimitation of the top frame member. In this way, a window is provided with which more space is provided for the rotation of the sash and the intermediate frame with respect to the stationary

frame about the first hinge connection and thus with which contact between the sash and intermediate frame and the stationary frame during the said rotation is minimized. Thereby it becomes simpler to open the window, and the opening of the window may be completed with a minimum of wear caused to the stationary parts of the window, and in particular the stationary frame.

[0021] In one embodiment the first hinge connection is positioned such that the hinge axis of the first hinge connection is arranged flush with a surface of the top frame member opposite to the bottom frame member.

[0022] In another embodiment the first hinge connection is positioned such that the hinge axis of the first hinge connection is arranged at a distance from the top frame member.

[0023] Either of these above-mentioned two embodiments provides for a window with which sufficient space is provided for the rotation of the sash with respect to the intermediate frame, to ensure that during the rotation of the sash with respect to the intermediate frame the sash cannot interfere with the space provided between the top sash member and the first hinge connection.

[0024] Further embodiments include such an embodiment in which the second hinge connection is arranged in such a way that, in the closed position of the sash, the hinge axis of the second hinge connection is arranged at a distance from the sash and on a side of the sash opposite to the frame when seen in the third direction. In this way, a window is provided in which the sash during rotation with respect to the intermediate frame is elevated further with respect to the stationary frame, thus providing a further contribution to that the sash may be rotated from the closed position to the open position about both the first hinge connection and the second hinge connection whilst being fully above the frame plane as well as, where provided, a sealing arrangement provided on the stationary frame.

Brief Description of Drawings

[0025] In the following embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 shows a perspective view of a window according to the invention comprising a stationary frame, an intermediate frame and a sash, the sash carrying a pane, and the sash being in a closed position, Fig. 2 shows an exploded view of a window according to the invention comprising a stationary frame, an intermediate frame and a sash, the pane being omitted for the sake of simplicity, Fig. 3 shows a perspective view of a window according to the invention, the sash being in an open position in which the sash and the intermediate frame are rotated about a first hinge connection with respect to the stationary frame, Fig. 4 shows a perspective view of a window accord-

ing to the invention, the sash being in an open position in which the sash and the intermediate frame are rotated about the first hinge connection with respect to the stationary frame and the sash furthermore is rotated about a second hinge connection with respect to the intermediate frame, and Fig. 5 shows a perspective view of a window according to the invention, the sash being in an open position in which the sash and the intermediate frame are rotated about the first hinge connection with respect to the stationary frame and the sash furthermore is rotated further about the second hinge connection with respect to the intermediate frame.

15 Description of Embodiments

[0026] Figs. 1 and 2 show an embodiment of a window according to the invention. The window comprises a stationary frame 1 adapted to be built into an inclined roof structure (not shown). With reference also to Figs. 3 to 5 the stationary frame 1 comprises a bottom frame member 11, a top frame member 12 and two side frame members 13 and 14. The stationary frame 1 defines a frame plane.

[0027] Referring to Fig. 1, a first direction D1 is defined as extending between and perpendicular to the top frame member 12 and the bottom frame member 11. A second direction D2 is defined as extending between and perpendicular to the side frame members 13 and 14. Both the first direction D1 and the second direction D2 extend in parallel with the frame plane. A third direction D3 is defined as extending perpendicular to the frame plane and thus also to both the first direction D1 and the second direction D2.

[0028] The window further comprises a sash 2 having a bottom sash member 21, a top sash member 22 and two side sash members 23 and 24 (cf. also Figs. 3 to 5). The sash 2 defines a sash plane.

[0029] The window further comprises an intermediate frame 4, a first hinge connection 5 for connecting the sash 2 and the intermediate frame 4 to the stationary frame 1, and a second hinge connection 6 for connecting the sash 2 to the intermediate frame 4. The sash 2 is adapted for carrying a pane 3. The intermediate frame 4 comprises a top member 41 and two side members 42 and 43 - cf. Fig. 2.

[0030] The sash 2 and the intermediate frame 4 are rotatable about the first hinge connection 5 between a closed position (Fig. 1) and an open position (Fig. 3) in such a way that the window is essentially top hung. The sash plane is parallel with the frame plane in the closed position and forms an angle with the frame plane in the open position. The rotation of the sash 2 and the intermediate frame 4 with respect to the stationary frame 1 follows about a hinge axis 51 of the first hinge connection 5. During a first part of movement for opening of the sash 2 and the intermediate frame 4 relative to the stationary frame 2, the sash 2 and the intermediate frame 4 are

rotated in a clockwise direction as seen from the right-hand side of Figs 1 to 3. The first hinge connection 5 is arranged at the top element 41 of the intermediate frame. Preferably, the sash 2 and the intermediate frame 4 are in engagement at the first hinge connection 5.

[0031] In a second part of movement for opening the sash 2 further, the sash 2 is rotatable about the second hinge connection 6 in order to enable rotating the sash 2 about this second hinge connection 6 to an open position in which the sash 2 is rotated beyond the position shown in Fig. 3 in order to provide access to the outside of the pane 3 for cleaning purposes, as is shown in Figs. 4 and 5. The rotation of the sash 2 with respect to the intermediate frame 4 follows about a hinge axis 61 of the second hinge connection 6. As indicated, this rotation of the sash 2 takes place in the clockwise direction as well, i.e. this second part of the movement takes place in the same direction as the first part of the movement.

[0032] Thus, from the closed position, the user operates the window, e.g. by means of an operating means (not shown) such as a handle connected with the sash 2, such as to move the sash 2 in such a way that the sash plane is moved away from the frame plane. Closing the window from the open position entails the opposite movements of the sash 2. In order to allow the sash 2 of the roof window to be rotated to a cleaning position, in which the outer side of the pane 3 is accessible from the inside of the building in which the roof window is mounted, the engagement between the intermediate frame 4 and the sash 2 at the first hinge connection 5 is releasable. This may be obtained in that locking means, which may be provided at the top of the roof window, are released. Such locking means are well-known as such and the provision thereof is obvious to the person skilled in the art.

[0033] With reference to Fig. 1 illustrating the closed position of the sash 2, the top sash member 22 and the first hinge connection 5 is positioned at a distance A from one another in the first direction D1. Put in other words, the first hinge connection 5 is arranged such that the hinge axis 51 of the first hinge connection 5 and the top sash member 22 is positioned at the distance A from one another in the first direction D1.

[0034] The distance A between the top sash member 22 and the first hinge connection 5 is preferably larger than 30 mm, preferably larger than 60 mm or larger than 100 mm, and is in one particular embodiment 160 mm.

[0035] Thereby a space 8 is provided between the top sash member 22 and the first hinge connection 5. The space 8 may optionally be provided with a covering element 81. The covering element 81 may form part of or be connected to the stationary frame 1 or the intermediate frame 4.

[0036] In the closed position the sash 2 is furthermore arranged on top of the stationary frame 1 when seen in the third direction D3. In other words, the top, bottom and side members 21-24 of 1 the stationary frame 1, respectively, in the closed position. Referring also to Fig. 4 and 5, the result is that a surface 15 of the stationary frame

1 and a surface 25 of the sash 2 are in mutual abutment in the closed position of the window.

[0037] Also, the rotation of the sash 2 and the intermediate frame 4 with respect to the stationary frame 1 about the first hinge connection 5 and the rotation of the sash 2 with respect to the intermediate frame 4 about the second hinge connection 6 follow in the same direction of rotation.

[0038] In the embodiment shown the first hinge connection 5 is furthermore positioned such that the hinge axis 51 of the first hinge connection 5, when seen in the first direction D1, is arranged on a side of the top frame member 12 opposite to the bottom frame member 11 such as to extend outside the outer delimitation of the top frame member 12.

[0039] More particularly, the first hinge connection 5 is positioned such that the hinge axis 51 of the first hinge connection 5 is arranged at a distance B (cf. Fig. 3) from the top frame member 12 seen in the first direction D1.

[0040] The distance B between the top frame member 21 and the hinge axis 51 of the first hinge connection 5 is preferably larger than 10 mm, more preferably larger than 30 mm or larger than 60 mm or larger than 100 mm, and is in one particular embodiment 160 mm. The distance A and the distance B may be equal to one another or alternatively be different from one another.

[0041] In the embodiment shown this is obtained in that the stationary frame 1 comprises a first further side frame member 16 and a second further side frame member 17. The first and second further side frame member 16 and 17 extend beyond the top frame member 12 opposite to the bottom frame member 11 when seen in the first direction D1. In this embodiment the first hinge connection 5 connects the sash 2 and the intermediate frame 4 to the first and second further side frame members 16 and 17 of the stationary frame 1. The first and second further side frame members 16 and 17 furthermore serve as mounting frames for connecting the stationary frame 1 and thus the window to a roof construction by means of suitable fastening means, e.g. mounting brackets and screws, to be attached to the side frame members 16 and 17 and to the roof construction 1 when building the stationary frame 1 into the roof construction.

[0042] In an alternative embodiment, connection elements (not shown) extending between the first hinge connection 5 and the top frame member 12 may be provided to obtain the distance between the hinge axis 51 of the first hinge connection 5 and the top frame member 12. Such connection elements may be provided as separate elements or may form a part or even an integral part of the first hinge connection 5.

[0043] Alternatively, the first hinge connection 5 may be positioned such that the hinge axis 51 of the first hinge connection 5 is arranged flush with a surface of the top frame member 12 opposite to the bottom frame member 11 i.e. such that the distance B is kept as small as possible.

[0044] The second hinge connection 6 is optionally and

in the embodiment shown positioned such that the second hinge axis 61 extends adjacent the sash outside the sash plane and opposite to the frame plane when seen in the closed position of the window.

[0045] The window may also comprise an optional gasket element or sealing arrangement 7. In the embodiment shown on Figs. 3 to 5, the surface 15 of the stationary frame 1 comprises a sealing member 71 and the surface 25 of the sash 2 comprises a sealing member 72. In other embodiments one or both of the sealing members 71 and 72, which form part of the sealing arrangement 7, may be omitted.

[0046] The sealing arrangement 7 is provided extending along substantially the whole circumferential extension of the at least one of the sash 2 and the stationary frame 1. In other embodiments the sealing arrangement 7 may be provided extending along a part of the circumferential extension of the at least one of the sash 2 and the stationary frame 1.

[0047] As mentioned above a space 8 with an optional covering element 81 is provided between the top sash member 22 and the first hinge connection 5.

[0048] The space 8 is adapted for receiving an accessory in the form of any one or more of a screening arrangement and a ventilation element (not shown). The space 8 may in one embodiment and as illustrated schematically in Fig. 4 be provided with a means 9 for receiving and/or mounting a screening arrangement or a ventilation arrangement or for attaching a screening arrangement or a ventilation arrangement to the window.

[0049] The cover element 81 is provided for closing the space 8 towards the surroundings. The cover element 81 may comprise or be a solar cell or a solar panel (not shown).

[0050] It should be noted that the above description of preferred embodiments serves only as an example, and that a worker skilled in the art will know that numerous variations are possible without deviating from the scope of the claims.

List of reference numerals

[0051]

- | | | |
|---|---|----|
| 1 | stationary frame 11 bottom frame member 12 top frame member 13 side frame member 14 side frame member 15 surface of stationary frame 16 first further side frame member 17 second further side frame member | 45 |
| 2 | sash 21 bottom sash member 22 top sash member 23 side sash member 24 side sash member 25 surface of sash | 50 |
| 3 | pane | |
| 4 | intermediate frame 41 top member of intermediate frame 42 side member of intermediate frame 43 side member of intermediate frame | 55 |
| 5 | first hinge connection 51 first hinge axis | |
| 6 | second hinge connection 61 second hinge axis | |

- | | |
|---|---|
| 7 | sealing arrangement 71 sealing member 72 sealing member |
| 8 | space 81 cover element |
| 9 | means for receiving/mounting |

5

- | | |
|----|------------------|
| D1 | first direction |
| D2 | second direction |
| D3 | third direction |

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- | | |
|---|----------|
| A | distance |
| B | distance |

Claims

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1. A roof window comprising:

a stationary frame (1) adapted to be built into a structure and having a top frame member (12), two side frame members (13, 14) and a bottom frame member (11), and defining a frame plane, a first direction (D1) extending between and perpendicular to the top frame member and the bottom frame member, a second direction (D2) extending between and perpendicular to the side frame members, and a third direction (D3) extending perpendicular to both the frame plane, the first direction and the second direction, a sash (2) having a top sash member (22), two side sash members (23, 24) and a bottom sash member (21), and defining a sash plane, an intermediate frame (4), at least one first hinge connection (5) for connecting the sash (2) and the intermediate frame (4) to the stationary frame (1), and at least one second hinge connection (6) for connecting the sash (2) to the intermediate frame (4), the sash (2) being rotatable about the first hinge connection (5) between a closed position and an open position, the sash plane being parallel with the frame plane in the closed position,

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characterised in that

the top sash member (22) and the first hinge connection (5) are, when seen in the closed position of the sash, positioned such that a hinge axis (51) of the first hinge connection (5) and the top sash member (22) are positioned at a distance (A) from one another in the first direction (D1), such that a space (8) is provided between the top sash member (22) and the hinge axis (51) of the first hinge connection (5).

2. A roof window according to claim 1, wherein during rotation of the sash (2) with respect to the intermediate frame (4), the sash is always located outside the frame plane of the stationary frame (1), and wherein in the closed position the sash (2) is ar-

ranged on top of the stationary frame (1) when seen in the third direction (D3).

3. A roof window according to claim 1 or 2, wherein a sealing arrangement (7) is provided at a surface of at least one of the sash (2) and the stationary frame (1) abutting the stationary frame and the sash, respectively, in the closed position, the sealing arrangement optionally being provided extending along substantially the whole circumferential extension of the at least one of the sash and the stationary frame. 5 10
4. A roof window according to any one of the above claims, wherein the stationary frame (1) further comprises a first further side frame member (16) and a second further side frame member (17), the first and second further side frame member extending beyond the top frame member (12) opposite to the bottom frame member (11) when seen in the first direction (D1) and wherein the first hinge connection (5) is for connecting the sash (2) and the intermediate frame (4) to the first and second further side frame member (16, 17) of the stationary frame (1). 15 20 25
5. A roof window according to any one of the above claims, wherein the rotation of the sash (2) and the intermediate frame (4) with respect to the stationary frame (1) about the first hinge connection (5) and the rotation of the sash (2) with respect to the intermediate frame (4) about the second hinge connection (6), respectively, follow in the same direction of rotation. 30
6. A roof window according to any one of the above claims, wherein the space (8) provided between the top sash member (22) and the first hinge connection (5) is adapted for receiving any one or more of a screening arrangement and a ventilation element. 35 40
7. A roof window according to any one of the above claims, and further comprising a cover element (81) adapted for closing the space (8) towards the surroundings, the cover element optionally comprising or being a solar panel. 45
8. A roof window according to any one of the above claims, wherein the first hinge connection (5) is positioned such that a hinge axis (51) of the first hinge connection (5), when seen in the first direction (D1), is arranged on a side (15) of the top frame member (12) opposite to the bottom frame member (11) such as to extend outside the outer delimitation of the top frame member. 50 55
9. A roof window according to claim 8, wherein the first hinge connection (5) is positioned such that the hinge axis (51) of the first hinge connection (5) is arranged

flush with a surface of the top frame member (12) opposite to the bottom frame member (11).

10. A roof window according to claim 8 or 9, wherein the first hinge connection (5) is positioned such that the hinge axis (51) of the first hinge connection is arranged at a distance from the top frame member (12).

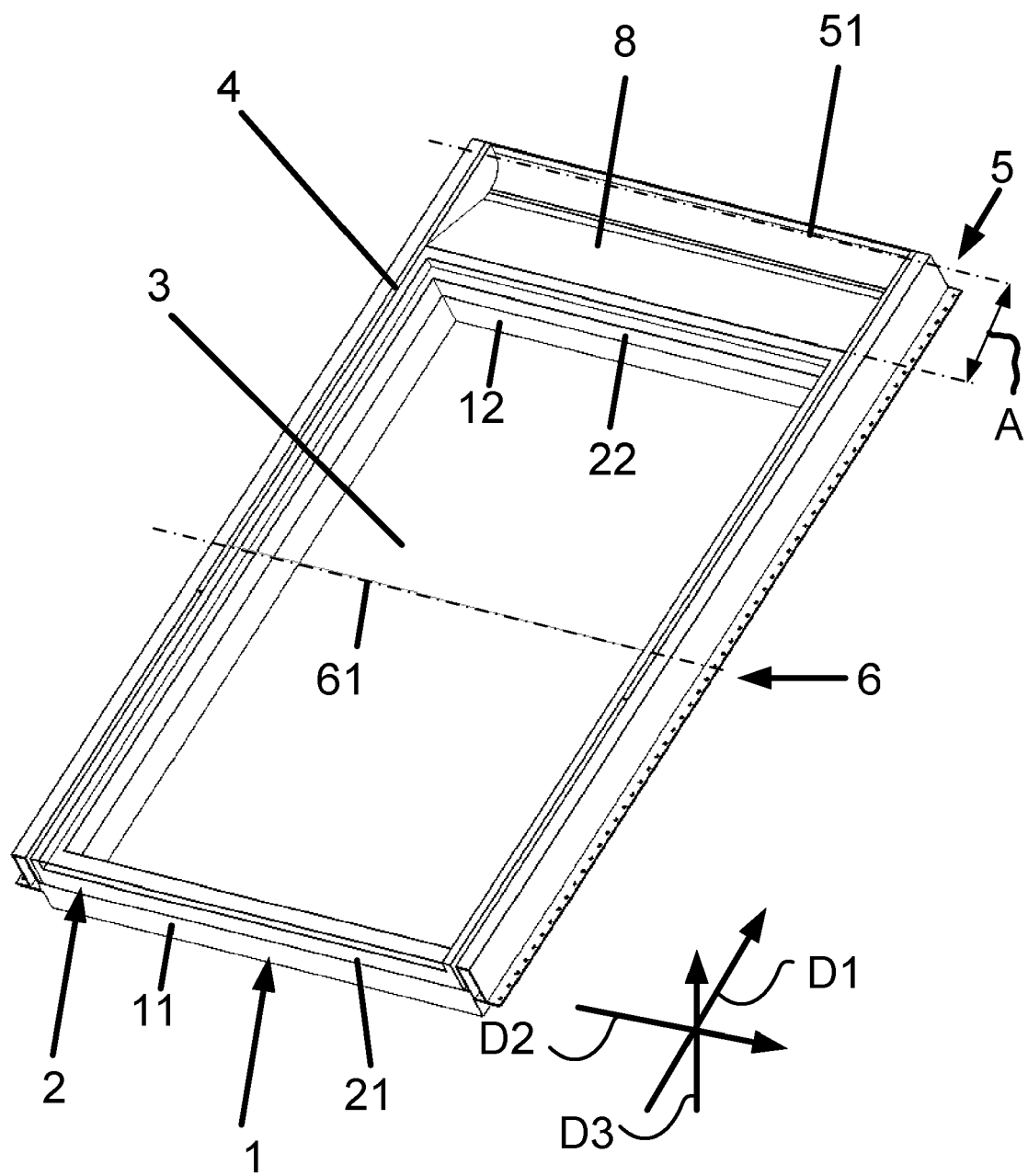


Fig. 1

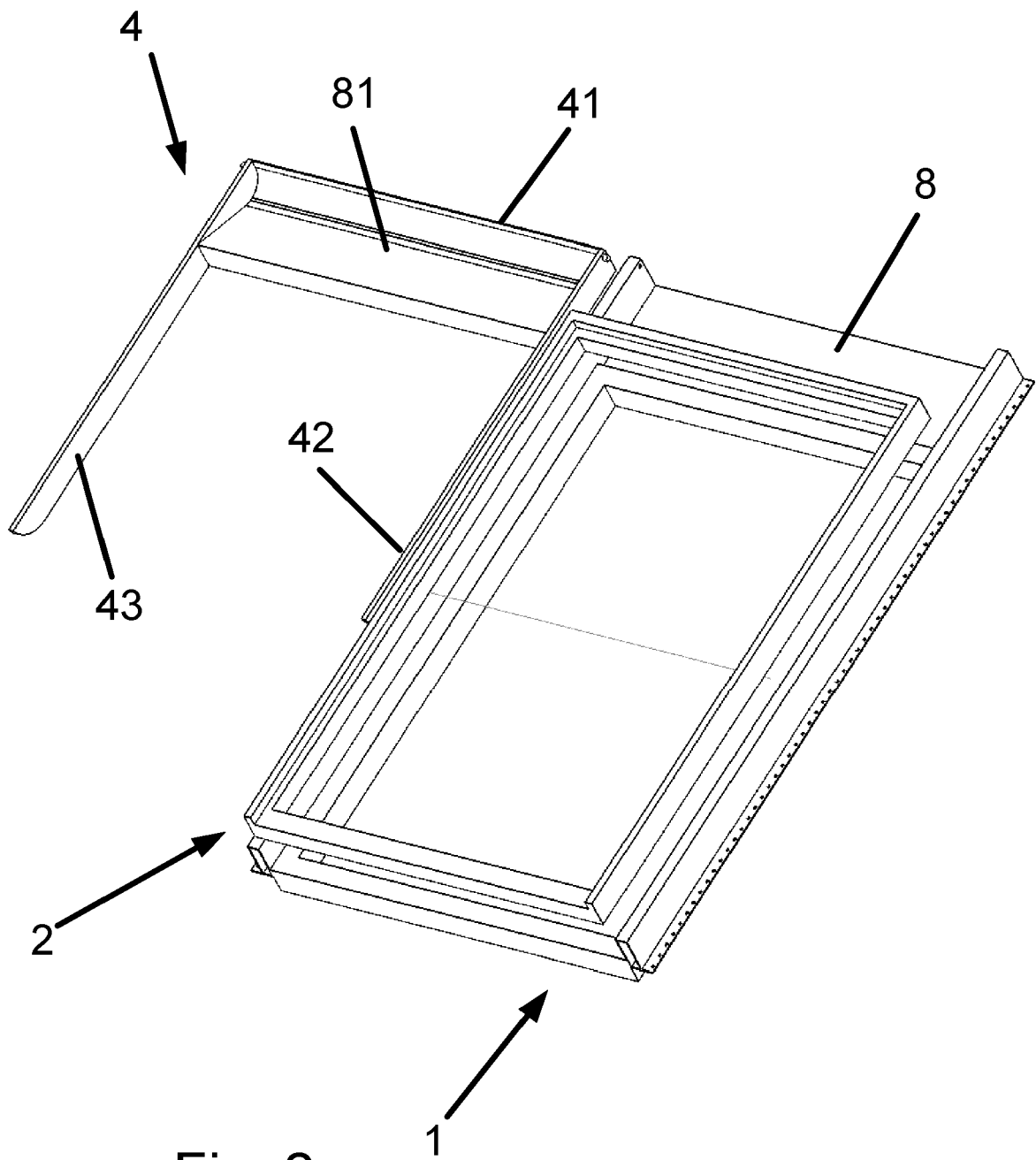


Fig. 2

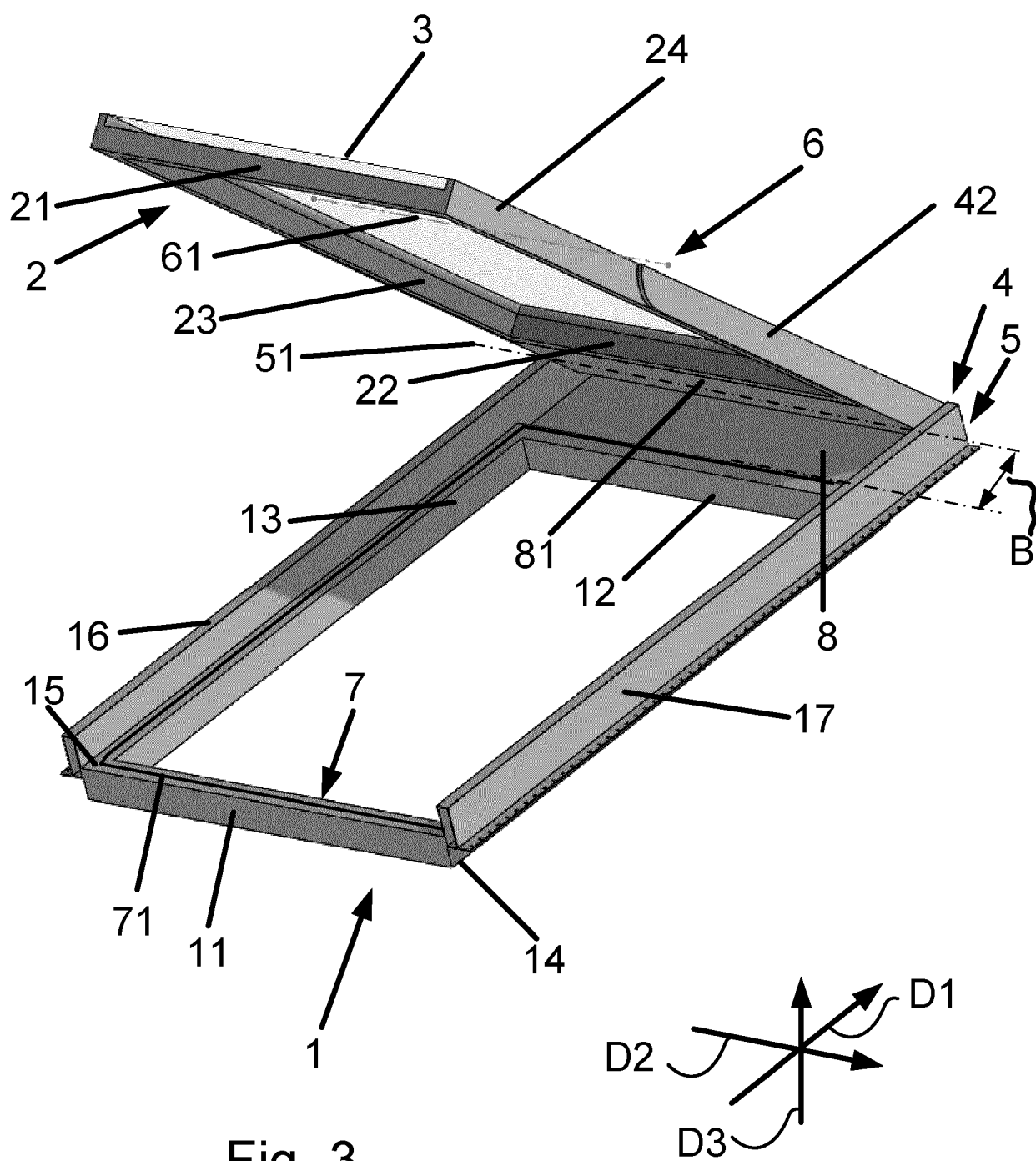
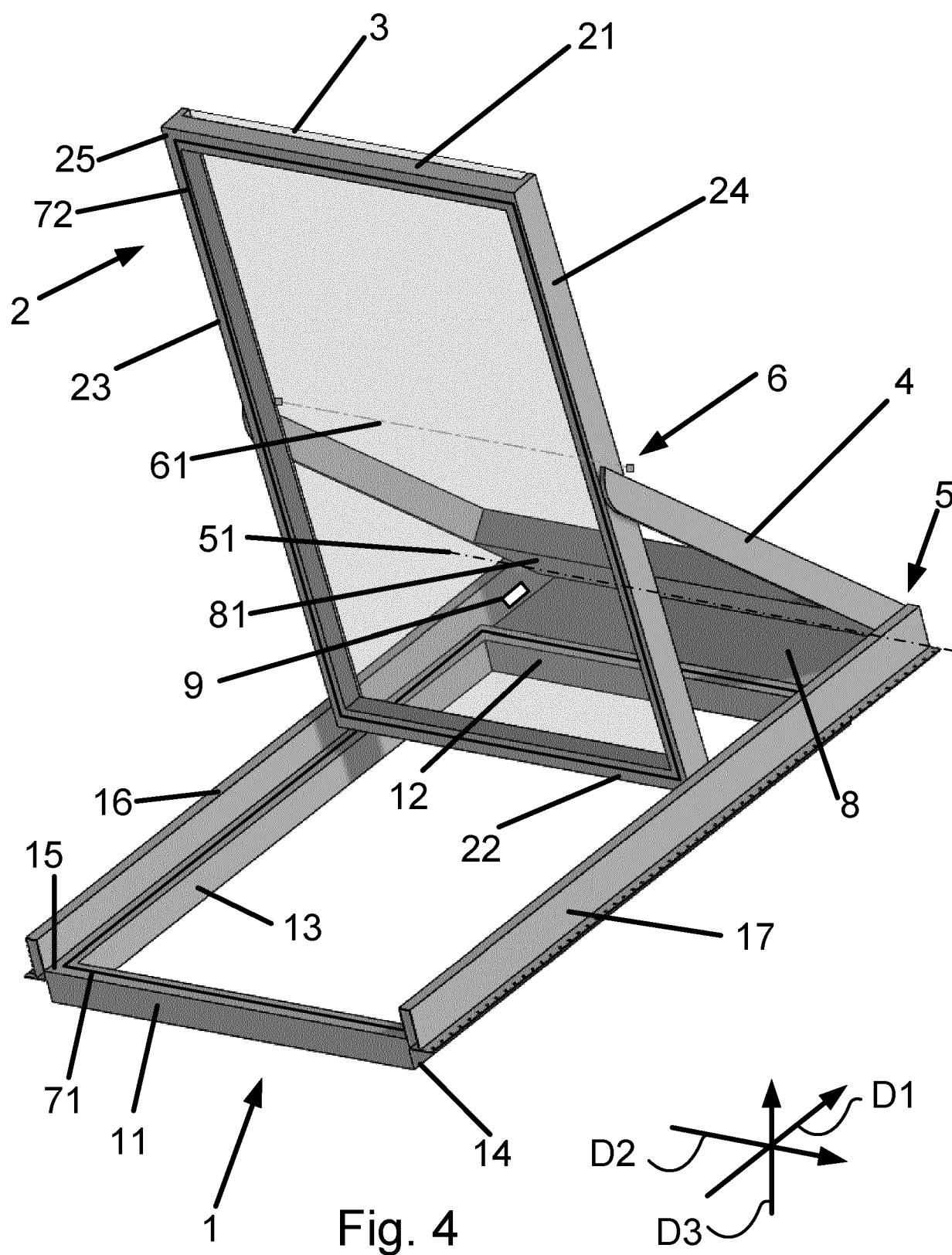


Fig. 3



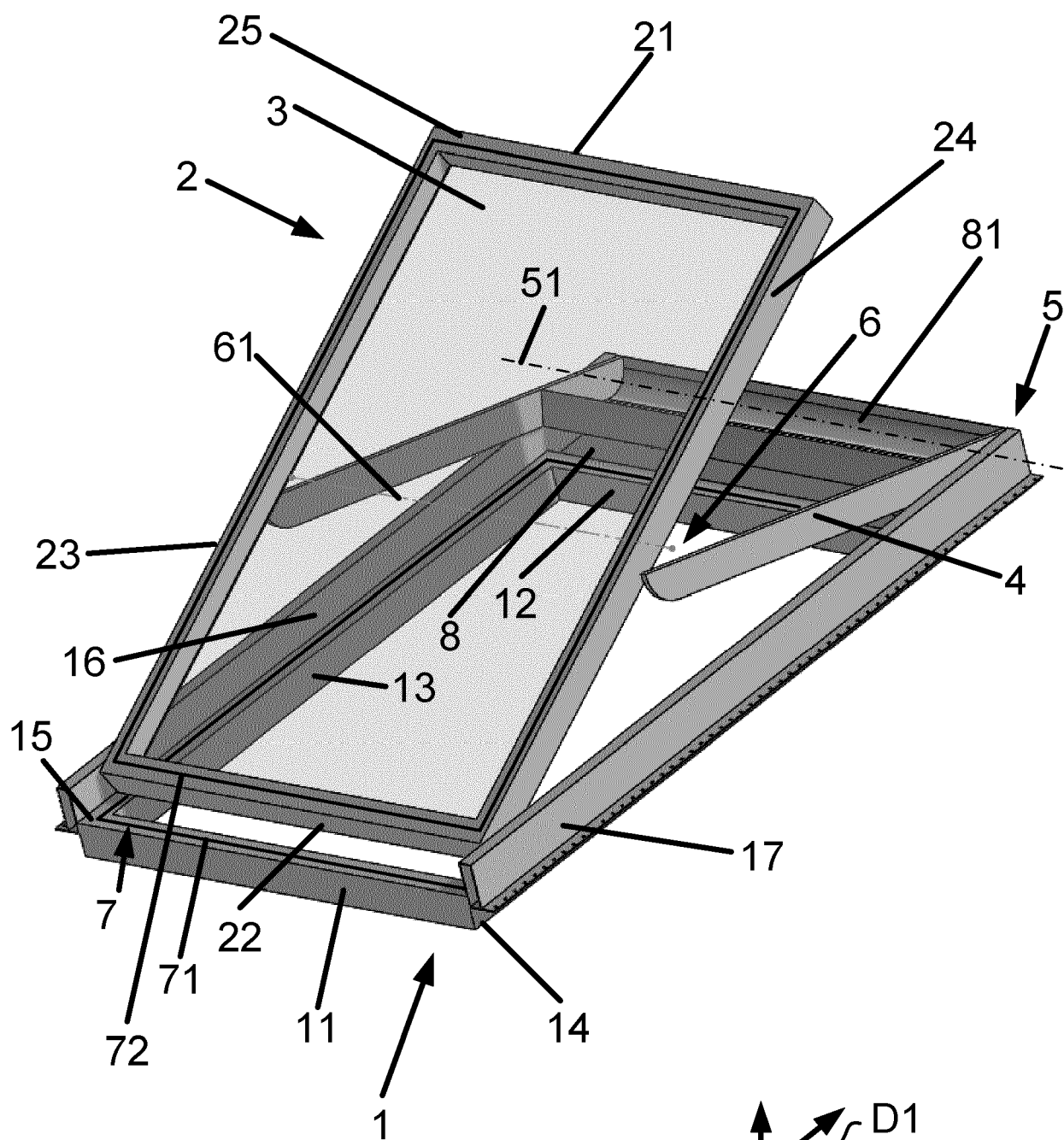
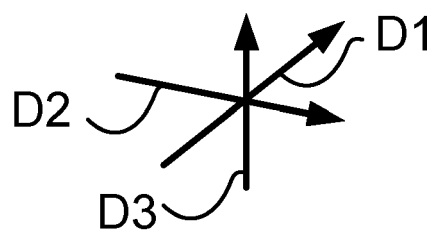


Fig. 5





EUROPEAN SEARCH REPORT

Application Number
EP 18 19 6694

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 202 219 A1 (DAMAS LUCIEN [FR]) 3 May 1974 (1974-05-03) * figures 1, 2, 4, 5 *	1,3,7-10	INV. E04D13/035
Y		6	
A		4	

X	EP 2 770 148 A2 (VKR HOLDING AS [DK]) 27 August 2014 (2014-08-27) * figures 1, 2, 5, 6, 9-12 *	1-3,7,9	
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Y		6	
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