



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.10.2023 Bulletin 2023/41

(51) International Patent Classification (IPC):
E04D 13/03^(2006.01) E04D 13/035^(2006.01)

(21) Application number: **23165349.4**

(52) Cooperative Patent Classification (CPC):
E04D 13/0354; E04D 13/031

(22) Date of filing: **30.03.2023**

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

(72) Inventors:
• **Noer, Jesper Händel**
2970 Hørsholm (DK)
• **Møllenberg, Simon Gulløv**
2970 Hørsholm (DK)
• **Mønsted, David Damm**
2970 Hørsholm (DK)
• **Justesen, Tobias Clement**
2970 Hørsholm (DK)

(30) Priority: **31.03.2022 DK PA202270169**

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

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

(54) **A ROOF WINDOW ARRANGEMENT COMPRISING A PLURALITY OF WINDOW UNITS AND A COMMON FRAME, AND METHOD OF INSTALLING SUCH A ROOF WINDOW ARRANGEMENT**

(57) A roof window arrangement comprising a plurality of window units and a common frame, and method of installing such a roof window arrangement

In the roof window arrangement, a plurality of window units (21, 22, 23) are arranged in a side-by-side configuration in a common frame (10). At least one window unit (21) comprises a fixed, not-openable pane-carrying frame (221) which is configured to be installed independently into the common frame (10).

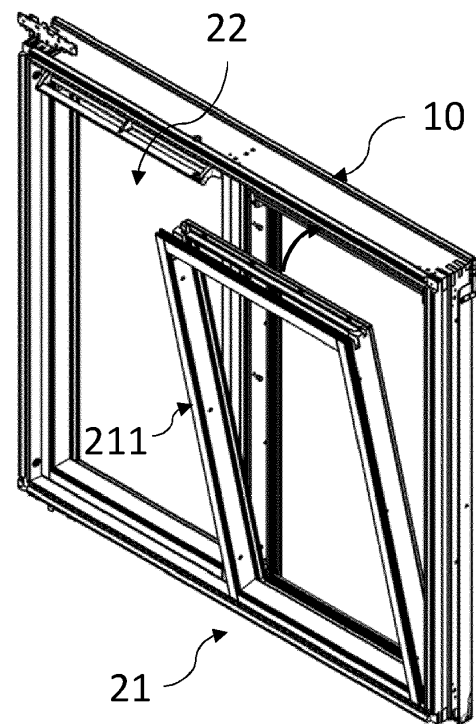


Fig. 10

Description

Technical Field

[0001] The present invention relates to a roof window arrangement comprising a plurality of window units in a side-by-side configuration in a mounted condition of the roof window arrangement, and a covering assembly including a set of coverings, each window unit comprising at least one pane-carrying frame and a pane, in which at least one window unit of the roof window arrangement comprises a pane-carrying frame in the form of an openable sash which opens about a hinge axis defined by a set of hinges, and in which a common frame is provided to act as a single, stationary frame of all of the plurality of window units in side-by-side configuration, said common frame being configured to be built into a roof surface and comprising a top member, two side members and a bottom member, and said plurality of window units comprising a first window unit with a non-openable pane-carrying frame with a top member, two side members, and a bottom member, and at least one neighbouring secondary window unit with a pane-carrying frame in the form of an openable sash with a top member, two side members, and a bottom member. The invention furthermore relates to a method of installing a roof window arrangement.

Background Art

[0002] Roof windows to be installed in inclined roof surfaces come in a variety of types, and are either installed as stand-alone window units, in which all sides of the roof window borders on the roofing, or in configurations in which several window units are built together to combine into larger arrays providing a larger light influx into a room of a building, and in which only outer sides of the outermost window units border on the surrounding roofing.

[0003] Typical configurations of twin or quadruple roof window arrangements installed side-by-side and/or above each other, respectively, are shown and described in Applicant's published international application WO 2004/055291 A1 and European patent No. EP 1 581 706 B1. The window units are typically standard roof windows in which the right side frame member of the left-hand window unit is located adjacent to the left side frame member of the right-hand window unit, and/or the bottom frame member of the upper window unit is located adjacent to the top frame member of the lower window unit. In a roof structure comprising rafters and battens, at least one rafter and a number of battens will typically need to be removed to provide a sufficiently large aperture in the roof surface and roof structure, while specially designed gap trimmers are normally mounted between the window units and fastened to the roof structure in order to ensure sufficient strength and support for the roof window arrangement.

[0004] A more elaborate roof window arrangement is

shown and described in Applicant's German utility model registration No. 20 2018 100 516 and European patent No. EP3406818B1. In the latter document, corresponding to commercial counterpart VELUX® Dormer, two rows of each three window units are connected to a respective frame structure positioned at an obtuse angle relative to each other such that the roof window arrangement protrudes from the roof surface.

[0005] The standard roof windows constituting the window units of the prior art roof window arrangements are installed with a relatively small distance between adjacent side frame members, typically about 18 mm, which leaves sufficient space for trimmers etc. Common to all of the above roof window arrangements is that the window units are protected from the weather by means of a covering assembly comprising a combination of flashing, cover and cladding elements which provide a weather-tight transition to the surrounding roofing and ensure tightness around each window unit and between adjacent window units. Even though the prior art covering assemblies function well, they are dependent on a relatively large number of tailor-made components that must be manufactured, stored, transported, and assembled at the building site.

[0006] To alleviate these challenges, Applicant's published European patent application EP 3 828 359 A1 shows and describes a roof window arrangement of the kind mentioned in the introduction. While providing a great degree of standardisation and a desired "slim look" due to the reduced distance between neighbouring window units, installation of the roof window arrangement has proven challenging.

Summary of Invention

[0007] With this background, it is therefore an object of the invention to provide a roof window arrangement by which installation is facilitated.

[0008] In a first aspect, this and further objects are achieved with a roof window arrangement of the kind mentioned in the introduction which is furthermore characterised in that the common frame further comprises at least one mullion extending between the top member and the bottom member and being substantially parallel to the two side members of the common frame, that in the mounted condition of the roof window arrangement, each side member of the pane-carrying frame of the first window unit is configured to be brought into abutment with a respective one of: a mullion and a side member of the common frame, and that at least the pane-carrying frame of the first window unit is configured to be releasably connected to the mullions, or to the mullion and the side member of the common frame, so as to allow the first window unit to be installed independently of the installation of the common frame.

[0009] In this way, the pane-carrying frame of the fixed, i.e. non-openable, window unit may be set aside while the common frame is installed in a first installation step.

Typically, the secondary window unit or units may be dismantled from the common frame in any event, and hence, the installation of the common frame takes place without the added weight. The mullion or mullions provide(s) additional stability to the common frame such that the rectangularity is maintained more easily.

[0010] In a second aspect, a method of installing a roof window arrangement is provided.

[0011] Other presently preferred embodiments and further advantages will be apparent from the subsequent detailed description and drawings.

Brief Description of Drawings

[0012] In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is an isometric view of a roof window arrangement in a first embodiment of the invention, seen from an interior side of the roof window arrangement in a mounted condition;

Fig. 2a is in exploded perspective view of a common frame with mullions of the roof window arrangement in the first embodiment;

Fig. 2b is a perspective view of a common frame in accordance to some embodiments where the mullions are integrally formed and the common frame is configured for secondary windows which are pivot-hung.

Fig. 2c is a perspective view of a common frame according to other embodiments of the invention where the mullions are integrally formed and the common frame is configured for secondary windows which are top-hung.

Fig. 3 is a perspective view, seen from an exterior side of the roof window arrangement of the first embodiment;

Fig. 4 is an isometric view of a roof window arrangement in a second embodiment of the invention, seen from the interior;

Fig. 5 is an exploded perspective view of a common frame with a mullion of the roof window arrangement in the second embodiment;

Fig. 6 is a perspective view, seen from the exterior, of the roof window arrangement of the second embodiment;

Fig. 7 is a sectional view along the line VII-VII in Fig. 6;

Fig. 8 is a sectional view, on a larger scale, of details shown in Fig. 7;

Fig. 9 is a view corresponding to Fig. 5, with further details of the roof window arrangement of the second embodiment;

Figs 10 and 11 are schematic isometric views of the roof window arrangement of the second embodiment during steps of installation of a non-openable, fixed window unit;

Figs 12 and 13 are schematic isometric views of the roof window arrangement of the second embodiment, showing uninstallation of the fixed window unit; Figs 14 and 15 are views corresponding to Figs 10 and 11, of the roof window arrangement of the first embodiment;

Fig. 15a shows an embodiment where the first window is fastened to the mullions.

Fig. 15b shows an embodiment where the first window is fastened to a top member of a common frame. Fig. 16 is a perspective view of the roof window arrangement of the first embodiment, in a condition of use;

Fig. 17 is a sectional view along the line XVII-XVII in Fig. 3;

Fig. 18 is a sectional view, on a larger scale, of details shown in Fig. 17;

Fig. 19 is a perspective sectional view along a line parallel to the line XVII-XVII in Fig. 3;

Fig. 20 is an exploded perspective view of details of the roof window arrangement of the first embodiment;

Fig. 21 is a partial perspective view, on a larger scale, of details of the roof window arrangement shown in Fig. 20;

Figs 22 and 23 are perspective views from different angles of details of the roof window arrangement shown in Fig. 20;

Fig. 24 is a sectional view along the line XXIV-XXIV in Fig. 3; and

Fig. 25 is a perspective sectional view, corresponding substantially to Fig. 24.

Description of Embodiments

[0013] In the figures of the drawings, embodiments of a roof window arrangement according to the invention are shown.

[0014] Referring initially to Figs 1 to 3, a first embodiment of a roof window arrangement 1 is presented, comprising a plurality of window units 21, 22, 23 configured side-by-side, and as seen from the interior of a room of a building with a roof surface (not shown), in which the roof window arrangement 1 is installed in a mounted condition of the roof window arrangement 1. In the embodiment shown, three window units 21, 22, 23 are present, but other configurations involving two or more than four window units are conceivable as will be described in connection with the second embodiment below.

[0015] Each window unit 21, 22, 23 comprises a pane-carrying frame 211, 221, 231 and a pane 214, 224, 234. A common frame 10 acts as a single, stationary frame of all of the plurality of window units 21, 22, 23 in the side-by-side configuration. The common frame 10 is configured to be built into the roof surface and connected to the underlying roof structure by means of a set of fittings represented by mounting bracket 3.

[0016] A covering assembly generally designated 5 is

shown as well. The covering assembly 5 provides covering for each window unit as will be described in further detail below.

[0017] Fig. 2 shows the common frame 10, comprising a frame top member 11 of the common frame 10, spanning all three window units 21, 22, 23 in the mounted condition, two frame side members 12 and 13, and a frame bottom member 14.

[0018] The at least one mullion 15, 16, 17 may be fastened to the common frame 10 by fastening means such as screws. In other reliable embodiments the common frame 10 and the mullions 15, 16, 17 are integrally formed, as shown in Fig. 2b and 2c. In such embodiments, the common frame and mullions are preferably made from a suitable polymer, such as polyurethane. The common frame may be manufactured by cast moulding. Alternatively, in not shown embodiments, the engagement between the mullion or mullions and the common frame could be provided by for instance form-locking engagement such that the use of separate fastening means is avoided.

[0019] The dimensions of the window units forming part of the roof window arrangement are typically chosen in accordance with specific installation conditions, including the area of the room of the building, the available roof surface etc. In the below configuration with three window units 21, 22, 23, the overall outer measures wf, hf of the common frame 10 generally present a substantially reduced width wf compared to the total width of three standard roof windows having the same size panes. The height hf generally corresponds to that of a standard roof window.

[0020] In the first embodiment, the common frame 10 further comprises two mullions 15, 16 extending between the top member 11 and the bottom member 14 and being substantially parallel to the two side members 12, 13 of the common frame 10.

[0021] In the embodiment shown in these figures, the three window units 21, 22, 23 have the following configuration:

Referring to Fig. 1, the first window unit 21 has a pane-carrying frame 211 with a top member 2111, two side members 2112 and 2113, and a bottom member 2114. As will be described in further detail below, the pane-carrying frame 211 constitutes a fixed, i.e. not openable structure, and is configured to be mounted independently of the remaining components of the roof window arrangement 1. In the following, reference will be made to the first window unit 21 as "fixed". This is to be construed as synonymous to "non-openable"; as will be apparent, at least parts of the first window unit 21 are configured to be releasably connected to other parts of the roof window arrangement 1. The parts of the first window unit 21 that are to be connected to the common frame 10 independently include at least the pane-carrying frame 211. The pane 214 is by some distance the heaviest element of the first window unit 21.

[0022] The second window unit 22 has a pane-carrying

frame in the form of an openable sash 221 with a top member 2211, two side members 2212, 2213, and a bottom member 2214, and the third window unit 23 has a pane-carrying frame in the form of an openable sash 231.

[0023] The general configuration of the third window unit 23 substantially corresponds to the openable sash 221, and elements of the third window unit 23 will only be described where suitable. In the embodiment shown, the second window unit 22 is positioned between the first window unit 21 and the third window unit 23.

[0024] The openable second and third window units 22, 23 are configured to be top-hung during normal use, representing a first operational condition, in which each openable sash 221, 231 is able to rotate about a primary hinge axis α_1 (shown in Fig. 3), but which is able to assume a second operational condition in which the openable sash 221, 231 pivots for cleaning purposes, about a secondary hinge axis α_2 . Details of the principles allowing such operations and coupling to a lifting device are found in Applicant's European patent No. 0 733 146 B1 and international published application WO 2019/101281.

[0025] Opening and closing of the openable sash 22, 23 during normal use is carried out by means of a handle 227, 237 connected to the respective bottom member 2214, 2314. Activating the second operational condition is carried out by a ventilation flap 228, 238 at the respective top member 2211, 2311 (shown in Fig. 17).

[0026] Also visible in Fig. 2 are reinforcement members 111 at the frame top member 11. Such a reinforcement member is known as such from Applicant's EP 3 564 460 B1.

[0027] Referring now to Figs 4 to 6, views corresponding to Figs 1 to 3 are shown, of a second embodiment, in which two window units 21 and 22 are present in common frame 10. Reference numerals having the same or analogous function are denoted by the same reference numerals in the first and second embodiments, and only differences will be discussed in detail.

[0028] The common frame 10 here comprises a single mullion 17.

[0029] In the second embodiment, the first window unit 21 is fixed and the second window unit 22 openable. The openable sash 221 of the second window unit 22 opens about a hinge axis α (shown in Fig. 10) defined by a set of hinges 212, 213, 232, 233. The hinges may be of any suitable kind, here shown as pivot hinges as for instance disclosed in Applicant's EP 1 038 083 B1, EP 1 781 883 B1, EP 2 770 146 A1 and EP 2 770 149 A1, or as a so-called pantograph hinge as described in Applicant's -pending international application WO 2017/076416 A1. The set of hinges of each of the first window unit 21 and the third window unit 23 comprises two sash hinge parts 212, 213, 232, 233 connected to the respective openable sash 211, 231.

[0030] Referring to Fig. 7, the first window unit 21 is shown, where each side member 2112, 2113 of the pane-carrying frame 211 of the first window unit 21 is brought

into abutment with the mullion 17, and the side member 12 of the common frame. The pane-carrying frame 211 of the first window unit 21 is releasably connected to the mullion 17 and the side member 12 of the common frame 10, so as to allow the first window unit 21 to be installed independently of the installation of the common frame 10.

[0031] Also, that ensures that the first window unit 21 is configured to be installed independently of the installation of the neighbouring secondary window unit 22.

[0032] The pane-carrying frame 211 of the first window unit 21 may alternatively and/or additionally be releasably connected to the top member 11 of the common frame 10 and/or to the bottom member 14 of the common frame 10. Thus, in some very reliable embodiments, the pane-carrying frame 211 of the first window unit 21 is releasably connected to the top member 11 of the common frame 10, as shown in Fig. 15b. By being only releasably connected to the top member 11 of the common frame 10, the window is securely fastened while reducing the number of fastening means and reducing installation time.

[0033] The inner sides of the side member 12 and the mullion 17 facing the pane-carrying frame 211 of the first window unit 21 are configured to allow the pane-carrying frame 211 to be installed from an interior side of the roof window arrangement 1, when the common frame 10 is in its mounted condition.

[0034] As shown in Figs 11 and 13, the side member 2113 of the pane-carrying frame 211 of the first window unit 21 is fixed to mullion 17 by releasable fastening means 4, comprising a set of screws 41 and cover plugs 42. The pane-carrying frame 211 of the first window unit 21 is detachable from the common frame 10 from the interior side of the roof window arrangement 1 in the absence of the fastening means 4. The pane-carrying frame 211 may be fixed to the top member 11 of the common frame 10 and/or the bottom member 14 of the common frame 10, by releasable fastening means 4 comprising a set of screws 41 and cover plugs 42.

[0035] The covering assembly 5 of the roof window arrangement 1 in the first embodiment shown in Fig. 3 will now be described in some detail. Reference is also briefly made to Figs 24 and 25. The description will be made in conjunction with the description of the covering assembly 5 of the second embodiment, shown in Fig. 6.

[0036] The set of coverings of the covering assembly 5 associated with the first window unit 21 are fastened to components of the common frame 10 and to the neighbouring secondary window unit 22, 23.

[0037] The neighbouring secondary window units 22, 23 are top-hung about a primary hinge axis α_1 in a first operational condition. The secondary window units comprise a handle 227, 237 (shown in Fig. 1) comprising an espagnolette mechanism (shown in Fig. 2) cooperating with one striking plate 142a, 142b, 143a, 143b. As shown in Fig. 1, the secondary units 22, 23 further comprise a ventilation flap 228, 238 to provide ventilation and to allow activation of a second operational condition in which the

sash 221, 231 of the secondary window unit 22, 23 is pivotable around a secondary hinge axis α_2 .

[0038] In Fig. 3, the covering assembly 5 comprises a top casing 5220, 5230, two side sash coverings 5221a, 5222a, 5231a, 5232a, two side frame coverings 5221b, 5222b, 5231b, 5232b and a bottom sash covering 5223, 5233 for each secondary window unit 22, 23. The covering assembly further comprises a top casing 511 and a bottom covering 514 for the first window unit 21. The top casing 511 is connected to the frame top member 11 of the common frame 10. The bottom covering 514 is connected to the frame bottom member 14 of the common frame 10.

[0039] Each of the neighbouring secondary window units 22 is pivot-hung about a hinge axis α by means of a hinge assembly 6 (shown in Fig. 8).

[0040] Referring to Fig. 6, the covering assembly 5 further comprises a common top casing 510 connected to the frame top member 11 of the common frame 10, two lower side sash coverings 5221, 5222, an upper side frame covering 513 and a mullion side frame covering 517. The covering assembly 5 further comprises a bottom sash covering 5223 for each secondary window unit 22, two side coverings 512a, 512b and a bottom covering 514 for the first window unit 21. The side coverings 512a, 512b are connected to a frame side member 12 (not shown) of the common frame 10. The bottom covering 514 is connected to the frame bottom member 14 (not shown) of the common frame 10.

[0041] Referring now to Figs 7 and 8, the frame side member 12 of the common frame 10 comprises a frame insert element 18. The side covering 512a is connected to the frame insert element 18.

[0042] Each pane 214, 224 is associated to a set of sash profiles 541, 542 functioning as glazing beads at border portions of the pane 214, 224, 234. The glazing bead 541 of the pane-carrying frame 211 of the first window unit 21 cooperates with an adapter profile 550 connected to an adjacent mullion 17. The adapter profile 550 cooperates in turn with a side sash covering 5222, 5222a of the neighbouring secondary window unit 22.

[0043] A lifting device 7 better shown in Figs 18 and 20 is accommodated by the mullion 15 or a side frame member of the common frame 10.

[0044] The adapter profile 550 is connected to the mullion 15 by means of a support element 19 better shown in Figs 22 and 23. The support element 19 comprises a carrier part 191 and a bush part 192. The carrier part 191 comprises a base portion 191a, an upstanding portion 191b, a depending portion 191c and a top portion 191d with an opening. The bush part 192 comprises a wall portion 192a, side portions 192b, front portions 192c, protrusions 192d and a snap hook 192e such that the bush part 192 is held to the carrier part 191.

[0045] A further aspect is achieved with a roof window arrangement of the kind mentioned in the introduction which is furthermore characterised in that the common frame 10 further comprises at least one mullion 15, 16;

17 extending between the top member 11 and the bottom member 14 and being substantially parallel to the two side members 12, 13 of the common frame 10,

that in the mounted condition of the roof window arrangement 1, each side member 2112, 2113 of the pane-carrying frame 211 of the first window unit 21 is configured to be brought into abutment with a respective one of:

a mullion 15, 16; 17, and
a side member 12 of the common frame,

and that at least the pane-carrying frame 211 of the first window unit 21 is configured to be releasably connected to the top member 11 and/or bottom member 14 of the common frame 10, so as to allow the first window unit 21 to be installed independently of the installation of the common frame 10.

[0046] In this further aspect, inner sides of the top member 11 and/or the bottom member 14 facing the pane-carrying frame 211 of the first window unit 21 may be configured to allow said pane-carrying frame 211 to be installed from an interior side of the roof window arrangement 1, the common frame 10 being in its mounted condition.

[0047] The top member 2111 and/or the bottom member 2114 of the first window 21 may be fixed to the top member 11 and/ or bottom member 14 of the common frame, respectively, by releasable fastening means 4, preferably comprising a set of screws 41 and cover plugs 42.

[0048] The invention is not limited to the embodiments shown and described in the above, but various modifications and combinations may be carried out.

List of reference numerals

[0049]

1 roof window arrangement
10 common frame
11 frame top member
111 reinforcement member
12 frame side member
13 frame side member
14 frame bottom member
142a striking plate
142b striking plate
143a striking plate
143b striking plate
15 mullion
16 mullion
17 mullion
18 frame insert element
19 support element
191 carrier part

191a base portion
191b upstanding portion
191c depending portion
191d top portion
192 bush part
192a wall portion
192b side portion
192c front portion
192d protrusions
192e snap hook
21 first window unit (fixed)
211 pane-carrying frame
2111 top member
2112 side member
2113 side member
2114 bottom member
214 pane
2141 sash profile
22 second window unit (openable)
221 pane-carrying frame
2211 top member
2212 side member
2213 side member
2214 bottom member
2215 insulating piece
222 sash hinge part (right)
223 sash hinge part (left)
224 pane
2241 sash profile
227 handle
228 ventilation flap
23 third window unit
231 pane-carrying frame / sash
2311 top member
2312 side member
2314 bottom member
234 pane
237 handle
238 ventilation flap
40 3 mounting bracket
4 fastening means
41 screw
42 cover plug
5 covering assembly
45 501 top frame covering
510 common top casing
511 top casing (first window unit)
512a lower side covering
512b upper side covering
50 513 upper side frame covering
514 bottom covering
517 mullion side frame covering
5211 5220 top casing (second window unit)
5221 lower side sash covering
55 5221 a side sash covering
5221 b side frame covering
5222 lower side sash covering
5222a side sash covering

5222b side frame covering		side members (12, 13) of the common frame (10),
5223 bottom sash covering		that in the mounted condition of the roof window arrangement (1), each side member (2112, 2113) of the pane-carrying frame (211) of the first window unit (21) is configured to be brought into abutment with a respective one of:
5230 top casing (third window unit)		
5231 a side sash covering		
5231 b side frame covering	5	
5232a side sash covering		
5232b side frame covering		
5233 bottom sash covering		
541 frame profile		a mullion (15, 16; 17), and
542 frame profile	10	a side member (12) of the common frame,
550 adapter profile		
6 hinge assembly		and that at least the pane-carrying frame (211) of the first window unit (21) is configured to be releasably connected to the mullions (15, 16), or to the mullion (17) and the side member (12) of the common frame (10), so as to allow the first window unit (21) to be installed independently of the installation of the common frame (10).
7 lifting device	15	
hf height of frame		
wf width of frame		
$\alpha 1$ primary hinge axis (top-hung)		
$\alpha 2$ secondary hinge axis (pivot position)	20	
α hinge axis		
Claims	25	
1. A roof window arrangement (1) comprising a plurality of window units (21, 22, 23) in a side-by-side configuration in a mounted condition of the roof window arrangement (1), and a covering assembly (5) including a set of coverings, each window unit comprising at least one pane-carrying frame (211, 221, 231) and a pane (214, 224, 234), in which at least one window unit (22, 23) of the roof window arrangement comprises a pane-carrying frame in the form of an openable sash (221, 231) which opens about a hinge axis (α) defined by a set of hinges, and in which a common frame (10) is provided to act as a single, stationary frame of all of the plurality of window units (21, 22, 23) in side-by-side configuration, said common frame (10) being configured to be built into a roof surface and comprising a top member (11), two side members (12, 13) and a bottom member (14), and said plurality of window units comprising a first window unit (21) with a non-openable pane-carrying frame (211) with a top member (2111), two side members (2112, 2113), and a bottom member (2114), and at least one neighbouring secondary window unit (22, 23) with a pane-carrying frame in the form of an openable sash (221, 231) with a top member (2211), two side members (2212, 2213), and a bottom member (2214),	30	
characterised in that	35	
the common frame (10) further comprises at least one mullion (15, 16; 17) extending between the top member (11) and the bottom member (14) and being substantially parallel to the two	40	
	45	
	50	
	55	
		2. A roof window arrangement (1) according to claim 1, wherein the first window unit (21) is configured to be installed independently of the installation of the at least one neighbouring secondary window unit (22, 23).
		3. A roof window arrangement (1) according to any one of the preceding claims, wherein inner sides of each side member (12) and each mullion (15, 16; 17) facing the pane-carrying frame (211) of the first window unit (21) are configured to allow said pane-carrying frame (211) to be installed from an interior side of the roof window arrangement (1), the common frame (10) being in its mounted condition.
		4. A roof window arrangement (1) according to any one of the preceding claims, wherein each of the side members (2112, 2113) of the pane-carrying frame (211) of the first window unit (21) is fixed to one of a mullion (15, 16; 17) and a side member (12) of the common frame (10) by releasable fastening means (4), preferably comprising a set of screws (41) and cover plugs (42).
		5. A roof window arrangement (1) according to claim 4, wherein the pane-carrying frame (211) of the first window unit (21) is detachable from the common frame (10) from the interior side of the roof window arrangement (1) in the absence of the fastening means (4).
		6. A roof window arrangement (1) according to any one of the preceding claims, wherein said set of coverings of the covering assembly (5) associated with the first window unit (21) are fastened to components of the common frame (10) and/or to the at least one neighbouring secondary window unit (22, 23).

7. A roof window arrangement (1) according to any one of the preceding claims, wherein at least one of said neighbouring secondary window units (22, 23) is top-hung about a primary hinge axis ($\alpha 1$) in a first operational condition, preferably comprising a handle (227, 237) comprising an espagnolette mechanism cooperating with at least one striking plate (142a, 142b, 143a, 143b), more preferably comprising a ventilation flap (228, 238) to provide ventilation and to allow activation of a second operational condition in which the sash (221, 231) of the secondary window unit (22, 23) is pivotable around a secondary hinge axis ($\alpha 2$).
8. A roof window arrangement (1) according to claims 6 and 7, wherein the covering assembly (5) comprises a top casing (5220, 5230), two side sash coverings (5221a, 5222a, 5231a, 5232a), two side frame coverings (5221b, 5222b, 5231b, 5232b) and a bottom sash covering (5223, 5233) for each secondary window unit (22, 23), and a top casing (511) and a bottom covering (514) for the first window unit (21), said top casing (511) being connected to the frame top member (11) of the common frame (10) and the bottom covering (514) being connected to the frame bottom member (14) of the common frame (10).
9. A roof window arrangement (1) according to any one of claims 1 to 6, wherein each said at least one of said neighbouring secondary window units (22) is pivot-hung about a hinge axis (α) by means of a hinge assembly (6), preferably comprising a ventilation flap (228) to provide ventilation and operation.
10. A roof window arrangement (1) according to claims 6 and 9, wherein the covering assembly (5) comprises a common top casing (510) connected to the frame top member (11) of the common frame (10), two lower side sash coverings (5221, 5222), an upper side frame covering (513) and a mullion side frame covering (517) and a bottom sash covering (5223) for each secondary window unit (22), and at least one side covering (512a, 512b) and a bottom covering (514) for the first window unit (21), said at least one side covering (512a, 512b) being connected to a frame side member (12) of the common frame (10) and the bottom covering (514) being connected to the frame bottom member (14) of the common frame (10).
11. A roof window arrangement (1) according to claim 10, wherein at least one of the frame side members (12, 13) of the common frame (10) comprises a frame insert element (18), and wherein at least one side covering (512a) is connected to the frame insert element (18).
12. A roof window arrangement (1) according to any one of the preceding claims, wherein each pane (214, 224, 234) is associated to a set of sash profiles (541, 542) functioning as glazing beads at border portions of the pane (214, 224, 234).
13. A roof window arrangement (1) according to claim 12, wherein the glazing bead (541) of the pane-carrying frame (211) of the first window unit (21) cooperates with an adapter profile (550) connected to an adjacent mullion (17; 15), said adapter profile (550) cooperating in turn with a side sash covering (5222, 5222a) of the neighbouring secondary window unit (22).
14. A roof window arrangement (1) according to claim 13 when dependent on claim 7, further comprising a lifting device (7) accommodated by a mullion (15) or a side frame member of the common frame (10).
15. A roof window arrangement (1) according to claim 14, wherein the adapter profile (550) is connected to the mullion (15) by means of a support element (19), preferably comprising a carrier part (191) and a bush part (192), said carrier part (191) more preferably comprising a base portion (191a), an upstanding portion (191b), a depending portion (191c), a top portion (191d) with an opening, and the bush part (192) more preferably comprising a wall portion (192a), side portions (192b), front portions (192c), protrusions (192d) and a snap hook (192e) such that the bush part (192) is held to the carrier part (191).
16. A method for installing a roof window arrangement (1) according to any one of claims 1 to 15, following the steps of;
- installing the common frame (10) in a roof structure of a building;
- placing at least the pane-carrying frame (211) of the first window unit (21) in the common frame (10) from the interior of the building such that each of the side members of the pane-carrying frame (211) of the first window unit (21) is brought into abutment with one of;
- a mullion (15, 16; 17),
- a side member (12) of the common frame (10);
- fastening releasably each of the side members of the pane-carrying frame (211) of the first window unit (21) to one of the abutting mullion (15, 16; 17) and abutting side member of the common frame with the fastening means (4).

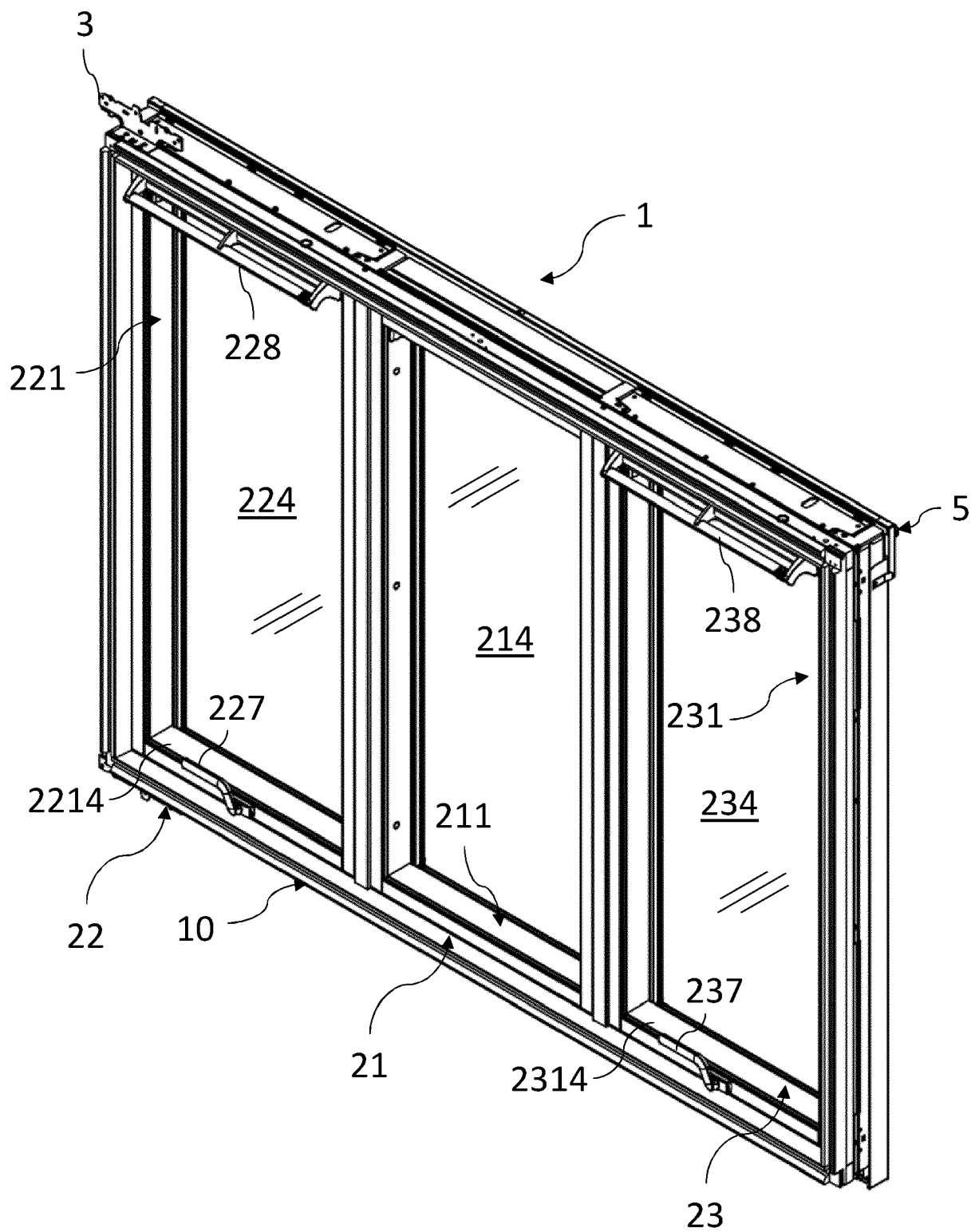


Fig. 1

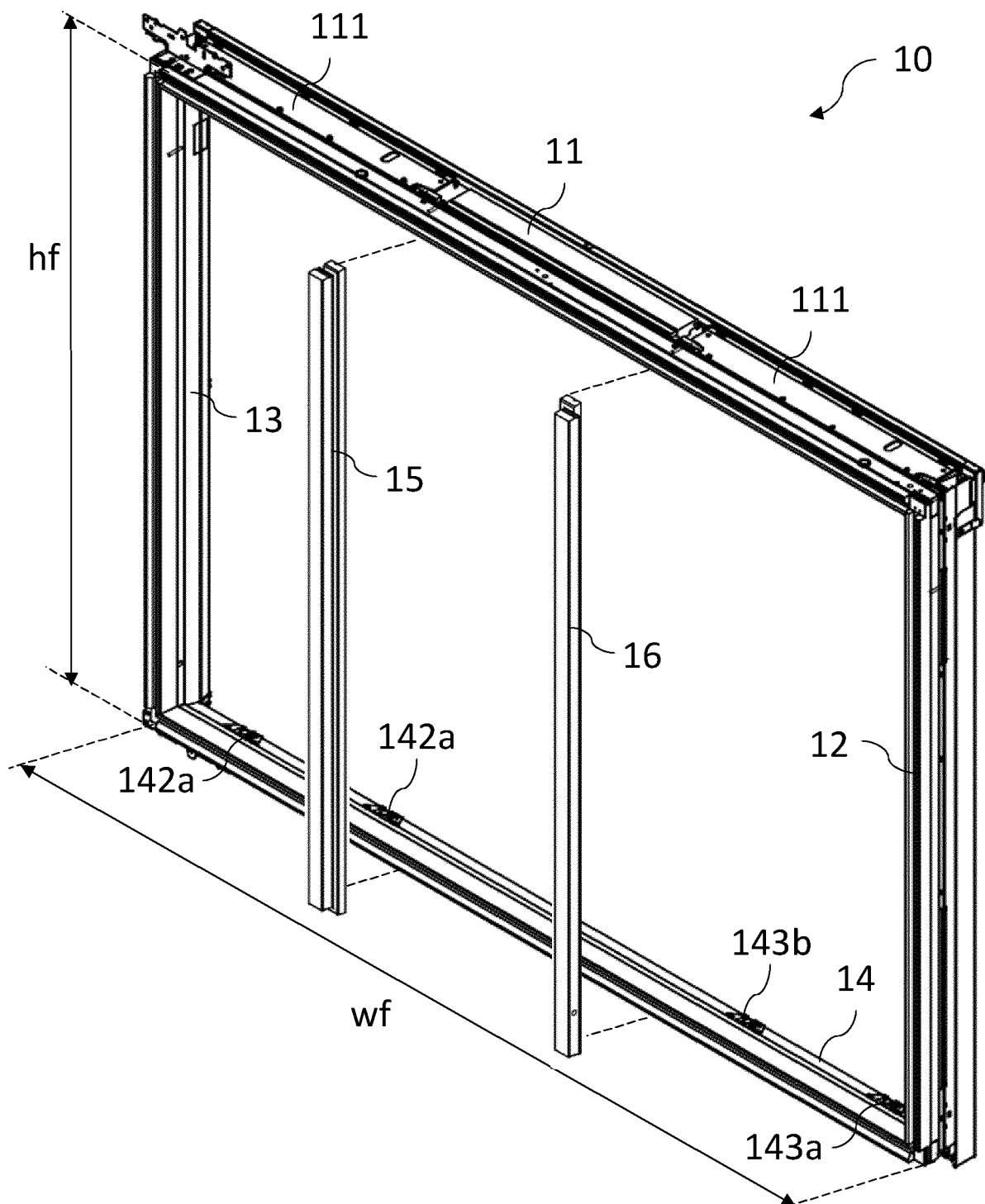


Fig. 2a

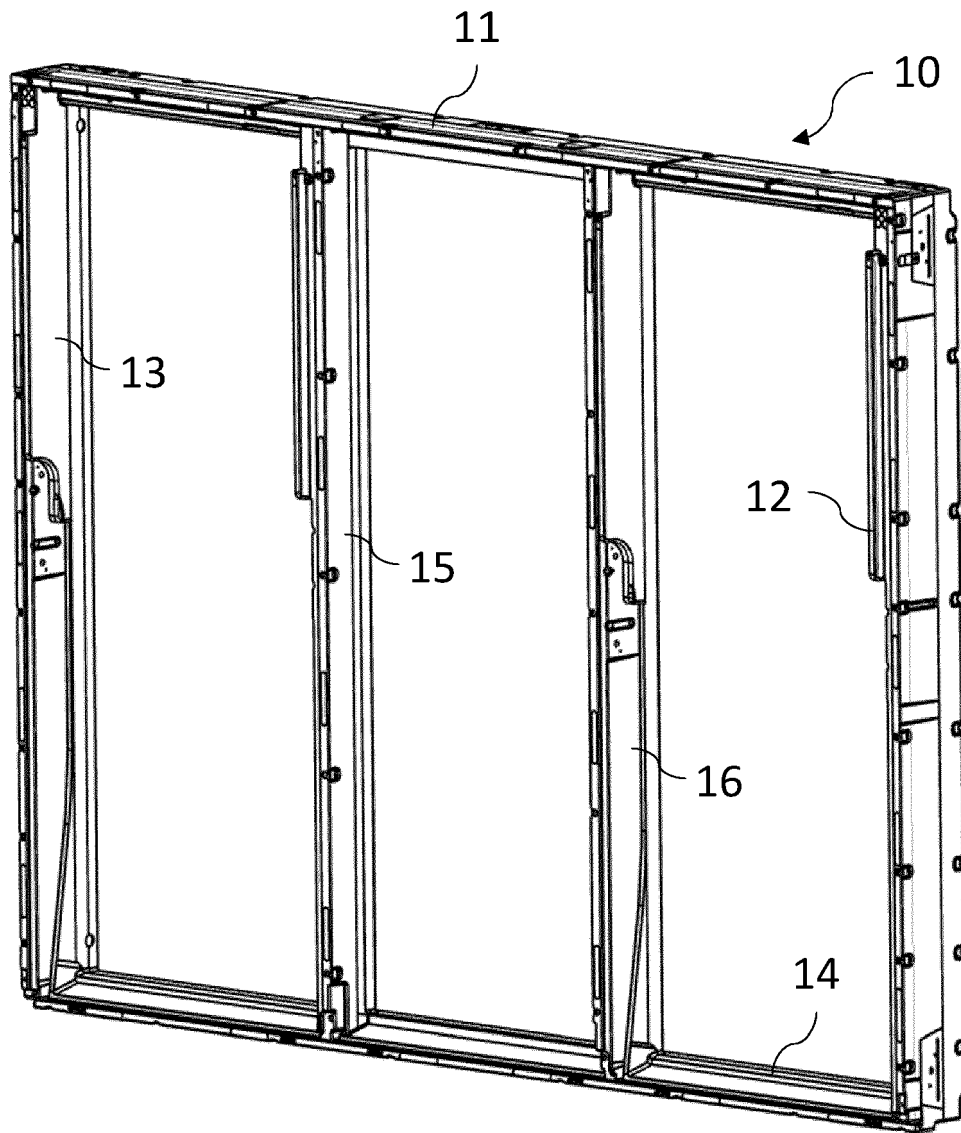


Fig. 2b

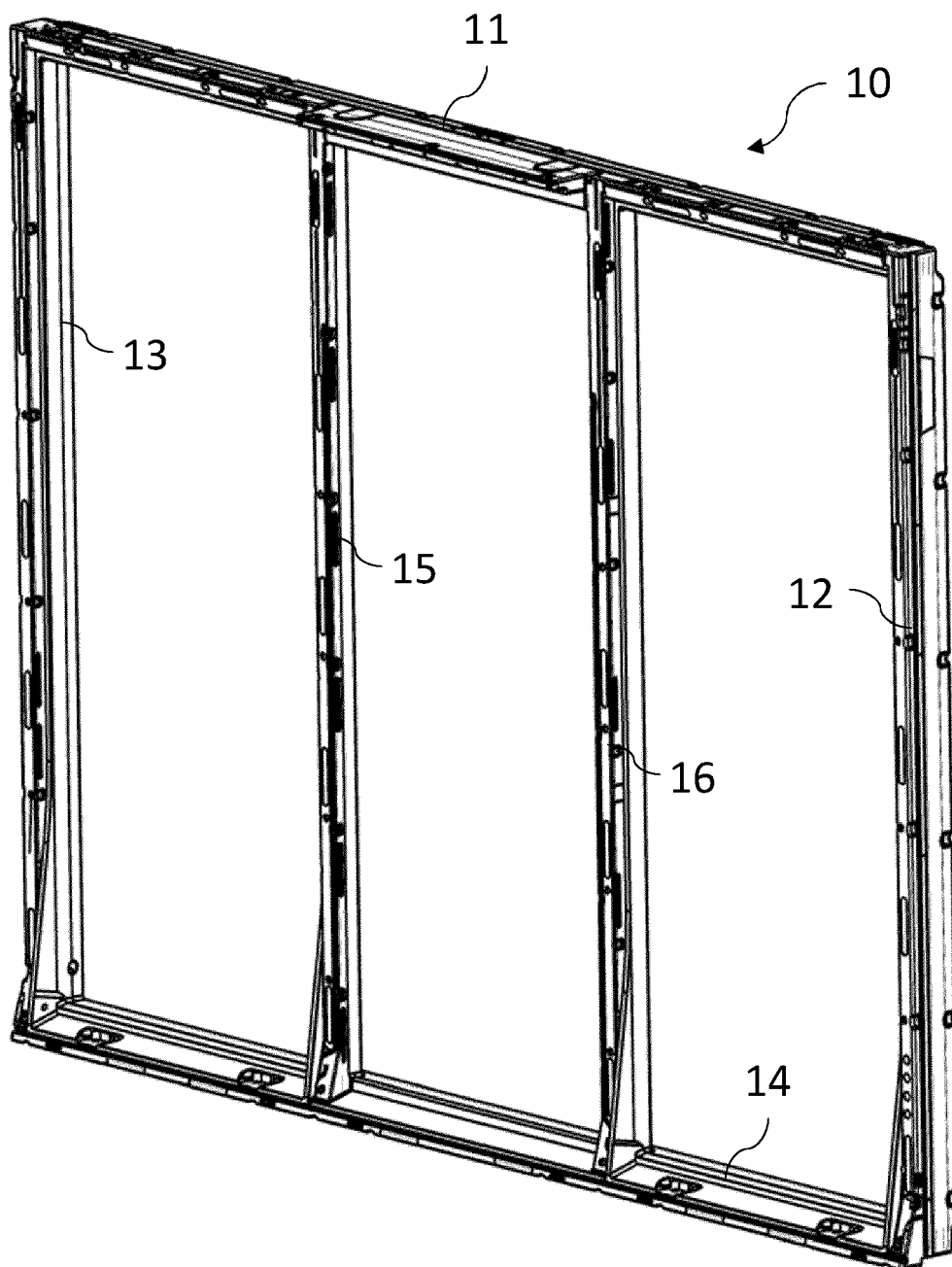


Fig. 2c

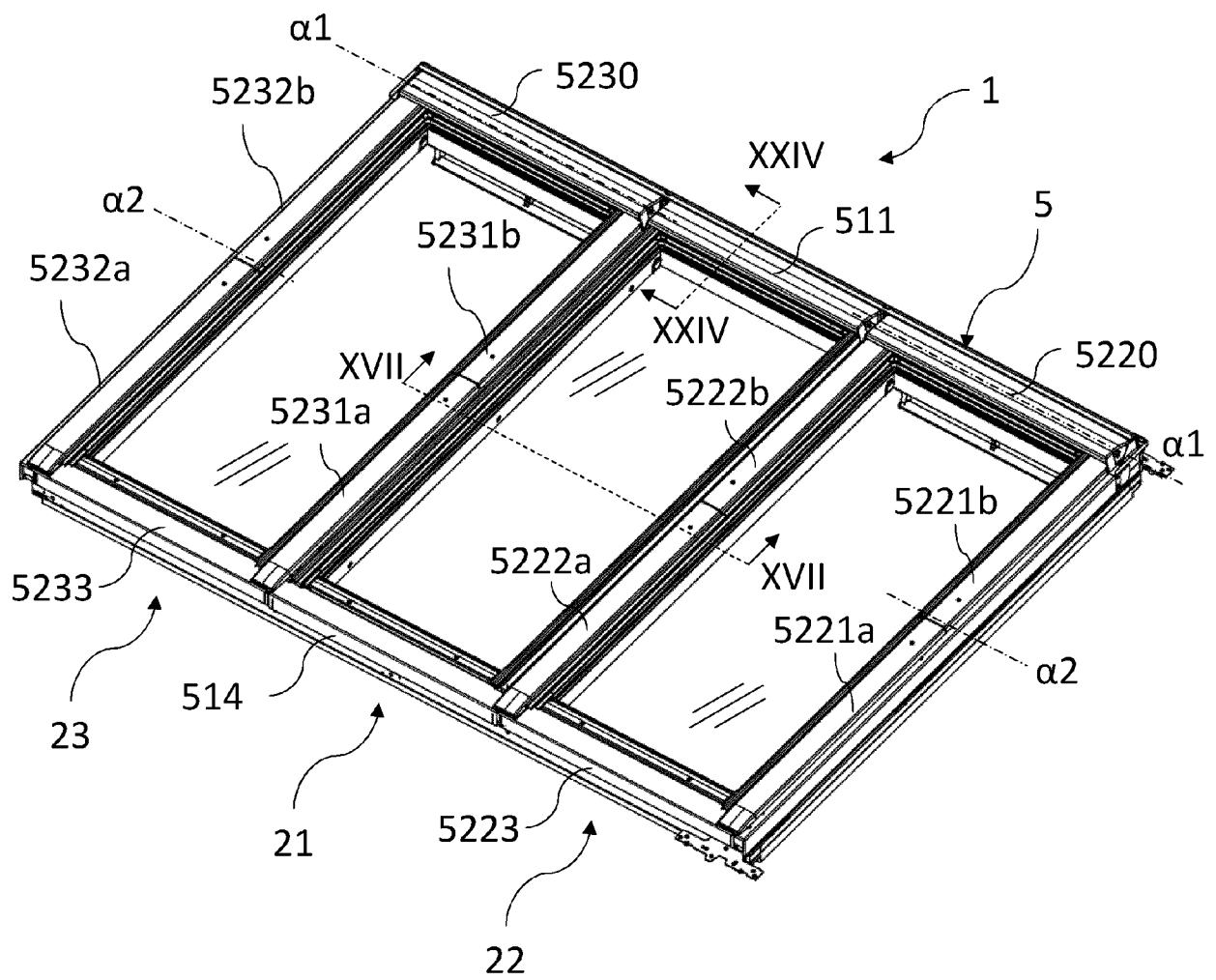


Fig. 3

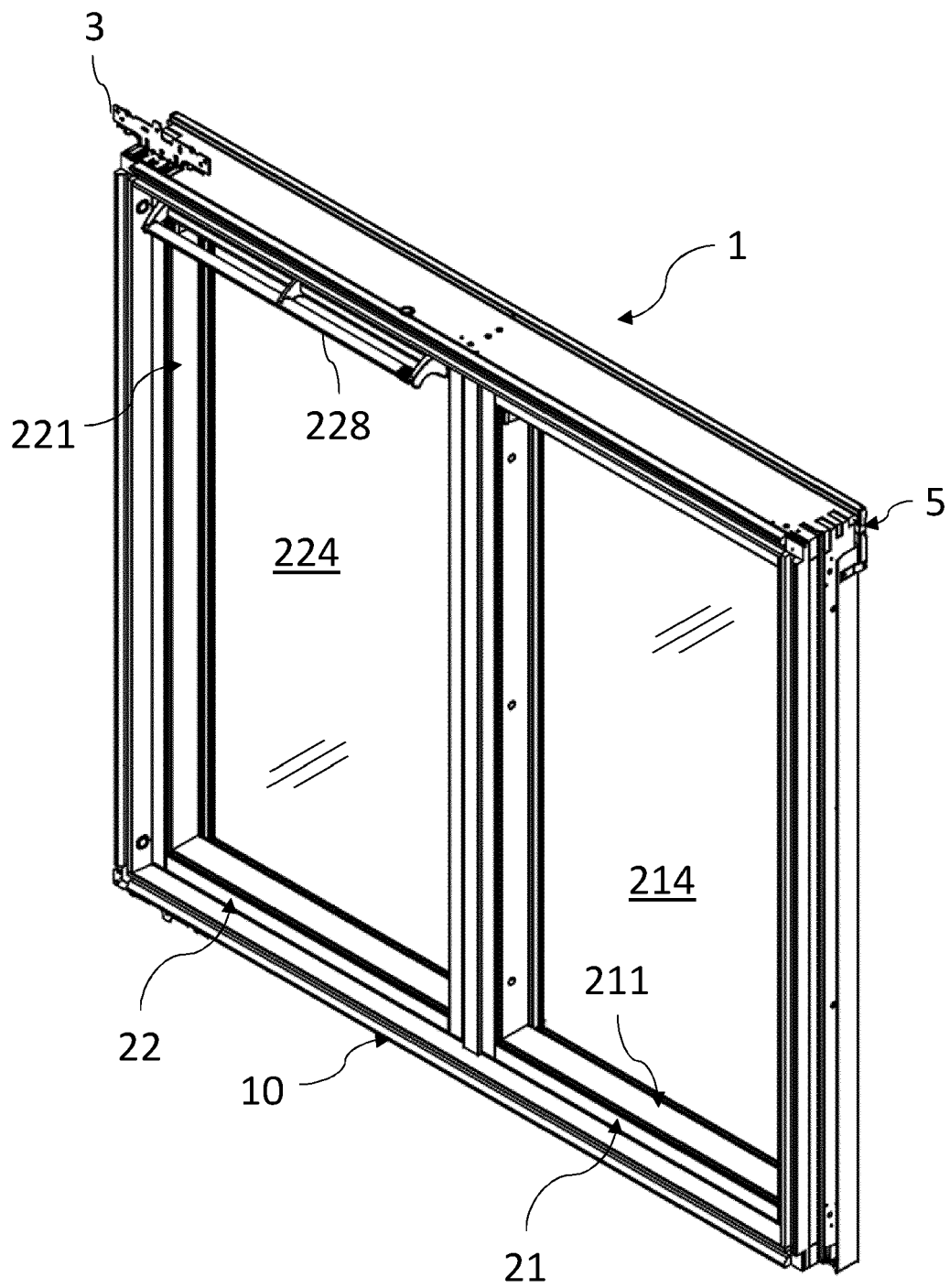


Fig. 4

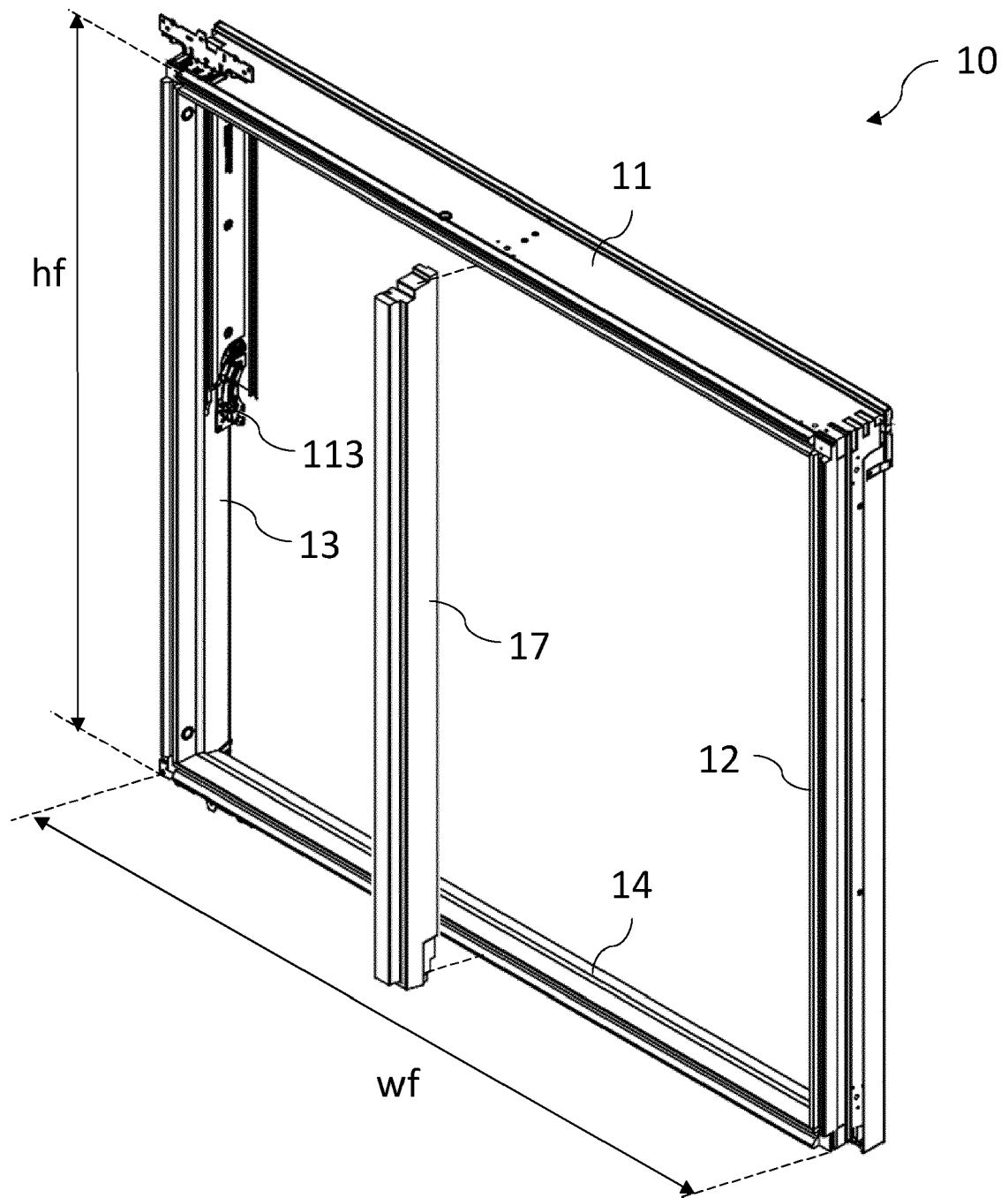


Fig. 5

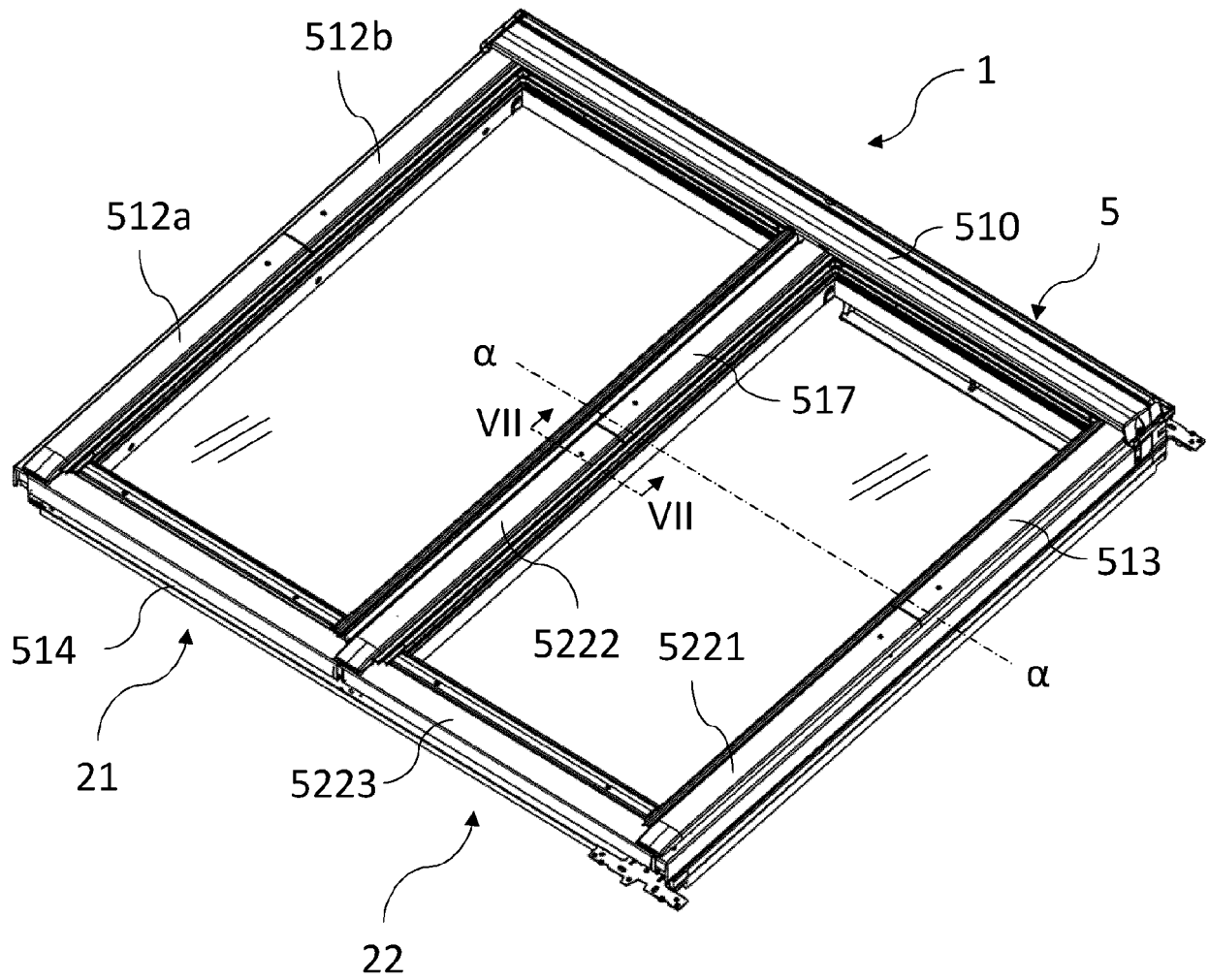
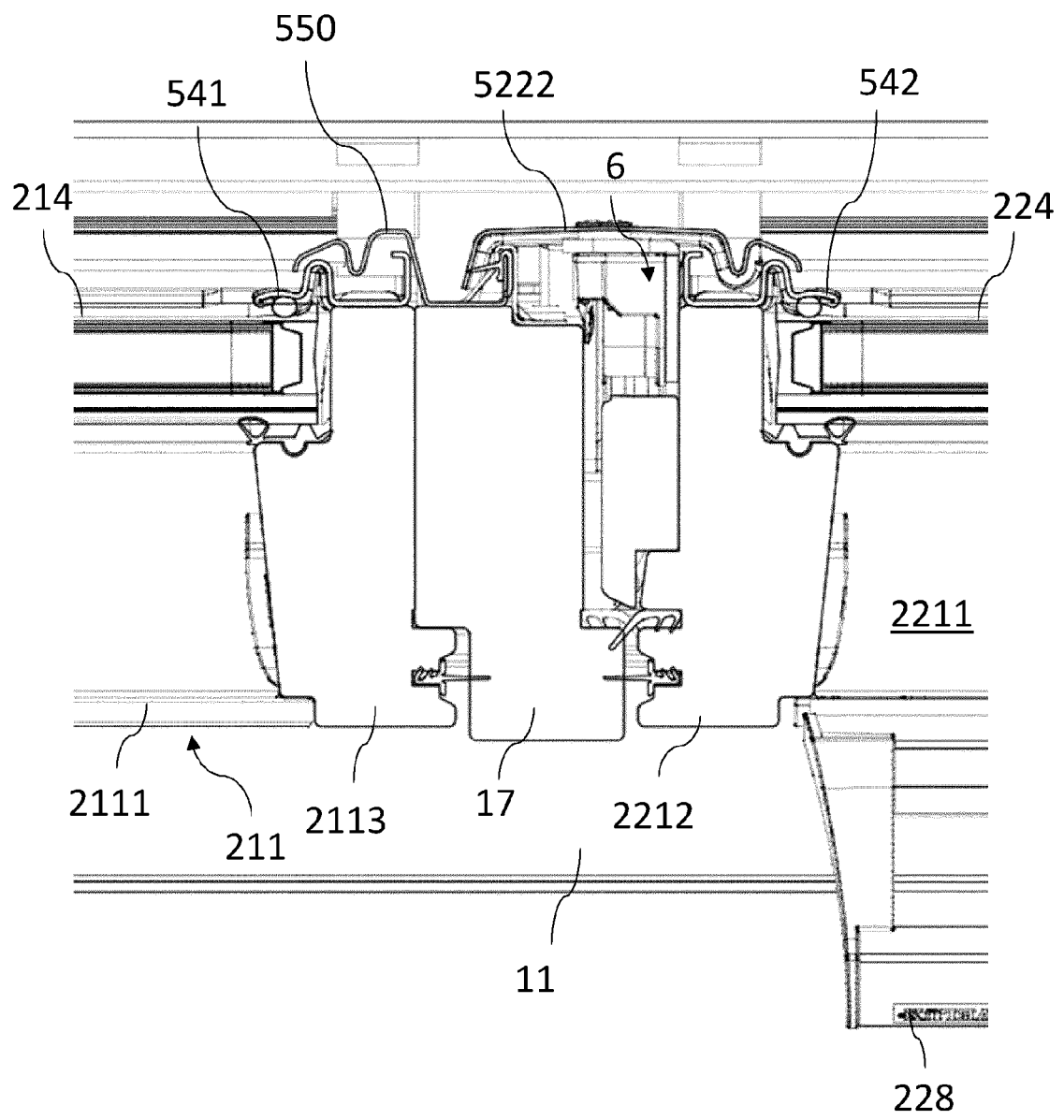
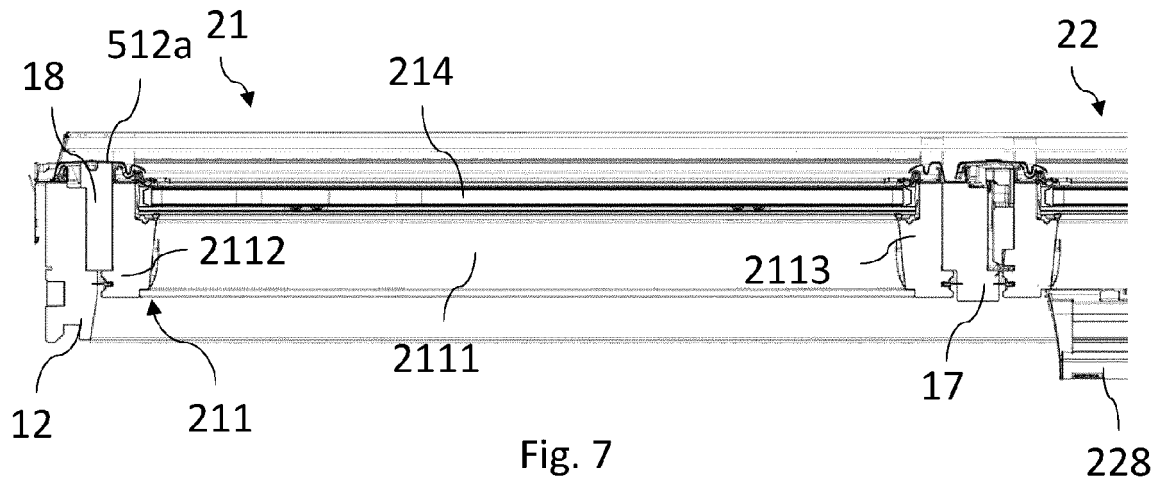


Fig. 6



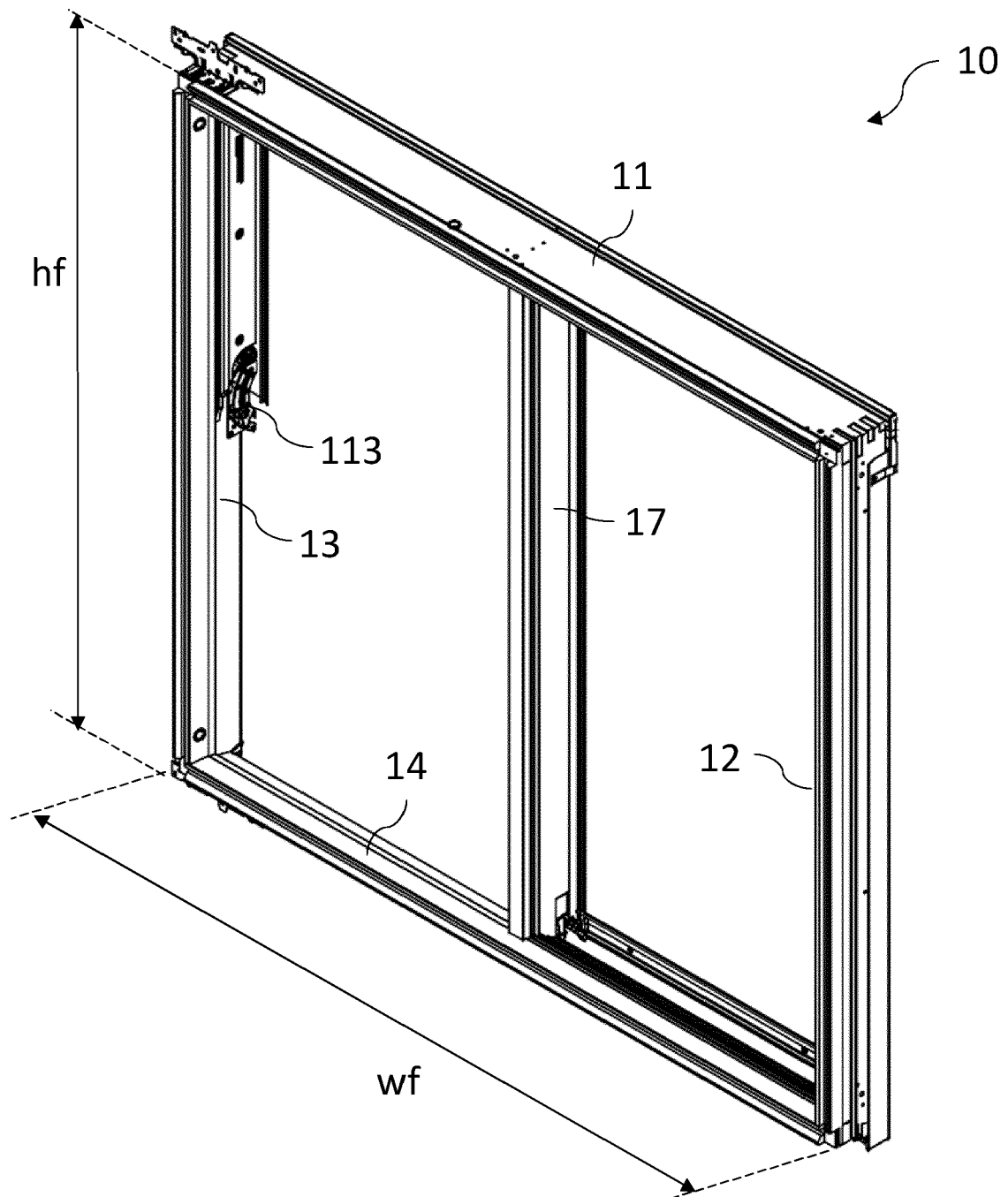


Fig. 9

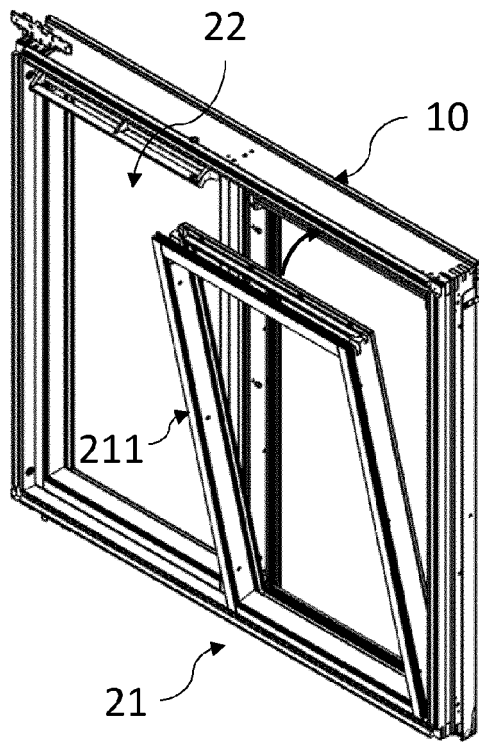


Fig. 10

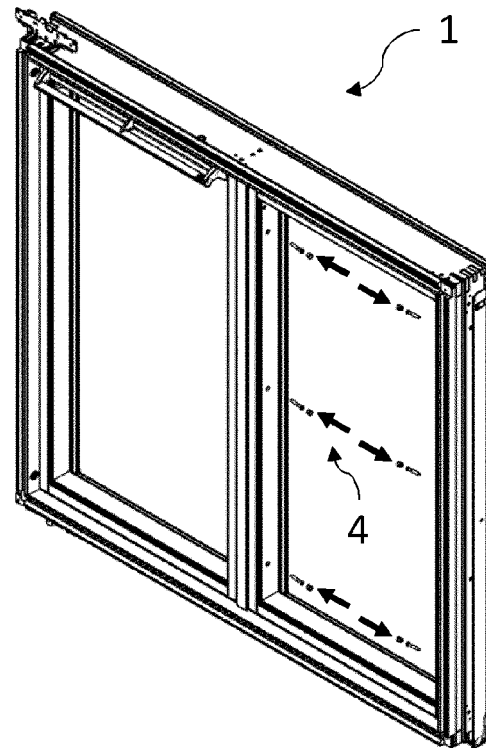


Fig. 11

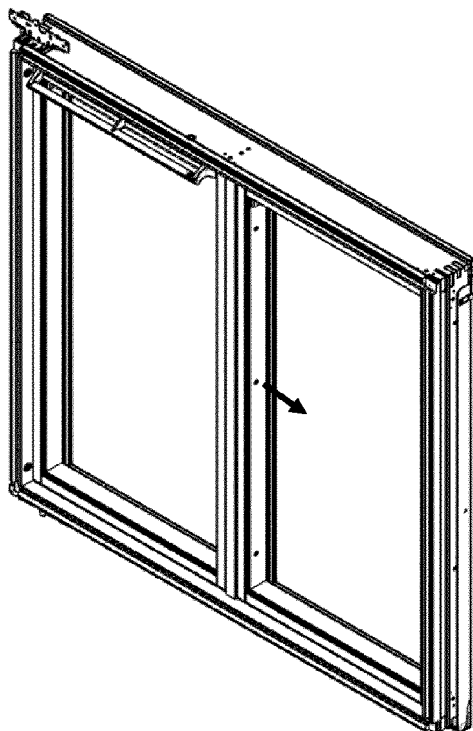


Fig. 12

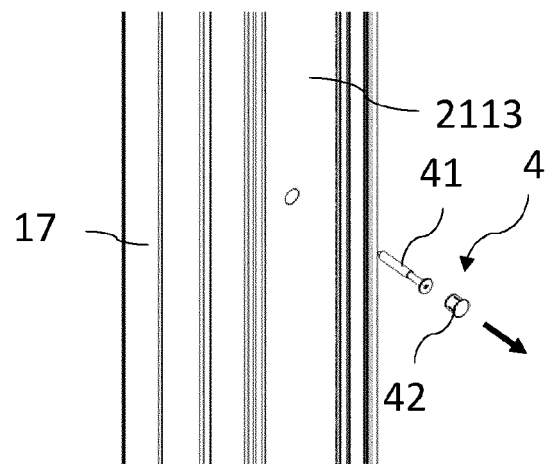


Fig. 13

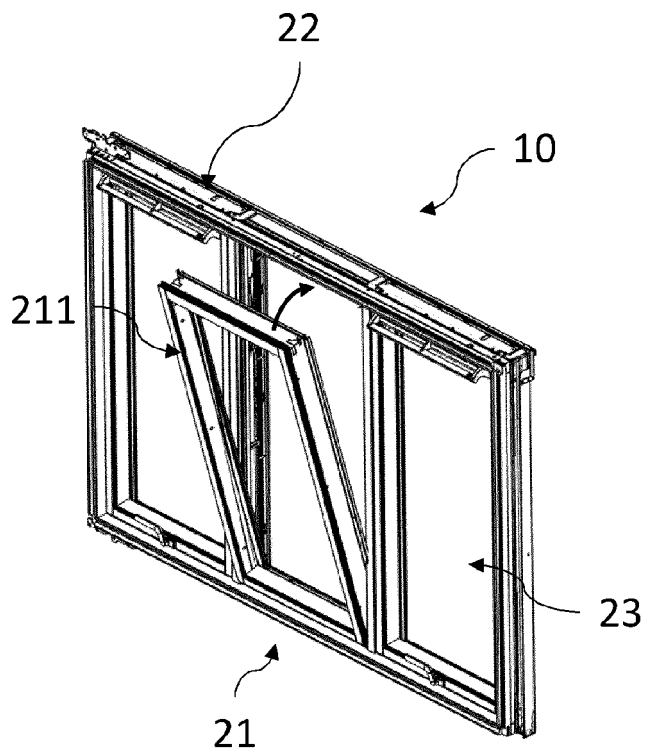


Fig. 14

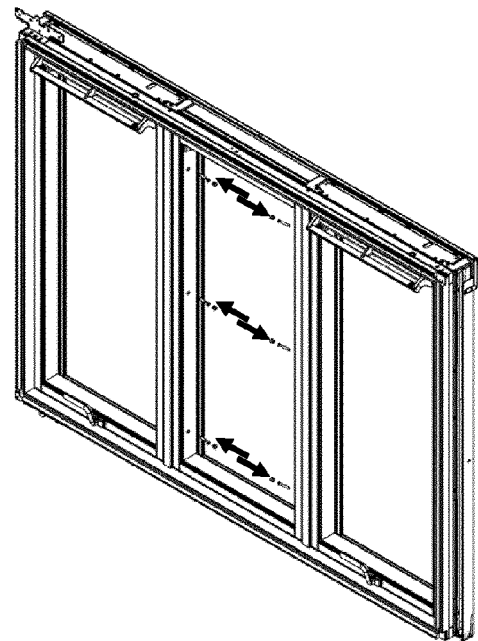


Fig. 15a

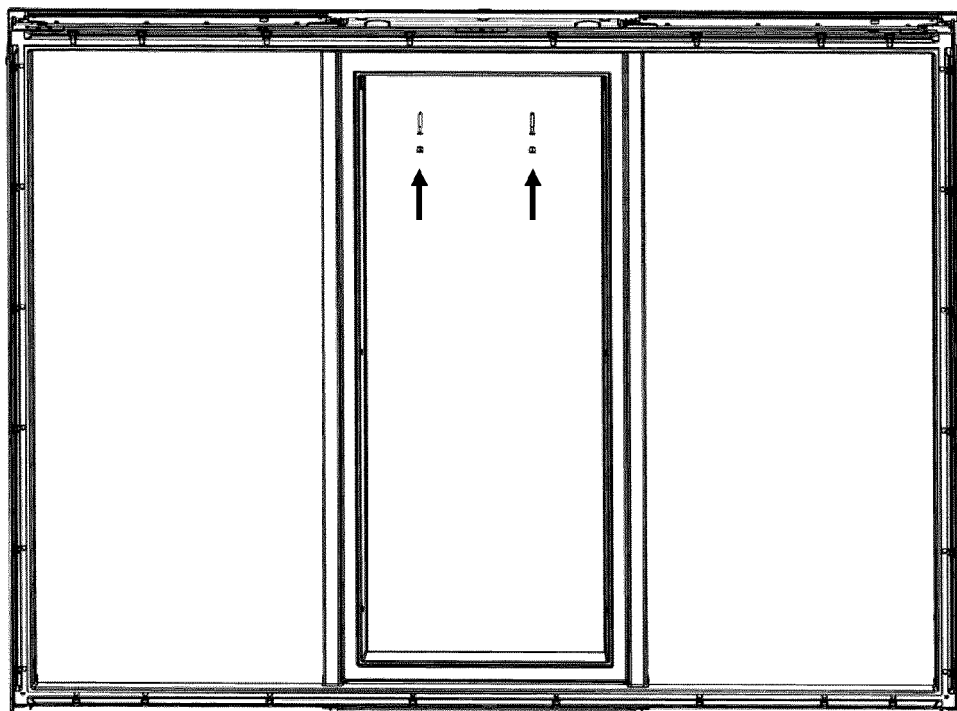


Fig. 15b

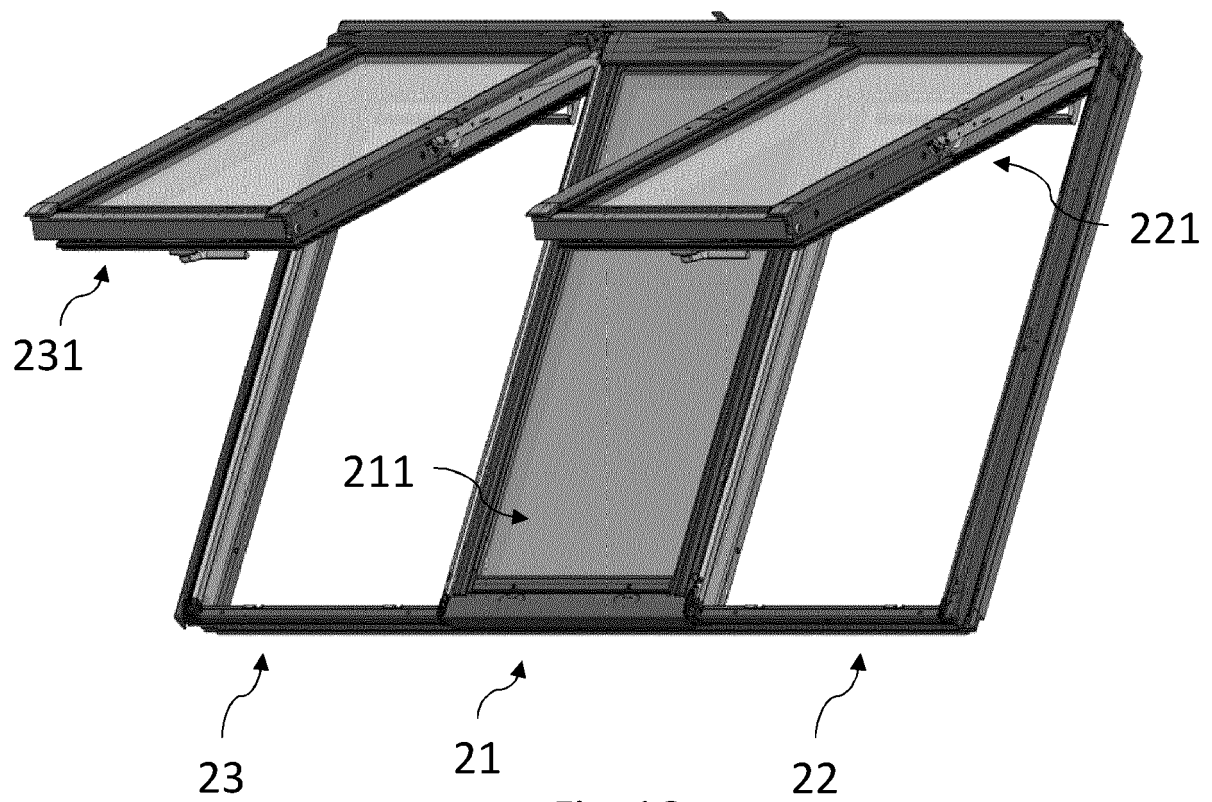
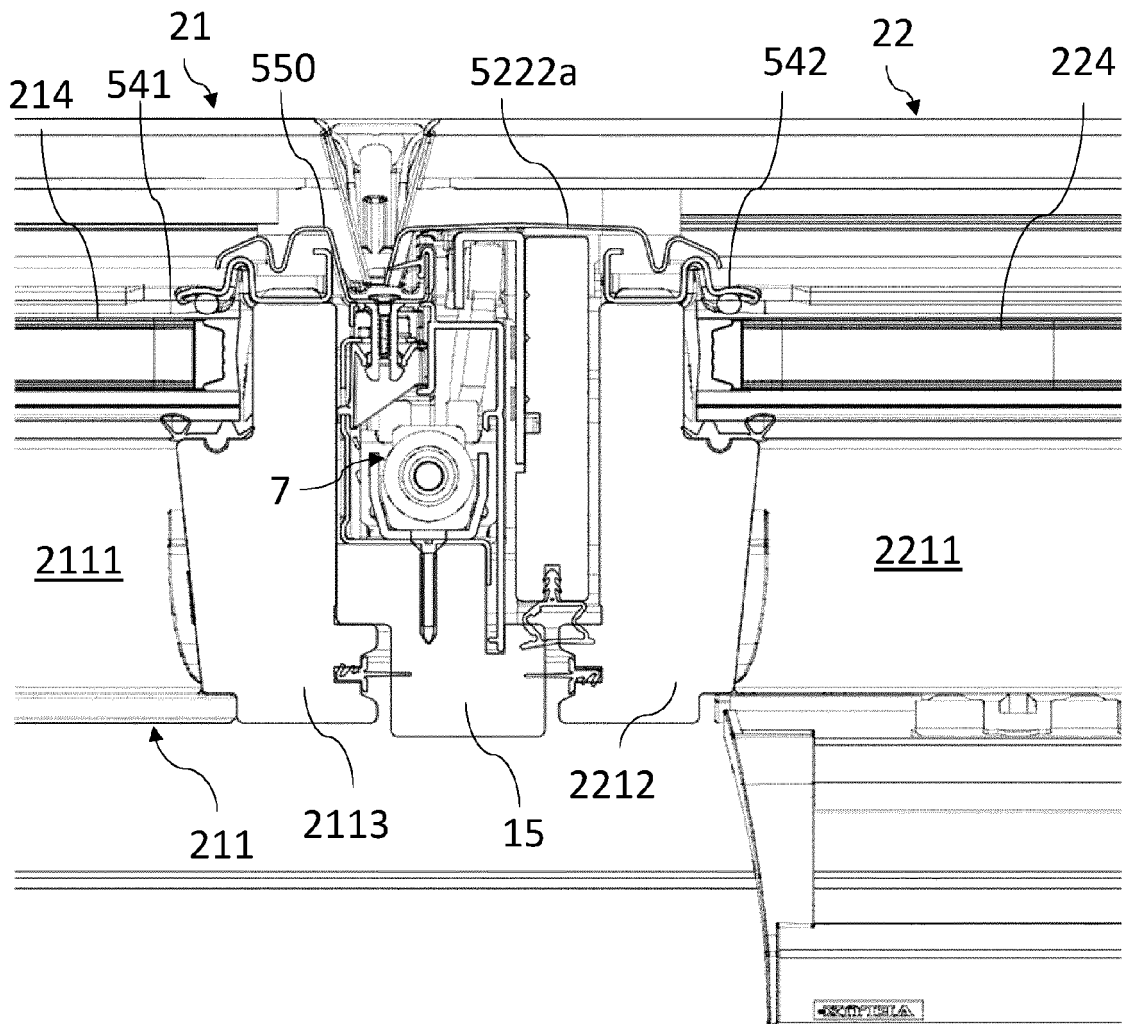
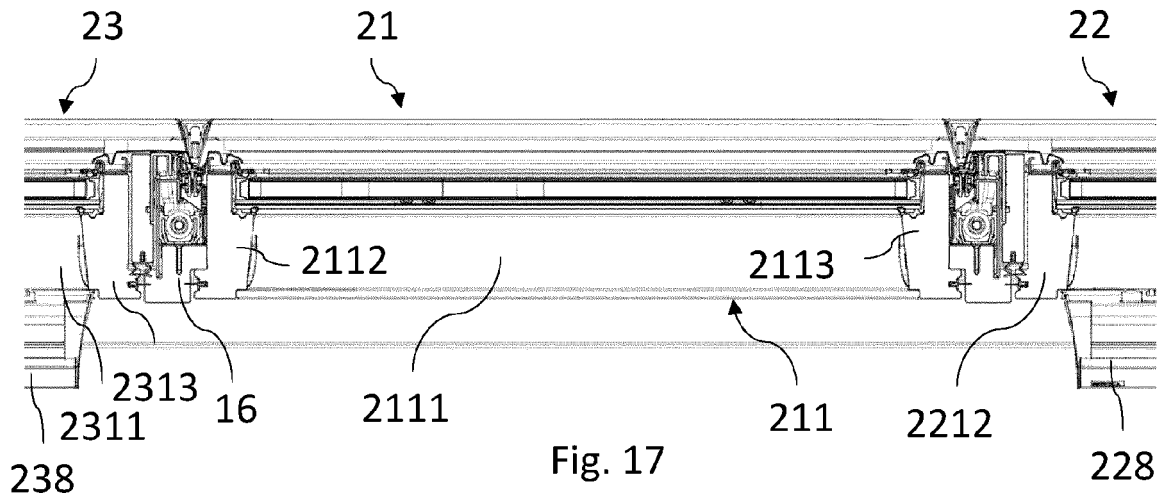


Fig. 16



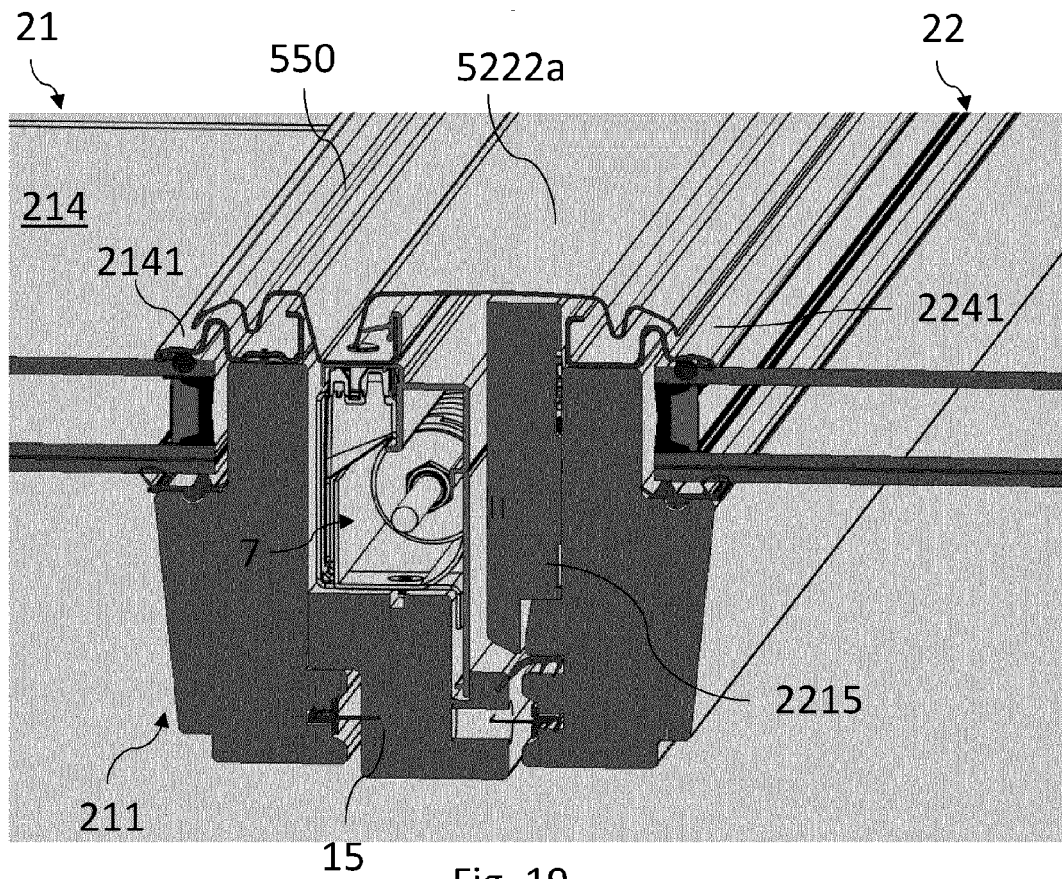


Fig. 19

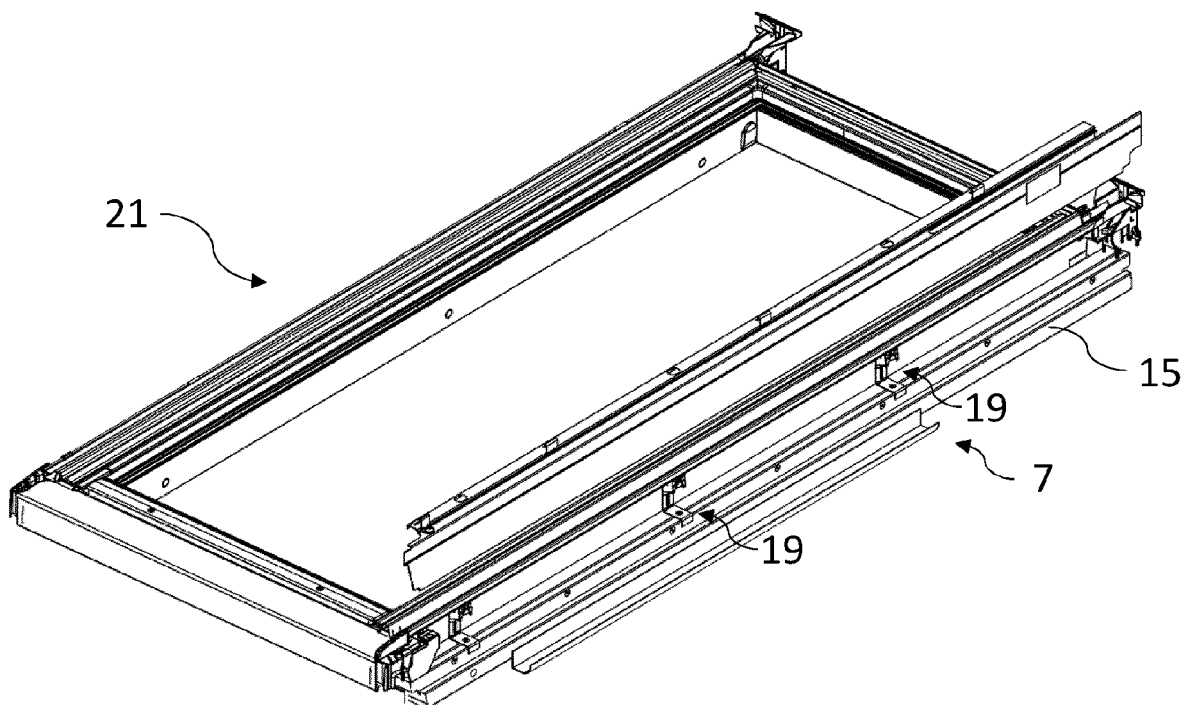


Fig. 20

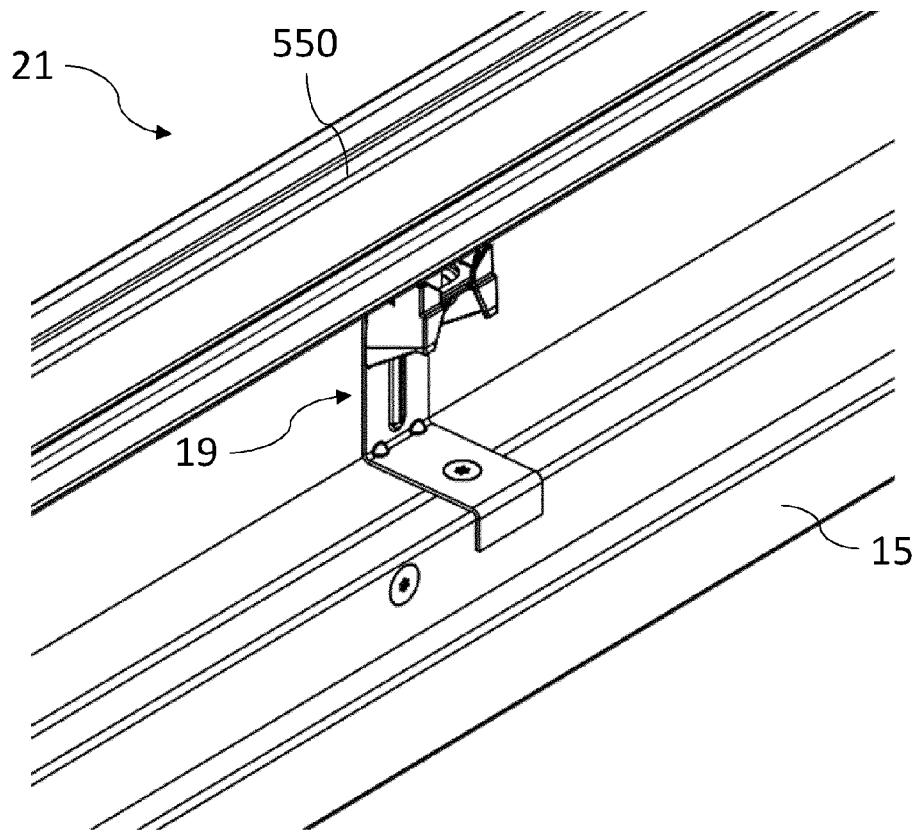


Fig. 21

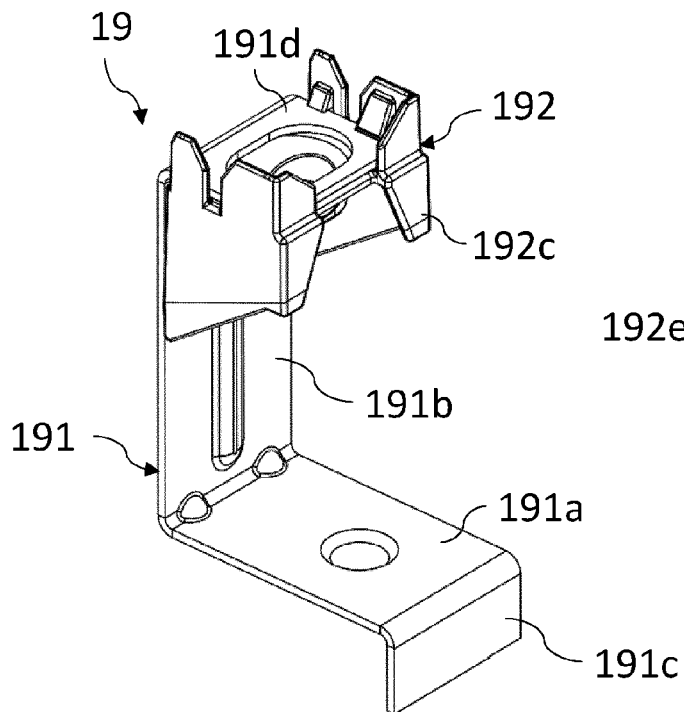


Fig. 22

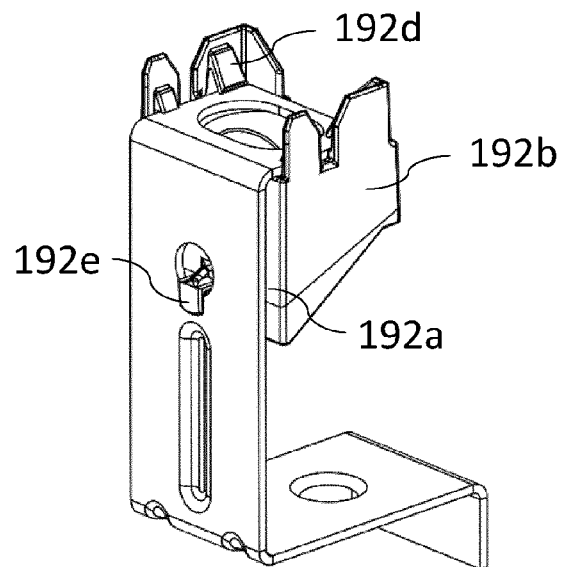


Fig. 23

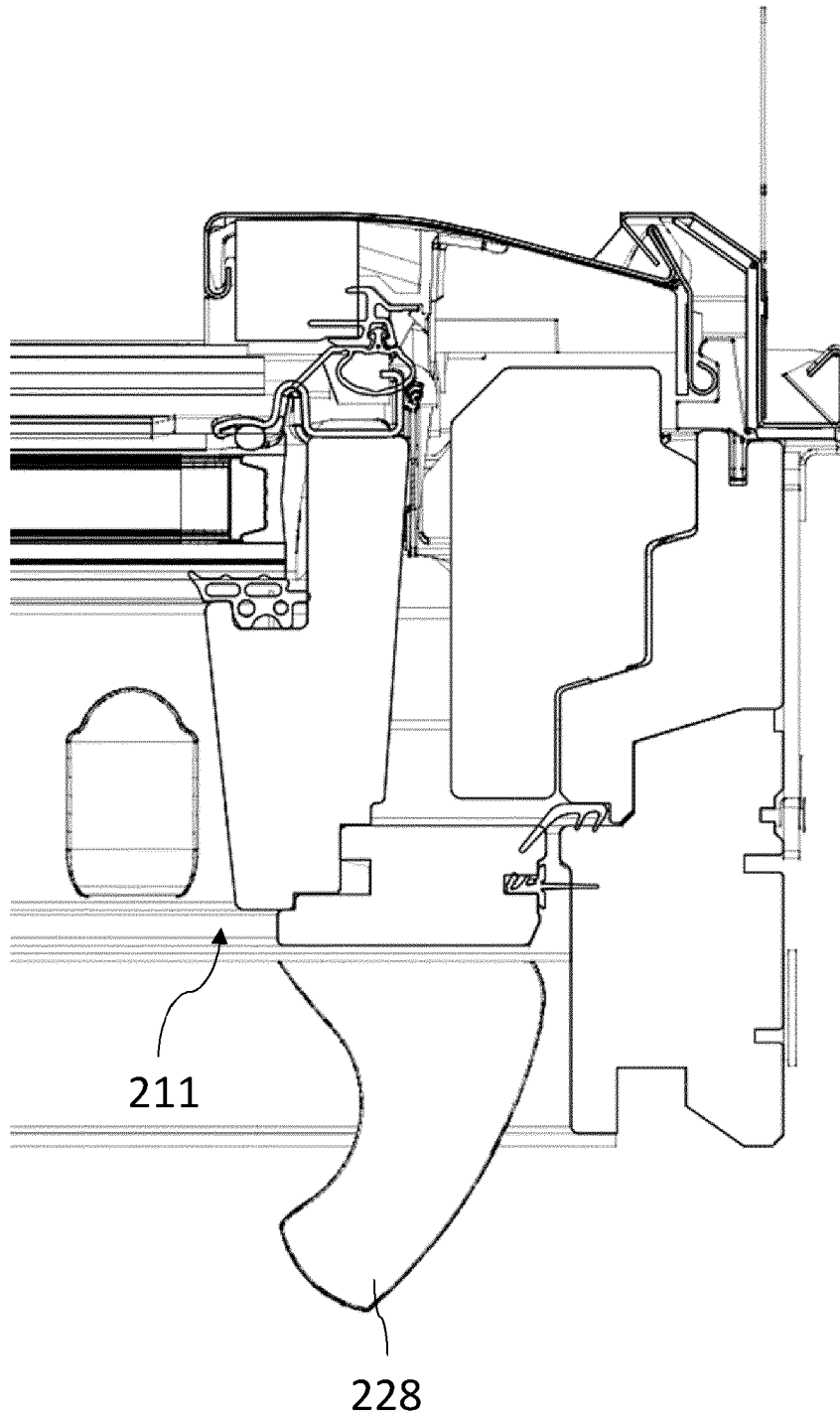


Fig. 24

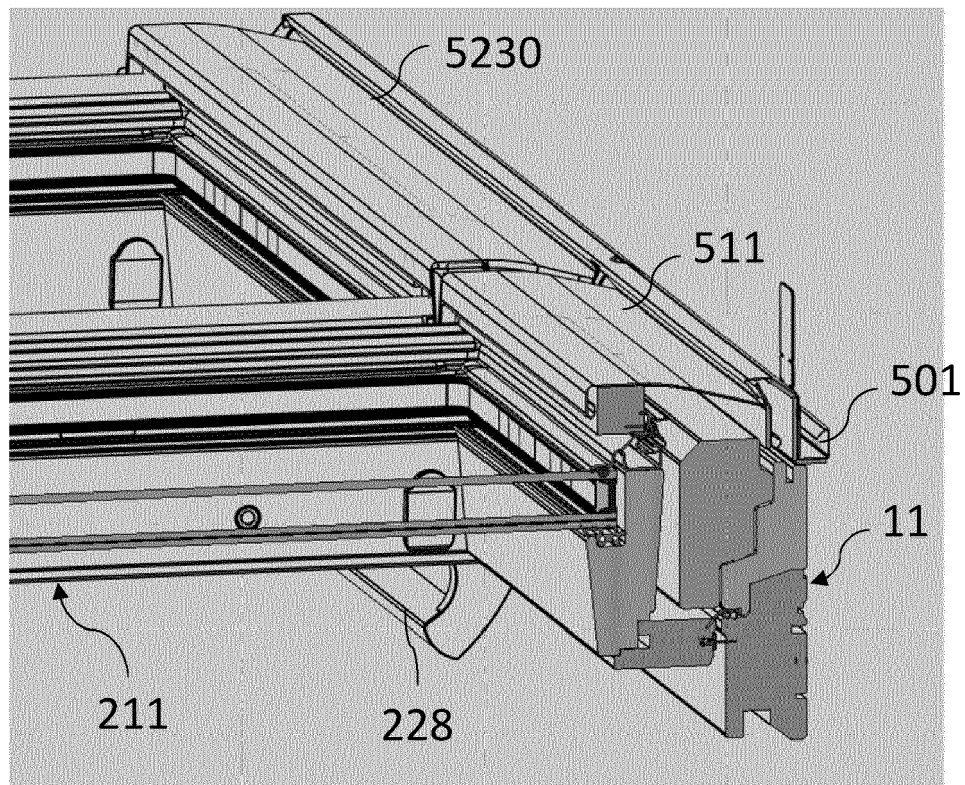


Fig. 25



EUROPEAN SEARCH REPORT

Application Number

EP 23 16 5349

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A, D	EP 3 828 359 A1 (VKR HOLDING AS [DK]) 2 June 2021 (2021-06-02) * figures 1-14a * -----	1-16	INV. E04D13/03 E04D13/035
A	JP H11 324247 A (TOSTEM CORP) 26 November 1999 (1999-11-26) * figures * -----	1-16	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		27 July 2023	Demeester, Jan
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 23 16 5349

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-07-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3828359 A1	02-06-2021	CN 112878598 A	01-06-2021
		DK 201970740 A1	15-07-2021
		EP 3828359 A1	02-06-2021
JP H11324247 A	26-11-1999	NONE	

REFERENCES CITED IN THE DESCRIPTION

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

Patent documents cited in the description

- WO 2004055291 A1 **[0003]**
- EP 1581706 B1 **[0003]**
- DE 202018100516 **[0004]**
- EP 3406818 B1 **[0004]**
- EP 3828359 A1 **[0006]**
- EP 0733146 B1 **[0024]**
- WO 2019101281 A **[0024]**
- EP 3564460 B1 **[0026]**
- EP 1038083 B1 **[0029]**
- EP 1781883 B1 **[0029]**
- EP 2770146 A1 **[0029]**
- EP 2770149 A1 **[0029]**
- WO 2017076416 A1 **[0029]**