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

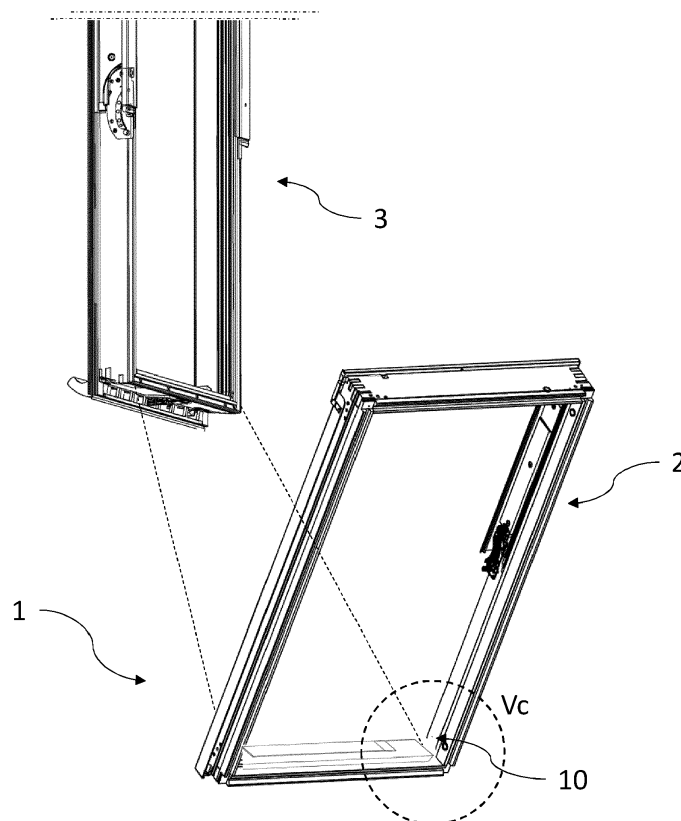
(72) Inventor: **Ansø, Mathias**  
**2970 Hørsholm (DK)**

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

(54) **A WINDOW INSTALLATION SYSTEM, AND A METHOD OF INSTALLING A ROOF WINDOW**

(57) The window installation system comprises a kit of parts for protecting a window frame in a window installation process. The window frame has a top frame member (300), a bottom frame member (200), a first side frame member (100), and a second side frame member (100) defining a central opening, the kit of parts compris-

ing: a bottom protection member (11); and at least one side protection member (12, 13), wherein said at least one side protection member is configured to be connected to the bottom protection member, thereby forming a protection unit (10).



**Fig. 5b**

## Description

### Technical Field

[0001] The present invention relates to a window installation system comprising a kit of parts, and a roof window having a window frame and a sash. The invention furthermore relates to a method of installing a roof window.

### Background Art

[0002] When installing windows, in particular roof windows in an inclined roof, the typical installation process involves mounting the stationary window frame in a first step to allow easy access to the exterior without necessarily exiting to the roof surface. During this procedure, mounting brackets and auxiliary equipment such as under-roofing etc. are installed, but the frame opening is sometimes also used for climbing through, either from the outside and in or vice versa. Also during the installation process, the sash needs to be fitted temporarily to ensure that the frame forms a proper rectangle, without skewness, which can be observed when closing and opening the sash. Following this, the sash is again dismounted and possible adaptation of the position of the frame is carried out. This procedural step is repeated until a satisfying fit has been reached. It is known that the most sensitive times for a window are when the installer is taking the sash in and out and that is when damage is most likely to occur. The step of fitting the sash into the frame typically involves engaging sash hinge parts with frame hinge parts. Since the sash carries the pane is relatively heavy and may be cumbersome to handle, in particular for broad and/or tall windows, the engagement process is challenging and typically involves two persons. There are several critical points when an installer works around the window; s/he can damage parts of the frame or sash, even though the procedure is carried out with great care: when it is removed from the frame, while reassembling sash and frame, when passing the sash to the outside, when working inside from hanging tools, with shoes while climbing in and out of the roof, when reaching parts through the frame to the outside, when roof is dirty and wet, etc.

[0003] Traditionally, experienced installers use cardboard or towels for protecting the frame, but this solution can become wet or fly away and do not offer a high standard protection for the frame.

[0004] After the damage has happened one can use a touch-up kit but there is no definitive solution to the problem. Hence, there exists a need for an window installation system including kit of parts for providing increased assistance to the installer in a window installation process.

### Summary of Invention

[0005] With this background, it is therefore an object

of the invention to provide a window installation system, in which the above-mentioned disadvantages are mitigated or even overcome.

[0006] In a first aspect, this and further objects are achieved with a window installation system of the kind mentioned in the introduction, which is furthermore characterised by the features of claim 1.

[0007] In this way, it is possible to provide a protection unit substantially preventing direct contact between objects, such as a sash, tools, body parts etc., and at least the covered interior portions of the window frame, thereby protecting the window frame in the window installation process. Additionally, the protection unit acts as a support for the sash before engagement of the hinges to fit the sash into the window frame and as guidance during the engagement of the parts of the hinges, thereby assisting the installer in the installation process.

[0008] The wording "protection" should, within the context of this application, be construed as an action of guarding, shielding and/or covering in order to prevent a damage of the window frame or the window sash. The at least one side member may have a pre-defined length of at least 25 cm to protect the side in a way that will limit most of the damages that can occur while handling, installing or removing a window frame. The window frame may be unmounted in a package, mounted or unmounted in free state or may be mounted in a stationary window frame. The advantage of this solution of protecting the window frame includes i.e.: preventing direct contact between a sash to be installed in the window frame and the interior portions of the window frame, more specifically preventing the damage of the windows frame when the sash is removed from the frame, while reassembling sash and frame, and when passing the sash to the outside, when working inside from hanging tools, with shoes while climbing in and out of the roof, when reaching parts through the frame to the outside, when roof is dirty and wet.

[0009] While only a single side protection member may be sufficient in some fields of application, it is preferred that the protection unit is formed by providing a first side protection member and a second side protection member connected to or connectable to the bottom protection member in a condition of use.

[0010] Additionally, or alternatively, the bottom protection member of the protection unit may be configured to cover substantially an entirety of the interior portion of the bottom frame member facing the central opening such that the pre-defined length of the bottom protection member is substantially equal to the inner width of the window. This solution would allow to protect the entire surface of the bottom part of the window and this would prevent most of the damages that can occur in the windows installation process.

[0011] In a presently preferred embodiment, the protection unit is in a U-shaped configuration in a condition of use, comprising a bottom protection member and two side protection members of substantially equal length.

The U-shape protection unit, when in place on the window frame, may be in close contact with adjacent sides of the window frame, thus providing better protection unit robustness and better protection for the window frame from be damaged by any liquid or dirt that may accidentally fell on the window frame.

**[0012]** The choice of material of the kit of parts may in principle be chosen according to whether it is intended for repeated usage etc. Preferably one should choose a "soft material" that best allows a damage free fall of any kind of objects, including the sash, on the window frame. The wording "soft material" may include expanded polypropylene (EPP), expanded polystyrene (EPS), rubber or any solid material that thank to its porous structure can dump a free falling of an object. One may also choose an "hard material" to have a more rigid structure. The wording "hard material" may include solid metals like aluminium, brass, titanium, bronze, iron, steel, copper, brass, silicon bronze, monel and/or alloys of the metals or natural materials like wood or synthesized materials like plastic. One may also choose a combination of soft and hard materials for the kit of parts.

**[0013]** In another embodiment, at least one side protection member, at a connection line with the bottom protection member, may be adapted for being folded so that it projects to the bottom protection member plane thereby facilitating easy and compact storage. The connection line may be made by for instance deforming, striking, or weakening material along the folding line, or by applying a strip, an adhesive of the like. Alternatively, the connection line may be made with joints that allows the side protection member to be folded so that it projects to the bottom protection member plane.

**[0014]** The kit of parts may also be adapted to be stored and reused one or more times. Preferably the kit of parts, when folded would occupy a minimal space that can facilitate the storage of the kit. Additionally, if the kit of parts may be made of a lasting material, it could be reused several times for protecting a windows frame.

**[0015]** The protection unit of the kit of parts may be provided as separate parts, but in a presently preferred embodiment, the protection unit is a single, one-piece unit. The wording "single unit" implies that the kit of parts is a single piece and this single piece corresponds to the protection unit. An advantage of using a single unit is that one does not have to mount or unfold the kit of part and the kit of parts is already in the protection form and ready to be used.

**[0016]** The bottom protection member and the at least one side protection member may be connected after been assembled. The wording "assembled", should, within the context of this application, be construed as an assembly technique, including releasable fastening means such as screws, interlocking fingers, or adhesive technique including adhesive means, glue, fastening strap, tape, Velcro. One of the advantages of this solution is that the kit of parts may be easily included in the windows packaging and therefore delivered with the window

packaging protecting the window frame parts when unmounted. Another advantage is that it can be easily assembled when needed.

**[0017]** In another presently preferred embodiment, the bottom protection member is composed of a plurality of pieces, preferably having an individually adapted profiling. This is particularly advantageous in a modular window installation system in which a range of pieces with various individual lengths and profiling forms part of the window installation system, such that a variety of window sizes may be accommodated.

**[0018]** According to a second aspect, a method of installing a roof window is provided.

**[0019]** A further scope of applicability of the present disclosure will become apparent from the detailed description given below. However, it should be understood that the detailed description and specific examples, while indicating preferred variants of the present inventive concept, are given by way of illustration only, since various changes and modifications within the scope of the inventive concept will become apparent to those skilled in the art from this detailed description.

**[0020]** Hence, it is to be understood that this inventive concept is not limited to the particular steps of the methods described or component parts of the systems described as such method and system may vary. It is also to be understood that the terminology used herein is for purpose of describing particular embodiments only, and is not intended to be limiting. It must be noted that, as used in the specification and the appended claim, the articles "a", "an", "the", and "said" are intended to mean that there are one or more of the elements unless the context clearly dictates otherwise. Thus, for example, reference to "a unit" or "the unit" may include several devices, and the like. Furthermore, the words "comprising", "including", "containing" and similar wordings do not exclude other elements or steps.

### Brief Description of Drawings

**[0021]** In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a roof window comprising a frame and a sash;

Fig. 2a is a perspective view of the frame of the roof window in Fig. 1;

Fig. 2b is a partial perspective view, on a larger scale, of the lower left-hand corner of the frame of Fig. 2a;

Fig. 3 is a perspective view of the sash of the roof window in Fig. 1;

Fig. 4a is a perspective view of a protection unit in a first embodiment of the present invention;

Fig. 4b is a view of the protection unit of Fig. 4a, seen from another angle

Fig. 4c is an exploded view of the protection unit of Figs 4a and 4b;

Figs 5a to 5f is a series of schematic views showing steps in an example of an inventive method of installing a roof window, of which Fig. 5c is a photograph corresponding to the detail Vc of Fig. 5b, and Figs 5d to 5f are photographs;

Fig. 6 is perspective view of a protection unit in a second embodiment of the invention;

Fig. 7 is an exploded perspective view of a protection unit in a third embodiment of the invention;

Figs 8a and 8b are exploded perspective views of a protection unit in a fourth embodiment of the invention;

Fig. 9 is an exploded perspective view of a further development of the protection unit in the third embodiment shown in Fig. 7;

Fig. 10 is an exploded perspective view of a protection unit in a fifth embodiment of the invention;

Fig. 11 is a partial perspective view, on a larger scale of details of the protection unit of Fig. 10;

Fig. 12 is an exploded perspective view of a protection unit in a sixth embodiment of the invention;

Fig. 13 is a partial perspective view, on a larger scale of details of the protection unit of Fig. 12;

Fig. 14 is an exploded partial perspective view of a protection unit of details of the protection unit of Figs 12 and 13;

Fig. 15 is an exploded perspective view of a protection unit in a seventh embodiment of the invention;

Fig. 16 is a perspective view of an eighth embodiment of a protection unit according to the invention; and

Figs 17 to 21 are views of a ninth embodiment of a protection unit according to the invention.

## Detailed description

[0022] The present inventive concept will now be described more fully hereinafter with reference to the accompanying drawings, in which currently preferred variants of the inventive concept are shown. This inventive concept may, however, be implemented in many different forms and should not be construed as limited to the variants set forth herein; rather, these variants are provided for thoroughness and completeness, and fully convey the scope of the present inventive concept to the skilled person.

### Figs 1 to 3

[0023] Referring initially to Fig. 1, a roof window 1 is shown, with a window frame 2, having a top frame member 300, a bottom frame member 200, and two side frame members 100, defining a central opening. The window will be referred to as "roof window" and only as "window" on equal footing. The invention is in particular intended for use in a roof window, to be installed in an inclined roof surface. Directional terms such as "upper", "lower" etc. relate to the position shown in the drawings. "Top", "bot-

tom", "side" denote the position in the mounted condition of the window and are used for convenience and not to be considered limiting. The invention is in principle applicable to all types of windows for installation in all types of roofs, including flat roofs, and facades, however.

[0024] Fig. 1 shows the roof window 1 seen from the side of the roof window which faces the interior side of a building structure in which the roof window 1 is installed. The frame 2 is stationary when the roof window 1 is in a mounted condition. A sash 3 carrying a pane 4 is connected to the frame 2 by means of a set of hinges 5, such that the sash 3 is pivotable about a substantially centrally located axis between an open and closed position relative to the stationary frame 2. Corresponding to the members of the window frame 2, the sash 3 has a top sash member 600, a bottom sash member 500, and two side sash members 400.

[0025] A covering assembly 6 comprising claddings 61, coverings 62 and a top box 63 is provided as well. These elements form part of a covering assembly to protect the exterior parts of the window from weathering.

[0026] The hinges 5 may also be located further upwards, towards the upper part of the stationary frame 2 and sash 3. In order to bring the sash 3 to a ventilation and a number of open positions, an operating member 7 is provided at the top sash member 600, such that a lock mechanism 8, also at the top sash member 600 is disengaged from a striking plate (not shown) on the top member 300 of the frame 2 in a manner known per se. Examples of so-called pivot hinges are shown in Figs 2a and 3 and a detailed description of such a hinge is present in for instance Applicant's EP1612352A1, WO 85/02646, WO 99/28581 and EP3486413A1. The invention is also applicable to so-called pantograph hinges, as described in Applicant's WO2017076416A1 and EP3252255A1.

[0027] In Fig. 2a, the sash 3 has been disassembled from the frame 2, and in Fig. 3, the sash 3 is shown separately. The sash 3 is typically connected to the frame 2 in a supply condition of a window installation system of the invention, in that a sash hinge part 53 of each hinge 5 is in engagement with a frame hinge part 52 of the corresponding hinge 5 by respective engagement means. In the specific example in which the hinge 5 is a pivot hinge, disengagement is carried out in that the engagement means of the sash hinge part 53, in the form of a slide bar (not shown in detail), is withdrawn from the engagement means of the frame hinge part 52, in the form of a guide (not shown in detail) of the frame hinge part 52.

[0028] By the terms "exterior" and "interior", mutually opposite sides of components of the roof window 1 are indicated, in a direction substantially perpendicular to the plane of the pane 4. The terms "outer" and "inner" are used to indicate for instance mutually opposite sides of the frame members 100, 200, 300, substantially in a direction parallel to the plane of the pane 4.

[0029] Each of the frame members 100, 200, 300 has an inner side facing the central opening. The inner sides

of the respective frame members 100, 200, 300 each comprises an exterior portion 102, 202 (exterior portion of top frame member 300 not visible), which, when the window is in the closed position, is covered by the sash 3 and therefore not visible from the interior of the building structure, and an interior portion of which the interior portion 101 of the side member 100 shown to the right in Fig. 1 and the interior portion 201 of the bottom frame member 200 are visible. The interior portions 101, 201 are not covered by the sash 3, when the window is in the closed position. Reference numeral 101 will be used to denote the interior portion of each of the side members 100, since these members are generally mirror-inverted to each other. Hence, the interior portion 101, 201 of each frame member 100, 200, 300 is visible from the interior side of the building structure in both in the open and closed positions of the sash. Eventually, each of the stationary frame members 100, 200, 300 also has a bottom surface 103, 203, 303 which here, in a manner known per se, includes a groove adapted to accommodate a lining forming a transition between the roof window 1 and an inner wall of the building in which the roof window 1 is installed.

**[0030]** As shown in Fig. 2a, the bottom frame member 200 of the window frame 2 defines an inner width  $w_i$ . In the specific embodiment of the kit of parts and window installation system according to the invention, in which the frame members 300, 200, 100 are stepped to provide stepped exterior portions, the inner width  $w_i$  is the distance between the mutually facing interior portions 101 of the first and second side frame members 100, which is substantially uniform over the height of the frame 2. However, other configurations of the frame are conceivable and the respective dimensions of a protection unit 10 of the kit of parts to be described in further detail below are relative as will be readily appreciated by the person skilled in the art.

**[0031]** In the following, reference will be made also to the enlarged view of Fig. 2b, showing the lower left-hand corner as seen from the inside. In the shown embodiment, the exterior portions 102, 202 of the inner sides of each of the frame members 100, 200, 300 are offset relative to the interior portions 101, 101, 201 to form a space in which the sash 3 is accommodated when the window is in a closed position.

#### Figs 4a to 4c

**[0032]** Referring now to Figs 4a to 4c, a first embodiment of a kit of parts for protecting at least the bottom parts of the stationary frame 2 in a window installation process will be described in further detail.

**[0033]** Fig. 4a illustrates the kit of parts for protecting a window frame in a window installation process, comprising: a bottom protection member 11; and at least one side protection member, here two side protection members 12 and 13. In the following, the side protection members 12, 13 will be referred to jointly or individually; the

side protection members 12, 13 may be formed in an identical, mirror-inverted manner, but variations are also conceivable.

**[0034]** The bottom protection member 11 is formed with a pre-defined length  $l_b$  and each side protection member 12, 13 with a pre-defined length  $l_s$ . The side protection members 12, 13 are connected to or connectable to the bottom protection member 11, thereby forming the protection unit 10 of the kit of parts of the invention. The protection unit 10 is adapted for covering at least partly the interior portion 201 of the bottom frame member 200 and the interior portion 101 of at least one of the first and second side frame members 100 in the position of use in the mounted condition of the roof window 1. in a U-shaped configuration in a condition of use, comprising a bottom protection member 11 and two side protection members 12, 13 of substantially equal length  $l_s$ .

**[0035]** In the embodiment shown, the bottom protection member 11 is configured to cover substantially an entirety of the interior portion 201 of the bottom frame member 200 facing the central opening such that the pre-defined length  $l_b$  of the bottom protection member 11 is substantially equal to the inner width  $w_i$  of the window.

**[0036]** In embodiments of the roof window 1, in which the window frame 2 is formed such that the exterior portion 202 of the inner side of the bottom frame members 200 is offset relative to the interior portion 201 to form a stepped portion, the bottom protection member 11 comprises a first portion 115 having a first thickness; and a second portion 116 having a second thickness. The second thickness is different from the first thickness to provide a pre-defined profiling of the bottom protection member 11. The bottom protection member 11 comprises a base portion 110 with a first longitudinal edge 111 and an opposed second longitudinal edge 112, each extending between one end edge 113 and another end edge 114 and defining the length  $l_b$  of the bottom protection member 11. The first portion 115 has a reduced thickness relative to the second portion 116 defining a shoulder 117 extending substantially in parallel to and located substantially halfway between the first and second longitudinal edges 111, 112 of the bottom protection member 11, and the first portion 115 is positioned adjacent to the first longitudinal edge 111 and configured to cover the interior portion 201 of the bottom frame member 200 while the second portion 116 is positioned adjacent to the second longitudinal edge 112 and configured to cover the exterior portion 202 of the bottom frame member 200 of the frame 2 of the roof window 1. In this way, the profiling of the outer side of the protection unit 10 is made to fit the profiling of the inner sides of the window frame at the bottom frame member 200. Furthermore, a recess 110r is formed in the base portion 110 adjacent the second longitudinal edge 112. This makes it possible to fit a sash with a bottom handle and furthermore provides a grip area for the installer.

**[0037]** Correspondingly, each side protection member 12, 13 comprises a base portion 130 with a first longitu-

dinal edge 131 and an opposed second longitudinal edge 132, each extending between one end edge 133 and another end edge 134. As shown, the other end edge 134 of the side protection member 12, 13 has a profiling corresponding to the profiling of the bottom protection member 11.

**[0038]** In a supply condition, the bottom protection member 11 and the side protection member or members 12 and 13 are configured to be assembled, thereby forming the protection unit. This may take place on the building site. The protection unit 10 may constitute one element of a kit of parts in a window installation system comprising a larger number of components for assisting the installer during the entire installation process. For instance, the parts of the protection units may be adapted to be stored and reused one or more times, for instance in a storage container such as for instance a box, a bag, a net, a strap device.

**[0039]** The material, or combination of materials, of the parts of the protection unit may be chosen in any suitable manner. One suitable example could be forming the bottom protection member 11 and the side protection members 12, 13 of expanded polypropylene EPP or expanded polystyrene EPS. The incorporation of hard plastic and/or metal is also conceivable.

#### Figs 5a to 5f

**[0040]** Referring now to Figs 5a to 5f, installation of the roof window 1 by means of the kit of parts forming the protection unit 10 of the first embodiment will be described in further detail.

**[0041]** The roof window 1 is provided as in the above. A protection unit 10 is formed by a kit of parts as in the above, including bottom protection member 11 and at least one side protection member 12, 13.

**[0042]** Referring first to Fig. 5a, the window frame 2 is mounted in the inclined roof structure (not shown as such). The protection unit 10 is placed to cover at least partly the inner face of the bottom frame member 200.

**[0043]** Referring now to Fig. 5b, the sash 3 is placed on the protection unit 10, with at least the top sash member 600 in contact with the protection unit 10 such that the protection unit 10 supports the sash 3. In the detail view of Fig. 5c, it is shown how the upper corner of the sash 3 is supported by the protection unit 10. It is noted that the sash 3 is placed up-side-down and inside-out so to say, in preparation of the subsequent rotation of the sash 3 relative to the window frame 2.

**[0044]** The placing of the sash 3 may take place either from the inside, i.e. from the room in which the roof window 1 is to be installed, or from the roof, i.e. from the exterior. In case the sash 3 is mounted from the exterior side, lifting the sash 3 into position may take place by a crane, as represented by crane cup 9 in Fig. 5d. From Fig. 5d it furthermore emerges how one of the sash hinge parts 53 is engaged with the corresponding frame hinge parts 52. The engagement takes place by allowing the

protection unit 10 to guide the sash 3.

**[0045]** Subsequently, the protection unit 10 is removed as shown in Fig. 5e, and the sash 3 is rotated into its closed position relative to the window frame 2 as shown in Fig. 5f.

**[0046]** In the specific embodiment of the protection unit 10, in which recess 110r is formed in the base portion 110 adjacent the second longitudinal edge 112, and locking mechanism 8 is positioned to protrude on the sash 3, the step of placing the sash 3 on the protection unit 10 comprises placing the lock mechanism 8 at the top sash member 600 in the recess 110r.

#### Fig. 6

**[0047]** Referring now to Fig. 6, a second embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 2000 has been added. Only differences relative to the first embodiment will be described in detail.

**[0048]** In this embodiment, the protection unit is a single, one-piece protection unit 2010, which may be formed as a moulded protection unit, for instance of EPP.

#### Figs 7 to 9

**[0049]** Referring now to Figs 7 to 9, a third and a fourth embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 3000 and 4000, respectively, has been added. Only differences relative to the first embodiment will be described in detail.

**[0050]** Here, the bottom protection member 3011; 4011 is composed of a plurality of pieces 3111a, 3111b, 3111c, 3111d; 4111a, 4111b, 4111c, 4111d, 4111e acting as building bricks that may be assembled to adapt the length lb of the bottom protection member to the specific width wi of the window frame 2. The pieces may have an individually adapted profiling, for instance to provide a recess corresponding to the recess 110r of the first embodiment. In this way, a range of pieces with various individual lengths and profiling may form part of the window installation system, such that a variety of window sizes may be accommodated.

**[0051]** Turning in particular to Fig. 8a, it is seen how one piece 4111a, 4111d; of the bottom protection member 4011 is integral with an associated side protection member 4013, 4012 to form a corner unit. By the term "integral" is to be understood as not being intended to be taken apart, including a one-piece configurations and configurations of two or more connected parts.

**[0052]** This corner unit may be readily combined with at least one other piece 4111b, 4111c, 4111e connected to or connectable to the one piece 4111a, 4111d of the bottom protection member 4011 in the condition of use.

**[0053]** The connection between the pieces of the bot-

tom protection member 3011, and of the side protection members 3012, 3013 to the bottom protection member, will now be described with reference to Fig. 9, in which the pieces 3111a, 3111b of the bottom protection member 3011 are shown connected to each other by at least one rod 3119a, 3119b extending in the longitudinal direction of the bottom protection member and received in an associated track 3110a, 3110b in the bottom protection member 3011. In this way, the rods 3119a and 3119b of the embodiment shown act as dowels holding the pieces together in a frictional, force-fitting engagement. The connection to the side protection members 3012 and 3013, respectively, may be carried out in a corresponding manner, as indicated in Fig. 9. The pieces 4111a, 4111d of the corner units of the embodiment of the protection unit (4010) may be connected either to each other in a similar manner, in which case there are pins in only one track to interact with the empty track of the other corner unit, or to an adjacent intermediate other piece 4111b, 4111c and/or 4111e.

#### Figs 10 to 14

**[0054]** Referring now to Figs 10 to 14, a fifth and a sixth embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 5000 and 6000, respectively, has been added. Only differences relative to the above embodiments will be described in detail.

**[0055]** Here, the pieces 5111a, 5111b, 5111c; 6111c, 6111b, 6111f, 6111g of the bottom protection member 5011; 6011 are connected to each other by at least one rod 5119a, 5119b; 6119b extending in the longitudinal direction of the bottom protection member and received in an associated track 5110a, 5110b in the bottom protection member 3011; 5011; 6011 as shown for the third embodiment above.

**[0056]** However, in the fifth embodiment, the pieces 5111a, 5111b, 5111c of the bottom protection member 5011 are slidably connected to each other by means of rods 5119a, 5119b slidably received in the associated track 5110a, 5110b in the bottom protection member 5011 such that the length of the bottom protection member 5011 is adjustable. In turn, this means that one and the same protection unit 5010 may be used in window frames 2 within a range of sizes. Thus, when the bottom protection member 5011 is in a position in which all pieces 5111a, 5111b, 5111c are slid together, the pre-defined length lb corresponds to the combined lengths of the individual pieces 5111a, 5111b, 5111c, whereas is two or all three pieces 5111a, 5111b, 5111c are partly or wholly slid out on the rods 5119a, 5119b, the pre-defined length lb is extended to fit the inner width wi of the window size in question. As shown in Fig. 10, this also means that an interspace is formed between adjacent pieces 5111a and 5111b and/or 511b and 5111c, respectively. While the interior portion 201 and the exterior portion 202 of the

bottom frame member 200 are thus partly exposed, the thickness of the bottom protection unit 5010 combined with an adequate maximum slid-out length provides for sufficient overall protection of the window frame.

**[0057]** Referring now to Figs 12 to 14, one piece 6111g is shown rotatable relative to another piece 6111f about the rod 6119b. In a window installation system configured to accommodate a variety of window sizes, requiring assembly of multiple pieces of various profiling, it is thus possible to use such a piece universally since it is configured to assume an inverted position in the bottom protection member 6011 of the assembled protection unit 6010 while still providing a good fit with the window frame and the protection aimed at.

#### Fig. 15

**[0058]** Referring now to Fig. 15, a seventh embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 7000 has been added. Only differences relative to the above embodiments will be described in detail.

**[0059]** In an embodiment comprising an alternative connection form, the pieces 7111a-7111x of the bottom protection member 7010 are connected to each other by a piece connection fitting 7119c allowing releasable snap connection between the pieces 7111a-7111x of the bottom protection member 7011 of the protection unit 7010. A corner connection fitting 7119d is here configured to connect the side protection member 7012 to the adjacent piece 7111a of the bottom protection member 7011. Snap connections involving form-locking or force-locking engagement between parts is well-known to the person skilled in the art and provides for a quick, yet reliable engagement and dis-engagement.

#### Fig. 16

**[0060]** Referring now to Fig. 16, an eighth embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 8000 has been added. Only differences relative to the above embodiments will be described in detail.

**[0061]** Another variant of the connection between pieces of the bottom protection unit is shown in Fig. 16. Here, the pieces 8111a, 8111b, 8111c of the bottom protection member 8011 are connected to each other by a shield element 8118a, 8118b in a slidable connection. In this manner, it is possible to adjust the pre-defined length lb of the bottom protection unit 8010. An interspace is formed between adjacent pieces; however such interspaces are covered by the respective shield element. In embodiments in which at least one piece 8111a of the bottom protection member 8011 is integral with an associated side protection member 8013 to form a corner unit, a corresponding shield element is provided as a corner

shield element 8118a.

#### Figs 17 to 21

**[0062]** Referring now to Figs 17 to 21, a ninth embodiment will be described in further detail. Elements having the same or analogous function as in the first embodiment carry the same reference numerals to which 9000 has been added. Only differences relative to the above embodiments will be described in detail.

**[0063]** In an embodiment, which is particularly advantageous in terms of both compactness during storage and transportation and ease of handling when bringing from the supply condition to the condition of use, the bottom and side protection member 9011, 9012, 9013 are adapted for being folded so that each side protection member 9012, 9013 assumes a position substantially parallel to the bottom protection member 9011 in a supply condition and projects to the bottom protection member plane in the condition of use. In the embodiment shown, a hinge link 9118 is provided and connects the bottom protection member 9011 with an associated side member 9012, 9013 in a hinge connection 9118a. In embodiments, where as shown, a piece 9111c, 9111a of the bottom protection member 9011 is integral with an associated, respective side protection member 9013, 9012 to form a corner unit, the hinge connection 9118a of the hinge link 9118 is formed in said piece 9111c, 9111a.

**[0064]** A further detail of the ninth embodiment is that the bottom protection member 9011 comprises at least one other piece 9111b connected to said at least one piece 9111c, 9111a of the bottom protection member 9011 via said hinge link 9118 in such a way that the length of the bottom protection member 9011 is adjustable to assume a desired pre-defined length lb in the condition of use, more preferably by means of an engagement pin 9118b configured to be received in one of a plurality of receiving openings 9111bx provided in the other piece 9111b. This provides for the possibility of adjusting the pre-defined length of the bottom protection unit 9010 to the inner width of the window frame of the window in question.

**[0065]** The person skilled in the art realizes that the present inventive concept by no means is limited to the preferred variants described above. On the contrary, many modifications and variations are possible within the scope of the appended claims.

**[0066]** Additionally, variations to the disclosed variants can be understood and effected by the skilled person in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims.

#### List of reference numerals

##### [0067]

- 1 roof window
- 2 frame

- 100 side frame member
- 101 interior portion
- 102 exterior portion
- 103 bottom surface
- 200 bottom frame member
- 201 interior portion
- 202 exterior portion
- 203 bottom surface
- 300 top frame member
- sash
- 400 side sash member
- 500 bottom sash member
- 600 top sash member
- pane
- hinge
- 52 frame hinge part
- 53 sash hinge part
- covering assembly
- 61 claddings
- 62 coverings
- 63 top box
- operating member
- lock mechanism
- crane cup
- protection unit
- bottom protection member
- 110 base portion
- 110r recess
- 111 first longitudinal edge
- 112 second longitudinal edge
- 113 one end edge
- 114 other end edge
- 115 first portion
- 116 second portion
- 117 shoulder
- side protection member
- side protection member
- 130 base portion
- 131 first longitudinal edge
- 132 second longitudinal edge
- 133 one end edge
- 134 other end edge
- protection unit (2<sup>nd</sup> embodiment)
- protection unit (3<sup>rd</sup> embodiment)
- 3011 bottom protection member
- 3110a track
- 3110b track
- 3111a piece
- 3111b piece
- 3111c piece
- 3111d piece
- 3112 side protection member
- 3113 side protection member
- 3119a rod
- 3119b rod
- protection unit (4<sup>th</sup> embodiment)
- 4011 bottom protection member
- 4111a piece



|      |                                              |
|------|----------------------------------------------|
|      | 4111b piece                                  |
|      | 4111c piece                                  |
|      | 4111d piece                                  |
|      | 4111e piece                                  |
|      | 4112 side protection member                  |
| 5010 | 4113 side protection member                  |
|      | protection unit (5 <sup>th</sup> embodiment) |
|      | 5011 bottom protection member                |
|      | 5110a track                                  |
|      | 5110b track                                  |
|      | 5111a piece                                  |
|      | 5111b piece                                  |
|      | 5111c piece                                  |
|      | 5112 side protection member                  |
|      | 5113 side protection member                  |
|      | 5119a first rod                              |
|      | 5119b second rod                             |
| 6010 | protection unit (6 <sup>th</sup> embodiment) |
|      | 6011 bottom protection member                |
|      | 6111a piece                                  |
|      | 6111b piece                                  |
|      | 6111c piece                                  |
|      | 6111f piece                                  |
|      | 6111g piece                                  |
|      | 6112 side protection member                  |
|      | 6113 side protection member                  |
|      | 6119b rod                                    |
| 7010 | protection unit (7 <sup>th</sup> embodiment) |
|      | 7011 bottom protection member                |
|      | 7111a piece                                  |
|      | 7112 side protection member                  |
|      | 7113 side protection member                  |
|      | 7119c piece connection fitting               |
|      | 7119d corner connection fitting              |
| 8010 | protection unit (8 <sup>th</sup> embodiment) |
|      | 8011 bottom protection member                |
|      | 8111a piece                                  |
|      | 8111b piece                                  |
|      | 8111c piece                                  |
|      | 8113 side protection member                  |
|      | 8118a corner shield element                  |
|      | 8118b shield element                         |
| 9010 | protection unit (9 <sup>th</sup> embodiment) |
|      | 9011 bottom protection member                |
|      | 9111a piece                                  |
|      | 9111a1 track in piece                        |
|      | 9111b piece                                  |
|      | 9111c piece                                  |
|      | 9112 side protection member                  |
|      | 9113 side protection member                  |
|      | 9118 hinge link                              |
|      | 9118a hinge connection                       |
|      | 9118b engagement pin                         |
| wi   | inner width of window frame                  |
| lb   | length of bottom protection member           |
| ls   | length of side protection member             |

## Claims

### 1. A window installation system, comprising:

- 5 a roof window (1) including a window frame (2) having a top frame member (300), a bottom frame member (200) defining an inner width (wi) of the window frame (2), and opposing first and second side frame members (100), defining a central opening, each of the frame members (300, 200, 100) having an inner face including an interior portion (301, 201, 101) and an exterior portion (202, 102) facing the central opening, and a sash (3) having a top sash member (600), a bottom sash member (500) and opposing first and second side sash members (400), together encasing a pane (4) and connected to the window frame (2) in a mounted condition by means of a set of hinges (5), and
- 10 a kit of parts for protecting the window frame (2) in a window installation process bringing the roof window (1) to the mounted condition, in which the kit of parts comprises at least one protection member adapted to be positioned on the bottom frame member (200) to cover at least the interior portion (201) of the bottom frame member (200),
- 15 **characterised in that**
- the kit of parts comprises a bottom protection member (11) having a pre-defined length (lb) and at least one side protection member (12, 13) having a pre-defined length (ls), said at least one side protection member (12, 13) being configured to be connected to the bottom protection member (11), thereby forming a protection unit (10); and that
- 20 the protection unit (10) is adapted for covering at least partly the inner face of the bottom frame member (200) and the inner face of at least one of the first and second side frame members (100).

### 2. A window installation system according to claim 1, wherein the protection unit (10) comprises a first side protection member (12) and a second side protection member (13) connected to or connectable to the bottom protection member (11) in a condition of use.

### 3. A window installation system according to any preceding claim wherein the bottom protection member (11) is configured to cover substantially an entirety of the interior portion (201) of the bottom frame member (200) facing the central opening such that the pre-defined length (lb) of the bottom protection member (11) is substantially equal to the inner width (wi) of the window.

### 4. A window installation system according to claim 2 or 3, wherein the protection unit (10) is in a U-shaped

configuration in a condition of use, comprising a bottom protection member (11) and two side protection members (12, 13) of substantially equal length (ls).

5. A window installation system according to any preceding claim, wherein the exterior portion (202) of the inner side of the bottom frame members (200) is offset relative to the interior portion (201) to form a stepped portion, and wherein the bottom protection member (11) comprises:

a first portion (115) having a first thickness; and  
a second portion (116) having a second thickness;

wherein the second thickness is different from the first thickness to provide a pre-defined profiling of the bottom protection member (11).

6. A window installation system according to any one of the preceding claims, wherein the bottom protection member (11) comprises a base portion (110) with a first longitudinal edge (111) and an opposed second longitudinal edge (112), each extending between one end edge (113) and another end edge (114) and defining the length (lb) of the bottom protection member (11).

7. A window installation system according to claims 5 and 6, wherein the first portion (115) has a reduced thickness relative to the second portion (116) defining a shoulder (117) extending substantially in parallel to and located substantially halfway between the first and second longitudinal edges (111, 112) of the bottom protection member (11), and wherein the first portion (115) is positioned adjacent to the first longitudinal edge (111) and configured to cover the interior portion (201) of the bottom frame member (200) while the second portion (116) is positioned adjacent to the second longitudinal edge (112) and configured to cover the exterior portion (202) of the bottom frame member (200) of the frame (2) of the roof window (1), and wherein a recess (110r) is formed in the base portion (110) adjacent the second longitudinal edge (112).

8. A window installation system according to claim 7, wherein each side protection member (12, 13) comprises a base portion (130) with a first longitudinal edge (131) and an opposed second longitudinal edge (132), each extending between one end edge (133) and another end edge (134), and wherein the other end edge (134) of the side protection member (12, 13) has a profiling corresponding to the profiling of the bottom protection member (11).

9. A window installation system according to any preceding claim, wherein the protection unit is a single, one-piece protection unit (2010), preferably as a

moulded protection unit, or the bottom protection member (11) and the at least one side protection member (12) are configured to be assembled, thereby forming the protection unit.

10. A window installation system according to claim 9, wherein the bottom protection member (3011; 4011; 5011; 6011; 7011; 8011; 9011) is composed of a plurality of pieces (3111a, 3111b, 3111c, 3111d; 4111a, 4111b, 4111c, 4111d, 4111e; 5111a, 5111b, 5111c), preferably having an individually adapted profiling, and wherein at least one piece (4111a, 4111d; 6111c, 6111a; 8111a; 9111c, 9111a) of the bottom protection member (4011; 6011; 8011; 9011) is integral with an associated side protection member (4013, 4012; 6013, 6012; 8013; 9013, 9012) to form a corner unit, and wherein the bottom protection member (4011) preferably comprises at least one other piece (4111b, 4111c, 4111e; 6111b; 8011b; 9111b) connected to or connectable to said at least one piece (4111a, 4111d; 6111c, 6111a; 8111a; 9111c, 9111a) of the bottom protection member (4011; 6011; 8011; 9011) in the condition of use.

11. A window installation system according to claim 10, wherein the pieces (3111a, 3111b; 5111a, 5111b, 5111c; 6111c, 6111b, 6111f, 6111g) of the bottom protection member (3011; 5011; 6011) are connected to each other by at least one rod (3119a, 3119b; 5119a, 5119b; 6119b) extending in the longitudinal direction of the bottom protection member and received in an associated track (3110a, 3110b; 5110a, 5110b) in the bottom protection member (3011; 5011; 6011), the pieces (5111a, 5111b, 5111c) of the bottom protection member (5011) preferably being slidably connected to each other by means of said at least one rod (5119a, 5119b) being slidably received in the associated track (5110a, 5110b) in the bottom protection member (5011) such that the length of the bottom protection member (5011) is adjustable.

12. A window installation system according to claim 11, wherein at least one piece (6111g) is rotatable relative to another piece (6111f) about said rod (6119b) and is configured to assume an inverted position in the bottom protection member (6011) of the assembled protection unit (6010).

13. A window installation system according to claim 10, wherein the pieces (7111a-7111x) are connected to each other by a piece connection fitting (7119c) allowing releasable snap connection between the pieces (7111a-7111x) of the bottom protection member (7011) of the protection unit (7010), preferably a corner connection fitting (7119d) configured to connect the side protection member (7012) to the adjacent piece (7111a) of the bottom protection member

(7011).

14. A window installation system according to claim 10, wherein the pieces (8111a, 8111b, 8111c) of the bottom protection member (8011) are connected to each other by a shield element (8118a, 8118b) in a slidable connection, at least one piece (8111a) of the bottom protection member (8011) being preferably integral with an associated side protection member (8013) to form a corner unit and at least one shield element being provided as a corner shield element (8118a).
15. A window installation system according to any of claims 10 to 14, wherein at least one bottom or side protection member (9011, 9012, 9013) is adapted for being folded so that each side protection member (9012, 9013) assumes a position substantially parallel to the bottom protection member (9011) in a supply condition and projects to the bottom protection member plane in the condition of use, a hinge link (9118) being preferably provided to connect the bottom protection member (9011) with an associated side member (9012, 9013) in a hinge connection (9118a), and at least one piece (9111c, 9111a) of the bottom protection member (9011) being preferably integral with an associated side protection member (9013, 9012) to form a corner unit, and wherein the hinge connection (9118a) of the hinge link (9118) is formed in said piece (9111c, 9111a), and the bottom protection member (9011) preferably comprising at least one other piece (9111b) connected to said at least one piece (9111c, 9111a) of the bottom protection member (9011) via said hinge link (9118), preferably such that the length of the bottom protection member (9011) is adjustable to assume a desired pre-defined length (lb) in the condition of use, more preferably by means of an engagement pin (9118b) configured to be received in one of a plurality of receiving openings (9111bx) provided in the other piece (9111b).
16. A window installation system according to any preceding claim, wherein the kit of parts is adapted to be stored and reused one or more times, preferably in a storage container such as for instance a box, a bag, a net, a strap device.
17. A window installation system according to any preceding claim, wherein the material of the bottom protection member (11) and the at least one side protection member (12, 13) comprises expanded polypropylene (EPP), expanded polystyrene (EPS) and/or hard plastic materials and/or metal.
18. A window installation system according to claim 17, wherein the window is a roof window (1) installed in an inclined roof structure of a building.

19. A method of installing a roof window (1) with a window frame (2) and a sash (3) in an inclined roof structure of a building, the window frame (2) having a top frame member (300), a bottom frame member (200), and opposing first and second side frame members (100), defining a central opening, each of the frame members (300, 200, 100) having an inner face including an interior portion (301, 201, 101) and an exterior portion (202, 102) facing the central opening, and a set of frame hinge parts (52) located at the opposing side frame members (100), and the sash (3) having a top sash member (600), a bottom sash member (500) and opposing first and second side sash members (400), together encasing a pane (4), and a set of sash hinge parts (53) located at the opposing side sash members (500), in which each pair of sash hinge part (53) and frame hinge part (52) constitute one hinge (5) of a set of hinges (5), said method comprising the steps of:

- providing a protection unit (10) formed by a kit of parts including a bottom protection member (11) and at least one side protection member (12, 13);
- mounting the window frame (2) in the inclined roof structure;
- placing the protection unit (10) to cover at least partly the inner face of the bottom frame member (200);
- placing the sash (3) on the protection unit (10), with at least the top sash member (600) in contact with the protection unit (10) such that the protection unit (10) supports the sash (3);
- engaging the sash hinge parts (53) with the corresponding frame hinge parts (52) by allowing the protection unit (10) to guide the sash (3);
- removing the protection unit (10); and
- rotating the sash (3) relative to the window frame (2).

20. The method of claim 19, wherein the exterior portion (202) of the inner side of the bottom frame members (200) is offset relative to the interior portion (201) to form a stepped portion, and the bottom protection member (11) comprises a first portion (115) having a first thickness and a second portion (116) having a second thickness different from the first thickness to provide a pre-defined profiling of the bottom protection member (11), and the bottom protection member (11) comprises a base portion (110) with a first longitudinal edge (111) and an opposed second longitudinal edge (112), each extending between one end edge (113) and another end edge (114) and defining the length (lb) of the bottom protection member (11), wherein the first portion (115) has a reduced thickness relative to the second portion (116) defining a shoulder (117) extending substantially in parallel to

and located substantially halfway between the first and second longitudinal edges (111, 112) of the bottom protection member (11), and wherein the first portion (115) is positioned adjacent to the first longitudinal edge (111) and configured to cover the interior portion (201) of the bottom frame member (200) while the second portion (116) is positioned adjacent to the second longitudinal edge (112) and configured to cover the exterior portion (202) of the bottom frame member (200) of the frame (2) of the roof window (1), and a recess (110r) is formed in the base portion (110) adjacent the second longitudinal edge (112), and wherein the step of placing the sash (3) on the protection unit (10) comprises placing a lock mechanism (8) at the top sash member (600) in said recess (110r).

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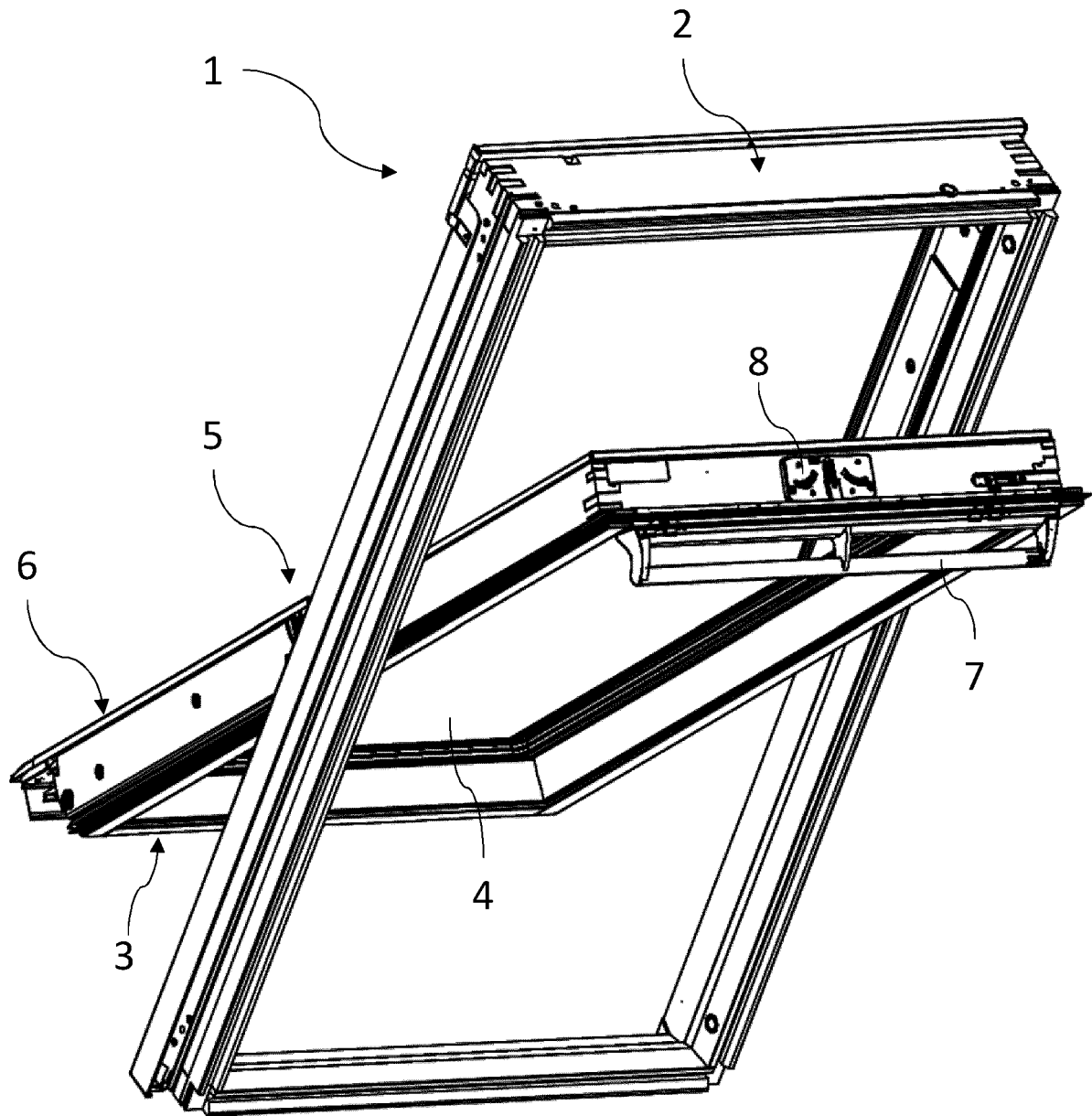


Fig. 1

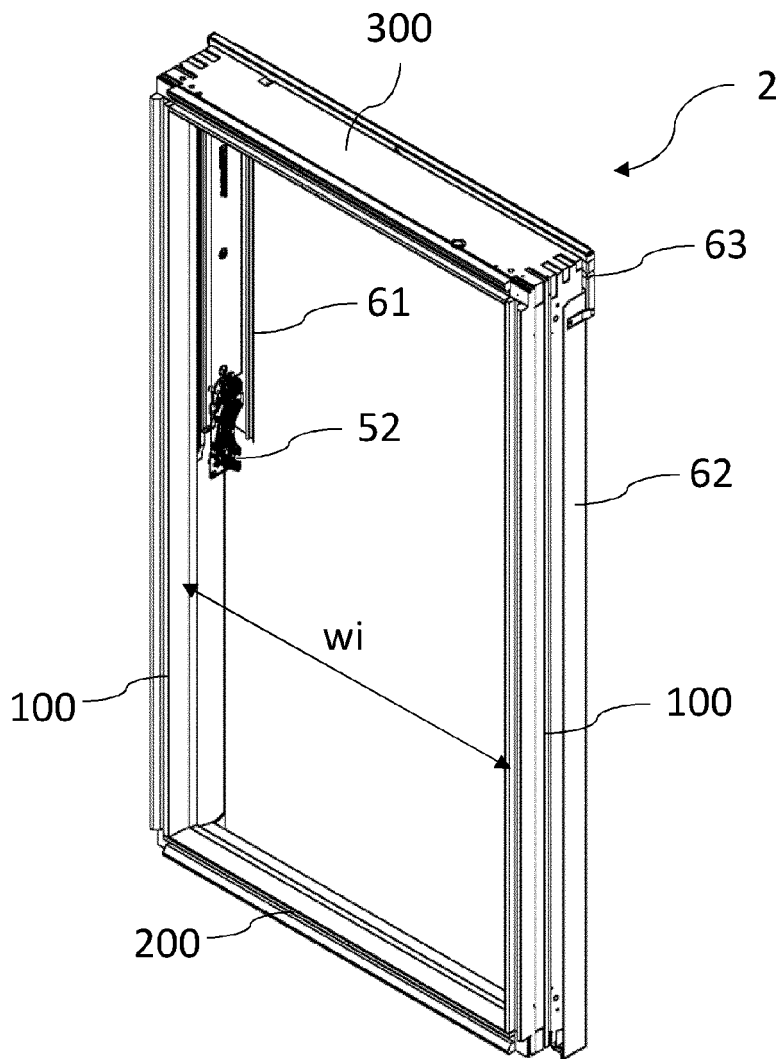


Fig. 2a

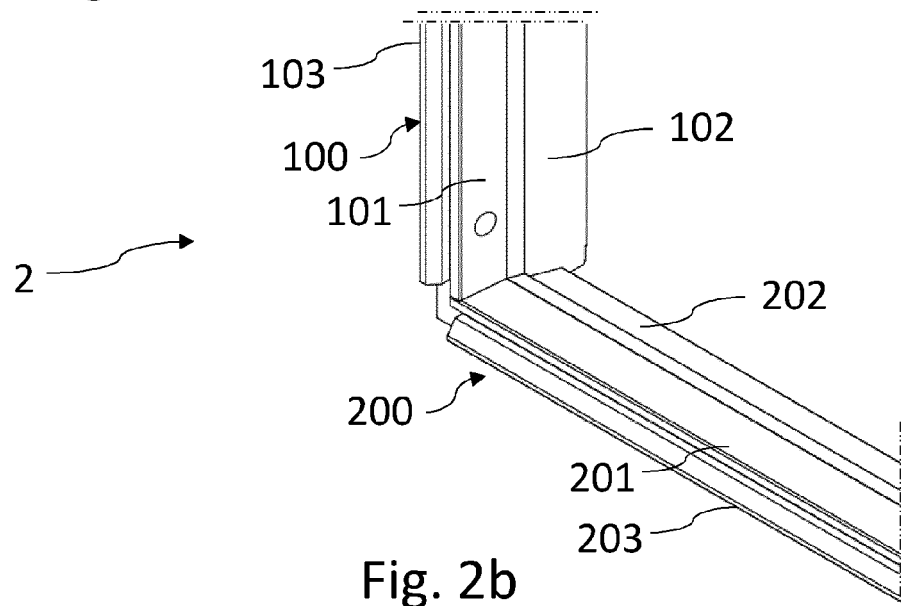


Fig. 2b

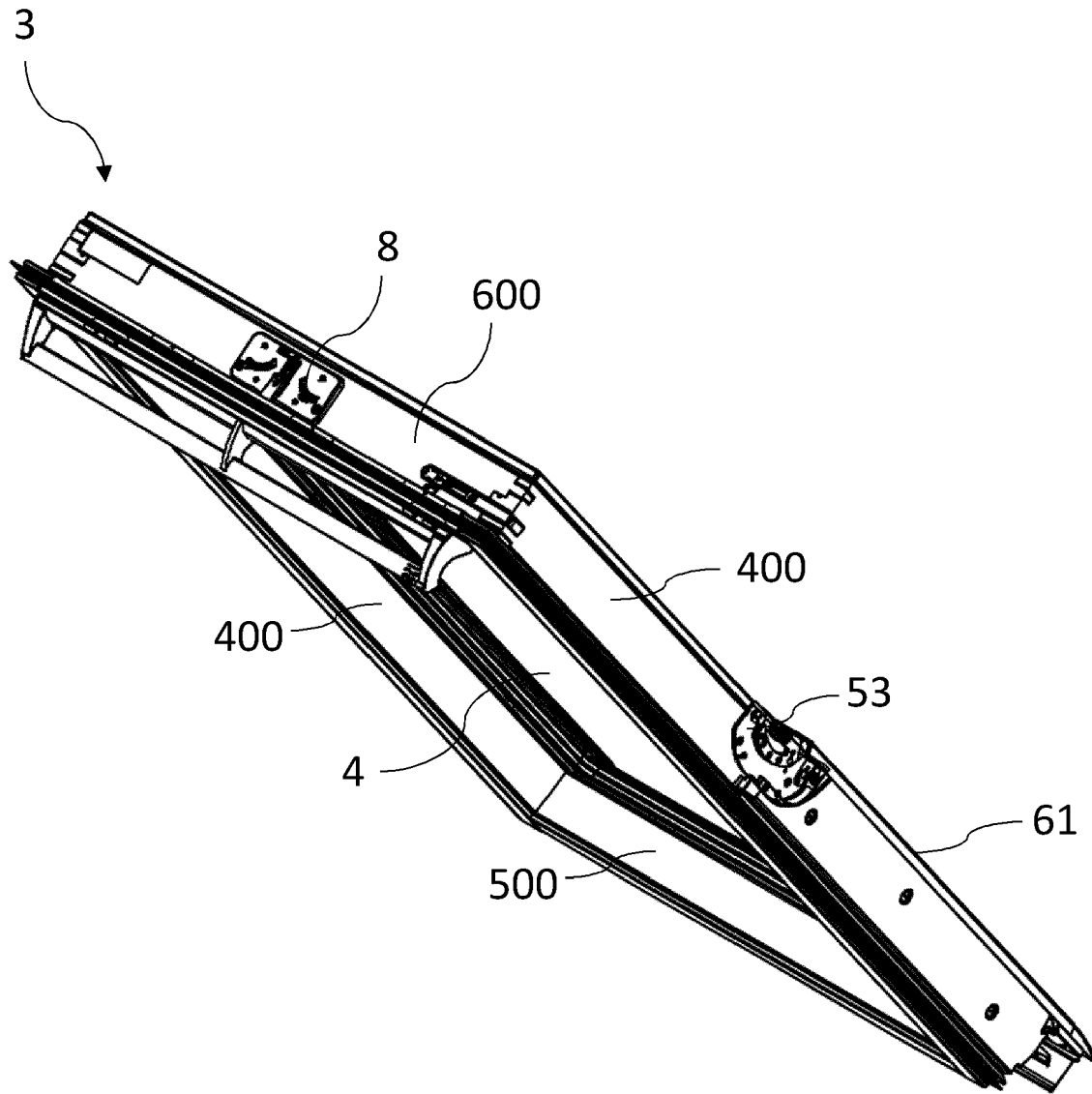


Fig. 3

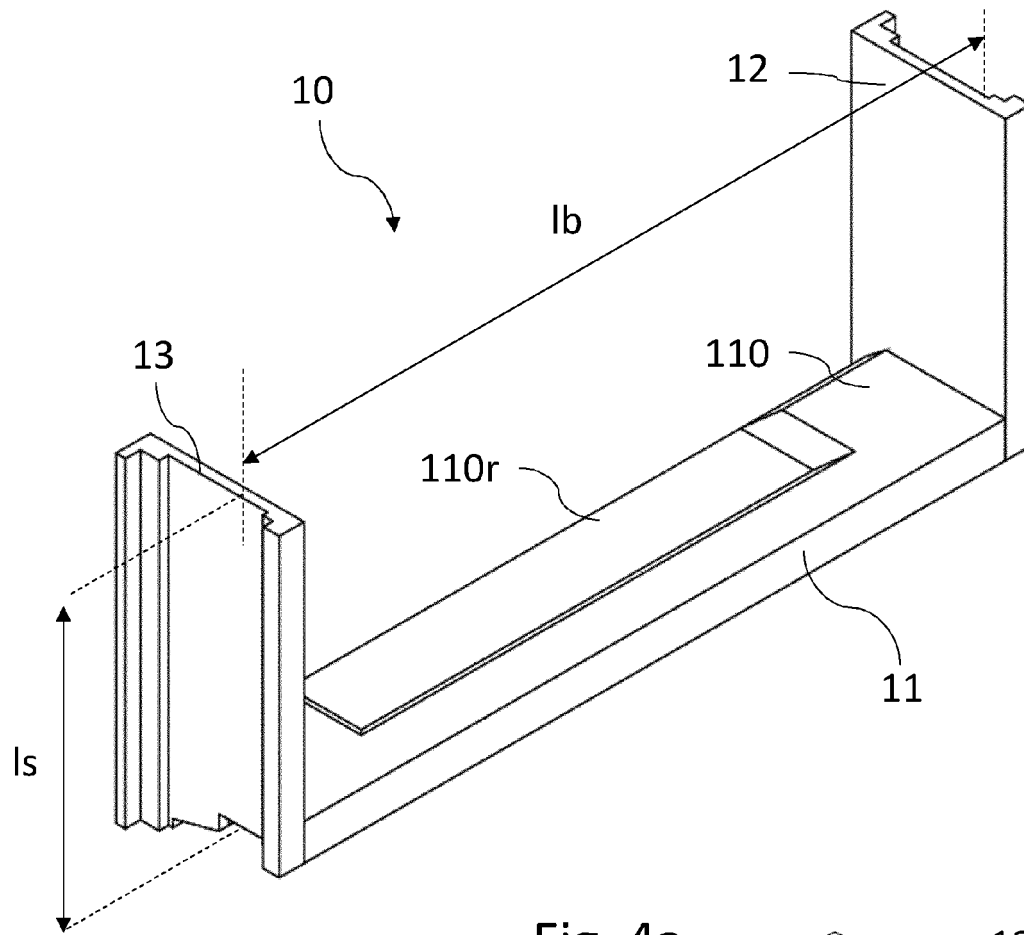


Fig. 4a

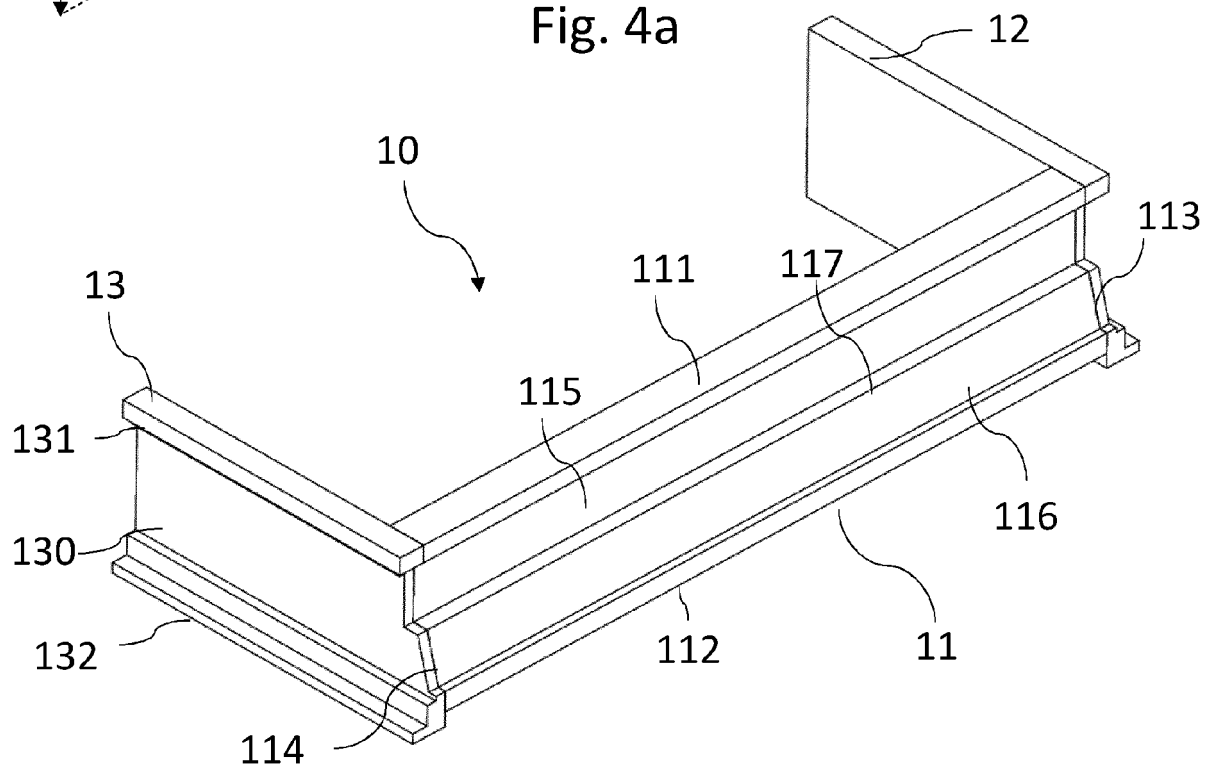


Fig. 4b



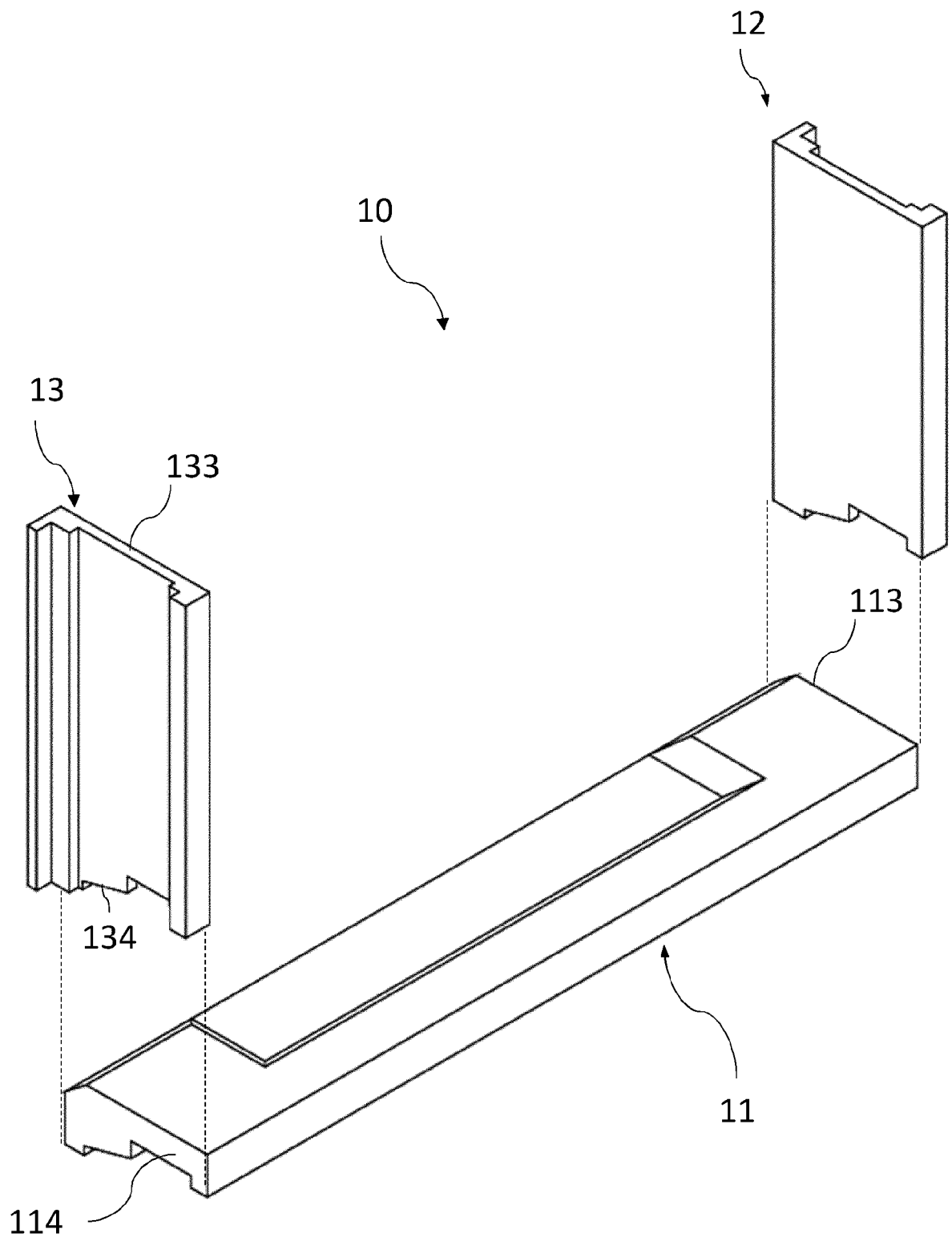


Fig. 4c

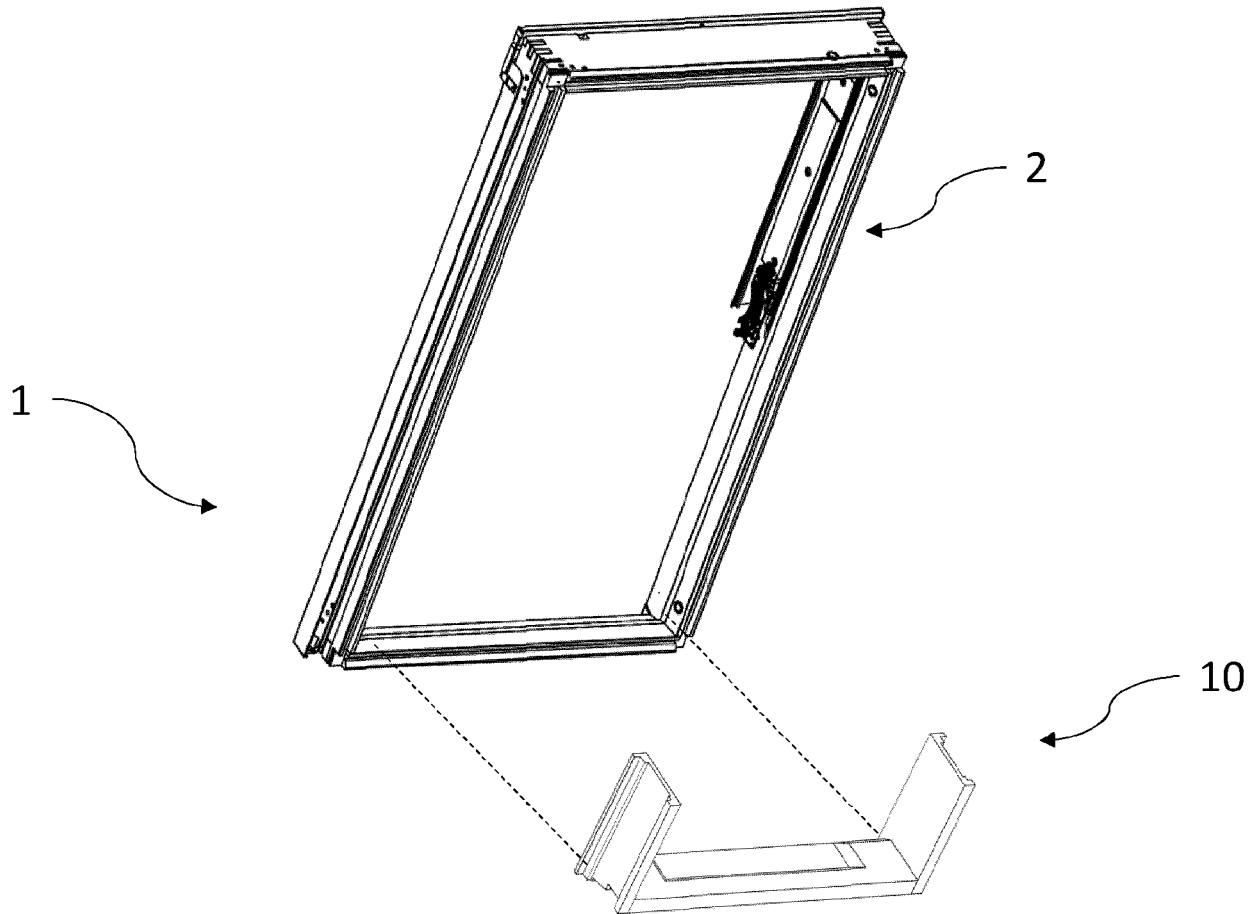


Fig. 5a

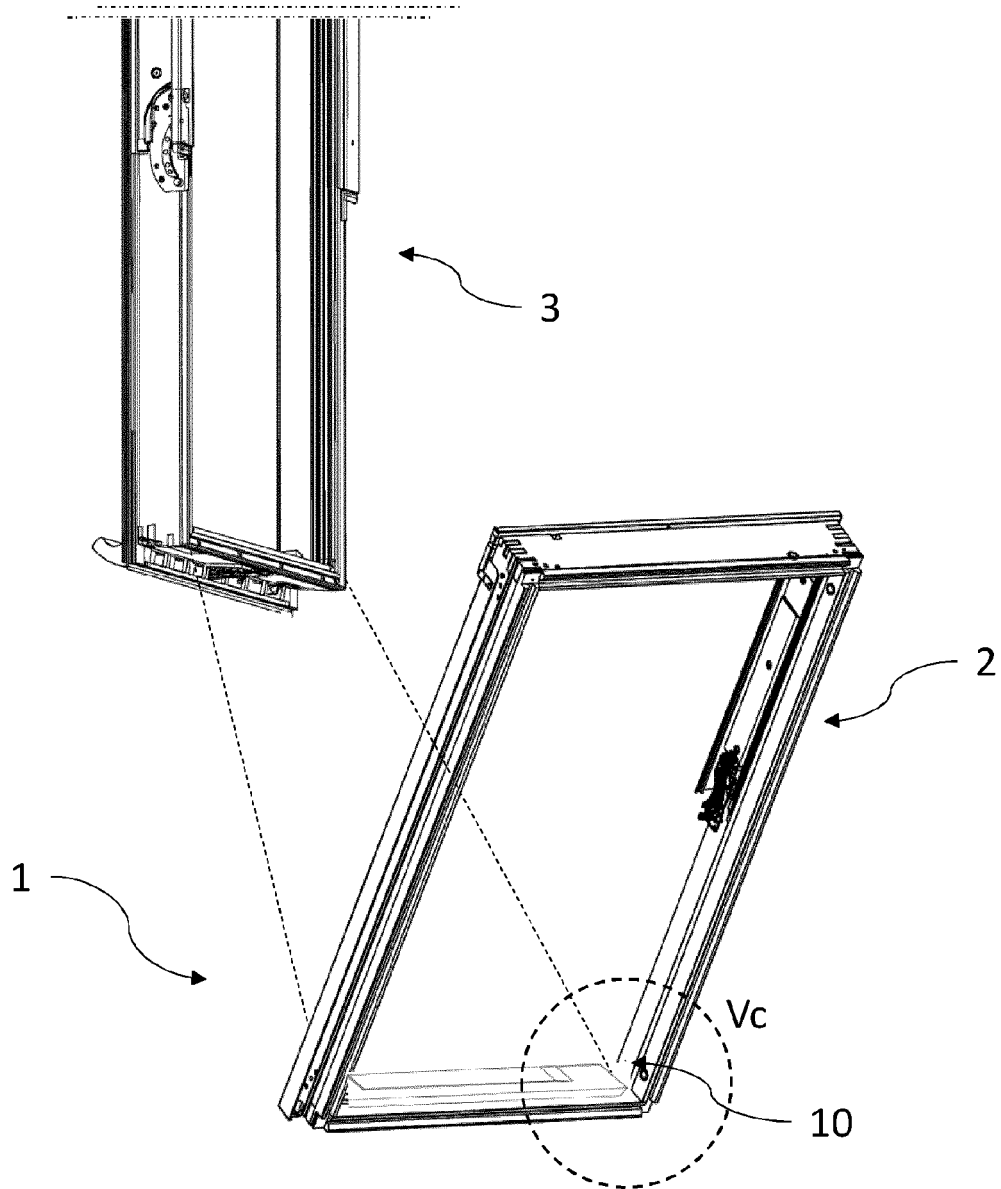


Fig. 5b

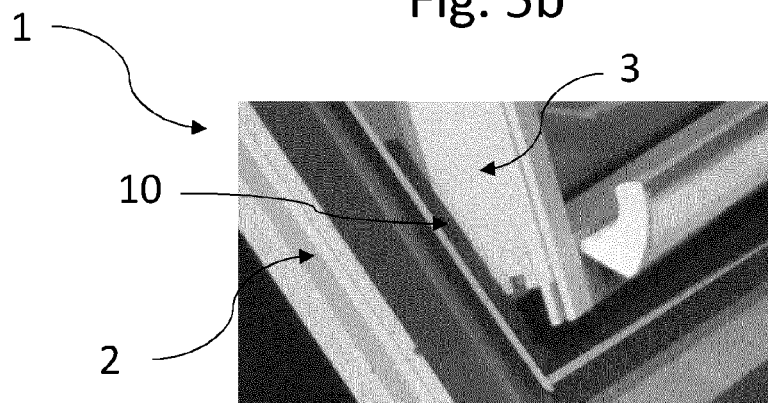


Fig. 5c

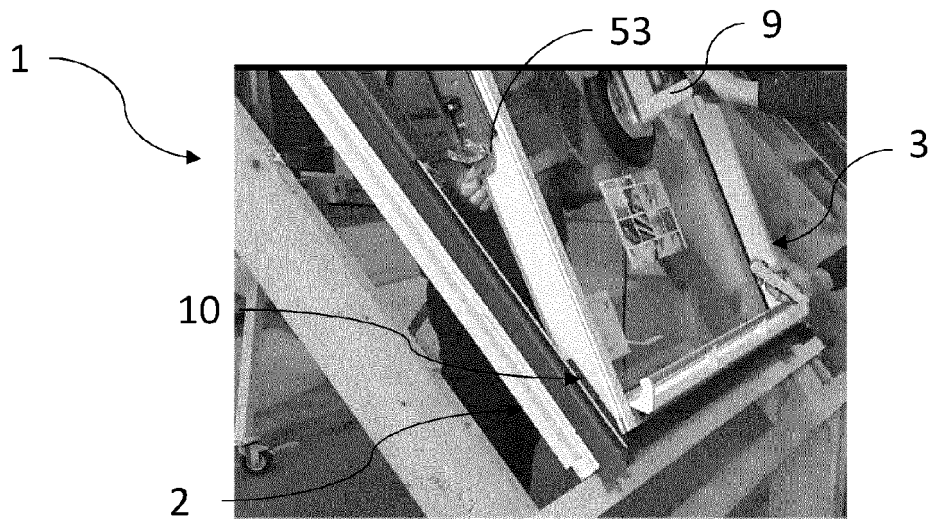


Fig. 5d

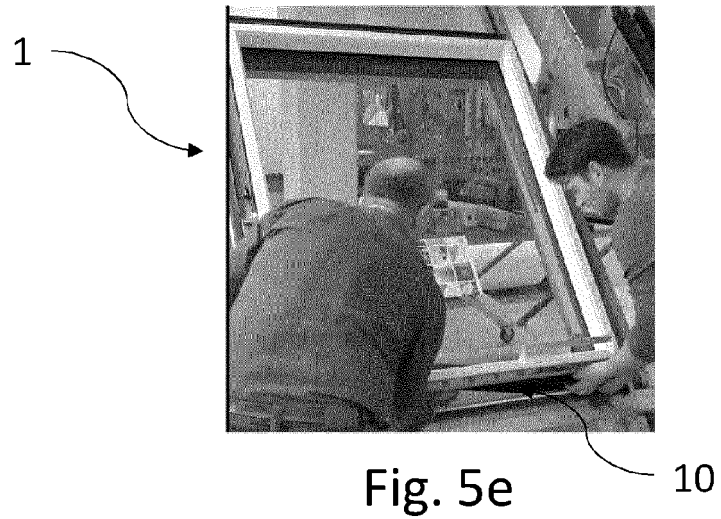


Fig. 5e

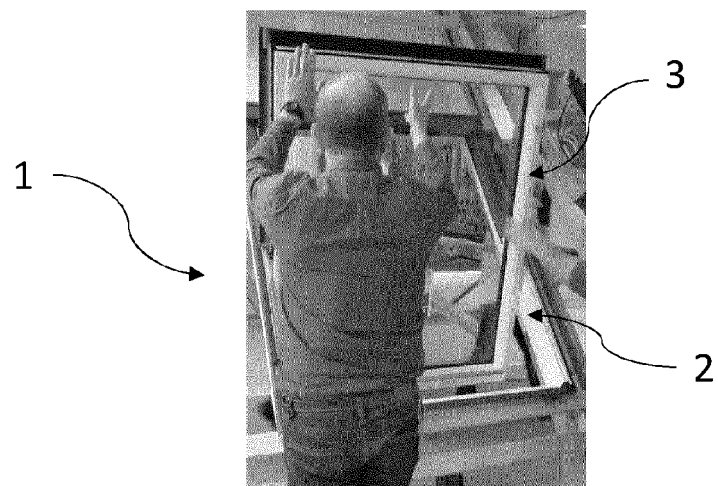


Fig. 5f

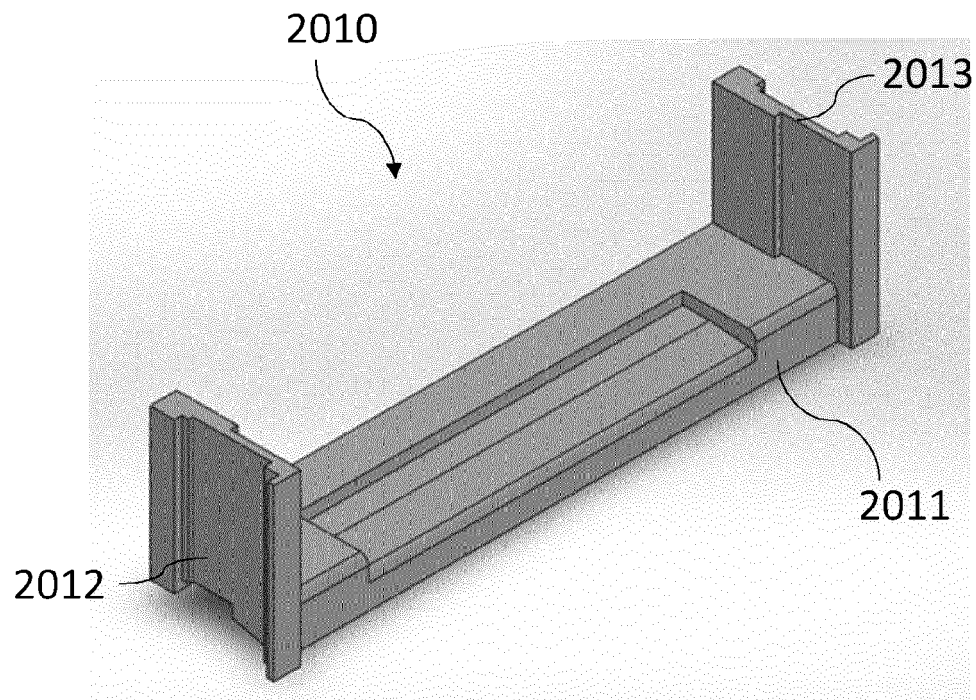


Fig. 6

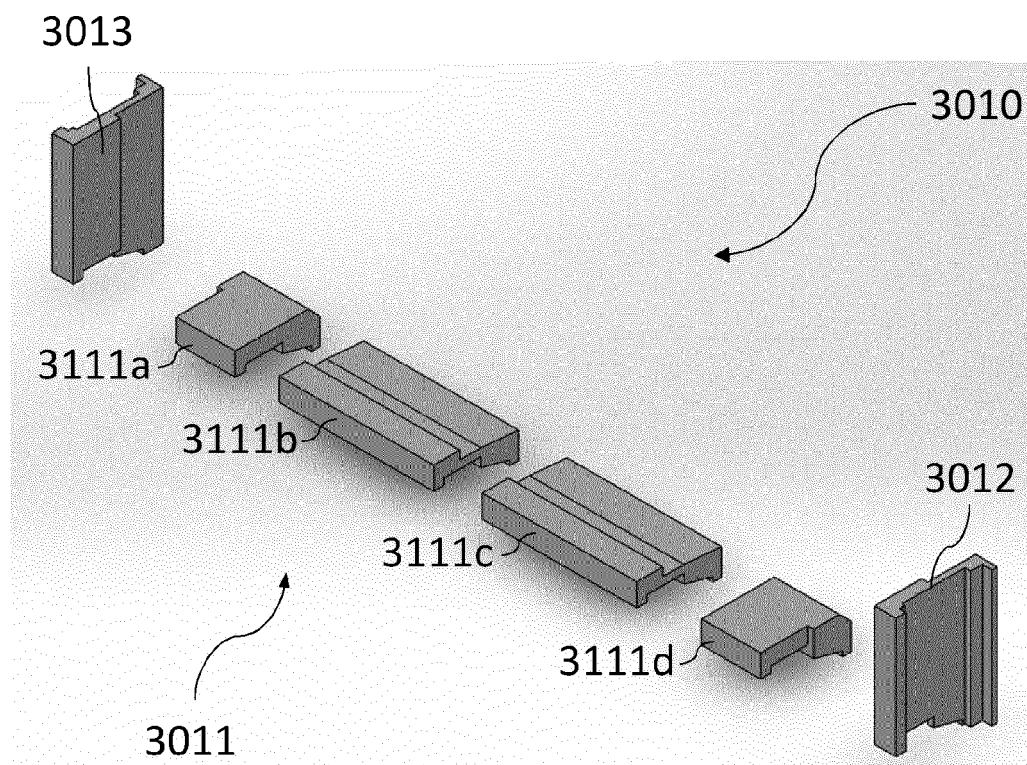


Fig. 7

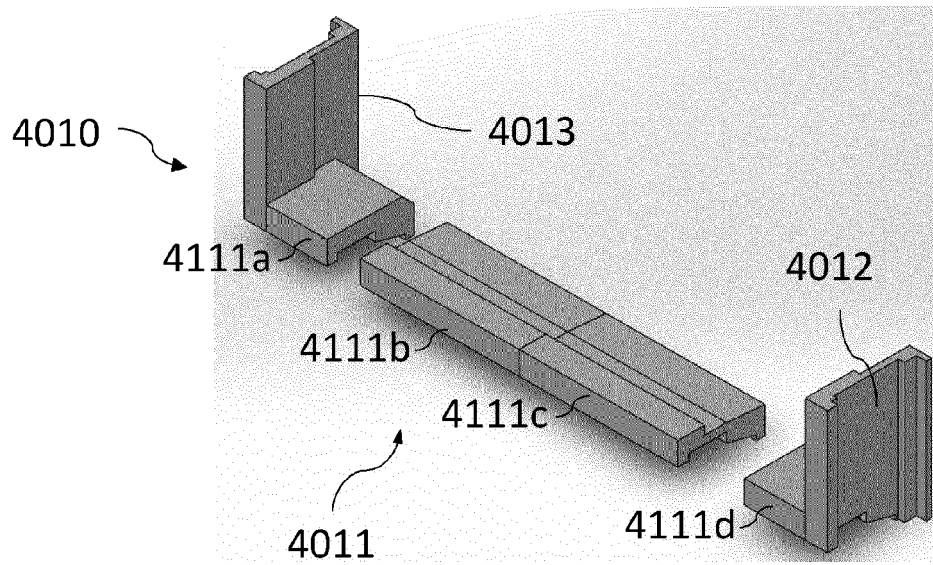


Fig. 8a

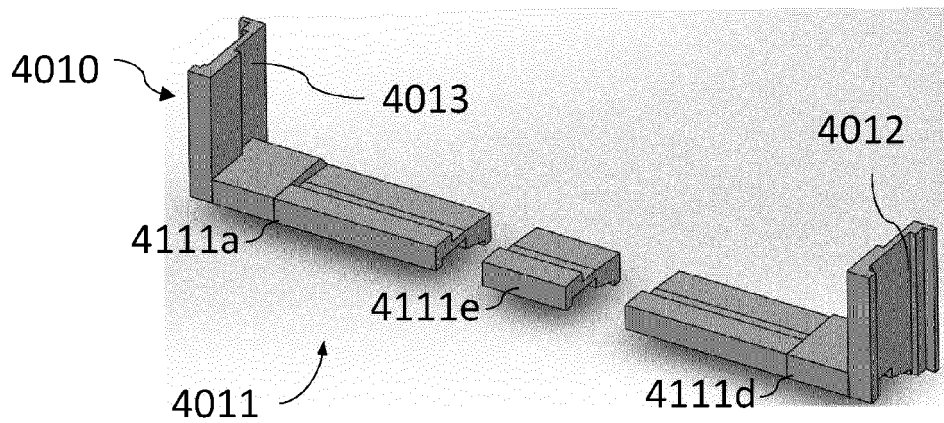


Fig. 8b

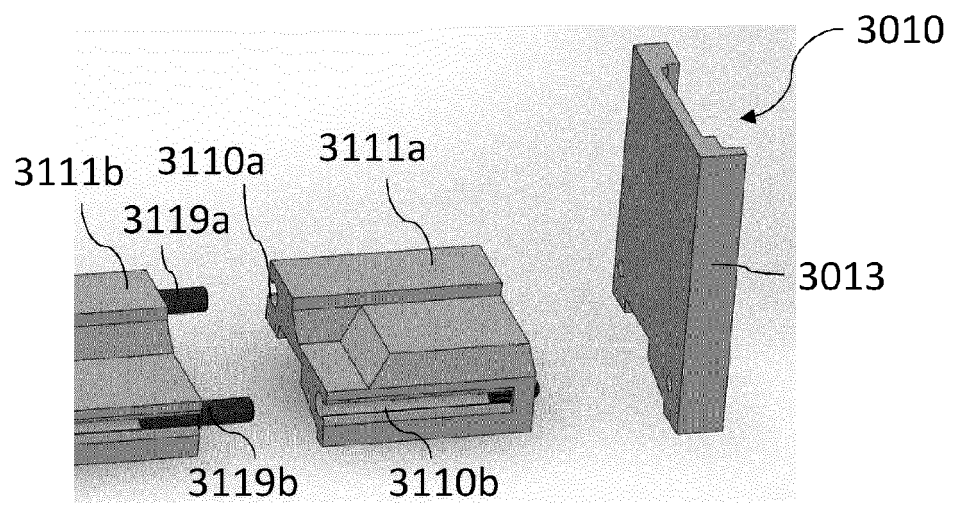


Fig. 9

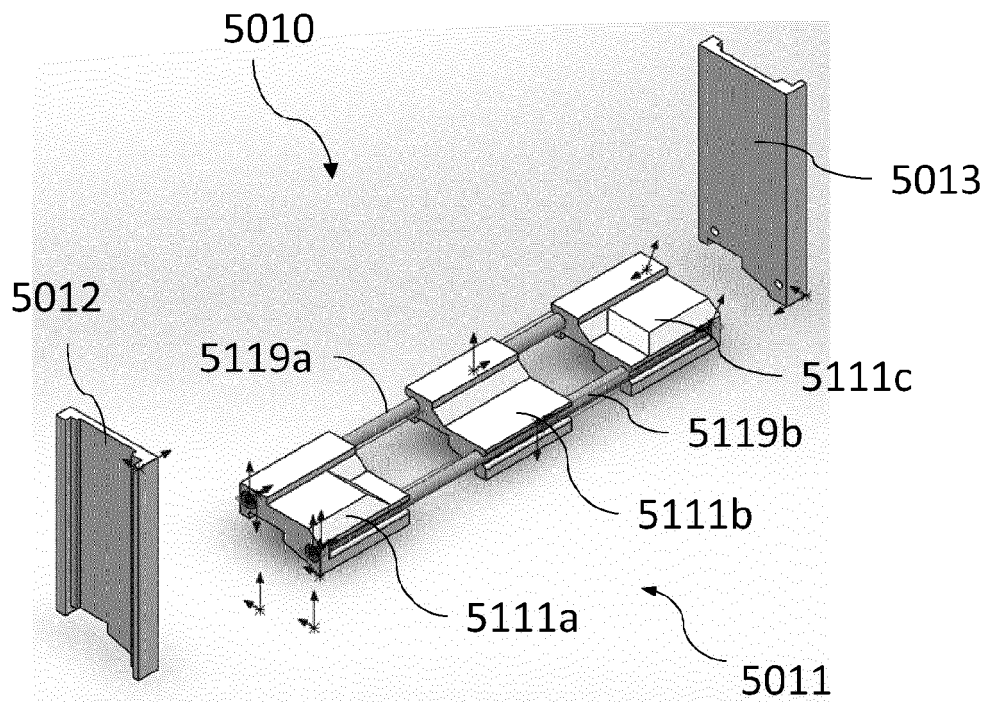


Fig. 10

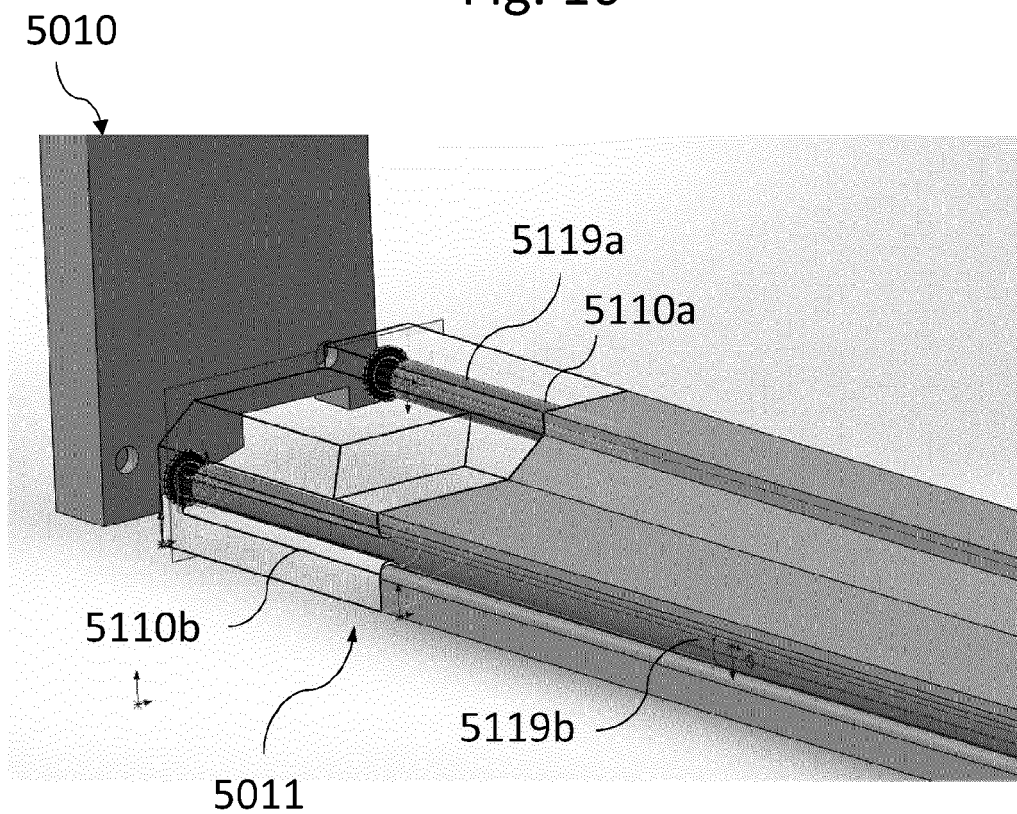


Fig. 11



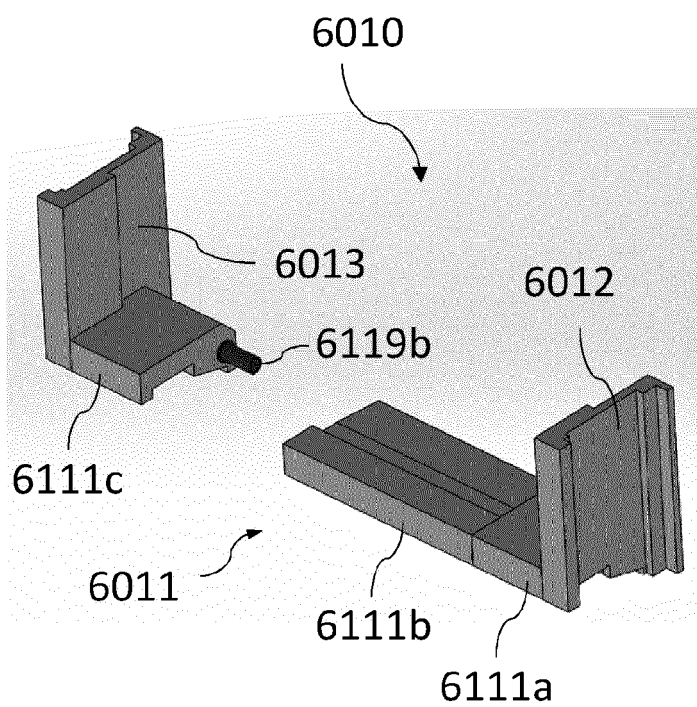


Fig. 12

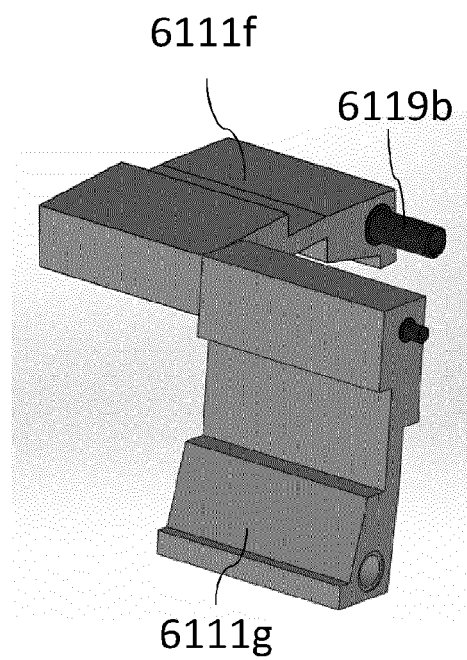


Fig. 13

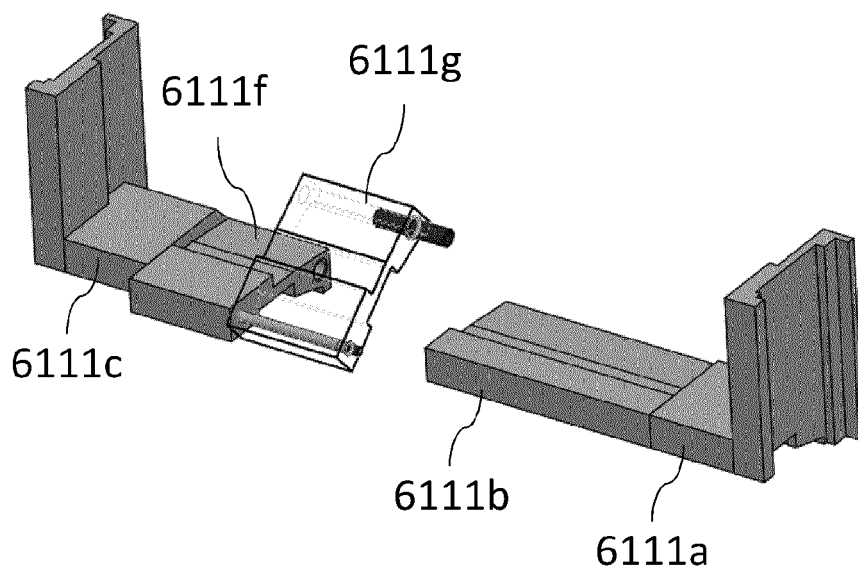


Fig. 14



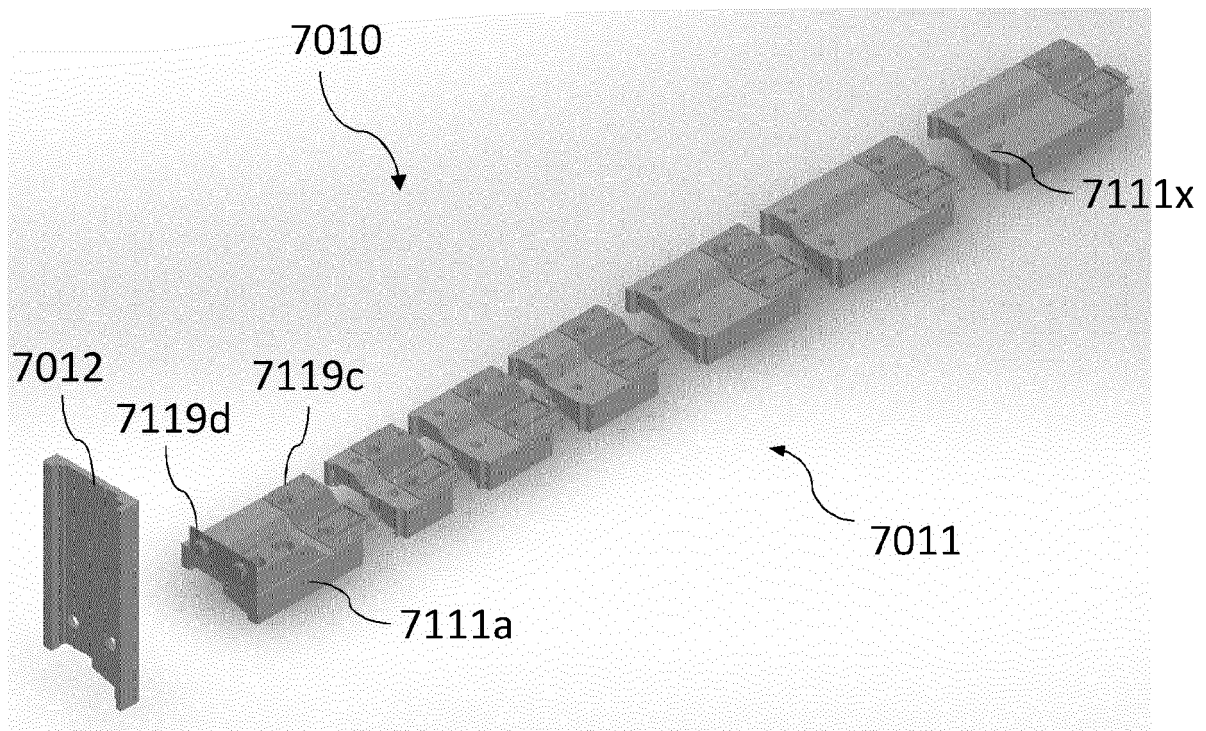


Fig. 15

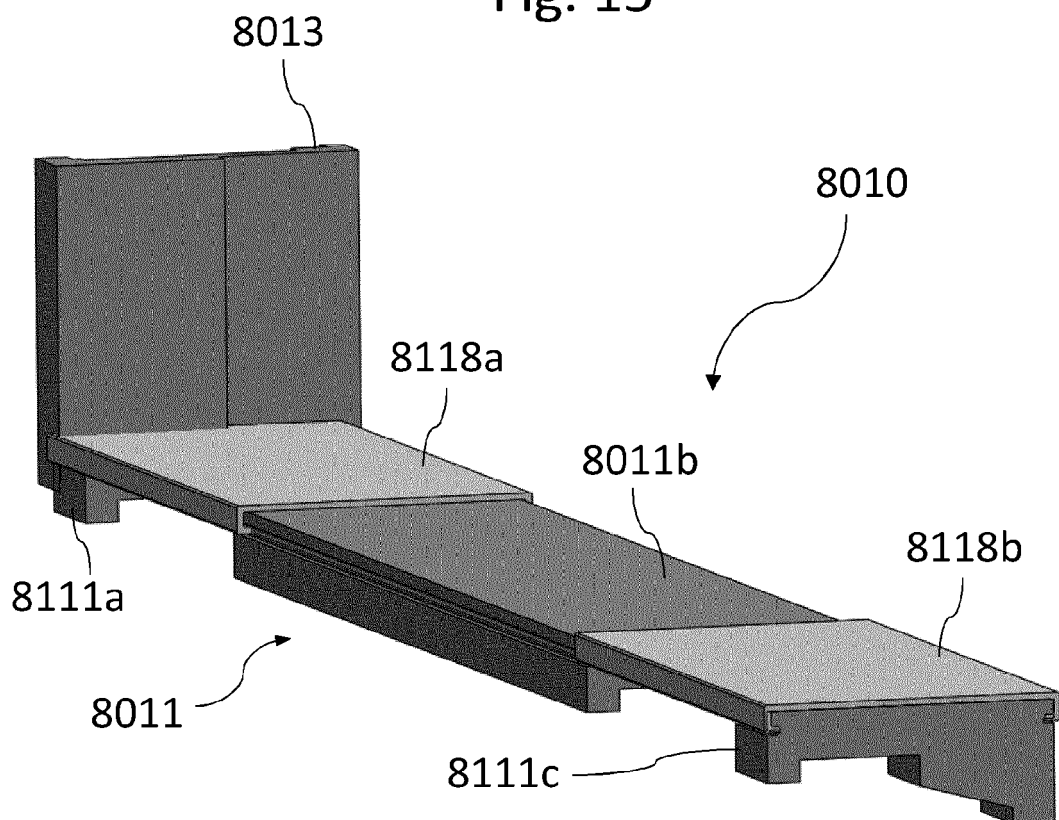


Fig. 16

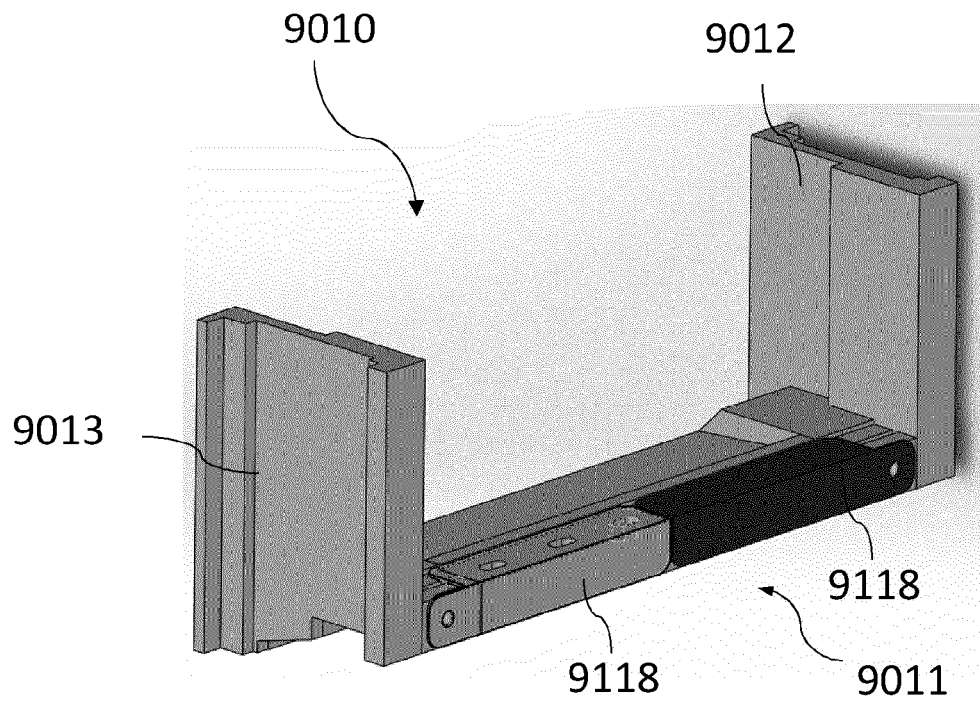


Fig. 17

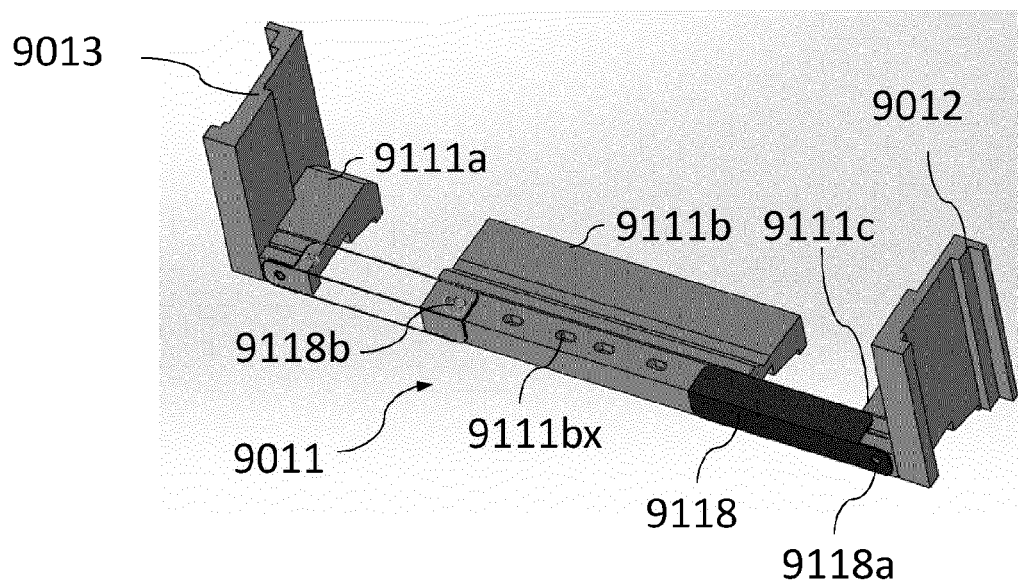


Fig. 18

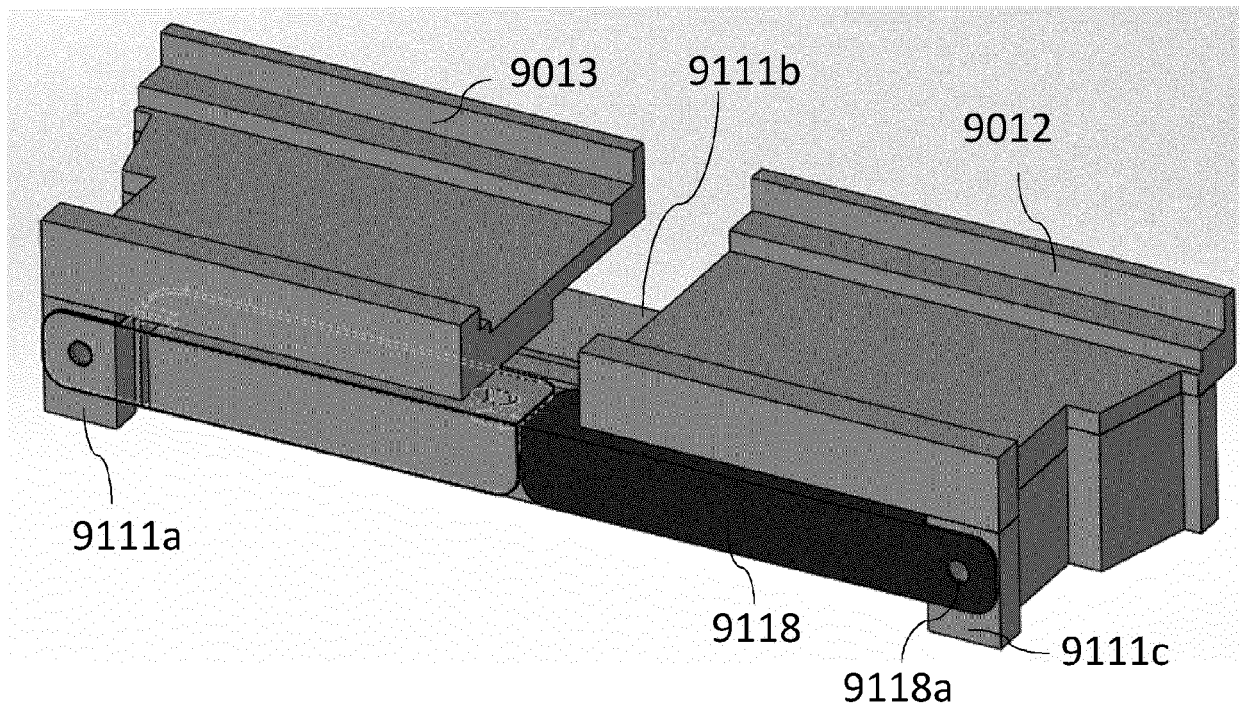


Fig. 19

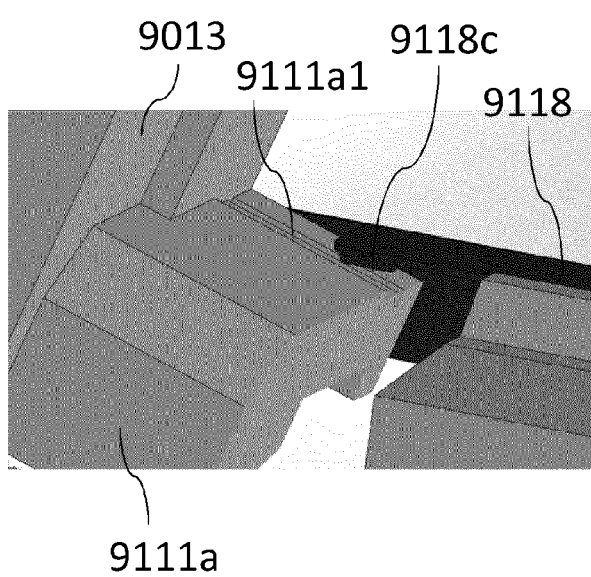


Fig. 20

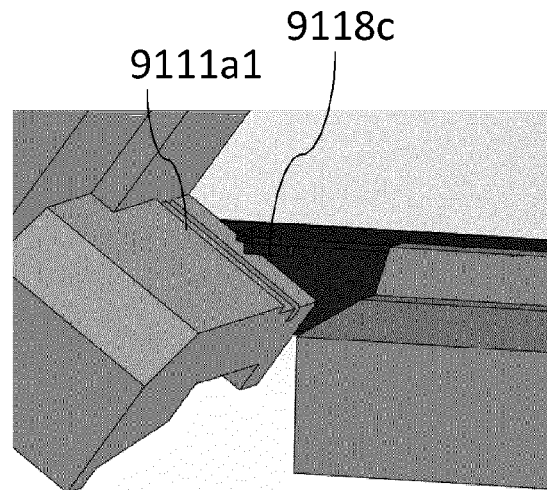


Fig. 21



## EUROPEAN SEARCH REPORT

Application Number  
EP 20 15 9927

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                |                                                             |                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document with indication, where appropriate, of relevant passages                                                  | Relevant to claim                                           | CLASSIFICATION OF THE APPLICATION (IPC) |
| X<br>A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | WO 98/22683 A1 (RASMUSSEN KANN IND AS [DK]; DYRBY ERIK BJOERN [DK] ET AL.)<br>28 May 1998 (1998-05-28)<br>* page 3; figure 1 * | 1-4,6,9,<br>10,12,<br>15-18<br>5,7,8,<br>11,13,<br>14,19,20 | INV.<br>E04D13/03                       |
| X<br>A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | EP 3 252 249 A1 (VKR HOLDING AS [DK])<br>6 December 2017 (2017-12-06)<br>* figures 4,6 *                                       | 1-4,6,9,<br>10,12,<br>15-18<br>5,7,8,<br>11,13,<br>14,19,20 |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                |                                                             | TECHNICAL FIELDS SEARCHED (IPC)         |
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