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(54) **Appliance members for a window and corresponding screening assembly**

(57) The window system comprises a window (2) and a screening assembly (1) including a screening device which may be a roller shutter (10), and at least one ap-

pliance member (100, 120). The appliance member or members is/are releasably connected with a track in a component of the window or the screening device, and is interchangeable between them.

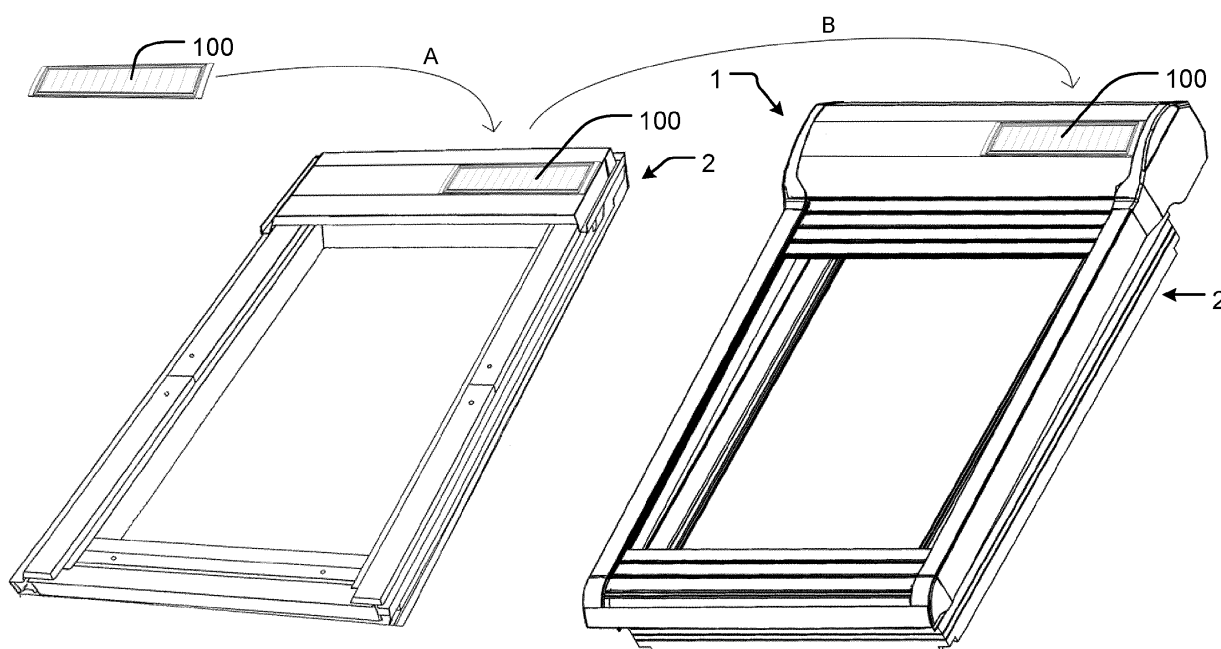


Fig. 1

Description

[0001] The present invention relates to a window system comprising: a window including a number of components, a screening assembly including a screening device, and at least one appliance member. The invention furthermore relates to a method for upgrading a window system.

[0002] Such window systems are known from many fields of application. When installed, the window of such a system is mounted in a façade or an inclined roof. The screening assembly is intended for use in screening of the window, and typically comprises a screening device mounted externally or internally of the window.

[0003] Over the years, it has been increasingly common to provide a number of external accessories or appliance members on the window itself or on the screening assembly. Such appliance members include for instance rain sensors, solar cells or photovoltaic elements, and other elements adapted to take part in or assist the operation of the window, of other roof or façade penetrating elements, or of the screening assembly. In externally positioned screening assemblies and on the window itself, any such appliance members are located outdoors, these parts are permanently exposed to the weathering.

[0004] Appliance members are normally connected to one or more components of the window in various manners such as for instance by means of adhesives or fastening means such as screws. This is often the case in which a traditional window is upgraded to a window, in which the window itself or its accessories are electrically operated. In that case, appliance members such as solar cell panels or rain sensors are after-mounted on the window. In other windows, which are dedicated to electric operation from the start, appliance members are often formed as integral parts of the window. Additional appliance members, for instance in the form of supplementary solar cell panels, are sometimes placed next to already present appliance members, in case for instance the need for power supply is increased following the mounting of new units to the window. In windows already provided with solar cell panels and in which a screening assembly comprising an external screening device is to be after-mounted, the additional problem arises that the external screening device to a large extent covers the solar cell panels of the window itself.

[0005] The appliance members to be used with prior art screening assemblies, for instance in the form of external roller shutters, are most often tailor-made and suggested located in or at the roller shutter itself, for instance beside the top element or in side rails, cf. for instance DE 199 14 677. For several reasons, it is, however, desirable to connect the appliance member or members to the top element itself, even though this location poses certain demands on the connection in order to maintain the parts of the roller shutter located on the inside of the top element protected. One example of a roller shutter having a number of appliance members connected to the

top element is disclosed in FR 2 842 860, in which appliance members including a photovoltaic element are located in a separate box connected to the top element of the roller shutter. A further development of this roller shutter is disclosed in FR 2 894 278 A1, in which the roller shutter is operated by means of a motor supplied with power from a photovoltaic element integrated into the top element. The photovoltaic element is at its back-side, i.e. the side facing inwards into the top element, connected to a receiver, to the motor, and to a battery. Even though the latter document provides for the all-elements-in-one design aimed at, this roller shutter is thus limited to be utilized with the integrated photovoltaic element, and nothing is mentioned about maintenance or exchange of one or more of the appliance members.

[0006] With this background it is an object of the present invention to provide a window system, in which upgrading of the window and after-mounting of appliance members are made more easy and cost-effective, and in which the selection and handling of appliance members are more flexible.

[0007] In a first aspect, these and further objects are achieved by a window system of the kind mentioned in the introduction, wherein at least one of said number of components of the window includes at least one track, and said screening device being provided with at least one track, and wherein said at least one appliance member is interchangeable between a track of the at least one window component and a track of the screening device, each at least one appliance member being received in a track of the window component or the screening device in a releasable connection.

[0008] In this manner, the substantially increased flexibility aimed at is fulfilled, and the costs for manufacturing and upgrading the window system are reduced, as the interchangeable feature of the appliance members entail that one and the same appliance member may be used and re-used in various positions in the components of the window and in the screening assembly. For instance, in case a window already provided with appliance members such as for instance solar cell panels and a rain sensor in one component, and it is desired to install an external screening device, the appliance members of the window are easily removed from the track of the window component and re-installed in the track of the screening device.

[0009] The term "releasable connection" is to be interpreted as including any connection between an appliance member or appliance members and the other part in the form of a window component or screening assembly, respectively, involving an at least temporary retention of the appliance member relative to the other part. The connection may involve any kind of contact or other cooperation between the appliance member or members and the other part, respectively, which fulfils this function, including connections including locking means separate from the appliance member or members and the other part. The term "releasable connection" includes connec-

tions that may be re-connected after release, but does not exclude connections that are not re-connectable following mutual releasing of the appliance member from the other part. Eventually, the term should be interpreted as including in general any connection that is possible to release without damage to at least the parts of the window component or screening assembly.

[0010] In principle, the track may be formed in any component forming part of the window. However, in a preferred embodiment, the window component including at least one track is a cover element selected from the group comprising: window top cover, window bottom cover, and window side cover.

[0011] One such component, in which appliance members are suitably placed, is the window top cover. Advantageously, the window top cover defines a length and a first longitudinal direction corresponding to a width direction of the window, and wherein the window top cover is provided with an external longitudinal track. The width dimension of the window leaves suitable room for the appliance member or members.

[0012] The track may either be formed integrally with the existing window top cover, but in an advantageous embodiment, the external longitudinal track is provided in a separate adapter element of the window top cover. In this manner, the traditional window top cover, for instance constituted by the top casing, may be reused, while the separate adapter element may be formed taking into account considerations of the track.

[0013] In another embodiment, appliance member or members are present also at the bottom of the window, as the window bottom cover defines a length and a first longitudinal direction corresponding to a width direction of the window, and wherein the window bottom cover is provided with an external longitudinal track. The external longitudinal track may be integral with the existing window bottom cover or provided in a separate adapter element of the window bottom cover.

[0014] In one embodiment, the screening device comprises a roller shutter having a top element defining a length and a longitudinal direction, two side rails extending at right angles to the top element, and a shutter body including a plurality of slats providing the screening, ends of the slats being guided in the side rails, said top element being adapted to be connected with at least one appliance member, and wherein said top element includes an external track extending in the longitudinal direction on the outer side of said top element, said track being adapted to receive each said at least one appliance member, that said track has a bottom portion positioned at a level inwards in the direction towards the interior of the top element relative to an upper surface of the top element, said top element preferably including a top cover, and said external track being preferably formed in the top cover.

[0015] The provision of the external track entails that operations such as maintenance, retrofitting, removal and exchange of the appliance member or members are

made very easy. Furthermore, as the track is positioned externally, the interior parts of the roller shutter are at no time exposed during the above-mentioned operations, and the interior parts thus remain protected by the top element. As the level of the bottom portion of the track is positioned at a lower level than the general upper surface level, the track is provided with a depressed configuration which in turn entails that it is possible to receive appliance member or members in the track without necessarily protruding beyond the upper surface of the top element. By making the connection between the roller shutter and the appliance member or members releasable, a greater degree of flexibility is achieved, as an appliance member or appliance members may easily be retrofitted, removed or exchanged.

[0016] The optional feature that said top element includes a top cover, and wherein said external track is formed in the top cover entails a number of advantages in relation to the manufacture and assembly of the roller shutter, and furthermore that the bending and torsional strengths of the top cover are increased. In turn, this means that the material thickness may be reduced while maintaining the same overall strength of the top element, and/or that the need for supplemental reinforcement of the top element is made superfluous. Such supplemental reinforcement is traditionally provided by separate profiles mounted in the top element, and as such separate profiles need not be mounted, the production is made cheaper and easier. It is of course also possible to increase the strength by maintaining the material thickness and supplemental reinforcement.

[0017] The track needs not extend throughout the length of the top element. Thus, in an embodiment, the track has an extension which is less than the length of the top element and/or is composed by a number of track parts located at a mutual distance from each other in the longitudinal direction of the top element.

[0018] The cross-section of the track is preferably selected from the group consisting of U-shape, V-shape, rectangular, square, dovetail-shaped, a rectangular or square main shape with one or more grooves in the sides.

[0019] In order to offer the possibility of having a series of coupled appliance members and optionally facilitate the mounting and the conditions during use, the track may be provided with a coating and/or separate strips, said coating and/or separate strips being preferably electrically conducting or adhesive.

[0020] Preferably, said track provides first engagement means for the releasable connection with the at least one appliance member, and said at least one appliance member is provided with second engagement means that are complementary to the first engagement means of the top element of the roller shutter.

[0021] In principle, such complementary first and second engagement means may take any suitable form, including contact only between mutually facing surfaces of the window component or screening device and the appliance member or members, respectively. The releas-

able connection between the appliance member or members and the window component or screening device may for instance be held in a non-positive engagement, or by positive engagement, possibly supplemented by other engagement means that acts on the appliance member and possibly the window component or screening device. The terms positive and non-positive engagement, respectively, are to be interpreted in their broadest sense. Hence, positive engagement is to be understood as involving releasable connection without the use of other forces for keeping parts together than the forces resulting from the contact between mutually facing surfaces of parts held together by the respective shapes. By non-positive engagement is to be understood that other forces are acting on the parts to hold the parts together. Typically, non-positive engagement involves the use of friction, cooperation between mutually interlocking elements such as VELCRO®, releasable adhesives etc.

[0022] Hence, in case said first and second engagement means are adapted to provide releasable connection by means of positive engagement between the window component and the at least one appliance member, the first and second engagement means may include mutually cooperating parts of a dovetail joint or a tongue-and-groove joint. This is a structurally simple and reliable manner of providing the releasable connection, as the appliance member or members may be slid out of the external track in the longitudinal direction of the window component or screening device.

[0023] Whether or not the engagement is positive or non-positive, the retention may be increased or upheld by supplemental locking means. It is suitable that supplemental locking means are provided in embodiments, in which the tracks have an "open" configuration, i.e. being of U-shape, V-shape, rectangular or square shape, whereas locking means may optionally also be provided also in tracks having a "closed" configuration, i.e. dovetail-shaped tracks or tracks with one or more grooves in the sides.

[0024] Additionally or alternatively, the releasable connection between the top element and the at least one appliance member may comprise a set of protruding and/or upstanding flaps or flanges on either the top element or the appliance member or members to engage releasably with a corresponding accommodating aperture or slit on the other of the appliance member(s) and window component or screening device. In a further development of the above-mentioned preferred embodiment, the upstanding and/or protruding flap(s) or flange(s) may be provided in the external track itself.

[0025] The at least one appliance member may be of any suitable kind, but is preferably selected from the group comprising solar cell panels, photovoltaic elements, power storage elements, such as capacitors or accumulators, members providing lighting, such as LCD and OLED, filling panels, members adapted for carrying information, sign boards, name plates, advertising signs, sensor and transducer elements.

[0026] In principle, the appliance member or members may have any suitable dimensions, as long as they are functional and do not compromise the overall appearance and functionality of the window component or screening device. It is advantageous if the length dimension of each appliance member has a predefined value such that one appliance member may be positioned in the width direction of a small window, two in a slightly wider window, three in a yet wider, and four in the widest windows of a range of windows of a programme.

[0027] Advantageously, the length dimension of each appliance member lies in the range 5 to 50 cm, and the width dimension lies in the range 5 to 15 cm, the dimensions of the appliance member not exceeding the corresponding dimensions of the window component or screening device. The thickness of the appliance members depends on the character of the appliance member, but in general, the thickness is limited to what is feasible in the window component or the screening assembly. Typically, the thickness is below 5 cm, preferably below 2 cm, or even below 1 cm.

[0028] In particular, it is advantageous in the case one appliance member is a solar cell panel having a length dimension in the range 30 to 38 cm, as this makes it possible to configure windows of a standard programme with an optimum number of solar cell panels.

[0029] Another advantageous choice of dimensions in an appliance member is constituted by a rain sensor having a length dimension in the range 5 to 15 cm.

[0030] Preferably, the upper surface of each at least one appliance member is substantially flush with the upper surface of the window component or screening device. In addition to providing an aesthetically attractive appearance of the window or screening assembly, the appliance member or members are protected during storage, transport, installation and use. The term "flush" is to be interpreted as meaning that there is no substantial perception of a level difference between the respective upper surfaces at least from a visual point of view. In this regard, it is noted that such windows and screening assemblies are most often positioned on roofs located a number of metres from ground level; hence, slight level differences may be conceivable while still being perceived as falling within the concept of "flush". The upper surface of the appliance member or members may also be positioned at a slightly lower level than the upper surface of the window component or screening device, and still be virtually unnoticeable within the defined context.

[0031] In a second aspect of the invention, a method for upgrading a window system is provided, comprising the steps of:

- providing a window including a number of components,
- providing at least one track in at least one of said number of components,
- providing a screening assembly including a screening device with at least one track,

providing at least one appliance member,
 receiving at least one appliance member in a track
 of the window component or the screening device in
 a releasable connection, and
 interchanging said at least one appliance member
 between a track of the at least one window compo-
 nent and a track of the screening device.

[0032] In further aspects of the invention, a roller shutter is provided, having a top element defining a length and a longitudinal direction, two side rails extending at right angles to the top element, and a shutter body including a plurality of slats providing the screening, ends of the slats being guided in the side rails, said top element being adapted to be connected with at least one appliance member, the roller shutter being characterized in that said top element includes an external track extending in the longitudinal direction on the outer side of said top element, said track being adapted to receive each said at least one appliance member, that said track has a bottom portion positioned at a level inwards in the direction towards the interior of the top element relative to an upper surface of the top element, and that said track is adapted to receive each at least one appliance member in a releasable connection.

[0033] In a further development, the track in the top cover of the top element of the roller shutter is provided by shaping the top cover in a roll-forming operation. Roll-forming is a well-established manufacturing process, in which a wide variety of profiling may be achieved in a number of materials of varying thickness. In combination with the strength increase provided by the presence of the track, which makes it possible to utilize a lower material thickness, the roll-forming operation is made particularly easy. A continuous track extending throughout the length of the top element is easily formed by roll-forming, substantially without the need for supplemental resources during the manufacture of the top cover itself. Alternative shaping operations are of course conceivable; examples being compression moulding or deep-drawing of one track, or of two or more track parts, each adapted to receive one or more appliance members.

[0034] In a further aspect, a screening assembly comprising a roller shutter, and at least one appliance member is provided.

[0035] In the screening assembly according to this aspect of the invention, the top element includes an external track extending in the longitudinal direction on the outer side of said top element, said track has a bottom portion positioned at a level inwards in the direction towards the interior of the top element relative to an upper surface of the top element, and each at least one appliance member is received in said track in a releasable connection.

[0036] In order to give architects, retailers, and end users optimum flexibility in the choice of appliance members, the screening assembly may be provided in a well-defined delivery state in which the appliance member is a filling panel extending substantially throughout

the length of the top cover of the roller shutter top element. Alternatively, the screening assembly may be provided in a delivery state in which one appliance member is a solar cell panel and another appliance member is a filling panel. This meets the most common demand for appliance members in screening assemblies comprising an electrically operated roller shutter. Solar cell panels renders the wiring much less complicated than roller shutters operated by motors supplied by power from for instance the interior of the building, and also meet the increasing requirements to use of sustainable energy sources.

[0037] Ease of retrofitting of supplemental appliance member or members is achieved in a further development of the above two suggested developments, in which the filling panel is provided with a number of weakening lines, preferably one weakening line extending along the edges of the filling panel parallel to the longitudinal direction, and/or preferably perpendicular to the longitudinal direction at distances corresponding to a predefined size of the appliance member or members.

[0038] In a still further aspect of the invention, a method of manufacturing a screening assembly comprising a roller shutter and at least one appliance member is provided.

[0039] The method comprises the steps of:

providing a top element,
 forming an external track in the longitudinal direction on the outer side of said top element, with a bottom portion positioned at a level inwards in the direction towards the interior of the top element relative to an upper surface of the top element,
 providing two side rails and connecting the side rails to the top element,
 providing a shutter body including a plurality of slats and inserting ends of the slats in the side rails,
 providing at least one appliance member,
 releasably connecting the at least one appliance member with said track such that said appliance member is substantially contained within said track.

[0040] As in the other further aspects of the invention, the provision of the external track entails that operations such as maintenance, retrofitting, removal and exchange of the appliance member or members are made very easy, while at the same time the interior parts of the roller shutter are virtually permanently protected. The fact that the appliance member or members is contained in the track, i.e. without any substantial protrusion beyond the upper surface, is made possible by the provision of the depressed configuration of the track. By making the connection between the roller shutter and the appliance member or members releasable, a greater degree of flexibility is achieved, as an appliance member or appliance members may easily be retrofitted, removed or exchanged.

[0041] In a further development of the method, the step of providing the top element includes the steps of provid-

ing a top cover with said track and providing two end covers for connection to the end cover, and wherein the step of releasably connecting the at least one appliance member is preferably carried out at least partly before the step of connecting at least one of the end covers with the top cover.

[0042] Further details are described, and further advantages stated, in the description of particular embodiments of the invention.

[0043] In the following the invention will be described in further detail by means of examples of embodiments with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a window system in an embodiment of the invention;

Fig. 2 is an exploded perspective view of a window of the window system in an embodiment of the invention;

Fig. 3 is an exploded perspective view of a window of the window system in another embodiment of the invention;

Figs 4 and 5 show exploded perspective views, on a larger scale, of details of the embodiment shown in Fig. 3;

Fig. 6 is a perspective view, on larger scale, of a detail of a window in yet another embodiment of the window system according to the invention;

Fig. 7 is an exploded perspective view, on a still larger scale, of the detail of Fig. 6;

Fig. 8 is a perspective view, on larger scale, of a detail of a window in a still further embodiment of the window system according to the invention;

Fig. 9 is a partly exploded perspective view including the detail shown in Fig. 8;

Fig. 10 is a perspective view, of a window in a yet further embodiment;

Fig. 11 is a perspective view of a screening assembly in an embodiment of the invention;

Fig. 12 is a plan view seen from the above of the screening assembly in the embodiment shown in Fig. 11;

Fig. 13 is a perspective view of a detail of the screening assembly in the embodiment shown in Fig. 11;

Figs 14 to 18 show side views corresponding to Fig. 13 of other embodiments of the roller shutter according to the invention;

Fig. 19 is a perspective view of a detail of the screening assembly in the embodiment shown in Fig. 11;

Figs 20 and 21 are perspective views, from different angles, of a detail of the screening assembly in a further embodiment;

Fig. 22 is a perspective view of a detail of the screening assembly in a still further embodiment;

Figs 23 and 24 are perspective views of details of the screening assembly in a yet further embodiment; and

Fig. 25 is a perspective view of a window in a another embodiment of the window system according to the

invention.

[0044] In the Figures of the drawings, embodiments of a window system according to the invention are shown.

The principle underlying the invention is shown in Fig. 1, in which a window generally designated 2 and a screening assembly generally designated 1 are shown. Furthermore, an appliance member 100 of the window system is shown in three different positions to be described in further detail below: A separate position, a first mounted position in which the appliance member 100 is mounted in a component of the window 2, and a second mounted position in which the appliance member 100 is mounted in the screening assembly 1. Arrow A indicates moving appliance member 100 from the separate position to the first position in which it is mounted in a component of the window (for instance during manufacture) and arrow B indicates moving appliance member 100 from its first position to the second position in which it is mounted in the screening assembly 1 (for instance when after-mounting a screening assembly 1 on the window 2). In the embodiment shown in Fig. 1, the screening assembly 1 comprises a screening device which is in the form of a roller shutter adapted to be mounted on the exterior of the window 2, but other kinds of screening assemblies to be mounted either on the exterior or to the interior of the window 2 are conceivable as well, as long as the appliance member is interchangeable between tracks of the window and the screening assembly as provided for by the invention. The window may be an electrically operated window, in which the opening and closing movement is performed by an electrical actuator powered by solar cell panels. Other functions of the window may be electrically operated as well.

[0045] Details relating to the screening assembly 1 will be described in detail further down with reference to Figs 11 to 24. Details of the window 2 of the window system are described in particular with reference to Figs 2 to 10. Like reference numerals indicate like or analogous elements throughout. The window 2 may for instance be a roof window adapted for installation in an inclined roof. The window 2 includes a number of components of which a frame 3 and a sash 4 are visible in Fig. 11. The sash 4 will most often be openable relative to the frame, viz. hinge connected to the frame 3, as in the embodiment shown, for instance by means of a set of pivot hinges (not shown) positioned close to a central axis of the window to allow the sash 3 to pivot relative to the frame 2, or by a more traditional hinge positioned at the top of the window.

[0046] Further window components include a number of cover elements to protect the frame 3 and sash 4 and the interior of the window 2 in general from penetration of water and other precipitation. The cover elements include a window top cover 2001, a window bottom cover 2002 and window side covers 2003a, 2003b and 2004a, 2004b. Such cover elements are traditionally formed of aluminium profiles that have been roll-formed, deep-

drawn or shaped in any other suitable manner. The window top cover 2001 forms the top casing of the window 2, whereas the window bottom cover 2002 comprises the bottom sash and frame coverings or claddings. The window side covers include frame striking bead coverings or claddings 2003a and 2004a, and sash striking bead coverings or claddings 2003b and 2004b. The cladding at each side of the window is a two-part cladding, as the window in the embodiment shown is a pivot window, i.e. in which the upper part of the sash moves inwards of the plane defined by the frame and the lower part of the sash outwards. In turn, this means that one part of the cladding (i.e. side cover 2003a) must be fastened to the frame 3, and another part of the cladding (i.e. side cover 2003b) fastened to the sash. The particular design of the pivot hinge shown in for instance EP 1 038 083 B1, incorporated herein by reference, allows the two cladding parts to be moved out of engagement with each other by the almost transitional respective movement of these parts at the beginning of the opening operation. Had the window instead been top-hung (or bottom-hung or side-hung), the cladding at each side of the window could have been formed by a single element.

[0047] Other components of a window system according to the invention may include flashing elements, not shown, forming the transition between the cover elements of the window and the surrounding roofing.

[0048] In the embodiment shown, a track 2123 is formed in the top cover 2001, and a track 2223 in the bottom cover 2002. Appliance members 100 and 120 are shown in the exploded view, and arrows C and D indicate their positioning into the tracks 2123 and 2223, respectively, of the respective one of the top cover 2001 and bottom cover 2002. Conceivable designs of the tracks are described in detail in connection with the description of the track in the screening assembly, viz. with particular reference to Figs 13 to 18. The tracks 2123 and 2223 may be identical to each other or differ on some points.

[0049] Correspondingly, the window bottom cover 2002 defines a length and a first longitudinal direction corresponding to the width direction of the window. The track 2223 of the window bottom cover 2002 extends externally in the longitudinal direction.

[0050] In the embodiment of Fig. 2, the external longitudinal tracks 2123 and 2223 are provided integrally in the top cover 2001 and bottom cover 2002, i.e. the top cover 2001 and bottom cover 2002 are formed in substantially one piece. In the embodiment shown in Figs 3 to 5, the top cover and bottom cover is each formed of substantially two parts, of which the track is provided in a separate element.

[0051] At the top of the window, the external longitudinal track 2123 is provided in separate adapter element 2101 of the window top cover 2001. The separate adapter element 2101 is intended to be mounted on a basis element 2100, which may for instance be the top casing of a traditional window. The adapter element 2101 may be formed as an extruded profile of the same material as

the top casing and comprises flange portions 2102 and 2103 for engagement with corresponding parts of the basis element 2100. Opposite projecting portions 2105 and 2106 are formed at a distance from the bottom portion 2104, thus forming the track 2123. Again, conceivable shapes and functions of the track, and its engagement with the appliance member or members will be described in further detail below. An end cover 2110 covers the ends of the basis element 2100 and the adapter element 2101, and a similar (not shown) end cover is provided at the longitudinally other end of the top cover 2001. Thus, the fact that the top cover 2001 is in fact made up by two parts will be virtually unnoticeable from the outside when the window is in its installed condition. In Fig. 3, a basis element 2100 is shown already mounted on the window, examples of appliance members being shown (corresponding to those of the embodiment of Fig. 6).

[0052] In a corresponding manner, the external longitudinal track 2223 in the bottom cover 2002 is provided in a separate adapter element 2201 to be connected to a basis element 2200. To this end, the adapter element 2201 has fastening holes 2202 for the reception of suitable fastening means such as screws.

[0053] The number of appliance members in one track may vary, just as the track may be formed by a number of separate track portions. Thus, in the embodiment shown in Fig. 2, two appliance members are mounted in each of track 2123 in the top cover 2001 and track 2223 in bottom cover 2002, respectively. Of these two appliance member one is a solar cell panel 100 and the other a filling panel 120. In the embodiment of Figs 3 to 5, two appliance members are present in the track 2123 of the top cover 2001 and one appliance member 100 in the track 2223 of the bottom cover 2002.

[0054] The dimensions of the appliance members may vary according to the particular function and of the size of the window in which they are to be used. In particular, the length dimension of each appliance member lies in the range 5 to 50 cm, and the width dimension lies in the range 5 to 15 cm, the dimensions of the appliance member not exceeding the corresponding dimensions of the window component or screening device. The thickness of the appliance members depends on the character of the appliance member, but in general, the thickness is limited to what is feasible in the window component or the screening assembly. Typically, the thickness is below 5 cm, preferably below 2 cm, or even below 1 cm. In the embodiment shown, the window top cover 2001 defines a length and a first longitudinal direction corresponding to a width direction of the window. The track 2123 of the window top cover 2001 thus extends externally and in the longitudinal direction. The dimensions of the track are to a large extent limited by the overall dimensions of the window component or the screening device of the screening assembly. Typically, the length and width of the track may thus lie in similar ranges as those of the appliance members. As one or more appliance members may be placed in one track. The size range of the depth

of the track is also substantially the same as for the appliance members; however, in some applications, the track may have an extra space below the appliance member or members to allow for wiring or other elements. In particular in the case of solar cell panels it is most important to have as large an exposable area as possible, i.e. the length and the width should be maximised, whereas the thickness of the solar cell panels may be made very small, for instance 1 cm or below.

[0055] It is advantageous if the length dimension of each appliance member has a predefined value such that one appliance member may be positioned in the width direction of a small window, two in a slightly wider window, three in a yet wider, and four in the widest windows of a range of windows of a programme. In practice, if an appliance member in the form of a solar cell panel 100 has a length of 30 to 38 cm, then one solar cell panel may be mounted in windows having a width of for instance 45 and 55 cm (and of course in larger windows, such as window having a width of 66, 78, 94, 114, or 134 cm); two solar cells in windows having a width of 66 (only applicable to the lower values of the range) and 78 cm; three in windows having a width of 94 (only applicable to the lower values of the range) and 114 cm; and four in windows having the largest width, 134 cm.

[0056] In the embodiments of Fig. 2 and Figs 3-5, the upper surface of each at least one appliance member is substantially flush with the upper surface of the window component, and there are only one or two appliance member(s) in each component/screening device.

[0057] In the embodiment of Figs 6 and 7, three appliance members 100, 110 and 120 are present in the window top cover 2001. The top cover 2001 may be designed in a manner corresponding to that described in connection with Fig. 5, viz. with a separate adapter element 2101 in which the track 2123 is provided mounted on a basis element 2100, the ends being closed by end covers 2110 (only one end cover shown). In principle, the appliance members may be selected from the group comprising solar cell panels, photovoltaic elements, power storage elements, such as capacitors or accumulators, members providing lighting, such as LCD and OLED, filling panels, members adapted for carrying information, sign boards, name plates, advertising signs, sensor and transducer elements, and in the embodiment shown, they include a solar cell panel 100, a rain sensor 110 and a filling panel 120. As mentioned in the above, the appliance members may have predefined dimensions. The width of each appliance member corresponds in substance to the width of the track, and lies in the interval 5 to 15 cm. It is in particular advantageous if the length of the solar cell panel 100 lies in the range 30 to 38 cm. The filling panel 120 may have a similar length, such that for instance a further solar cell panel may be engaged with the track of the window top cover 2100. This further solar cell panel may either be an additional solar cell panel, or a solar cell panel which is interchanged from another window component or a screening assembly. Conversely, each of the

appliance members of the window may, according to the principle underlying the invention, be interchanged into another component of the window or to a screening assembly. In the embodiment of Figs 8 and 9, three appliance members are also provided in the component of the window constituted by the top cover 2001. However, in this document the two appliance members, solar cell panel 100 and filling panel 120, are positioned in the track 2123 such that they are substantially flush with the upper surface, whereas rain sensor 110 is positioned in a protruding position.

[0058] Other aspects of the track of the window components, among others the form and shape of the track, number and position of track parts, engagement options with the appliance member etc. will be described in further detail with reference to the screening assembly.

[0059] Details relating to the particular appliance members will also be described in additional detail in the following.

[0060] In Figs 11 to 24 of the drawings, embodiments of a screening assembly according to the invention are shown. The screening assembly is generally designated 1 and comprises a screening device, which in the embodiment shown is in the form of a roller shutter 10 and at least one appliance member 100. The screening device may also take other forms, such as for instance other external screening devices, for instance awning blinds, or internal screening devices such as Venetian blinds, pleated blinds or roller blinds. The appliance member or appliance members, of which one appliance member 100 is shown in Fig. 11, are releasably connected to a top element 12 of the roller shutter 10. In addition to the top element 12, the roller shutter 10 has two side rails 13 and 14 extending at right angles to the top element 12, two mounting rails 15 and 16 extending in parallel with and below a respective side rail 13, 14, and a transverse element 17 extending between the ends of the mounting rails 15 and 16 opposite the ends at the top element 12. A shutter body 18 includes a plurality of slats 18a providing the screening, and the ends of the slats 18a are guided in the side rails 13 and 14. The invention is applicable to screening assemblies comprising screening devices having similar configuration to the shown and described roller shutter, and is applicable to other types of screening devices in the same category as the roller shutter, i.e. exterior screening devices positioned on top of for instance a roof window and having a screening body to be rolled out from the top element as well, such as for instance an awning blind.

[0061] The roller shutter 10 is intended to be mounted on the exterior of the window 2, for instance a roof window adapted for installation in an inclined roof. The window comprises in a manner known per se a frame 3 and a sash 4 encasing a pane 5. The sash 4 will most often be openable relative to the frame, viz. hinge connected to the frame 3, as in the embodiment shown, for instance by means of a set of pivot hinges (not shown) positioned close to a central axis of the window to allow the sash 3

to pivot relative to the frame 2, or by a more traditional hinge positioned at the top of the window. The roller shutter may be mounted on the window frame or on sash. In the embodiment shown, the roller shutter 10 is mounted on the frame 3 in that the mounting rails 15 and 16 are fastened to a respective side piece of the frame 3. The side rails 13 and 14 are connected to the sash 4 such that the side rails 13 and 14, and consequently the shutter body 18 and slats 18a, follow the tilting movement of the sash 4.

[0062] The aperture to be screened is defined by the area limited by the top element 12, the side rails 13, 14, and the bottom of the window, that is the bottom piece of the frame or sash of the window. This aperture thus corresponds in substance to the pane. In order to attain the desired screening, the shutter body 18 is adapted to be moved from a non-screening position to a screening position, in which it covers the pane and other parts of the window to a larger or lesser degree. The shutter body 18 is adapted to be wound up in and rolled out from the top element 12 by means of a driving device, not shown, in a direction perpendicular to said longitudinal direction to a screening position. Examples of driving devices in roller shutters and examples of tiltable slats are disclosed in Applicant's co-pending international applications published under Nos WO2009/143842 and WO2009/143853, the contents of which are incorporated herein by reference.

[0063] The top element 12 is adapted to be positioned at the top of the window in the mounted position, i.e. at the top piece of the frame and the sash of the window, and comprises in the embodiment shown a top cover 21 and two outer end covers, of which the right-hand end cover 22 is visible in Fig. 11. The top element 12 defines a longitudinal direction in parallel with the top piece of the frame and sash of the window. Hence, this longitudinal direction is parallel to the longitudinal direction of the slats and perpendicular to the direction, in which the shutter body moves when rolling up and out the shutter body.

[0064] Referring now to Figs 12, 13, and 19, the parts of the top element 12 will be described in further detail.

[0065] As shown most clearly in Fig. 13, a track 23 is provided in the top element 12. In the embodiment shown, the track 23 is a continuous track having a substantially dovetail-shaped cross-sectional configuration as will be described in further detail below. The track 23 is, in the embodiment shown, provided in the top cover 21. During manufacturing of the screening assembly, the appliance members 100 and 120 are positioned in the track 23 by introducing them from one of the ends of the top cover 21 of the top element 12.

[0066] The top element 12 as such, and consequently the top cover 21 and outer end covers 22, serve to hide and protect the inner parts of the roller shutter 10, such as for instance the drive mechanisms for the rolling up and unrolling of the shutter body 18 and other mechanisms, for instance mechanisms as described in any of

Applicant's above-mentioned international applications. Terms such as "left-hand" and "right-hand" refer to the orientation shown in for instance Fig. 11 and are utilized for reasons of convenience only. The top cover 21 is at each of its longitudinal ends connected to an end element 20, cf. Fig. 19, which in the position of use of the screening assembly 1 is covered by the end cover 22. The end element 20 is to that end provided with a plurality of abutment surfaces of which three abutment surfaces 201, 202 and 205 are indicated in Fig. 19. The track 23 of the top element 12, which in the embodiment shown is provided in the top cover 21, is received in the space provided substantially between abutment surfaces 202 and 205. In this area, there is a further abutment surface 203 on which an upstanding pin 204 is formed. The pin 204 cooperates (in a manner not shown) with a corresponding aperture (not shown) in the top cover 21. Other configurations of the top element 12 are of course conceivable; for instance, the top element could be designed as moulded element including all of cover parts, or manufactured in another manner, just as the track in the top element could be formed in any suitable manner.

[0067] The description of the formation of the track and engagement means in all of the embodiments relating to the top element 12 of the screening device 10 relates equally to the formation of the track in the window components.

[0068] Alternative embodiments of the top cover of the top element 12 will be described with reference to Figs 14 to 18.

[0069] The releasable connection between the appliance member 100, or other appliance members, and the top element 12 of the roller shutter 10 will be described with particular reference to Figs 20 to 24.

[0070] As mentioned in the above description of Fig. 11, the screening assembly 1 comprises the roller shutter 10 with its top element 12 defining a longitudinal direction x-x, and at least one appliance member, in the embodiment shown one appliance member 100. The appliance member 100 is releasably connected with the top element 12 of the roller shutter in any suitable manner, examples of which will be described below. The top cover 21 of the top element 12 includes an external track 23 extending in the longitudinal direction x-x on the outer side of the top cover 21. The track 23 is adapted to receive each appliance member and provides first engagement means for the releasable connection with the appliance member 100 and other appliance members. As is apparent, the track is positioned externally, the interior parts of the roller shutter are at no time exposed during the above-mentioned operations, and the interior parts thus remain protected by the top cover, which thus provides a substantially unaffected surface. Notwithstanding the need to protect and hide the interior parts, slight or non-substantial openings may be provided in the track. An upper surface 21a of the top cover 21 of the top element 12 of the roller shutter 10 is slightly curved with a predefined radius of curvature. Alternatively, the upper surface

may be substantially plane, thus giving the top cover a more L-shaped profile. The top cover 21 may be formed in any suitable manner but in the embodiment shown, the top cover is shaped in a roll-forming operation.

[0071] The first engagement means for the releasable connection with the appliance member 100 are in the embodiment shown in Fig. 13 provided in the form of the shape of the track 23. The track 23 has a bottom portion 24 positioned at a lower level, i.e. at a level displayed inwards in the direction towards the interior of the top element 12, than the upper surface 21a of the top cover 21 of the top element 12 of the roller shutter 10. From the bottom portion 24, the track 23 is narrowed at each longitudinal side edge and ends in two opposite projecting portions 25 and 26, such that the distance between the opposite projecting portions 25 and 26 is smaller than the width of the bottom portion 24 in a direction perpendicular to the longitudinal direction of the track 24. In this manner, a joint slightly resembling a dovetail joint is formed, having abutment surface portions 27 and 28, respectively, formed below the opposite projecting portions 25 and 26.

[0072] In its simplest form, the second engagement means are provided by giving the appliance member a shape complementary to the first engagement means of the top element top cover of the roller shutter. In the embodiment of the track 23 shown in Fig. 13, this could for instance be provided by any of the versions of the appliance members shown in Figs 20 to 24.

[0073] In Figs 20 and 21, an appliance member 110 in the form of a rain sensor is shown. On each longitudinal side 110a and 110b, the appliance member 110 has second engagement means 111, 112 for cooperation with the first engagement means of the track 23. The second engagement means on the one longitudinal side 110a is in the form of one or more, here three, protruding flaps 111 which, in the mounted position abut either of the abutment surface portions 27, 28, depending on the orientation of the rain sensor 110 in the track 23. On the other longitudinal side 110b, the second engagement means take the form of two curved strips 112 having a slight resilient or springy action. This means that the strips 112 act in two manners: One in positive engagement with the other of the abutment surface portions 28, 27 of the track 23, and one resilient contact with the wall portion of the track 23 between the bottom portion 24 and the abutment surface portion 28. That is, by means of the strips 112, retention of the rain sensor 110 in the track 23 is increased. The presence of the springy strips 112 makes it furthermore possible to mount the rain sensor 110 in the track 23 in two manners: Either by inserting the rain sensor 110 into the track 23 in the longitudinal direction from one end thereof, or by positioning the longitudinal side 110 with its protruding flaps 111 below one of the opposite projecting portions 25 or 26, and then pivot the rain sensor 110 while simultaneously pressing the strips 112 inwards towards the longitudinal side 110b of the rain sensor 110 until the strips 112 are positioned below

the other of the opposite projecting portions 26 or 25, following which the strips 112 automatically resume their relaxed condition shown in Fig. 21. The upper surface 113a of the rain sensor 110 may be substantially plane or have a curvature corresponding to that of the upper surface 21a of the top cover 21 of the top element 12 of the roller shutter 10. In the mounted position of the screening assembly, the rain sensor 110 is kept in the track 23 partly by the mutually cooperation of the engagement means as described in the above, but is also held in non-positive engagement with the wall portions of the track by the friction between the engagement means 111, 112 and the wall portions. This means that for instance a rectangular track shape as indicated in Fig. 14 may be used.

[0074] In Fig. 22, the appliance member 100 shown in Figs 11 and 12 is shown. This appliance member is a solar cell panel 100 and is provided as a unit comprising a casing 101 and the actual solar cell panel elements 102. The casing 101 has second engagement means corresponding to those of the rain sensor 110 shown in Figs 10 and 11, of which a number of flaps 103 are shown. The upper surface 101a of the casing 101 may be flat or plane, or have a curvature resembling that of the upper surface 21a of the top cover 21 of the top element 12 of the roller shutter 10, whereas the upper surface of the solar cell panel elements 102 may be plane.

[0075] In Fig. 23, the appliance member is a filling panel 120 having a profiling with an upper surface 121a having a curvature similar to that of the upper surface 21a of the top cover 21 of the top element 12 of the roller shutter 10. Longitudinally extending flanges 122, 123 protrude from depending wall portions 124, 125 of the filling panel 120, the flanges 122, 123 forming the second engagement means cooperating with the abutment surface portions 27 and 28 of the track 23.

[0076] Fig. 24 shows an example of a mounted position of the filling panel 120 in the track 23. This position is representative of all appliance members positioned in the track of the top element in the embodiments in which the upper surface of each appliance member is flush with the upper surface of the top element of the roller shutter. As described, the term "flush" is to be interpreted within the defined context as allowing for slight variations in the respective levels of the top element and the appliance member, as long as a viewer does not conceive any conspicuous difference.

[0077] Other examples of positive engagement are possible with the embodiments of Figs 15 and 16, in which the first engagement means of the tracks 523 and 623 of the top covers 521 and 621 are formed as one part of a dovetail joint or a tongue-and-groove joint, respectively.

[0078] Other cross-sectional shapes of the track are possible, cf. the rectangular track 423 of the top cover 421 of Fig. 14 and the U-shaped track 723 of the top cover 721 of Fig. 17. These tracks do not allow for positive engagement, at least not without modification, but require

non-positive engagement means such as for instance friction (rectangular track 423), VELCRO®, releasable adhesives, magnets etc. In case of the rectangular track 423, it may be possible to retain the engagement by the use of second engagement means as described in connection with the embodiment of Figs 20 and 21.

[0079] Additional or alternative forms of releasable connection between the top element and the at least one appliance member other than the shown external track are of course conceivable. For instance, the releasable connection may be provided by a set of protruding and/or upstanding flaps or flanges on either the top element or the appliance member or members to engage releasably with a corresponding accommodating aperture or slit on the other of the appliance member(s) and top element. Furthermore, such releasable connection in the form of one or more protruding flaps or flanges to engage with an aperture or slit may be combined with the track of the embodiments shown and described, such that the upstanding and/or protruding flap(s) or flange(s) is/are provided in the longitudinally extending track itself.

[0080] Referring now to Fig. 18, the track 823 of the top cover 821 may be provided with an electrically conducting coating and/or separate strips 824 and 825 as indicated.

[0081] In the case of electrically conducting coatings and/or strips, it is particularly advantageous that the coating or separate strips are positioned as shown, namely on surfaces of the track facing downwards. Any moisture that might intrude below the appliance member or members mounted in the track is thus not able to reach the coating or separate strips, or at least it is rendered more difficult for moisture getting into contact with the coating or separate strips. The appliance member or members would in that case be provided with corresponding electrical wiring. Other forms of electrical conductors are conceivable as well, for instance conductors extending transversely to the track of the top element. The appliance member or members would then be provided with for instance carbon contacts to cooperate with the conductor of the top element. The wiring may for instance be provided in the track itself. This presupposes that the track is formed to accommodate the wiring, for instance by being deeper than strictly necessary to receive the appliance member itself.

[0082] Other examples of appliance members are solar cell panels, photovoltaic elements, power storage elements, such as capacitors or accumulators, members providing lighting, such as LCD and OLED, filling panels, screening devices, members adapted for carrying information, sign boards, name plates, advertising signs, sensor and transducer elements.

[0083] In addition to the use of electrically conducting coatings and/or strips, coatings or strips that are adhesive may also be utilized in the track. Such adhesive may for instance be ethylene vinyl acetate (EVA) due to its low-temperature toughness, stress-crack resistance, hot-melt adhesive water proof properties, resistance to

UV radiation, and heat-conducting properties. The latter property is particularly advantageous in connection with the use of solar cell panels or other heat-generating appliance members, as the generated heat may then easily be transferred to other parts of the top element and the roller shutter as such to prevent local overheating.

[0084] In a not-shown embodiment, the screening assembly may be provided in a well-defined delivery state in which the appliance member is a filling panel extending substantially throughout the length of the top cover of the roller shutter top element.

[0085] Alternatively, the screening assembly may, for instance as shown in Fig. 12, be provided in a delivery state in which one appliance member is a solar cell panel 100 and another appliance member is a filling panel 120. This meets the most common demand for appliance members in screening assemblies comprising an electrically operated roller shutter. Solar cell panels renders the wiring much less complicated than roller shutters operated by motors supplied by power from for instance the interior of the building, and also meet the increasing requirements to use of sustainable energy sources.

[0086] Such solar cell panels may be used for supplying power to various units, one of which is the above-mentioned direct supply of an electrically operated roller shutter. Appliance members such as a further solar cell panel may be connected to the track of the roller shutter as well, for instance for supplying power to a chargeable battery located within the top element of the roller shutter and acting as a back-up power supply to the electrically operated roller shutter during extended periods of overcast or rainy weather.

[0087] It is conceivable to provide an entire kit of appliance members for use with a screening assembly in any of the above-mentioned two delivery states. This is particularly the case if it is desirable to upgrade a manually operated roller shutter to an electrically operated roller shutter. The kit may comprise a solar cell panel (or an additional solar cell panel, as the case may be) and a rain sensor.

[0088] As indicated in Figs 12 and 23 the filling panel 120 is provided with a number of weakening lines 126 and 127, perpendicular to the longitudinal direction x-x at distances corresponding to a predefined size of the appliance member or members. Depending on the releasable connection chosen, weakening lines extending along the edges of the filling panel parallel to the longitudinal direction are conceivable as well.

[0089] Eventually, referring to Fig. 25 a further embodiment of the window system according to the invention is shown. As in the above, the window system comprises a window 2 having a window component in the form of a top casing 2001, in which an appliance member 100 is releasably attached in a track (not shown in detail). The window system furthermore comprises an internal screening assembly comprising a screening device 11, for instance in the form of an electrically operated blind, having a bottom element 11a, to which a screening body

11b is fastened at an end edge. The opposite end edge of the screening body 11b is fastened to a top element 11c which may either be mounted stationarily at the top of the window frame or sash, or be movable manually. In the bottom element 11a of the internal screening device 11, an appliance member 100 is releasably mounted in a track. The appliance member 100 of the internal screening device 11 may typically be a solar cell panel providing the power to operate the blind. As in the above embodiments, the appliance member 100 of the internal screening device 11 is interchangeable with appliance members of other parts of the window system, i.e. components of the window itself, with an external screening assembly, or with another internal screening assembly.

[0090] The invention should not be regarded as being limited to the embodiments shown in the drawings and described in the above. Various modifications and combinations may be carried out within the scope of the appended claims.

Claims

1. A window system comprising:

a window (2) including a number of components, a screening assembly (1) including a screening device (10), and at least one appliance member (100), wherein at least one of said number of components of the window includes at least one track, and said screening device being provided with at least one track, and wherein said at least one appliance member (100) is interchangeable between a track of the at least one window component and a track of the screening device (10), each at least one appliance member being received in a track of the window component or the screening device in a releasable connection.

2. A window system according to claim 1, wherein the window component including at least one track is a cover element selected from the group comprising: window top cover, window bottom cover, and window side cover.

3. A window system according to claim 2, wherein the window top cover defines a length and a first longitudinal direction corresponding to a width direction of the window, and wherein the window top cover is provided with an external longitudinal track.

4. A window system according to claim 3, wherein the external longitudinal track is provided in a separate adapter element of the window top cover.

5. A window system according to claim 2, wherein the

window bottom cover defines a length and a first longitudinal direction corresponding to a width direction of the window, and wherein the window bottom cover is provided with an external longitudinal track.

6. A window system according to claim 5, wherein the external longitudinal track is provided in a separate adapter element of the window bottom cover.

7. A window system according to any one of the preceding claims, wherein the screening device comprises a roller shutter (10) having a top element (12) defining a length and a longitudinal direction, two side rails (13, 14) extending at right angles to the top element (12), and a shutter body (18) including a plurality of slats (18a) providing the screening, ends of the slats (18a) being guided in the side rails (13, 14), said top element (12) being adapted to be connected with at least one appliance member (100, 110; 120), and wherein said top element includes an external track (23; 423; 523; 623; 723; 823) extending in the longitudinal direction on the outer side of said top element, said track being adapted to receive each said at least one appliance member, that said track (23) has a bottom portion (24) positioned at a level inwards in the direction towards the interior of the top element (12) relative to an upper surface (21a) of the top element (12), said top element (12) preferably including a top cover (21; 421; 521; 621; 721; 821), and said external track (23; 423; 523; 623; 723; 823) being preferably formed in the top cover.

8. A window system according to claim 7, wherein each track has an extension which is less than the length of the corresponding window component or screening device and/or is composed by a number of track parts located at a mutual distance from each other in a longitudinal direction of the component or screening device.

9. A window system according to any one of the preceding claims, wherein said track provides first engagement means for the releasable connection with the at least one appliance member, and said at least one appliance member is provided with second engagement means that are complementary to the first engagement means of the window component or screening device.

10. A window system according to claim 9, wherein said first and second engagement means are adapted to provide releasable connection by means of positive engagement between the window component or screening device and the at least one appliance member, preferably by that the first and second engagement means include mutually cooperating parts of a dovetail joint or a tongue-and-groove joint.

11. A window system according to claim 10, wherein said first and second engagement means are adapted to provide releasable connection by means of non-positive engagement. 5
12. A window system according to any one of the preceding claims, wherein supplemental locking means are provided.
13. A window system according to any one of the preceding claims, wherein the releasable connection between the window component or screening device and the at least one appliance member comprises a set of protruding and/or upstanding flaps or flanges on either the window component or screening device, or the appliance member or members to engage releasably with a corresponding accommodating aperture or slit on the other of the appliance member(s) and window component or screening device, preferably by that the upstanding and/or protruding flap(s) or flange(s) is/are provided in the track itself. 10 15 20
14. A window system according to any one of the preceding claims, wherein the at least one appliance member is selected from the group comprising solar cell panels, photovoltaic elements, power storage elements, such as capacitors or accumulators, members providing lighting, such as LCD and OLED, filling panels, members adapted for carrying information, sign boards, name plates, advertising signs, sensor and transducer elements. 25 30
15. A window system according to any one of the preceding claims, wherein the upper surface of each at least one appliance member is substantially flush with the upper surface of the window component or screening device. 35
16. A method for upgrading a window system, comprising the steps of: 40
- providing a window including a number of components,
- providing at least one track in at least one of said number of components, 45
- providing a screening assembly including a screening device with at least one track,
- providing at least one appliance member,
- receiving at least one appliance member in a track of the window component or the screening device in a releasable connection, and 50
- interchanging said at least one appliance member between a track of the at least one window component and a track of the screening device. 55

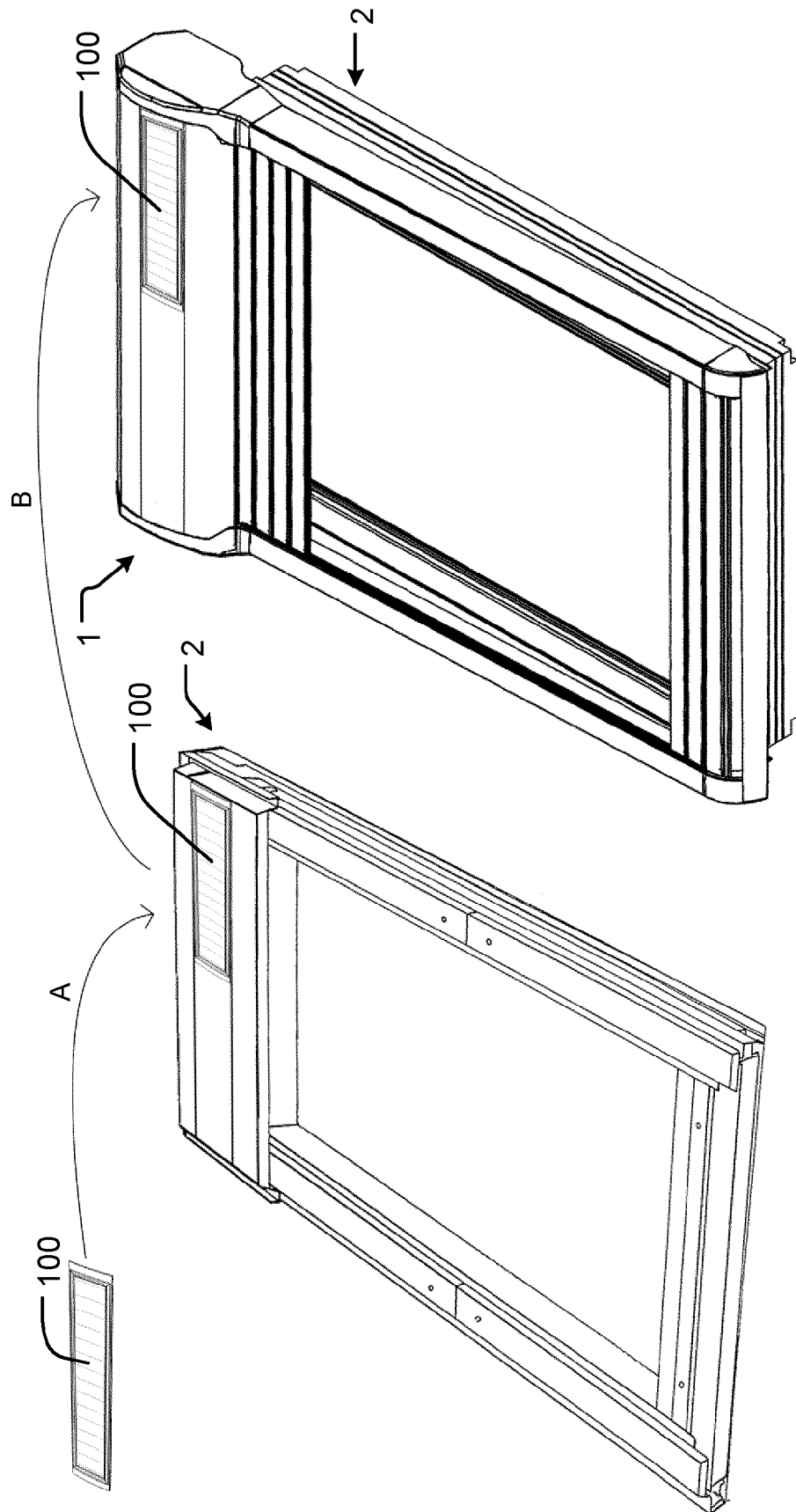


Fig. 1

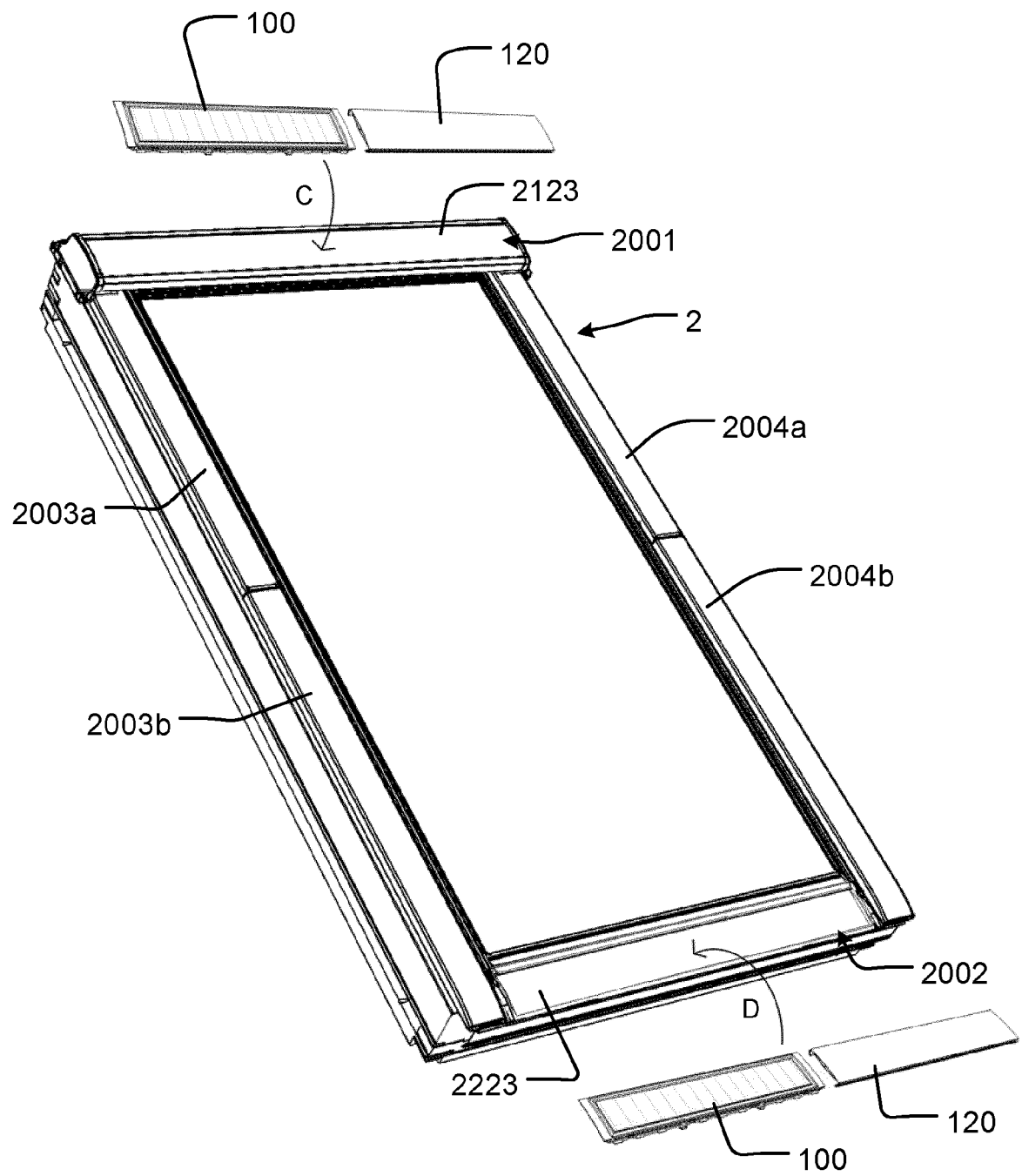


Fig. 2

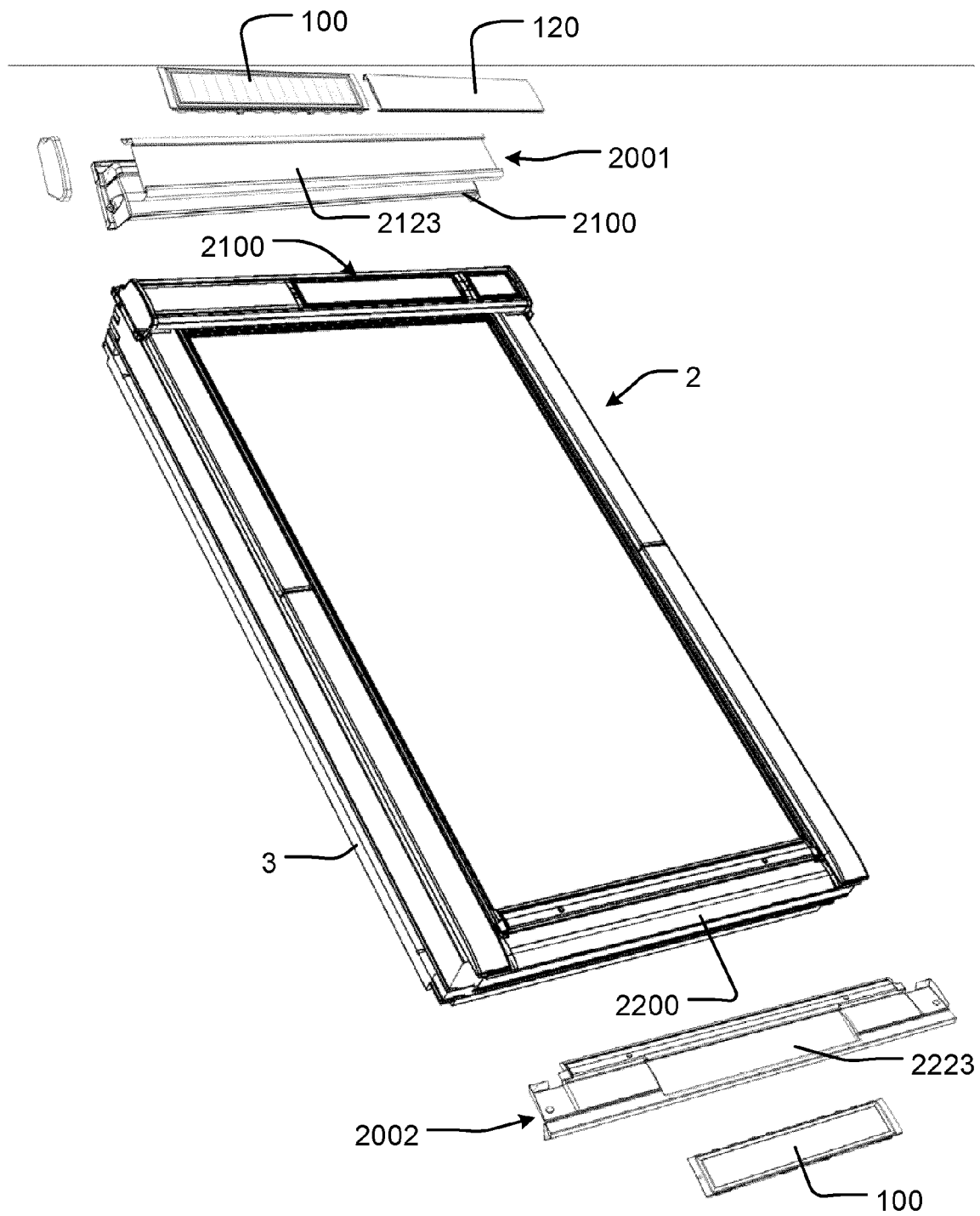


Fig. 3

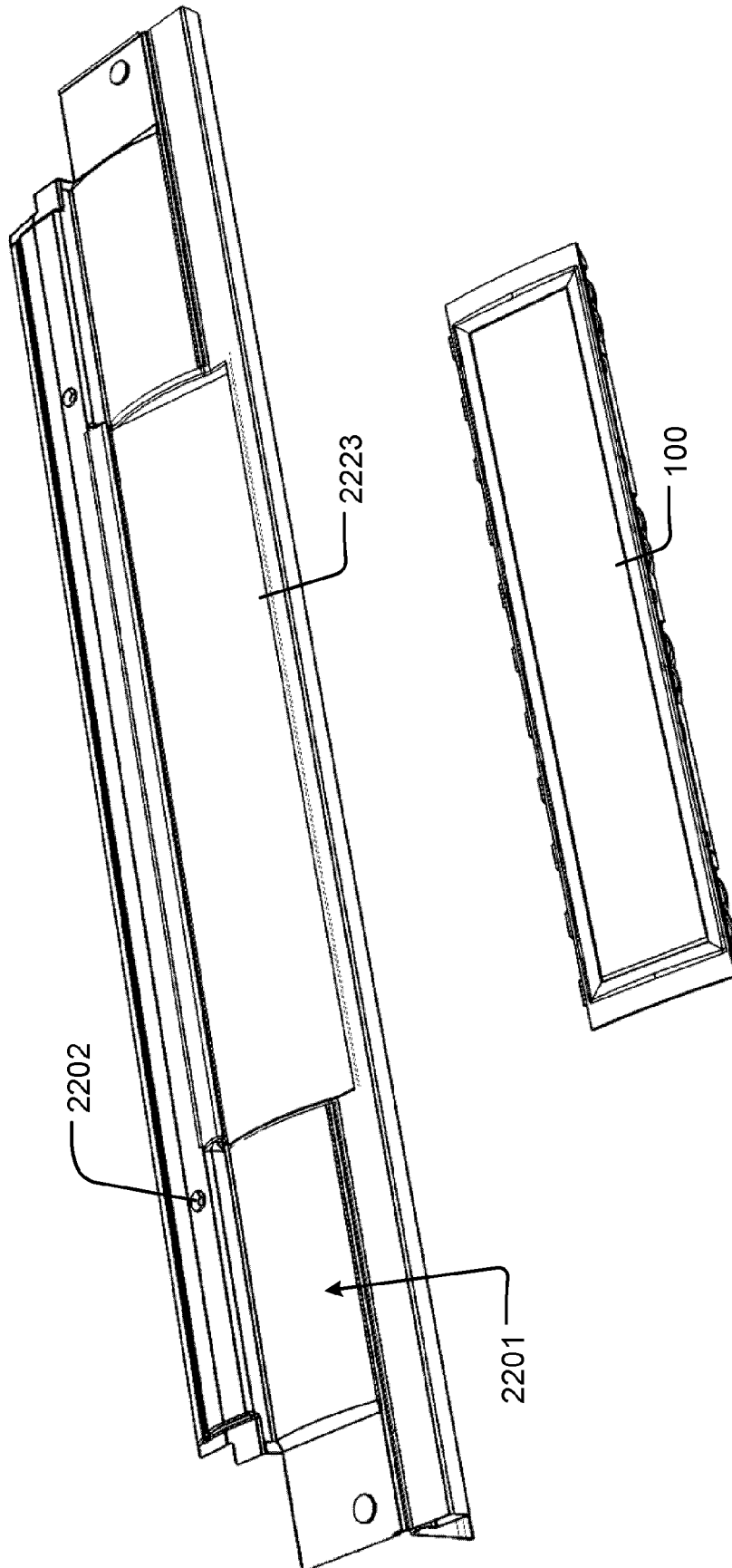


Fig. 4

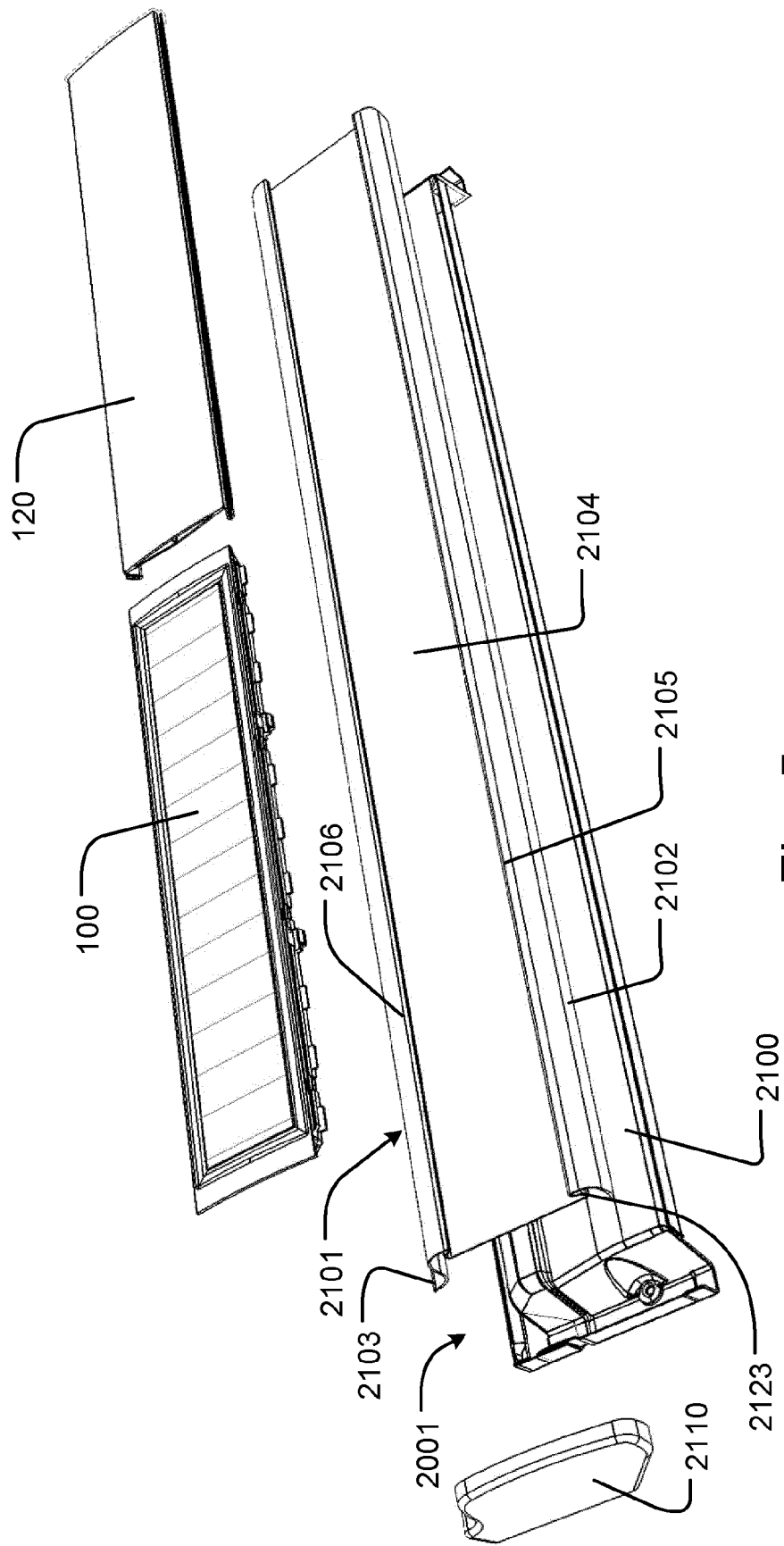


Fig. 5

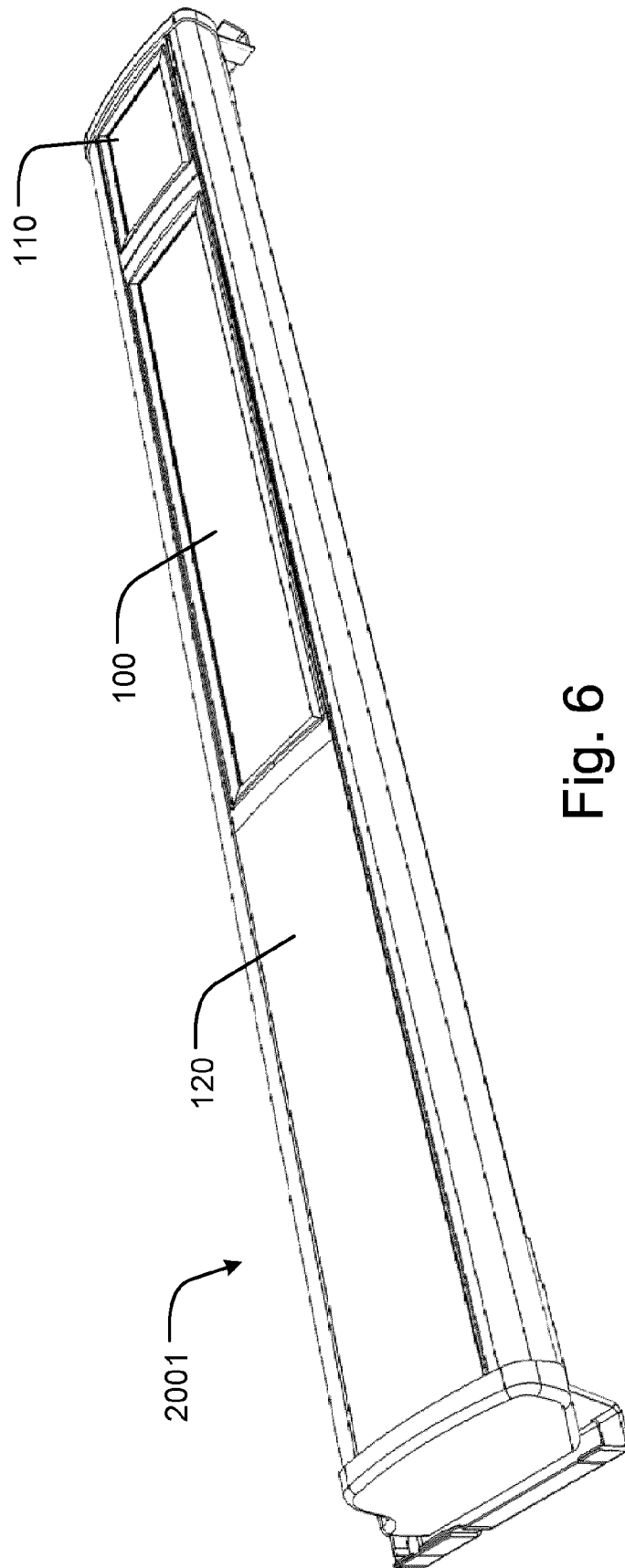


Fig. 6

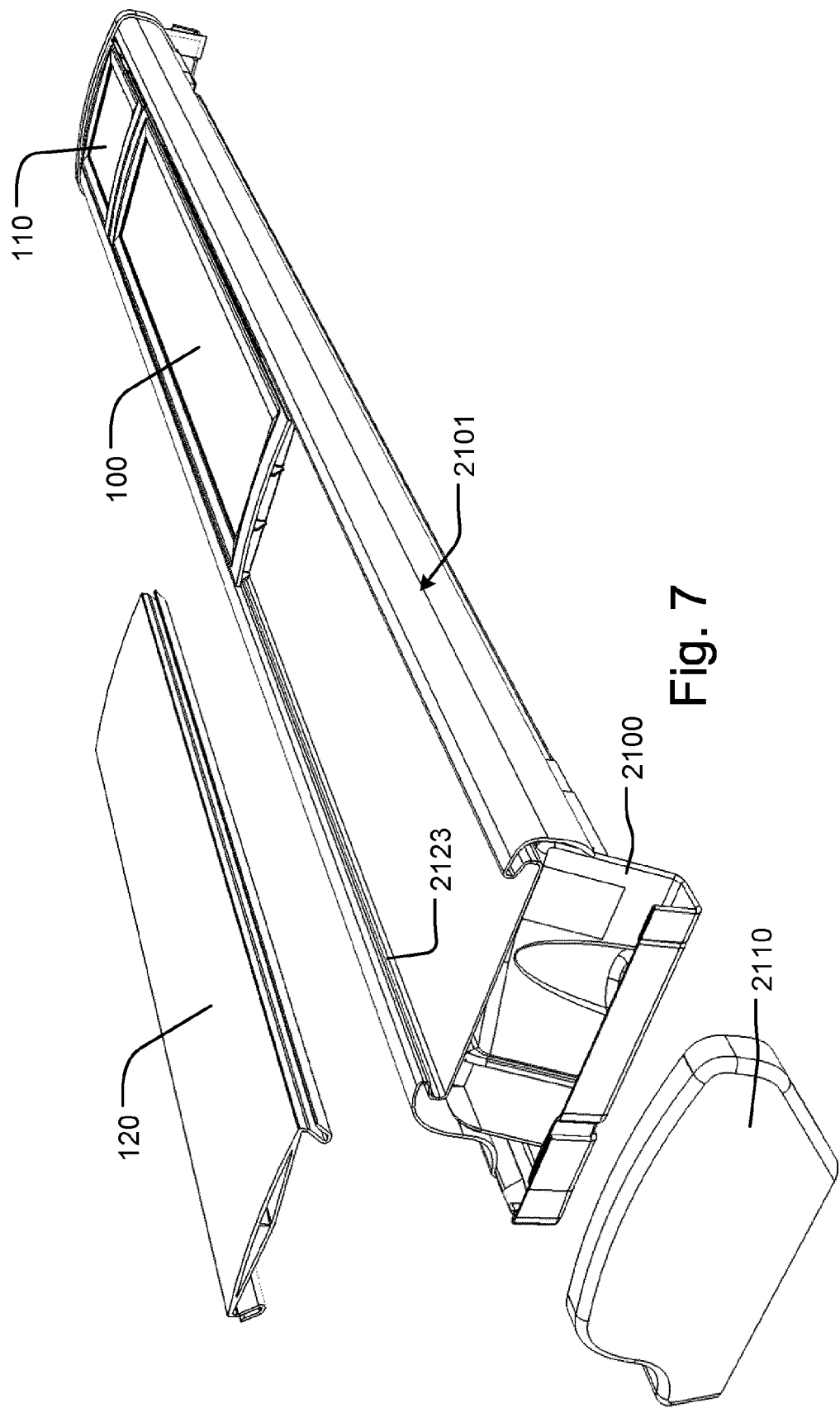


Fig. 7

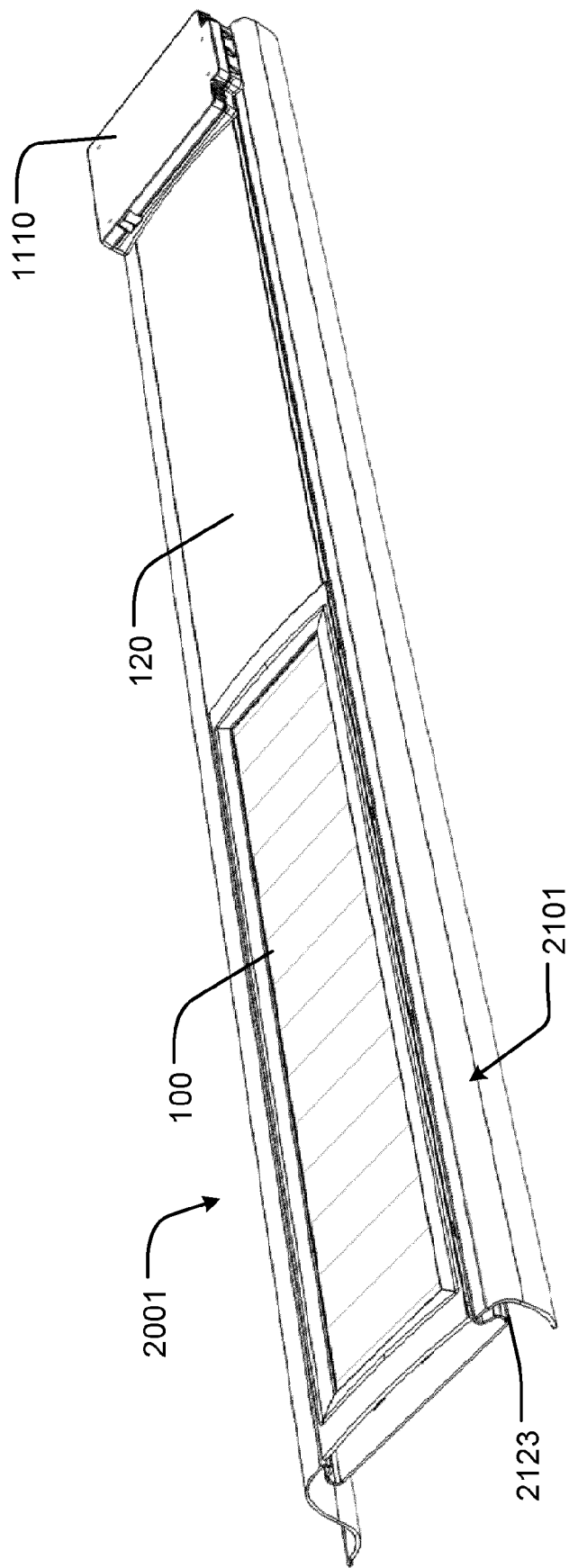


Fig. 8

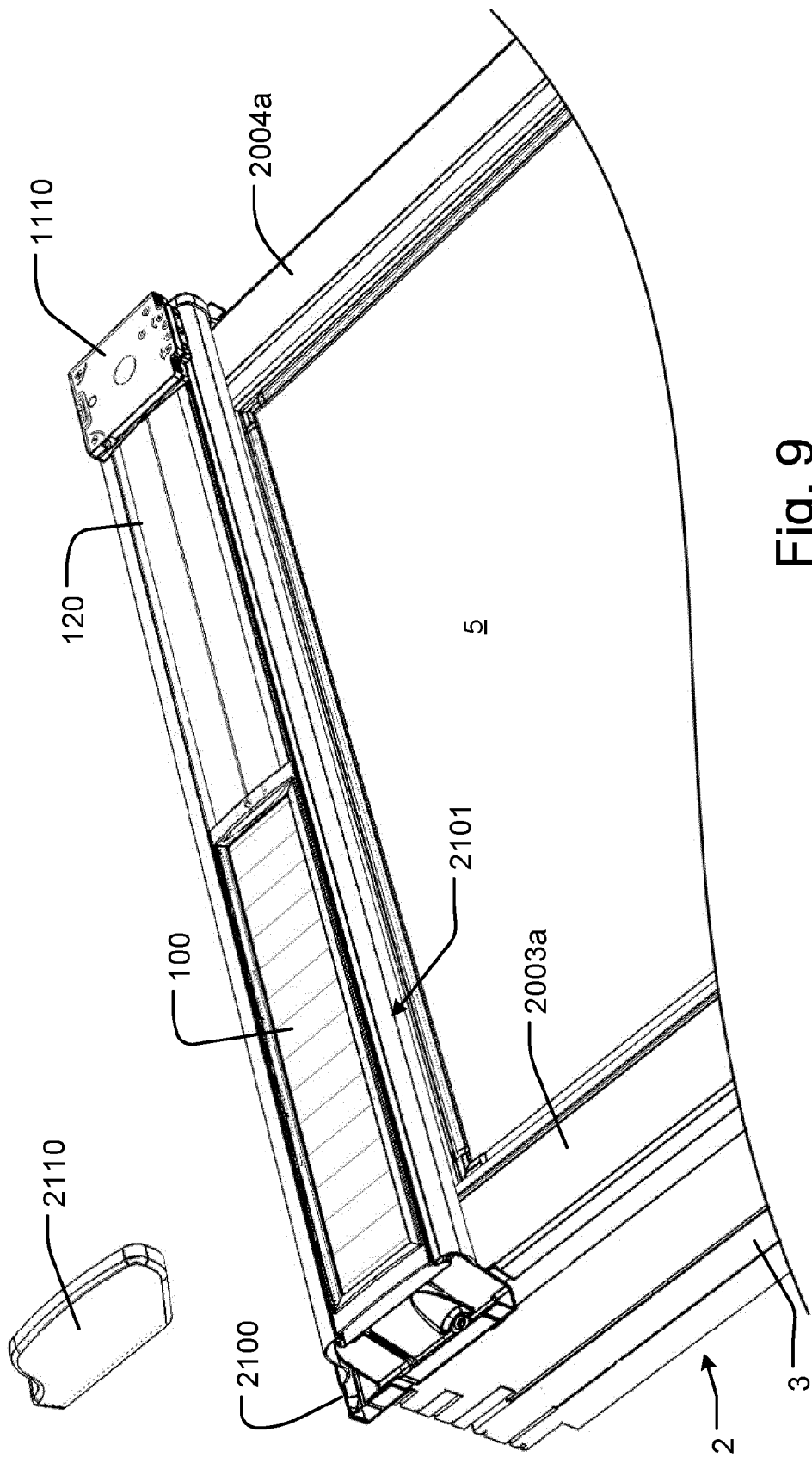


Fig. 9

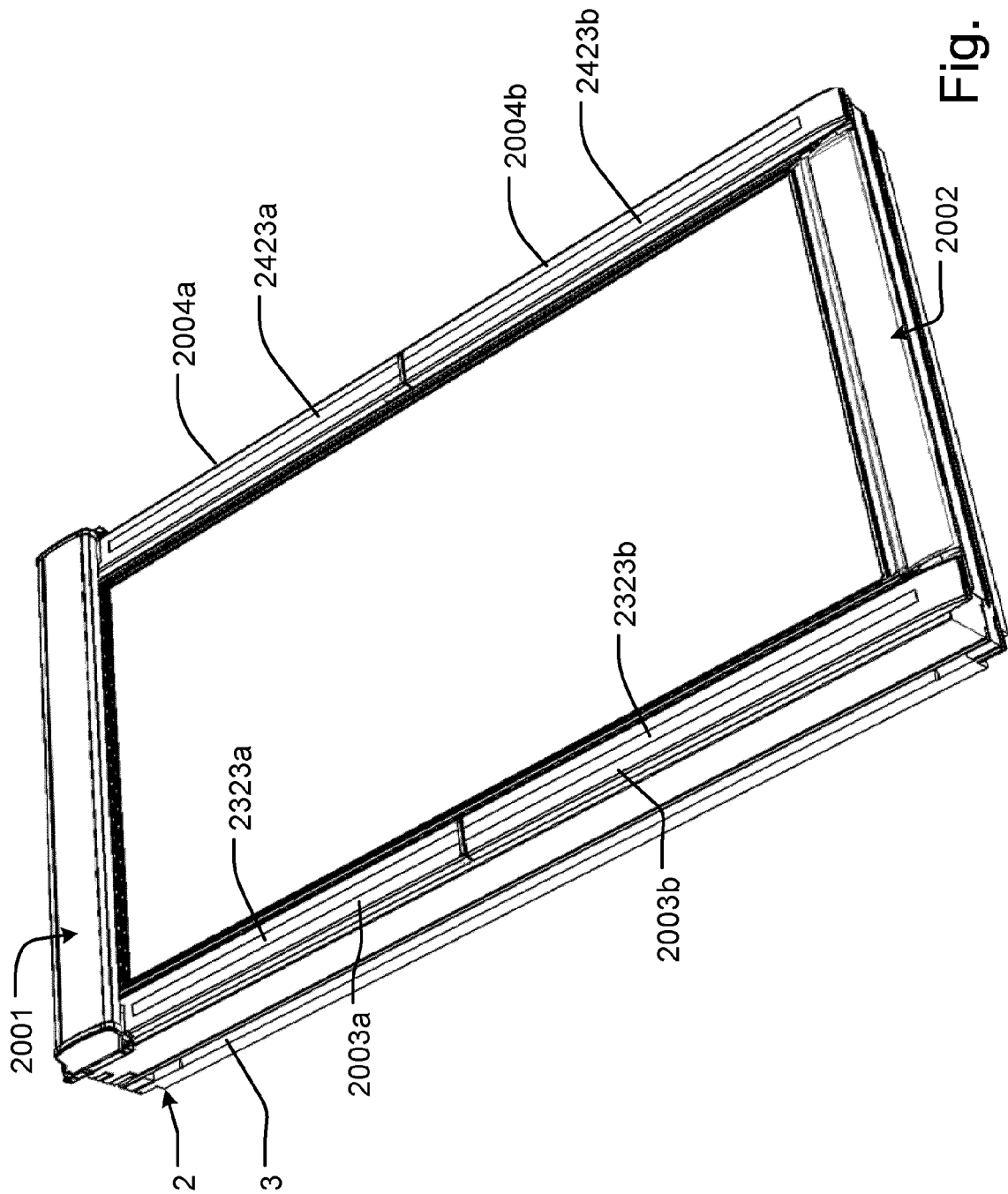


Fig. 10

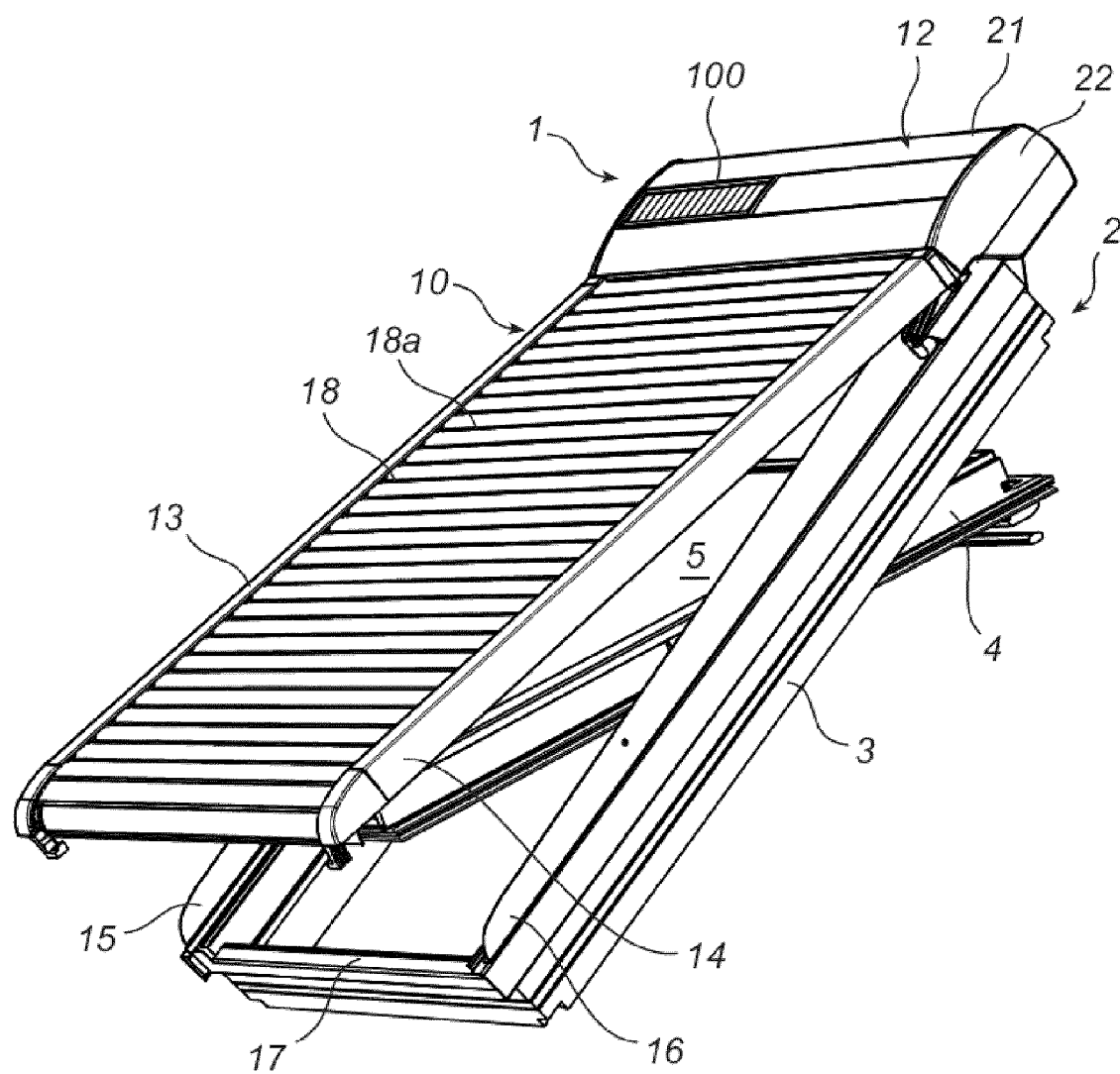


Fig. 11

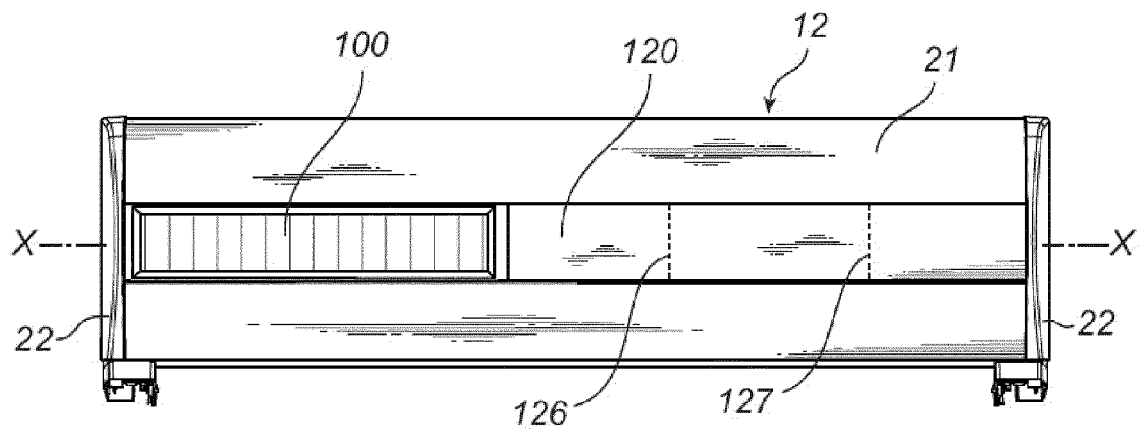


Fig. 12

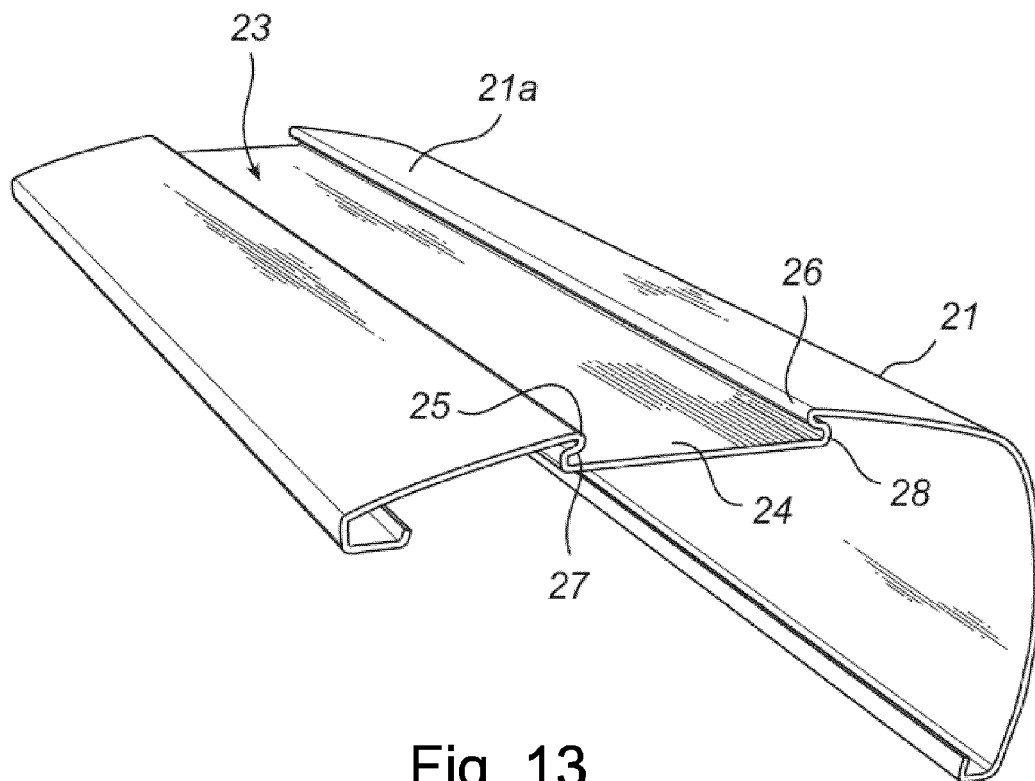


Fig. 13

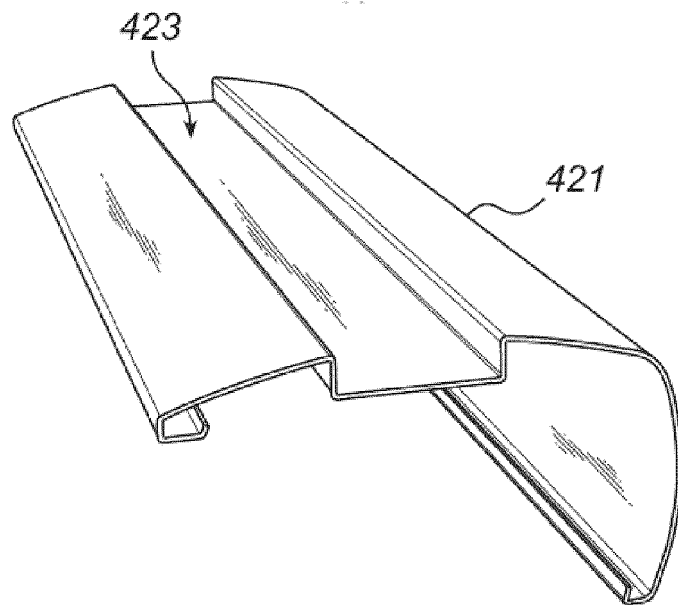


Fig. 14

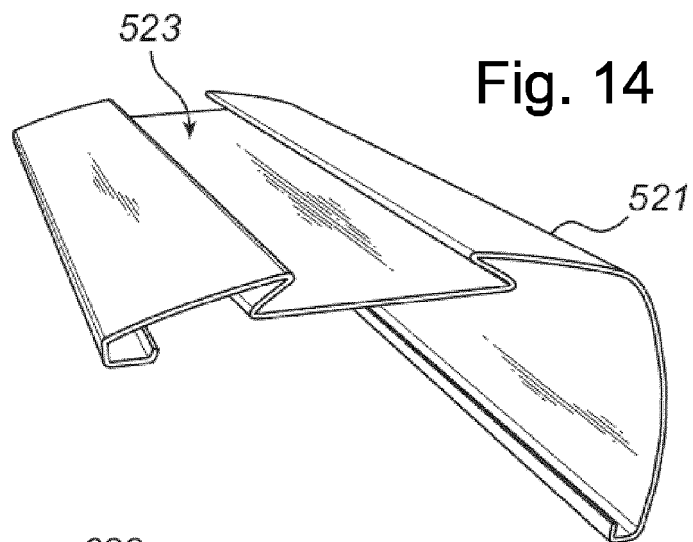


Fig. 15

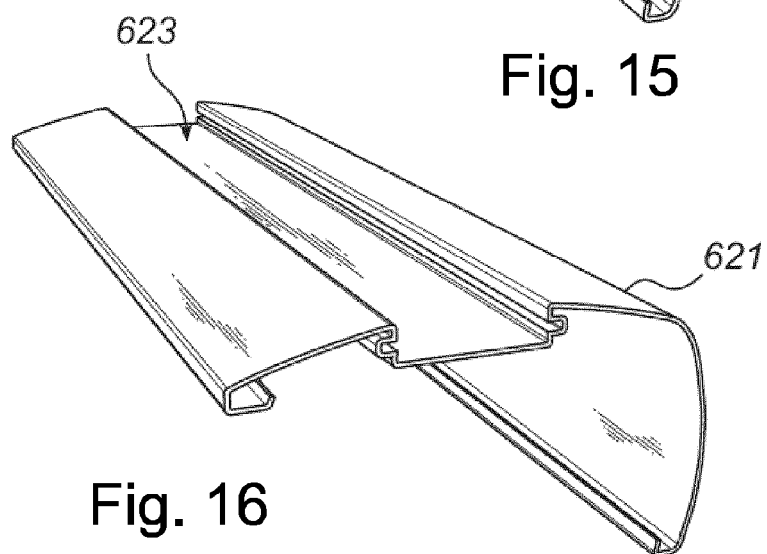


Fig. 16

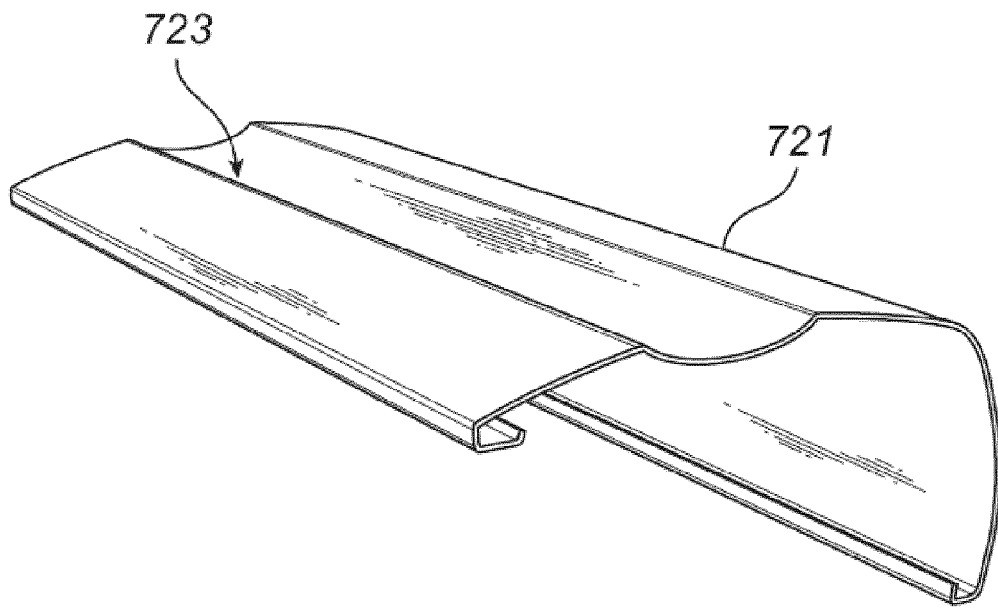


Fig. 17

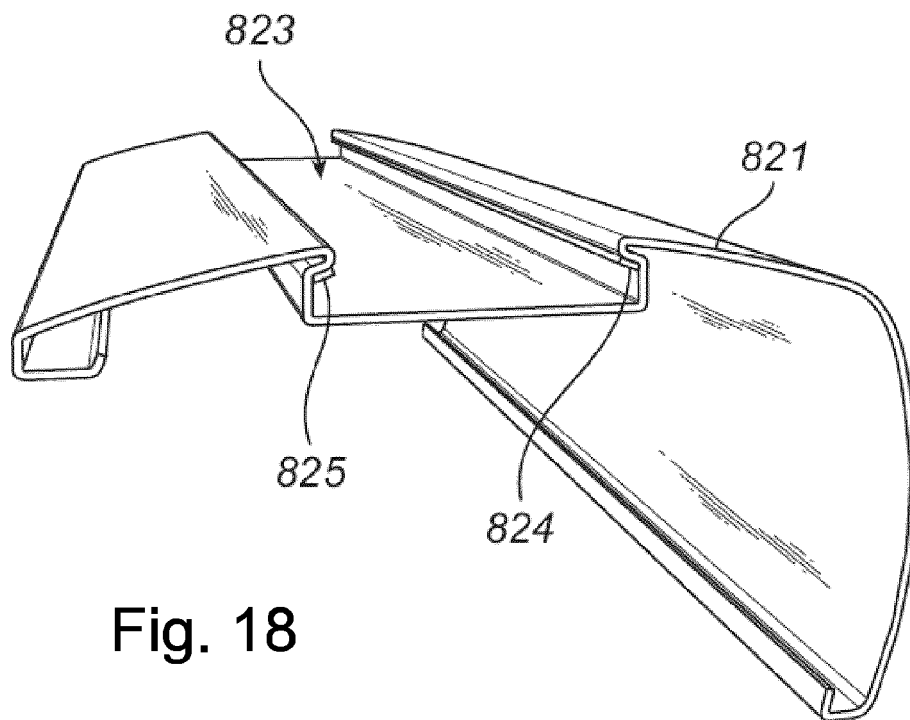


Fig. 18

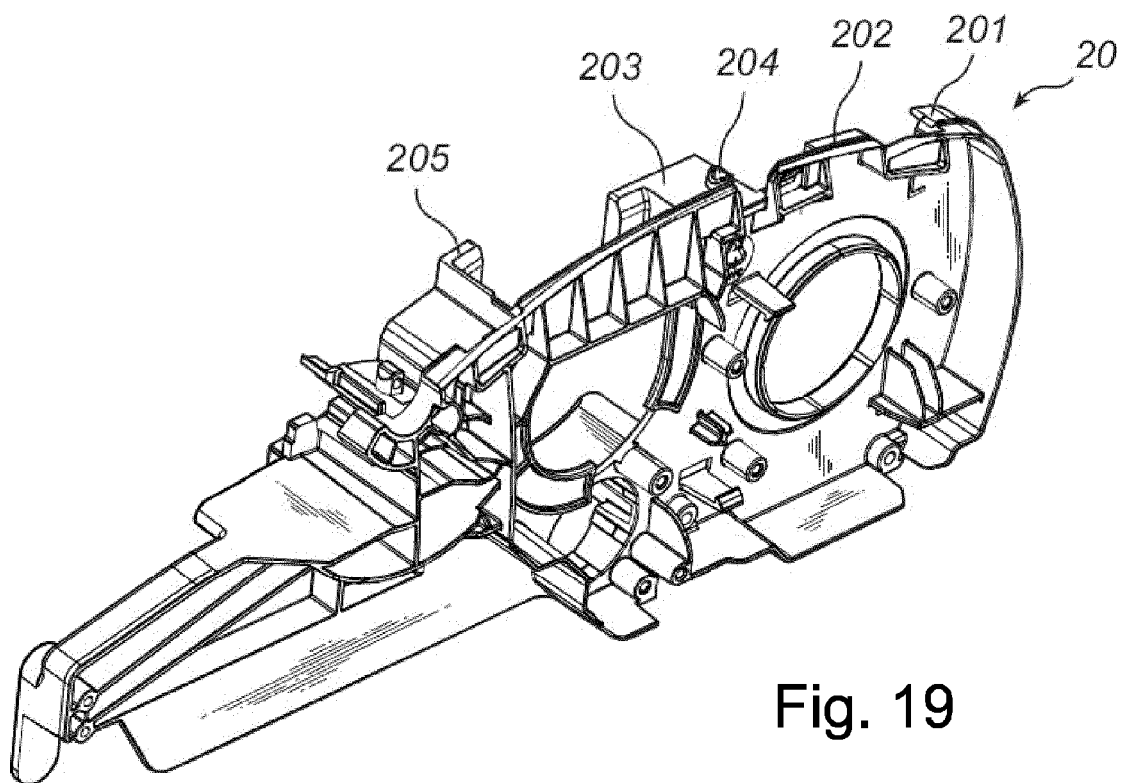


Fig. 19

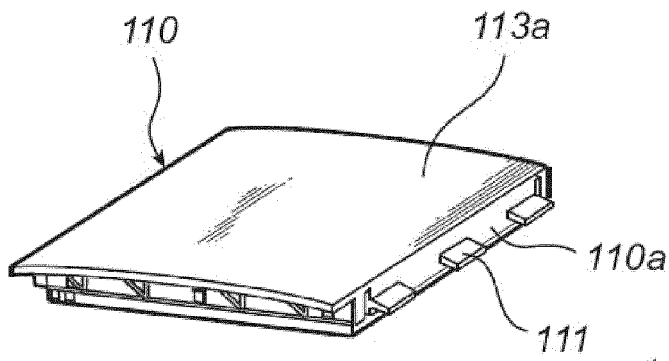


Fig. 20

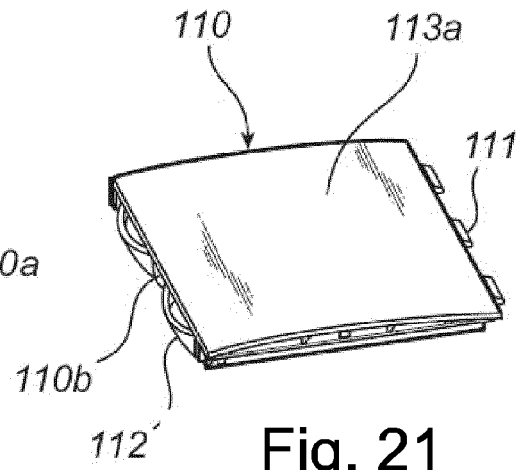


Fig. 21

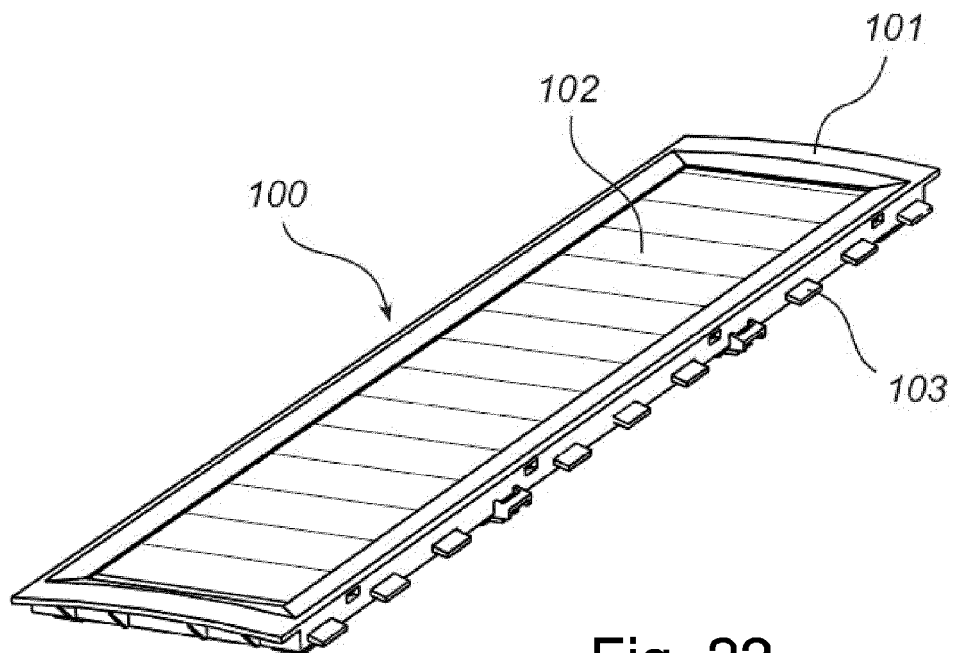


Fig. 22

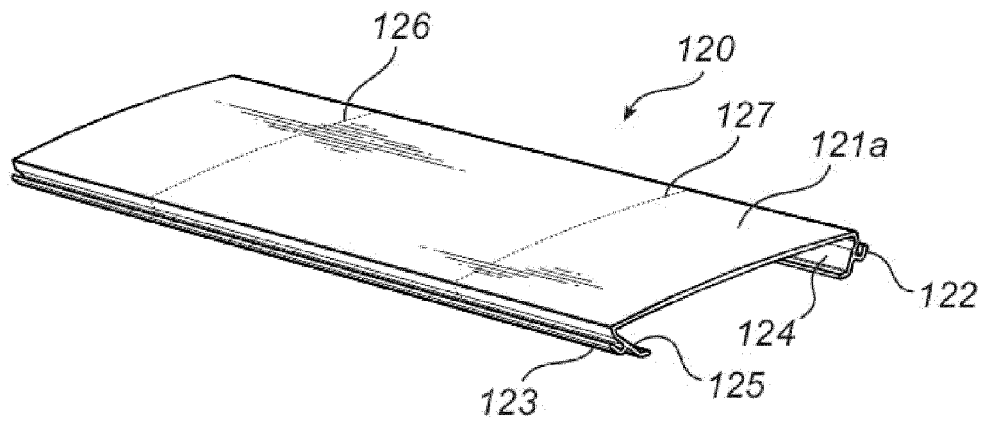


Fig. 23

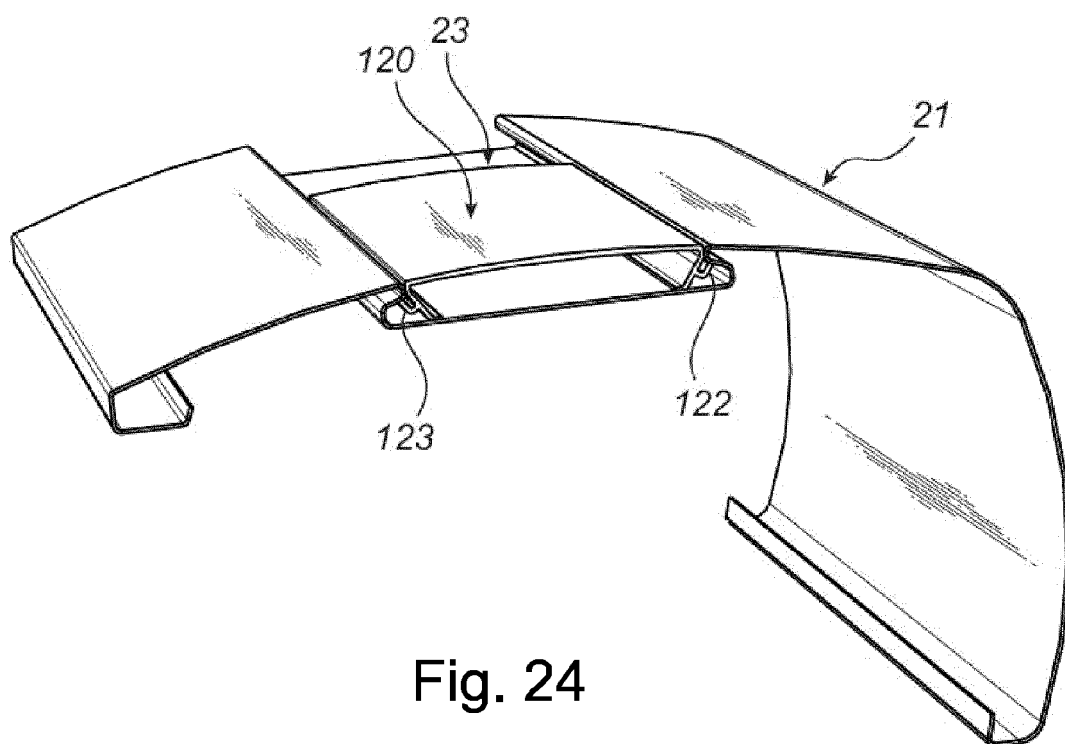


Fig. 24

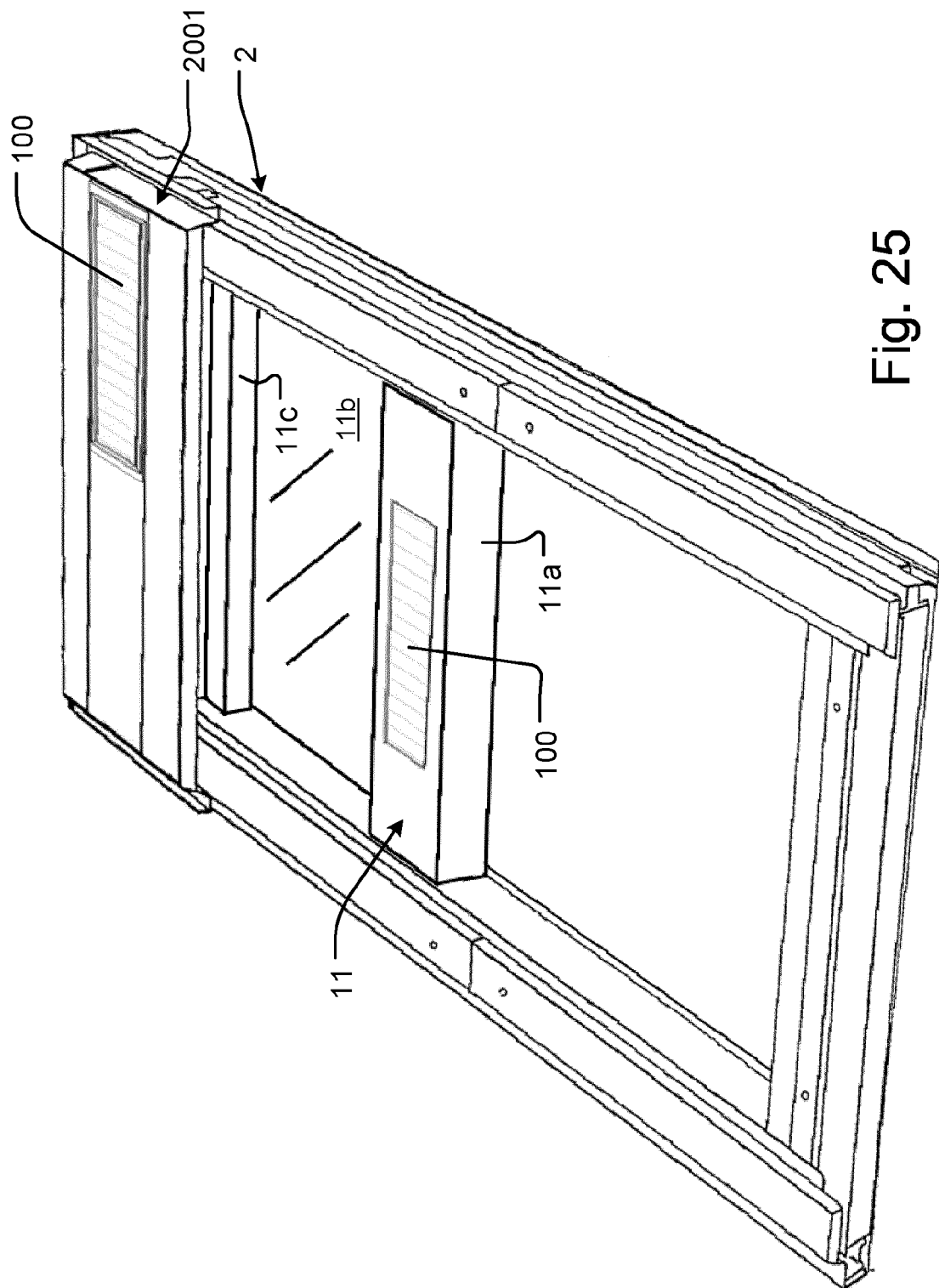


Fig. 25



EUROPEAN SEARCH REPORT

Application Number
EP 11 19 0941

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 24 April 2012	Examiner Schwertfeger, C
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24-04-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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