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(54) **A roof window having improved cleaning properties, and a method of cleaning such a roof window**

Dachfenster mit verbesserten Reinigungseigenschaften und Verfahren zur Reinigung solch eines Dachfensters

Fenêtre de toit présentant de meilleures propriétés de nettoyage et procédé de nettoyage de ladite fenêtre

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Description

[0001] The present invention relates to a roof window comprising a stationary frame adapted to be built into a structure and having a top member, two side members and a bottom member, and defining a frame plane, a sash having a top member, two side members and a bottom member, and carrying a pane and defining a sash plane in parallel with the frame plane, an intermediate frame, at least one first hinge connection for connecting the sash and the intermediate frame to the stationary frame, releasable locking means for releasing the engagement between the intermediate frame and the sash at the first hinge connection, at least one second hinge connection for connecting the sash to the intermediate frame, operating means for opening and closing the sash relative to the frame, and a first set of cover elements being provided on the stationary frame and a second set of cover elements provided on the sash to provide a substantially weather-proof transition between the roof window and the surroundings, the second set of cover elements including a top sash cover element, wherein the top sash cover element comprises a first leg section substantially parallel to the sash plane and a second leg section at an angle thereto. The invention furthermore relates to a method of cleaning such a roof window.

[0002] Basically, such roof windows may be provided in a number of varieties and include more or less complicated structures in order to allow opening of the sash and to fulfil other functions, such as ventilation.

[0003] Windows of the pivoting or centre-hung type have found widespread acceptance, especially as roof windows, inter alia because this kind of window facilitates easy window cleaning, due to the fact that the pane-carrying sash may be pivoted essentially 180° to allow cleaning of the outside surface of the pane from inside the building. This is made possible by the provision of a pivot hinge, with a particular pattern of movements, which in turn makes it possible to establish an overlap between the cladding members forming part of a set of cover members of the sash and the frame in the closed position of the pivot window, without the use of elaborate devices such as linkage mechanisms to provide the appropriate relative movement. This is a particularly important feature in windows installed in a roof. A further advantage of the pivot window is that it can be fully opened to a position where the sash is turned approximately 90° in which position air inlet is essentially unrestricted, rather than being restricted by a linkage mechanism limiting the opening angle. Eventually, a pivot window provides for an easy operation, partly due to the position of the operating means at the top member of the sash, partly because the weight of the sash is substantially balanced with the hinge axis situated close to the centre line of the window.

[0004] On the other hand, top-hung windows, i.e. windows in which the hinge axis is located near or at the top members of the sash and frame, have a number of advantages as well; for instance, operation of the window

may take place with a handle at the bottom member of the sash, which is a logical and easily accessible position. Furthermore, a large opening is provided when the sash is opened, allowing even small top-hung windows to function as emergency exits. However, in order to allow cleaning of a top-hung window, normally installed in an inclined roof, from the inside of the building, an intermediate frame must be provided.

[0005] Examples of top-hung windows that pivot for cleaning are for instance disclosed in Applicant's WO-A-89/10460, EP 0 733 146 B1 and EP 1 873 323 B1. To make it possible to pivot the window sash approximately 180° to a convenient cleaning position, the sash structure is connected with an intermediate frame with frame arms, which in the closed position of the window are positioned between the upper parts of the frame and sash side members, and which during normal use of the window as a top-hung turning window follow the sash side members. The axis of rotation of this connection lies approximately halfway between the top and bottom members of the frame and sash, and operation of the window to this pivoting movement is carried out in a manner frequently used in connection with roof windows by means of a ventilation and control flap which releases a locking mechanism positioned between the frame and sash top members. The total pattern of movements of the sash, the frame and the intermediate frame requires that the top cap connected with the intermediate frame is retained against a support member connected with the intermediate frame arm, whereas the lower part with a screw connection is secured to the screw fitting which is connected with the part of the fitting connected with the intermediate frame arm between the intermediate frame arm and the sash side member.

[0006] For most fields of application, the engagement between the cladding parts poses no problem during operation. However, there are situations in which a less complex form of such cladding parts is desired.

[0007] One example of a roof window seeking to overcome the problem of two-part claddings is described in FR-A-2581119; however, this window is of a relatively elaborate design.

[0008] A further example of a prior art roof window is described in EP 0 179 509 A1.

[0009] In such roof windows in general, it is of importance to ascertain that the movements to be performed are manageable throughout, and without the risk of body parts such as fingers or, even worse, a head are caught between moving window parts.

[0010] With this background it is an object of the present invention to improve a roof window of the kind mentioned in the introduction with respect to manufacture, installation and cleaning facilities, while at the same time retaining sufficient weather-proofing properties of the roof window.

[0011] In a first aspect, this and further objects are met by the provision of a roof window of the kind mentioned in the introduction, which is furthermore characterized by

the features of the characterizing portion of claim 1.

[0012] Thereby a roof window is provided, with which the desired improved manufacturing and operational conditions are improved. It is thus possible to rotate the sash in a relatively easy and uncomplicated manner, without the use of additional equipment in the form of links or guides.

[0013] In another aspect, a method of cleaning such a roof window is provided.

[0014] Presently preferred embodiments and further advantages will be apparent from the following detailed description and the dependent claims.

[0015] The invention will be described in more detail below by means of a non-limiting example of an embodiment and with reference to the schematic drawing, in which

Fig. 1 shows a perspective view of a roof window in an embodiment which does not fall within the scope of the claimed invention;

Figs 2, 3 and 4 show partial sectional views of the roof window in the embodiment of Fig. 1, on a larger scale;

Fig. 5 shows a schematic partial perspective view of details of a roof window in another embodiment, according to the invention, with the sash of the roof window in another position;

Figs 6 to 8 show schematic cross-sectional views of a detail of a roof window in a further embodiment of the invention, with the sash of the roof window in three different positions; and

Figs 9 to 12 show schematic perspective views of a roof window in an embodiment of the invention, in four different positions during use of a method for cleaning a roof window according to the invention.

[0016] The embodiment of the roof window shown in Figs 1 to 4 comprises a stationary frame 1 to be built into an inclined roof surface (not shown) and a sash 2 carrying a pane 3. The stationary frame has, in a manner known per se, a bottom member 11, a top member 12, and two side members 13, 14, which together define a frame plane, and the sash in a corresponding manner a bottom member 21, a top member 22, and two side members 23, 24 encasing the pane 3 and defining a sash plane.

[0017] Referring also to the schematic views of Figs 9 to 12 illustrating the principle underlying the invention, the roof window includes a first hinge connection 15 at the top members 12, 22 of the frame and the sash, respectively, to render the roof window top-hung during normal operation, via an intermediate frame generally designated 4, of which only its top member 42 is shown in more detail. A second hinge connection 25 is provided between the sash and the intermediate frame in order to rotate the sash about this second hinge connection to provide access to the outside of the pane 3 for cleaning purposes. In the embodiment shown, a lifting device including a spring arrangement 6 comprising a spring, or

two springs, is connected to a lifting arm 7.

[0018] From a closed position, the user operates the operating means of the window. The operating means may as shown be a handle 8 connected with the sash bottom member. The bias of the spring arrangement 6 of the lifting device acts on the lifting arm 7, which in turn exerts a moment on the intermediate frame 4 and hence on the sash 2 relative to an axis at the first hinge connection 15. In combination with the force, and hence moment, exerted by the user operating the operating device, the moment resulting from the weight of the sash and the pane is overcome to move the sash in a first direction such 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 and relevant parts of the lifting device. A similar lifting device may be provided at each side of the roof window.

[0019] In order to allow the sash 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 at the first hinge connection 15 is releasable, in that locking means 16 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.

[0020] In order to provide a substantially weather-proof connection between the roof window and the exterior, a number of cover elements are provided. In a more traditional window, cover elements include cladding elements and flashing elements, and also in the roof window according to the invention, such cladding and flashing elements may be used wherever appropriate. At the top of the roof window according to the invention, however, a particular design of the cover elements is foreseen:

Referring to Fig. 5 showing the principle underlying the invention, a first set of cover elements is provided on the stationary frame 1 and a second set of cover elements is provided on the sash 2 to provide a substantially weather-proof transition between the roof window and the surroundings.

[0021] The second set of cover elements includes a top sash cover element 200 and the first set of cover elements includes a top frame cover element 100. The top sash cover element overlaps the top frame cover element to a maximum opening angle when the sash is rotated in the first direction relative to the frame plane, but is releasable from the overlap to allow a rotation of the sash in a second direction opposite the first direction. Also shown in this figure is a third set of cover elements in the form of an intermediate frame cover element 400.

[0022] A presently preferred embodiment of such a roof window is shown in Figs 6 to 8 showing the roof window in three different positions: Fig. 6 shows the sash in the closed position, in the position shown in Fig. 7, the sash has been rotated about the first hinge connection and in a first direction to a maximum opening angle, which

in the embodiment shown is approximately 45°, and in Fig. 8, the locking means 16 of the first hinge connection 15 has been released and the sash 2 is free to move in a second direction about the second hinge connection 25, without the respective cover elements 100, 200, 400 coming into conflict with each other.

[0023] Thus, in the embodiment shown the top sash cover element 200 comprises a first leg section 201 substantially parallel to the sash plane and a second leg section 202 at an angle thereto. The top frame cover element 100 comprises a first leg section 101 substantially parallel to the frame plane and an upstanding second leg section 102 substantially perpendicular thereto, the second leg section 202 of the top sash cover element overlapping the upstanding second leg section 102 of the frame cover element slightly in the closed position of the sash, and abutting the first leg section 101 of the top frame cover element 100 in the maximum opening angle as shown when comparing Figs 6 and 7. In order to increase the weather-proofing even further, the top frame cover element 100 also comprises a third leg section 103 perpendicular to the upstanding second leg section 102 in the embodiment shown. Furthermore, a third set of cover elements is provided and includes an intermediate frame cover element 400, which is adapted to be brought into releasable contact with the top sash cover element 200, as shown at a sealing member 205. The intermediate frame cover element 400 comprises a hook-shaped section 401 cooperating with the third leg section 103 of the top frame cover element 100. In the embodiment shown, the intermediate frame cover element 400 is provided on the top member 42 of the intermediate frame 4, but it is conceivable to provide this cover element 400 on other parts, for instance at the sides of the intermediate frame 4.

[0024] In order to bring the window sash 2 from the position shown in Fig. 6 to the position shown in Fig. 7, the intermediate frame 4 and the pane-carrying sash 2 are in an initial step opened and rotated relative to the stationary frame 1, with the locking means 16 in a locked position, about the first hinge connection 15. This initial step is in the embodiment shown carried out by the assistance of the lifting device 6, 7. In a secondary step, the engagement between the sash 2 and the intermediate frame 4 is released to bring the locking means 16 to an unlocked position. This operation allows the sash 2 to be lifted out of contact with the stationary frame 1 by rotating the sash 2 about the second hinge connection 25 without guidance from the stationary frame. Comparing Figs 7 and 8, it is seen how the top sash cover element 200 during the initial phase of this step is moved from the position in Fig. 7, in which the second leg section 202 abuts the first leg section 101 of the top frame cover element 100, to the position of Fig. 8, in which the top sash cover element 200 has been moved out of contact with the top frame cover element 100 without any conflict between the cover elements.

[0025] In order to ease the movement of the sash about

the second hinge connection, the top sash member is in the embodiment shown provided with an additional operating means, here in the form of a handle 85.

[0026] In order to clean primarily the outside of the pane of the roof window according to the invention, the following steps are performed, with particular reference to the consecutive Figures 9 to 12:

rotating the sash in a first direction relative to the frame plane about the first hinge connection, releasing the locking means of the first hinge connection, rotating the sash about the second hinge connection in the second direction opposite the first direction through a predefined angle, cleaning the outside of the pane, rotating the sash in the first direction about the second hinge connection, reengaging the locking means of the first hinge connection, and closing the sash by rotation in the second direction about the first hinge connection.

[0027] During the rotation of the sash about the second hinge connection, the sash 2 is located entirely outside the plane of the stationary frame 1. The movement is completely free, in that no guidance between the bottom member 21 of the sash 2 relative to the stationary frame 1 is necessary. This provides for a particularly easy operation at all stages of the procedure. Furthermore, as the user is able to control the movement, no unforeseen sudden movements are possible.

[0028] Once the locking means have been released, it is possible to move the sash slightly back towards the frame plane, before commencing the rotation about the second hinge connection, in case this increases the user comfort.

[0029] It should be noted that the above description of preferred embodiments serves only as an example, and that a person skilled in the art will know that numerous variations are possible without deviating from the scope of the claims.

Claims

1. A roof window comprising:

a stationary frame (1) adapted to be built into a structure and having a top member (12), two side members (13, 14) and a bottom member (11), and defining a frame plane,
a sash (2) having a top member (22), two side members (23, 24) and a bottom member (21), and carrying a pane (3) and defining a sash plane in parallel with the frame plane,
an intermediate frame (4),
at least one first hinge connection (15) for con-

- necting the sash (2) and the intermediate frame (4) to the stationary frame (1),
 releasable locking means (16) for releasing the engagement between the intermediate frame (4) and the sash (2) at the first hinge connection (15),
 at least one second hinge connection (25) for connecting the sash (2) to the intermediate frame (4),
 operating means (8) for opening and closing the sash relative to the frame, and
 a first set of cover elements (100) being provided on the stationary frame and a second set of cover elements (200) provided on the sash to provide a substantially weather-proof transition between the roof window and the surroundings, the second set of cover elements including a top sash cover element (200), wherein the top sash cover element (200) comprises a first leg section (201) substantially parallel to the sash plane and a second leg section (202) at an angle thereto, **characterized in that** the first set of cover elements includes a top frame cover element (100), and that the top sash cover element (200) overlaps the top frame cover element (100) to a maximum opening angle when the sash (2) is rotated in a first direction relative to the frame plane, but may be moved away from said overlap by release of the locking means (16) and by rotation of the sash (2) in a second direction opposite the first direction, and that a third set of cover elements includes an intermediate frame cover element (400), which is adapted to be brought into releasable contact with the top sash cover element (200), preferably at a sealing member (205).
2. A roof window according to claim 1, wherein the top frame cover element (100) comprises a first leg section (101) substantially parallel to the frame plane and an upstanding second leg section (102) substantially perpendicular thereto, the second leg section (202) of the top sash cover element (200) overlapping the upstanding second leg section (102) of the frame cover element (100) slightly in the closed position of the sash, and abutting the first leg section (101) of the top frame cover element in the maximum opening angle.
 3. A roof window according to claim 2, wherein the top frame cover element (100) also comprises a third leg section (103) perpendicular to the upstanding second leg section (102).
 4. A roof window according to claim 3, wherein the intermediate frame cover element (400) comprises a hook-shaped section (401) cooperating with the third leg section (103) of the top frame cover element.
 5. A roof window according to any one of the preceding claims, wherein the top sash member is provided with an additional operating means, preferably in the form of a handle (85).
 6. A method of cleaning a roof window according to any one of claims 1 to 5, comprising the steps of:
 - rotating the sash (2) in a first direction relative to the frame plane about the first hinge connection (15),
 - releasing the engagement between the intermediate frame (4) and the sash (2) by releasing the locking means (16) at the first hinge connection (15),
 - rotating the sash (2) about the second hinge connection (25) in the second direction opposite the first direction through a predefined angle,
 - cleaning the outside of the pane (3),
 - rotating the sash (2) in the first direction about the second hinge connection (25),
 - reengaging the locking means (16) of the first hinge connection (15), and
 - closing the sash by rotation in the second direction about the first hinge connection (15).

Patentansprüche

1. Dachfenster, umfassend:

einen stationären Rahmen (1), der dazu angepasst ist, in eine Struktur eingebaut zu werden und der ein oberes Bauteil (12), zwei Seitenbauteile (13, 14) und ein unteres Bauteil (11) aufweist und eine Rahmenebene definiert, einen Flügel (2) mit einem oberen Bauteil (22), zwei Seitenbauteilen (23, 24) und einem unteren Bauteil (21), wobei der Flügel (2) eine Fensterscheibe (3) trägt und eine Fensterscheibenebene parallel zur Fensterscheibe definiert, einen Zwischenrahmen (4), wenigstens eine erste Scharnierverbindung (15) zur Verbindung des Flügels (2) und des Zwischenrahmens (4) mit dem stationären Rahmen (1), lösbbare Verriegelungsmittel (16) zum Lösen des Eingriffs zwischen dem Zwischenrahmen (4) und dem Flügel (2) an der ersten Scharnierverbindung (15), wenigstens eine zweite Scharnierverbindung (25) zur Verbindung des Flügels (2) mit dem Zwischenrahmen (4), Betätigungsmittel (8) zum Öffnen und Schließen des Flügels relativ zu dem Rahmen, und einen ersten Satz von Abdeckelementen (100), die an dem stationären Rahmen vorgesehen sind, und einen zweiten Satz von Abdeckele-

menten (200), die auf dem Flügel vorgesehen sind, um einen im Wesentlichen wasserdichten Übergang zwischen dem Dachfenster und der Umgebung bereitzustellen, wobei der zweite Satz von Abdeckelementen ein oberes Flügelabdeckelement (200) beinhaltet, wobei das obere Flügelabdeckelement (200) einen ersten Schenkelabschnitt (201) im Wesentlichen parallel zu der Fensterscheibenebene und einen zweiten Schenkelabschnitt (202) in einem Winkel dazu aufweist,

dadurch gekennzeichnet, dass der erste Satz von Abdeckelementen ein oberes Rahmenabdeckelement (100) aufweist, und dass das obere Flügelabdeckelement (200) das obere Rahmenabdeckelement (100) bis zu einem maximalen Öffnungswinkel überlappt, wenn der Flügel (2) in eine erste Richtung relativ zu der Rahmenebene gedreht wird, wobei das obere Flügelabdeckelement (200) durch Lösen der Verriegelungsmittel (16) und durch Rotation des Flügels (2) in eine zweite Richtung entgegengesetzt der ersten Richtung von der Überlappung weg bewegt werden kann, und dass ein dritter Satz von Abdeckelementen ein Zwischenrahmenabdeckelement (400) aufweist, das dazu angepasst ist, in lösbaren Kontakt mit dem oberen Flügelabdeckelement (200) gebracht zu werden, vorzugsweise an einem Dichtelement (205).

2. Dachfenster nach Anspruch 1, wobei das obere Rahmenabdeckelement (100) einen ersten Schenkelabschnitt (101) im Wesentlichen parallel zu der Rahmenebene und einen im Wesentlichen senkrecht dazu aufrecht stehenden zweiten Schenkelabschnitt (102) aufweist, wobei der zweite Schenkelabschnitt (202) des oberen Flügelabdeckelements (200) den aufrecht stehenden zweiten Schenkelabschnitt (102) des Rahmenabdeckelements (100) in der geschlossenen Position des Flügels geringfügig überlappt und im maximalen Öffnungswinkel an dem ersten Schenkelabschnitt (101) des oberen Rahmenabdeckelements anstößt.
3. Dachfenster nach Anspruch 2, wobei das obere Rahmenabdeckelement (100) ferner einen dritten Schenkelabschnitt (103) aufweist, der senkrecht zu dem aufrecht stehenden zweiten Schenkelabschnitt (102) verläuft.
4. Dachfenster nach Anspruch 3, wobei das Zwischenrahmenabdeckelement (400) einen hakenförmigen Abschnitt (401) aufweist, der mit dem dritten Schenkelabschnitt (103) des oberen Rahmenabdeckelements zusammenwirkt.
5. Dachfenster nach einem der vorhergehenden An-

sprüche, wobei das obere Flügelbauteil mit zusätzlichen Betätigungsmitteln versehen ist, vorzugsweise in Form eines Handgriffs (85).

- 5 6. Verfahren zum Reinigen eines Dachfensters nach einem der Ansprüche 1 bis 5, umfassend die folgenden Schritte:

Rotieren des Flügels (2) um die erste Scharnierverbindung (15) in einer ersten Richtung relativ zu der Rahmenebene,
Lösen des Eingriffs zwischen dem Zwischenrahmen (4) und dem Flügel (2) durch Lösen der Verriegelungsmittel (16) an der ersten Scharnierverbindung (15),
Rotieren des Flügels (2) um die zweite Scharnierverbindung (25) in der zweiten Richtung entgegengesetzt der ersten Richtung über einen vordefinierten Winkel,
Säubern der Außenseite der Fensterscheibe (3),
Rotieren des Flügels (2) in die erste Richtung um die zweite Scharnierverbindung (25),
Verriegeln der Verriegelungsmittel (16) der ersten Scharnierverbindung (15), und
Schließen des Flügels durch Rotation in die zweite Richtung um die erste Scharnierverbindung (15).

Revendications

1. Fenêtre de toit comprenant :

un cadre fixe (1) adapté pour être incorporé dans une structure et ayant un organe supérieur (12), deux organes latéraux (13, 14) et un organe inférieur (11), et définissant un plan de cadre, un châssis (2) ayant un organe supérieur (22), deux organes latéraux (23, 24) et un organe inférieur (21), et portant un carreau (3) et définissant un plan de châssis en parallèle avec le carreau,
un cadre intermédiaire (4),
au moins un premier raccord à charnière (15) pour raccorder le châssis (2) et le cadre intermédiaire (4) au cadre fixe (1),
un moyen de verrouillage libérable (16) pour libérer l'enclenchement entre le cadre intermédiaire (4) et le châssis (2) au niveau du premier raccord à charnière (15),
au moins un second raccord à charnière (25) pour raccorder le châssis (2) au cadre intermédiaire (4),
un moyen de fonctionnement (8) pour ouvrir et fermer le châssis par rapport au cadre, et
un premier ensemble d'éléments couvrants (100) étant prévu sur le cadre fixe et un deuxième

me ensemble d'éléments couvrants (200) étant prévu sur le châssis pour fournir une transition sensiblement résistante aux intempéries entre la fenêtre de toit et les environs, le deuxième ensemble d'éléments couvrants comportant un élément couvrant de châssis supérieur (200), l'élément couvrant de châssis supérieur (200) comprenant une première section de tronçon (201) sensiblement parallèle au plan de châssis et une deuxième section de tronçon (202) formant un angle avec celui-ci,

caractérisée en ce que le premier ensemble d'éléments couvrants comporte un élément couvrant de cadre supérieur (100), et **en ce que** l'élément couvrant de châssis supérieur (200) chevauche l'élément couvrant de cadre supérieur (100) à un angle d'ouverture maximal lorsque le châssis (2) est tourné dans une première direction par rapport au plan de cadre, mais peut être éloigné dudit chevauchement par libération du moyen de verrouillage (16) et par rotation du châssis (2) dans une seconde direction opposée à la première direction, et **en ce qu'un** troisième ensemble d'éléments couvrants comporte un élément couvrant de cadre intermédiaire (400), qui est adapté pour être amené en contact libérable avec l'élément couvrant de châssis supérieur (200), de préférence au niveau d'un organe d'étanchéité (205).

2. Fenêtre de toit selon la revendication 1,

dans laquelle l'élément couvrant de cadre supérieur (100) comprend une première section de tronçon (101) sensiblement parallèle au plan de cadre et une deuxième section de tronçon debout (102) sensiblement perpendiculaire à celui-ci, la deuxième section de tronçon (202) de l'élément couvrant de châssis supérieur (200) chevauchant légèrement la deuxième section de tronçon debout (102) de l'élément couvrant de cadre (100) dans la position fermée du châssis, et soutenant la première section de tronçon (101) de l'élément couvrant de cadre supérieur dans l'angle d'ouverture maximal.

3. Fenêtre de toit selon la revendication 2,

dans laquelle l'élément couvrant de cadre supérieur (100) comprend également une troisième section de tronçon (103) perpendiculaire à la deuxième section de tronçon debout (102).

4. Fenêtre de toit selon la revendication 3,

dans laquelle l'élément couvrant de cadre intermédiaire (400) comprend une section en forme de crochet (401) coopérant avec la troisième

section de tronçon (103) de l'élément couvrant de cadre supérieur.

5. Fenêtre de toit selon l'une quelconque des revendications précédentes, dans laquelle l'organe de châssis supérieur est pourvu d'un moyen de fonctionnement supplémentaire, de préférence sous la forme d'une poignée (85).

6. Procédé de nettoyage d'une fenêtre de toit selon l'une quelconque des revendications 1 à 5, comprenant les étapes de :

rotation du châssis (2) dans une première direction par rapport au plan de cadre autour du premier raccord à charnière (15), libération de l'enclenchement entre le cadre intermédiaire (4) et le châssis (2) en libérant le moyen de verrouillage (16) au niveau du premier raccord à charnière (15), rotation du châssis (2) autour du second raccord à charnière (25) dans la seconde direction opposée à la première direction d'un angle prédéfini, nettoyage de l'extérieur du carreau (3), rotation du châssis (2) dans la première direction autour du second raccord à charnière (25), ré-enclenchement du moyen de verrouillage (16) du premier raccord à charnière (15), et fermeture du châssis par rotation dans la seconde direction autour du premier raccord à charnière (15).

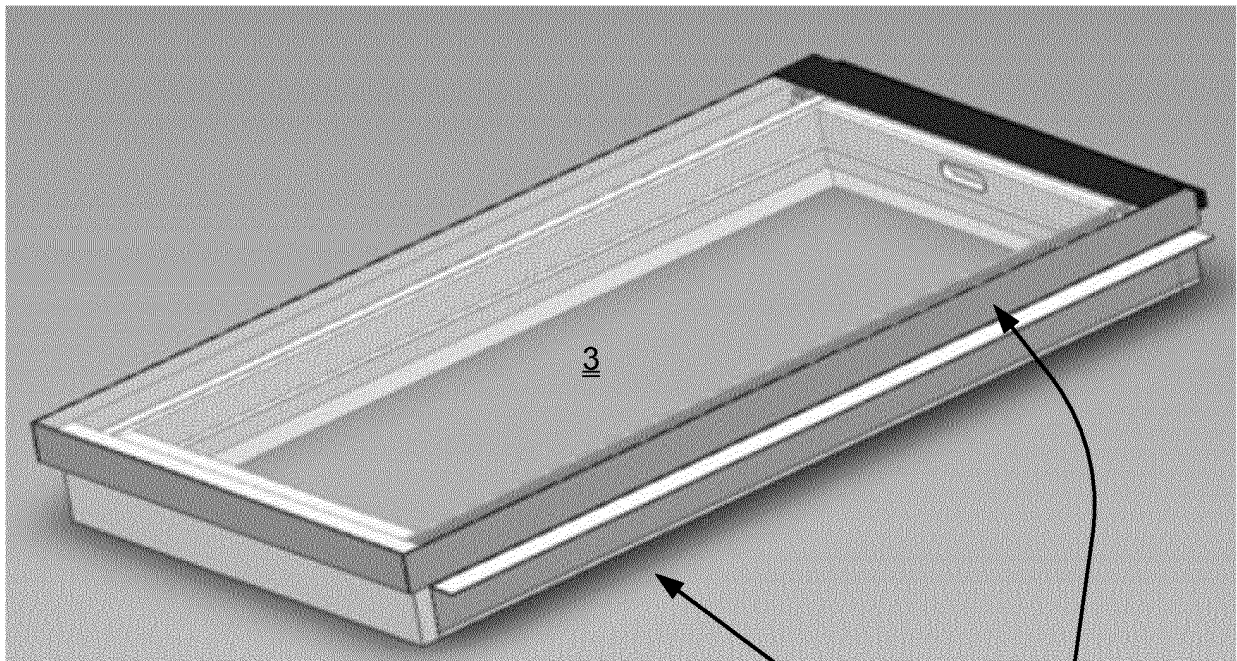


Fig. 1

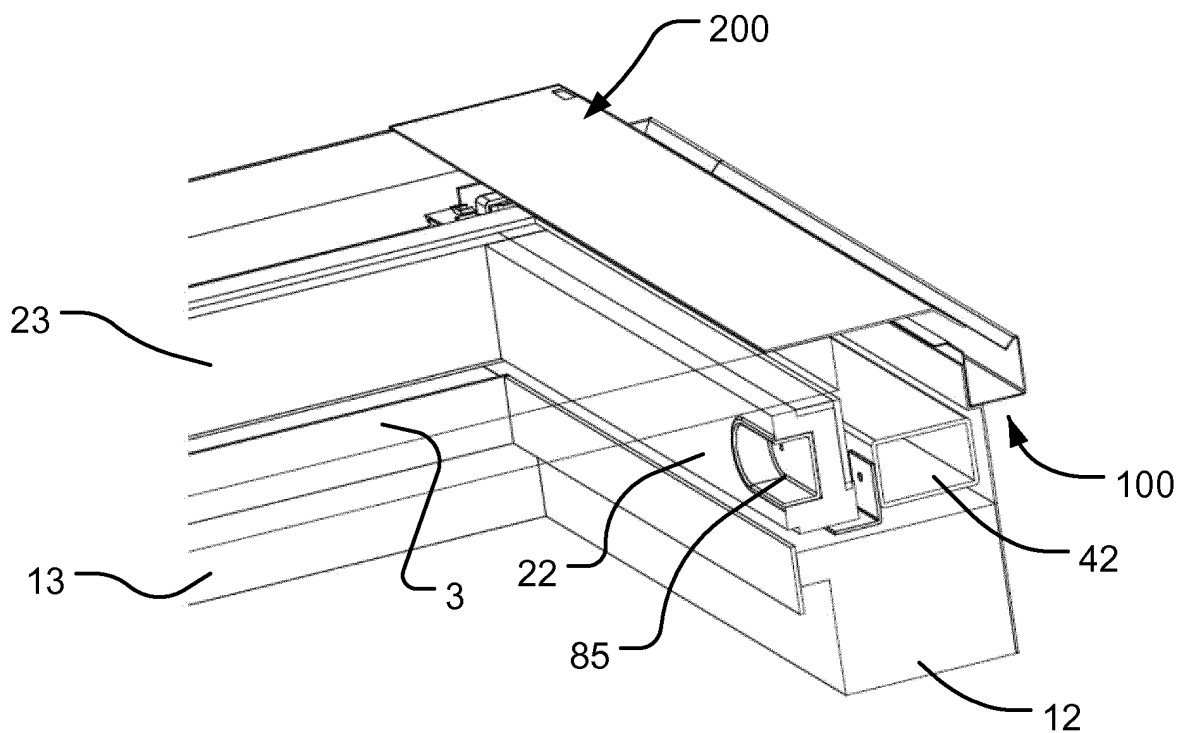
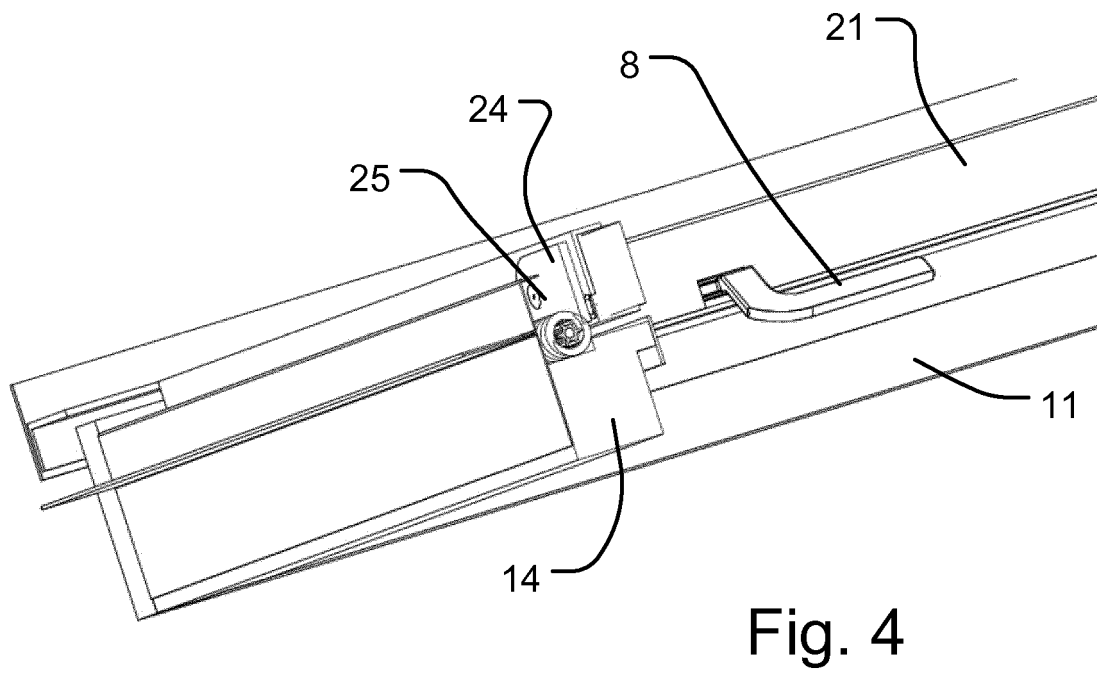
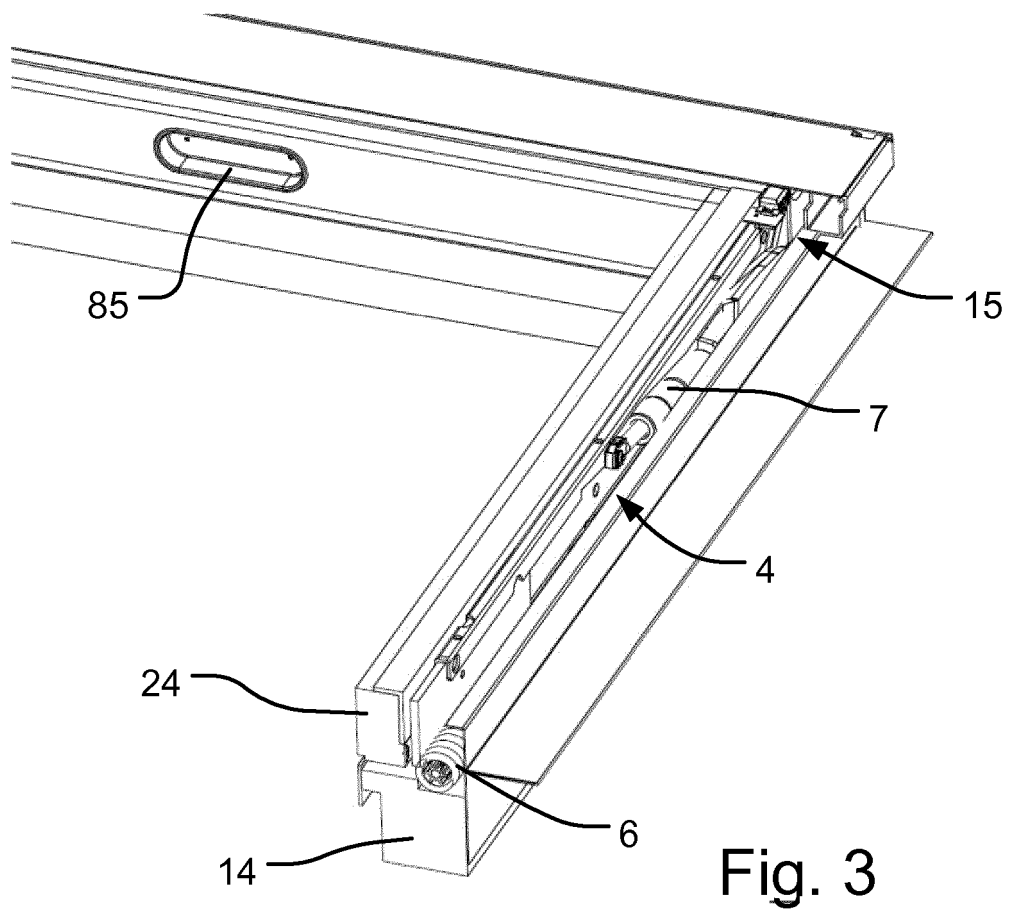
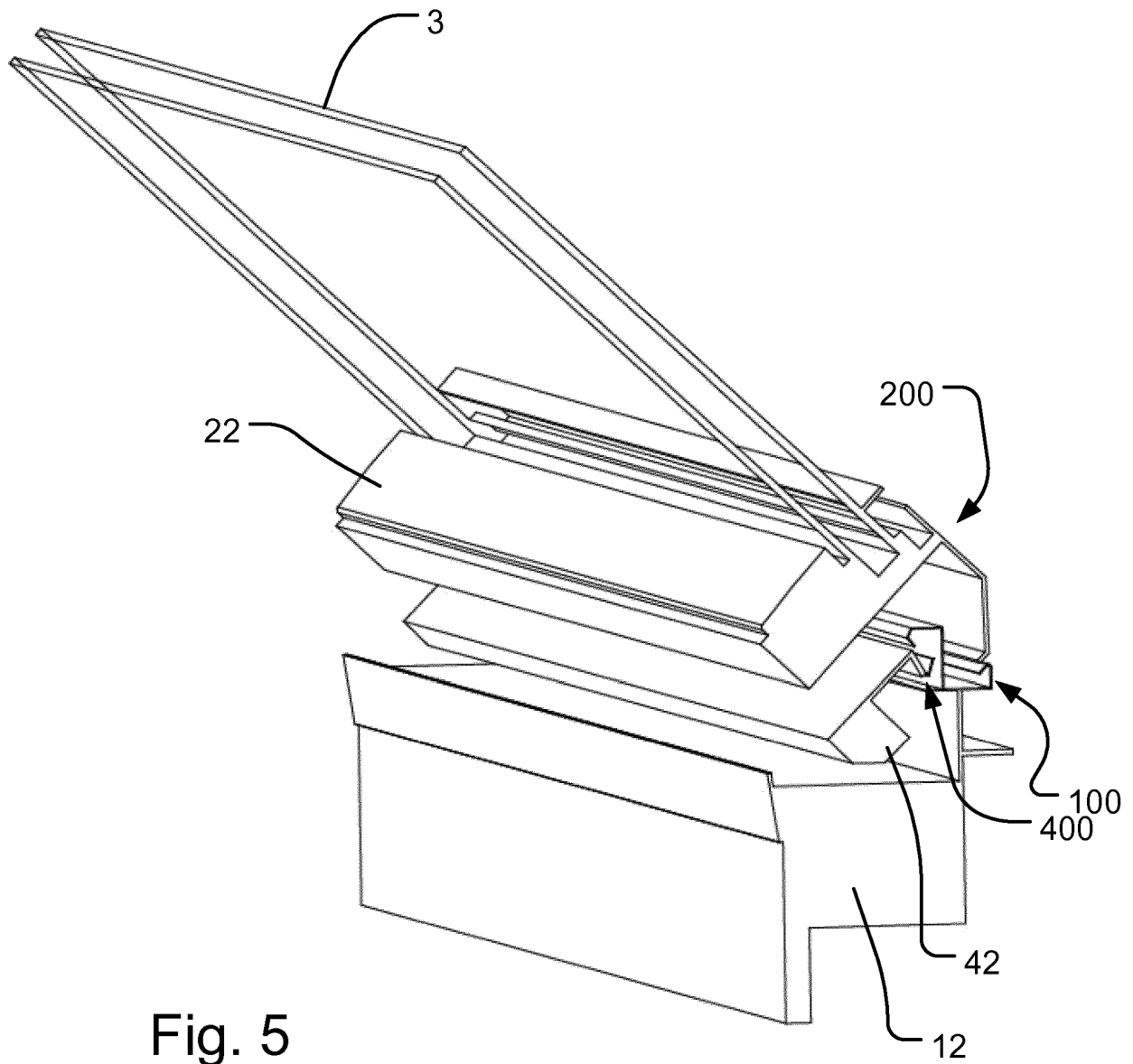


Fig. 2





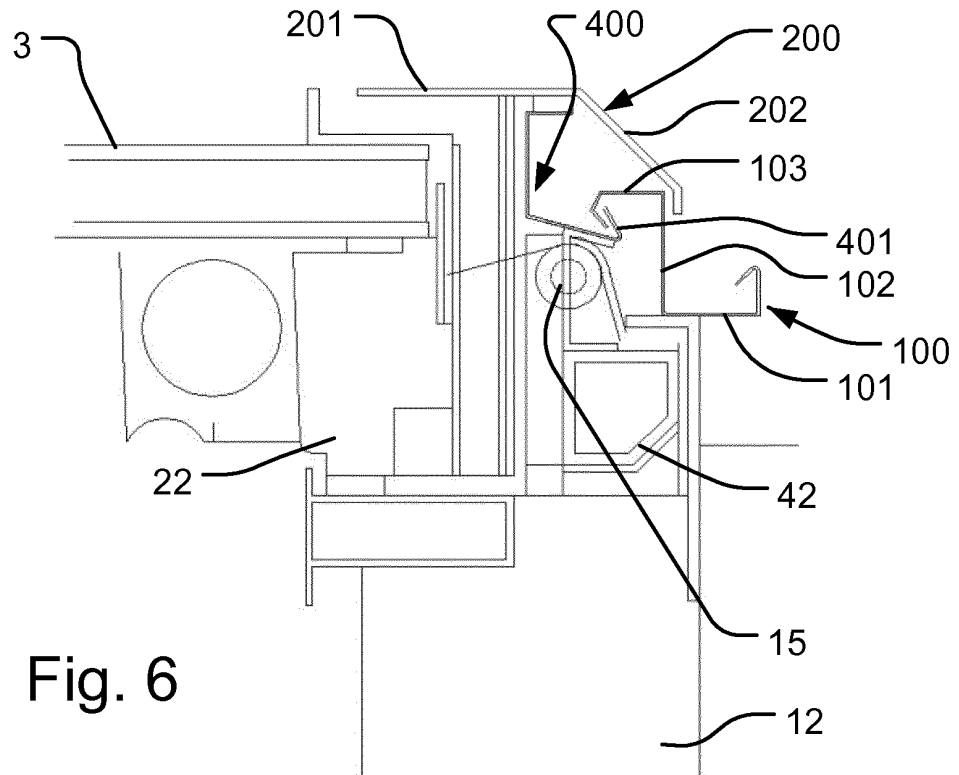


Fig. 6

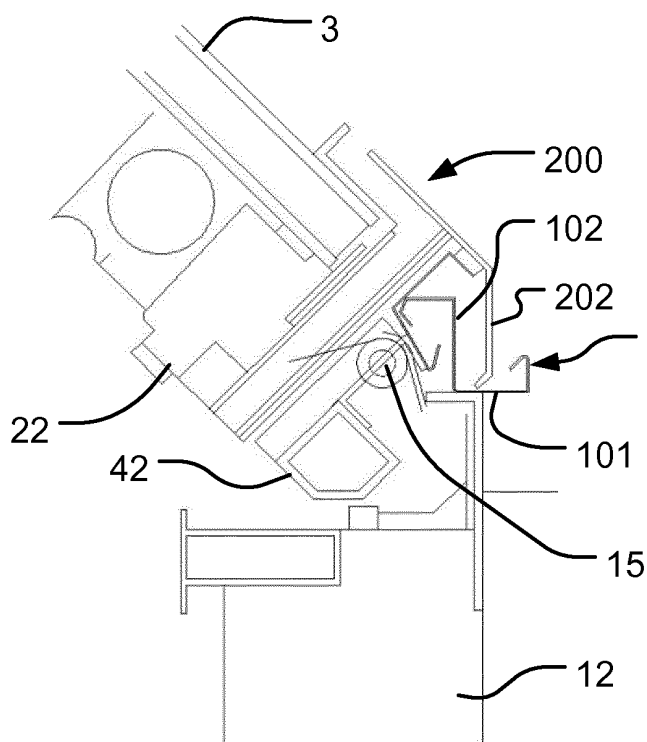


Fig. 7

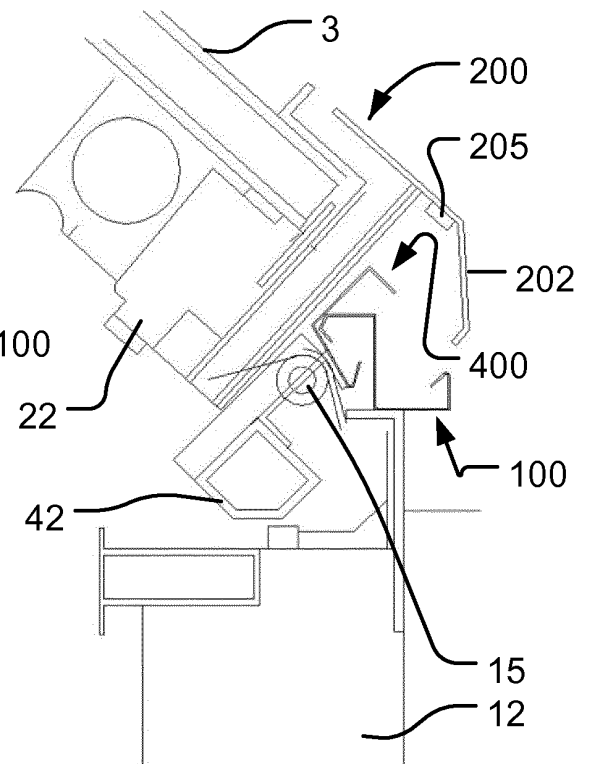
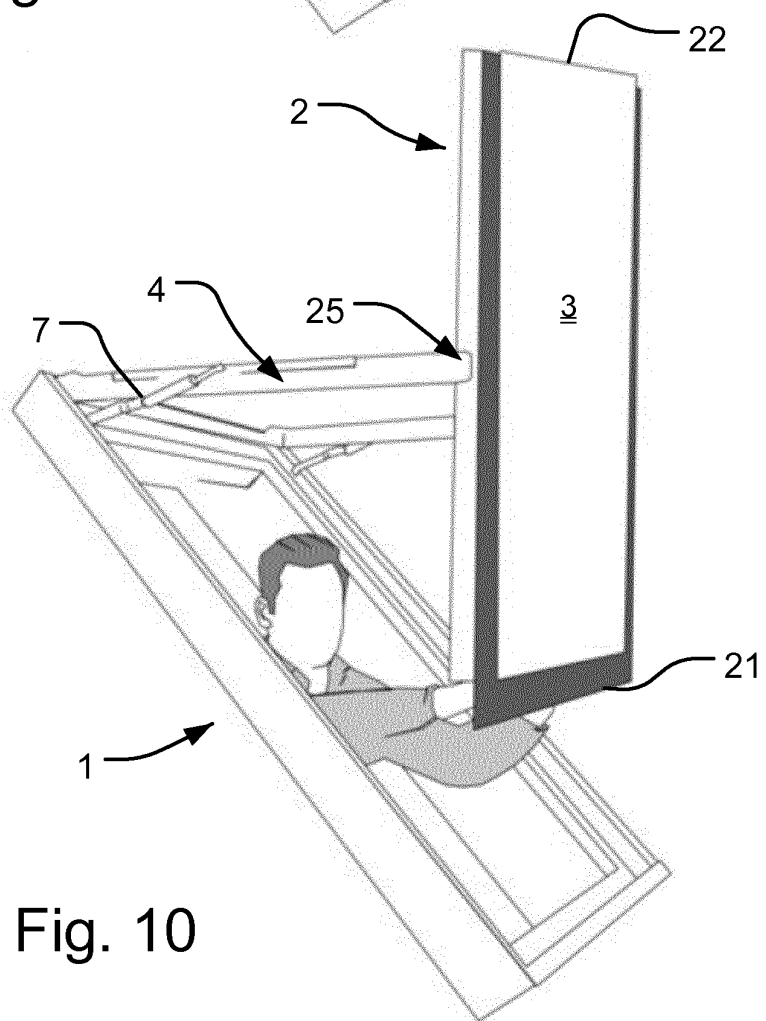
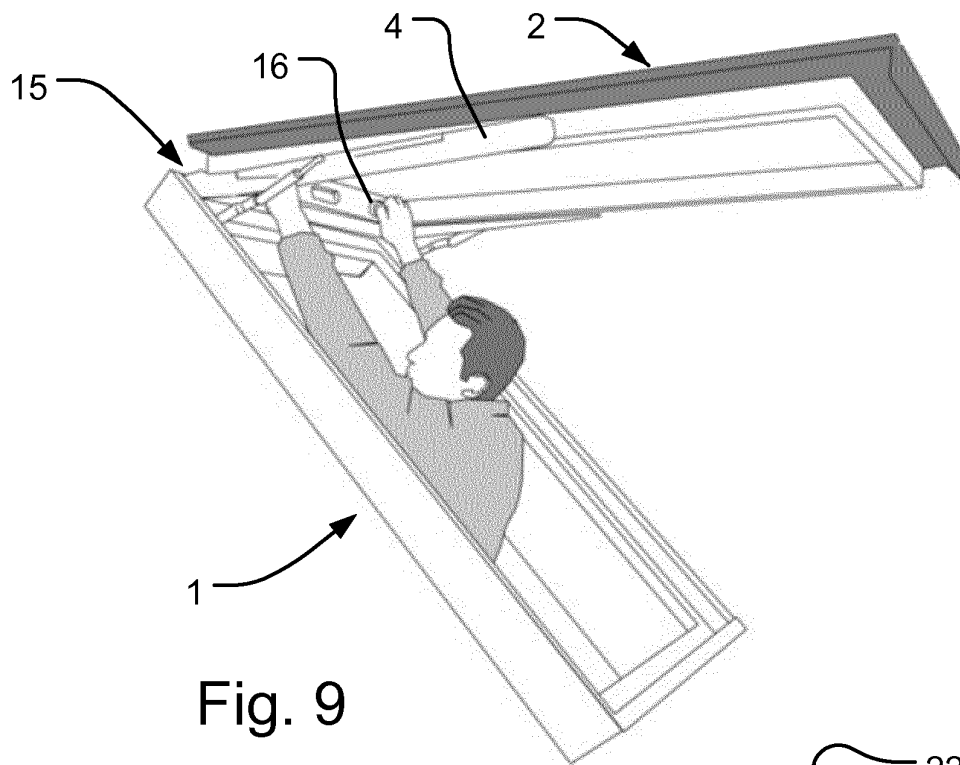
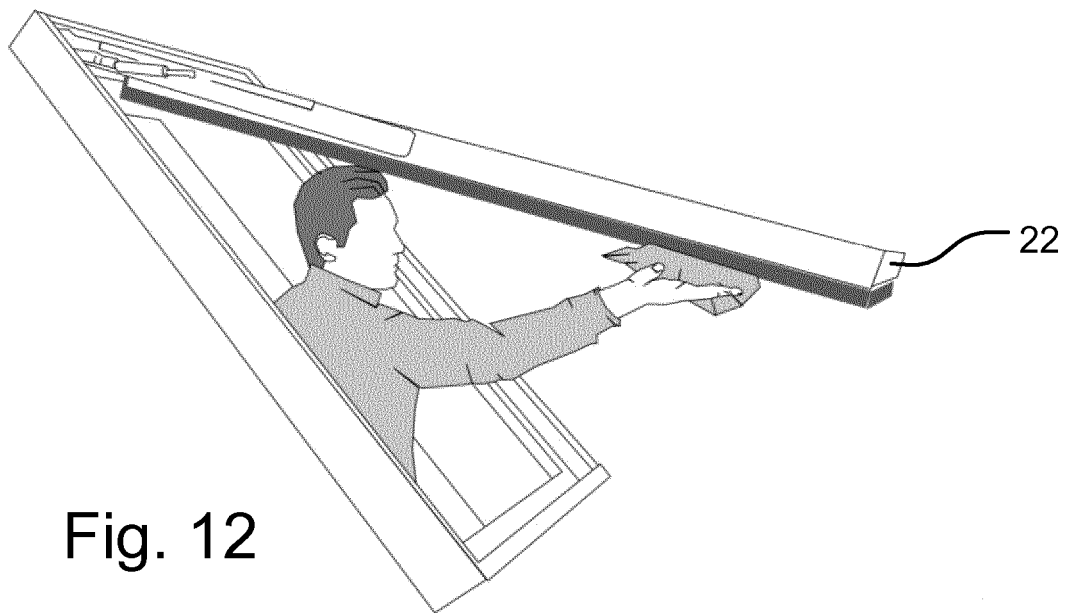
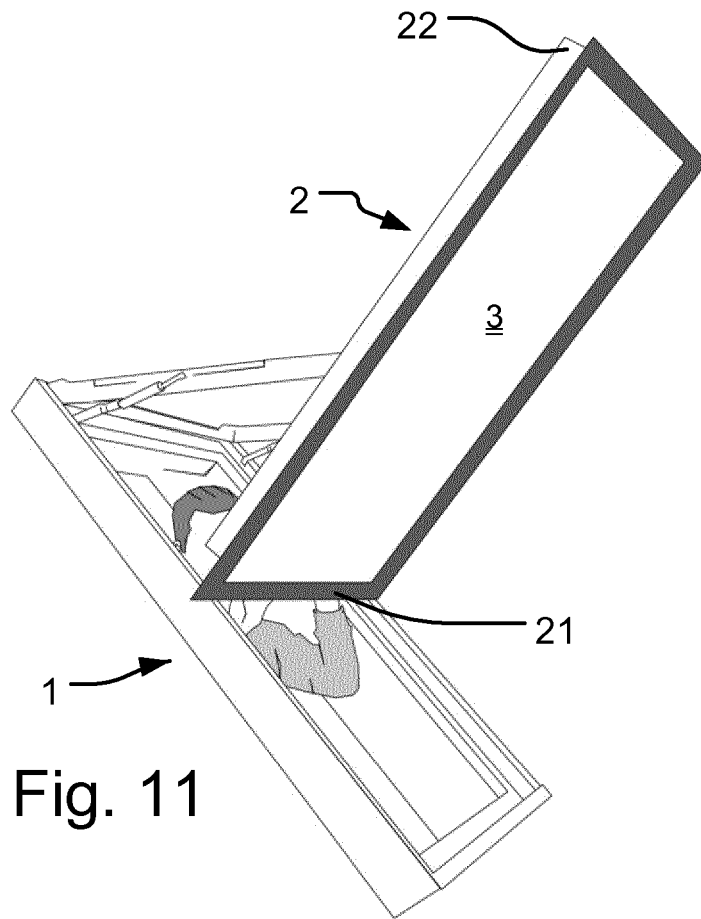


Fig. 8





REFERENCES CITED IN THE DESCRIPTION

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