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(54) A ROOF WINDOW SYSTEM WITH A STABILIZING ASSEMBLY

DACHFENSTERSYSTEM MIT STABILISIERUNGSANORDNUNG

SYSTÈME DE FENÊTRE DE TOIT AVEC UN ENSEMBLE DE STABILISATION

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Description

Technical Field

[0001] The present invention relates to a roof window system comprising at least two window units configured to be built in side by side, separated by a spacing, in a roof structure of a roof, in particular comprising an inclined roof surface, each window unit comprising a top member, two side members, and a bottom member, the side members defining a common height and depth of the roof window system, said roof window system furthermore comprising a stabilizing assembly positioned in the spacing between neighbouring window units in the mounted condition of the roof window system.

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 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. 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. Removing battens weakens the roof structure, additionally the insulation of the roof itself is reduced when an opening is created in a roof structure.

[0004] When the roof opening is large enough to accommodate two or more window units, additional measures are needed to preserve the robustness and insulating proprieties of a roof structure, and depending on the distance between the window units, gutter assemblies and insulating profiles need to be manufactured, handled and stored.

[0005] A system according to the preamble of claim 1 is furthermore known from EP 2 568 094 A1.

Summary of Invention

[0006] With this background, it is therefore an object of the invention to provide a roof window system which is more simple, adjustable, cost-effective and with a reduced installation time and complexity.

[0007] This and further objects are achieved with a roof window system according to claim 1.

[0008] Providing a roof window system with the above characteristics, a simpler, more robust configuration is achieved. Easier assembly of the roof window is provided, since fewer steps are required in the installation process. With this configuration, the two window units may be mounted easily as a single roof window. This leads to easier installation, as well as reduced manufacturing costs due to the fewer mounting parts. Additionally, this solution provides an improved stability in a simple manner, while at the same time improving the insulating properties. The presence of a connection flange on the strengthening profile with connection means for the connection of the stabilizing rail to the window unit ensures that assembly is facilitated, and the strengthening properties improved even further.

[0009] In one embodiment, the set of stabilizing rails of the stabilizing assembly comprises two substantially identical, mirror-imaged stabilizing rails, and wherein the thickness of the insulating profile of each stabilizing rail substantially corresponds to half of the dimension of the gap of the spacing between facing side members of neighbouring window units in the mounted condition of the roof window system. In this way, the mounting is simple and logical, since the two window units are provided with basically identical stabilizing rails. In use, the combined widths of the two insulating profiles fill the gap of the spacing. In principle, the insulating profile of one stabilizing rail could be different from the insulating profile of the other stabilizing rail.

[0010] In an alternative embodiment, the set of stabilizing rails of the stabilizing assembly comprises a first stabilizing rail with an insulating element fastened to the strengthening profile and a second stabilizing rail comprising only the strengthening profile, and wherein the thickness of the insulating profile of the first stabilizing rail substantially corresponds to the dimension of the gap of the spacing between facing side members of neighbouring window units in the mounted condition of the roof window system. This solution is particularly advantageous in roof window systems in which neighbouring window units are positioned with a spacing presenting only a small gap.

[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 drawings, in which

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

Fig. 2 is a perspective view of the roof structure and of a support assembly of the roof window system in an embodiment of the invention;

Fig. 3 is a longitudinal sectional view of the roof window system in an embodiment of the invention;
Figs 4 and 5 are cross-sectional views of embodiments of the roof window system according to the invention;
Fig. 6 is an end perspective view of a support beam usable in an embodiment of the invention;
Fig. 7 is an end lateral view of a support beam usable in an embodiment of the invention;
Fig. 8 and Fig. 9 are perspective views, from different angles, of a mounting bracket usable in an alternative embodiment of the roof window system according to the invention;
Fig. 10 is a perspective view of the roof window system in an embodiment of the invention;
Fig. 11 is a perspective view of an embodiment of the roof window system of Fig. 10 during installation into a roof structure;
Fig. 12 is a detailed view of the roof window system of Fig. 11;
Fig. 13 is a perspective view of another embodiment of the roof window system during installation into a roof structure;
Fig. 14 is a detailed view of the roof window system of Fig. 13 installed in a roof structure;
Fig. 15 is an exploded isometric view of the insulating assembly of the roof window system in an embodiment of the invention;
Figs 16 and 17 are perspective views, from different angles, of the transition member of the insulating assembly in embodiments of the invention;
Figs 18 and 19 are plan views of the transition member of the insulating assembly in embodiments of the invention;
Figs 20 to 23 are perspective views, from different angles, of the stabilizing rail in embodiments of the invention;
Fig. 24 is a partial perspective view of the top part of details of a roof window system in an embodiment of the invention;
Fig. 25 is a partial perspective view of the top bottom of details of a roof window system in another embodiment of the invention;
Fig. 26 is a cross-sectional view of a cover assembly of a roof window system in an embodiment of the invention;
Fig. 27 is a close-up of details of Fig. 27;
Fig. 28a and Fig. 28b show an example of a prior art cover assembly;
Fig. 29 is a perspective view of the cover assembly of a roof window system in an embodiment of the invention;
Fig. 30 is a close-up of details of Fig. 29; and
Figs 31 and 32 are perspective views, from different angles, of a tool for dismounting the cover assembly in an embodiment of the roof window system according to the invention; and
Figs 33 and 34 are perspective views, from different angles, of a tool for dismounting the cover assembly in an embodiment of the roof window system according to the invention.

Description of Embodiments

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

[0014] Referring initially to Fig. 1, a roof structure 2 and a simplified view of the roof window system 1 in an embodiment of the invention are shown The roof window system 1 comprises two window units 11, 12 configured side-by-side.

[0015] A window unit can consist of a single window including frame, sash and pane etc. and/or comprise of more than one single window. It could be two windows placed over and under each other as seen in an inclination of the roof or positioned arbitrarily in extension of each other in the roof surface, and preferably having a common width and thus individual height. Each such window in an over and under configuration could also have unique features relating to the frame, sash and pane etc. It could be a fixed frame with a pane, a frame with a sash being fixed or able to turn around a centre, top, bottom or side axis. Alternatively or additionally, the frame could hold a ventilation device, solar panel etc. Also such a window unit could be of different size, e.g. width, compared with another unit to be placed in the side by side configuration.

[0016] Each window unit 11, 12 here comprises an openable roof window of a well-known configuration, including a sash hinged in a frame representing the respective window unit by a top member 111, 121, two side members 112, 113, 122, 123, and a bottom member 114, 124. A combined width W of the roof window system 1 is the combination of the width of first window unit W1, the dimension of a spacing SP between the two window units 11, 12, and the width of second window unit W2. The common height H of the roof window system 1 is the height of any of window units 11, 12. It is noted that the individual widths of the first and second window units need not be identical; however, the height is a common height H.

[0017] The roof structure 2 comprises rafters 20, 21 and battens 22. In order to obtain an adequately dimensioned aperture for the roof window system 1 and at the same time at least retain the structural integrity of the roof structure 2, an upper horizontal trimmer 23, a lower horizontal trimmer 24 and a vertical trimmer 25 are installed. To aid in the subsequent installation of a support assembly 3 of the roof window system 1 in the roof structure 2, auxiliary batten pieces 28 are installed opposite the intended position of an upper support beam 31 and a lower support beam 32, respectively, which form part of the support assembly 3 to be described in further detail below.

[0018] Fig. 2 is a perspective view of the roof structure

2 and of a support assembly 3 of the roof window system 1 as seen from the interior. The roof structure 2 furthermore comprises an underroofing 26 placed over the rafters 20, 21 and below the battens 22. The support assembly 3 is shown as from the interior of a building and comprises a set of support beams, here an upper support beam 31 and a lower support beam 32, configured to be mounted substantially horizontally in said roof structure 2 such that the top member 111, 121 and the bottom member 114, 124 of each window unit 11, 12 are intended to be connected with the respective support beam 31, 32 in a mounted condition of the roof window system 1, for instance by using mounting brackets connected to the frame and battens, respectively.

[0019] Fig. 3 is a sectional view and shows in more detail the upper support beam 31 and lower support beam 32 in relation to the window unit 11. Visible in Fig. 3 is a lining panel 95 which at one edge is received in a groove 17 in the top member 111 of the first window unit 11. It is noted that such groove 17 is circumferential and present in all members of the frame of the roof windows constituting the window units. It is also shown that the lining panel 95 is allowed to form a bend between a first portion near the window unit 11 and a second inclined portion such that a diverging clearing is formed. By the bend, sufficient insulation is present in the area near the lining panel 95.

[0020] The upper and lower parts of the insulating assembly 5 can be seen placed between the top frame member 111 and the upper support beam 31 and the bottom frame member 114 and the lower support beam 32. Also it is shown how the underroofing 26 is arranged with respect to the upper and lower support beams 31, 32 and how a supplementary underroof collar 96 is arranged over the battens 22 and connected to the top frame member 111 and how its arranged under the lower batten 22 below the window unit 11 and connected to the bottom frame member 114 of the window unit 11. The underroof collar 96 is brought into overlap with the underroofing 26. Furthermore, a vapour barrier membrane 27 forms part of the roof structure 2 such that the insulation is protected from moisture from the interior. A supplementary vapour barrier collar 97 is also provided, which at one edge portion is connected to the window units 11, 12 and at an opposite edge portion to the vapour barrier membrane 26. Also visible in Fig. 3 are two installation battens 29, of which the uppermost installation batten 29 is positioned to extend between the upper support beam 31 and the upper horizontal trimmer 23, and the lowermost installation batten 29 between the lower support beam 32 and the lower horizontal trimmer 24.

[0021] Also visible in Fig. 3 is a flashing arrangement 91 at the top and a flashing arrangement 94 at the bottom which provide a weather-tight transition between the window units 11, 12 and the surrounding roofing together with further flashing arrangements 92 and 93 indicated in Figs 4 and 5.

[0022] Fig. 6 and Fig. 7 are respectively an end perspective view of one of the support beams, here upper support beam 31, at its connection to the rafter 21. The support beam 31 has a top surface 311, a side surface 312, a side surface 313, and a bottom surface 314. The support beam 31 is inserted in a mounting bracket 4 comprising a base 41, an upstanding flange 43 on either side of the base 41, and two legs 42 each connected to a flange 43. The mounting bracket 4 is in turn fastened to the rafter 21 by suitable fastening means. The material of the support beams may in principle be chosen arbitrarily, as long as the material has sufficient strength and wear properties. Typically, a wooden material is chosen, and may include laminated wooden beams such as Glulam beams, Kerto® beams etc. which are dimensionally stable, strong and light-weight.

[0023] Further details of the mounting bracket 4 in the embodiment shown will be described in further detail with particular reference to Figs 8 and 9. Here, it is shown that the base 41 comprises a first edge 411 and a second edge 412. Each upstanding flange 43 is connected to, in the embodiment shown perpendicularly to, the base 41 at a first transition edge 431 of the upstanding flange 43 and each leg 42 is connected to the respective upstanding flange 43 at a second transition edge 432 of the upstanding flange 43. In the embodiment shown, the first transition edge 431 is perpendicular to the second transition edge 432.

[0024] Each leg 42 comprises an inner free side edge portion 422 in extension of the second transition edge 432 of the upstanding flange 43 such that an upper section of each said leg 42 extends above a plane of the base 41 and a lower section of each said leg 42 extends below the plane of the base 41. As indicated, the legs 42 have a relatively large extension in the height direction, perpendicular to the longitudinal direction of the rafter 21. In this way, it is possible to fasten the mounting brackets 4 at such a position that a minimum of fastening elements such as screws or nails are located close to the top of the rafter. In turn, the zone surrounding the window units 11, 12 in the roof structure 2 is rendered free of fastening elements which is advantageous for a number of reasons, including the overall mounting as well as insulation and other climate adaptability properties.

[0025] The base 41, each leg 42 and each upstanding flange 43 comprises at least one hole or aperture adapted to receive fastening means such as screws or nails. Here, each leg 42 is provided with a plurality of holes and apertures 426, 427, 428 such that at least one hole or aperture is located in the upper section and at least one hole or aperture in the lower section. This provides for flexibility in the selection of holes for fastening of the mounting bracket 4 to the rafter 21. A hole 413 in the base 41 is intended to receive fastening means such as a screw driven into the support beam 31 or 32 once it has been introduced between the upstanding flanges 43. The upstanding flanges 43 are also provided with a set of holes 436 serving also to receive screws to be driven into the support beam 31 and 32.

[0026] The installation of the roof window system in the roof structure 2 comprising a plurality of rafters 20, 21 and battens 22, and optionally at least one trimmer 23, 24, 25 is performed substantially as follows with particular reference to Fig. 6:
Each mounting bracket 4 is connected to a rafter 21 or a vertical trimmer 25 by legs 42 such that the base 41 protrudes from the rafter 21 or vertical trimmer 25 and supports a bottom surface 314 of the respective support beam 31, 32. In case there are no trimmers, all mounting brackets 4 are connected to rafters; in case there are trimmers on either side, all mounting brackets are connected thereto. The connection advantageously takes place perpendicularly as shown. In the fastened condition, each upstanding flange 43 protrudes from the rafter 21 or vertical trimmer 25 as the case may be. Thereby, it supports a side surface 312, 313 of the respective support beam 31, 32, as shown perpendicularly.

[0027] Referring briefly again to Fig. 7, the top surface 311 of each support beam 31, 32 is in the configuration shown substantially flush with an upper side of the battens 22 of the roof structure 2 in the mounted condition of the roof window system 1. As mentioned in the above, this positioning is made possible by the particular configuration of the mounting brackets 4, in particular of the legs 42.

[0028] While the support assembly 3 has now been installed by means of the mounting brackets 4 as indicated in the above embodiments, the aperture in the roof structure 2 is preferably provided with insulation and the window units 11 and 12 are prepared for installation. As shown in Fig. 10, stabilizing rails 6, 6b of a stabilizing assembly is connected to the respective window unit 11, 12 and window installation brackets 15 are connected to the window units in a manner known per se. Turning now to Fig. 11, an insulating assembly 5 is shown connected to the roof structure 2.

[0029] For the description of the stabilizing assembly and the insulating assembly of the roof window system according to the invention, reference is first made jointly to Figs 4, 10, 11 and 12, in which a roof window system comprising two window units 11 and 12 configured to be mounted with a gap G of the spacing SP of about 100 mm is shown. Secondly, reference is made jointly to Figs 5, 13 and 14 in which a roof window system comprising two window units 11 and 12 configured to be mounted with a gap G of the spacing SP of about 18 mm is shown. Details of the respective stabilizing assembly and insulating assembly will be described in the following.

[0030] Fig. 15 shows an exploded isometric view of the insulating assembly 5 of the roof window system 1. The insulating assembly 5 comprises two side members 52, 53, a plurality of top and bottom members including at least a first and a second top member 511, 512, a first and a second bottom member 541, 542, and two transition members 55, 56, which together form a single insulating frame 50.

[0031] Each side member 52, 53 has a length corresponding substantially to the common height H of the window units 11, 12, and each member 511, 512, 541, 542 of the top and bottom members has a length corresponding substantially to the respective width W1, W2 of the window units 11, 12.

[0032] Each transition member 55, 56 is configured to be positioned between facing ends 5115, 5125 of the first and second top members 511, 512, and the at least first and second bottom members 541, 542, respectively. In the installed condition of the insulating assembly 5, the two side members 52, 53, the top and bottom members 511, 512, 541, 542, and the two transition members 55, 56 extend along a periphery of the window units 11, 12 including the top members, the outer side members 112, 123 of the window units 11, 12 and span the combined width W and the common height H and depth D of the roof window system.

[0033] In the embodiment shown, each member of the plurality of top and bottom members 511, 512, 541, 542 is formed as a standard insulating frame piece comprising an insulating element 5121 and a supporting rail 5122 having a uniform cross-section. The term "standard insulating frame piece" encompasses components of commercially available insulating frames fitting a counterpart roof window of a pre-defined size, for instance within a size range of products. The configuration of an insulating frame piece is well-known per se, for instance from Applicant's EP 2677092 B1. As is also known as such, the insulating assembly 5 furthermore comprises a set of four connector brackets 57 configured to connect the side members 52, 53 to a respective top and bottom member 511, 541, 512, 542. The supporting rail 5122 of the standard insulating frame piece constituting each member of said plurality of top and bottom members 511, 512, 541, 542 has engagement means, preferably in the form of an opening, configured to engage with corresponding engagement means of the connector bracket 57, preferably comprising a barb or lug.

[0034] Referring now to Figs 16 to 19, each transition member 55, 56 comprises an insulating element 551 and an engagement element 552 configured to bring the transition member 55, 56 into engagement with the associated top and bottom members 511, 512, 541, 542 at the respective facing ends 5115, 5125 thereof. Referring now also to Figs 12 and 13, the insulating element 551 comprises an enlarged lower section 5511 and an upper section 5512, the enlarged lower section 5511 being provided with an inclined edge 5513 such that a ledge 5514 is formed in the transition area between the upper and lower sections 5512, 5511. The ledge 5514 may in principle have any suitable configuration but preferably surrounds at least in part the upper section 5512 on an inner face and end faces as shown. Here, the engagement element 552 comprises an L-shaped clip with a first leg 5521 and a second leg 5522, the first leg 5521 being configured to be received in receiving means of the insulating element 551, which may take the form of a slot 5515 in an outer side of the upper section 5512 of the insulating element

551. The second leg 5522 of the L-shaped clip comprises engagement means configured to engage with corresponding engagement means of the member of said plurality of top and bottom members 511, 512, 541, 542. The engagement means here comprises a barb or lug 5523. To ensure continuity, the shape of the transition member 55, 56 is adapted to the shape of the member of said plurality of top and bottom members 511, 512, 541, 542.

[0035] Depending on the selected spacing SP between neighbouring window units 11, 12, a width wb, wk and a depth db, dk of the transition member 55, 56 is chosen. Comparing Figs 18 and 19, two different sizes are shown. In principle, the transition members could be chosen to span the spacing between facing sides of neighbouring roof windows placed at an arbitrary distance from each other. Typically, some standard distances are foreseen, but in principle, the insulating assembly could be provided for spacings ranging from almost contact within the neighbouring roof windows to 500 mm within the neighbouring roof windows. In the embodiments shown, two standardized widths of 100 mm and 18 mm are described

[0036] The insulating element 551 of each transition member 55, 56 is advantageously made from a dimensionally stable material having good thermal insulating properties, preferably a polymer foam, such as extruded polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinylchloride (PVC), expanded polystyrene (EPS), extruded polystyrene (XPS) or mineral wool.

[0037] In the installation situation shown in Fig. 10, the insulating assembly 5 is configured to cooperate with the stabilizing rail 6 positioned in the spacing SP between neighbouring window units 11, 12 in the mounted condition of the roof window system such that the stabilizing rails 6 and 6b are - at least in part - in abutment with the two transition members 55, 56.

[0038] In a supply condition, the insulating assembly 5 is supplied as an unassembled kit, in which the two side members 52, 53 and the plurality of top and bottom members 511, 512, 541, 542 are packaged together, preferably in parallel with each other, and each of the two transition members 55, 56 is connected to a respective one of the at least first and second top members 511, 512 and the at least first and second bottom members 541, 542. Alternatively, the transition members 55, 56 could be provided separately. Although the transition members 55, 56 are shown as separate members, they could optionally be integrally connected to the top and/or bottom members either in a configuration where the transition member 55, 56 is partly integrated into one of the first and second top/bottom members 511, 512, 541, 542 or in a configuration where the transition member 55, 56 is fully integrated into both of the first and second top/bottom members 511, 512, 541, 542 thus forming a continuous top/bottom member.

[0039] Turning now to Figs 20 and 21, a first embodiment of the stabilizing rail 6 is shown. It is noted that a substantially identical, mirror-imaged second stabilizing rail 6b is provided as well. Where appropriate, reference will also be made to a second embodiment of the stabilizing rail 1006 of Fig. 22 and a third embodiment of the stabilizing rail 2006 of Fig. 23, and to the interaction between respective insulating profiles of the stabilizing rails 6, 6b; 1006 of the stabilizing assembly and the transition member 55 of the insulation assembly 6 shown in Figs 24 and 25, respectively. Only differences between the embodiments will be described in detail.

[0040] Just as the overall configuration of the stabilizing assembly itself, each stabilizing rail 6, 6b; 1006, 1006b; 2006, 2006b has a generally longitudinal extension and comprises at least a strengthening profile 62, 62b; 1062, 1062b; 2062, 2062b.

[0041] One or both stabilizing rails of a set comprises an insulating profile 61 fastened to the strengthening profile 62. The strengthening profile 62 comprises means for connection to the side member 113 of one window unit 11 of neighbouring window units 11, 12. Correspondingly, the strengthening profile 62b of the second stabilizing rail 6b comprises means for connection to the side member 122 of the other window unit 12 of the roof window system. Here, the insulating profile 61 has such a thickness tk, tb and depth dk, db that it substantially spans half of the gap G of the spacing SP between facing side members 113, 122 of neighbouring window units 11, 12 in the mounted condition of the roof window system 1. In this way, the insulating profiles 61 and 61b together span the gap G of the spacing SP.

[0042] The strengthening profile 62 comprises a connection flange 621 with connection means 623, 624, 625, 626 for the connection of the stabilizing rail 6; 1006; 2006 to the window unit 11. In the embodiment shown, the connection means comprise a set of lugs 623 protruding from a surface of the connection flange 621 configured to face and match holes in the side member 113 of the window unit 11 to which the stabilizing rail 6; 1006; 2006 is connected. Furthermore, the connection means comprise at least one set of holes 624, 625 and/or set of apertures 626 for receiving fastening means and/or fittings, the position and number of the at least one set of holes or apertures 624, 625, 626 preferably depending on the common height H of the roof window system 1 and also matching holes provided in the side member 113 of the window unit 11. Matching the connection means of the stabilizing rail 6; 1006; 2006 with holes in the side members of the window units facilitates correct positioning and mounting. One example of fastening means is screws 627 indicated in Figs 10 and 13. The number and position of the fastening means may be chosen in accordance with the height of the window units 11, 12, and thus of the roof window system 1, such that three sets of two screws 627 are provided to fasten the stabilizing rail 6 to the side member 113 of the first window unit 11 and the stabilizing rail 6b to the side member 122 of the second window unit 12, namely one set near the top, one set near the bottom and one set substantially

centrally. In case the common height H is larger, more than three sets may be provided, and fewer than three sets of screws 627 may be provided, for instance as shown in Fig. 13.

[0043] Each stabilizing rail 6, 6b; 1006, 1006b; 2006, 2006b has a length which is chosen as substantially corresponding to the common height H of the roof window system 1. At least the insulating profile 61 is chosen to have a length corresponding to the full length of the stabilizing rail 6 but the strengthening profile 62 has a length which is shorter than the full length of the stabilizing rail 6, such as to leave an end portion at each end of the stabilizing rail 6 in which the insulating profile 61 protrudes beyond opposing ends of the strengthening profile 62, the length of said end portions being preferably about 10 to 60 mm, more preferably about 40 mm.

[0044] Referring now in particular to Fig. 24, it is seen how the ledge 5514 of the transition member 55 cooperates with the shoulder 613 and cut-out portion 614 of the insulating profile 61 at the top of the roof window system, and also at the inclined edge 5513 with the facing edge 5115 of the first top member 511 of the insulating assembly 5 (and correspondingly at the other side of the other stabilizing rail 6b).

[0045] Correspondingly, at the bottom of the roof window system in the embodiment of Fig. 25, the insulating profile 1061 of the first stabilizing rail 1006 is shown in interaction with the transition member 56. The thickness tb of the insulating profile 61 which spans substantially the gap G of the spacing SP between neighbouring window units 11, 12 corresponds in substance to the width wb as defined by the upper section 5512 of the transition member 56.

[0046] Also clearly visible in this figure is the configuration of the second stabilizing rail 1006b in the mounted condition. This second stabilizing rail 1006b comprises only strengthening profile 1062b, which is mounted reversely on the window unit 12 as compared with the strengthening profile 1062 mounted on the window unit 11.

[0047] In general, the strengthening profile 62 of the stabilizing rail 6; 1006 comprises a fastening flange 622 extending substantially perpendicularly to the connection flange 621, thus forming an L-shape, the fastening flange 622 being fastened to the insulating profile 61 at an under side, facing away from the connection flange 621, preferably by means of adhesion. Here, the insulating profile 61 of the stabilizing rail 6; 1006; 2006 comprises a base section 611 defining said pre-defined thickness tk, tb. The insulating profile 61 of the stabilizing rail 6 comprises a ledge 612 and a shoulder portion 613 above the base section 611, and wherein the fastening flange 622 is positioned on the ledge 612 such that an upper side of the fastening flange 622 is substantially flush with an upper side of the shoulder portion 613.

[0048] In the second embodiment shown in Fig. 23, the insulating profile 2061 of the stabilizing rail 2006 comprises a base section 2611 defining said pre-defined thickness tb and an upper section 2615 having a smaller thickness, and wherein the connection flange 2621 of the strengthening profile 2062 comprises a folded flange portion 2627, the connection flange 2621 and the folded flange portion 2627 form fastening surfaces relative to the upper section 2615 of the insulating profile 2061.

[0049] The insulating profile 61 of the stabilizing rail 6 is made from a dimensionally stable material having good thermal insulating properties, preferably a polymer foam, such as extruded polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinylchloride (PVC), expanded polystyrene (EPS), extruded polystyrene (XPS) or mineral wool. For instance, the same material as for the insulating assembly 5 may be chosen.

[0050] The strengthening profile 62 is made from any suitable material which is capable of performing the function of a reinforcing rail, e.g. with properties like a gusset. Typically, a composite or metal material, such as steel.

[0051] Referring now to Figs 26 and 27, a first embodiment of a cover assembly is shown, in a disengaged and an engaged position, respectively. The cover assembly is intended to cover the spacing between facing sides of neighbouring roof windows placed at an arbitrary distance from each other. Typically, some standard distances are foreseen, but in principle, the cover assembly could be provided for spacings ranging from a contact within the neighbouring roof windows to 500 mm within the neighbouring roof windows. In the embodiment shown, a standardized width of the gap G of the spacing SP of 100 mm is described. The person skilled in the art would be aware of necessary adaptions to the cover assembly to accommodate other dimensions.

[0052] The cover assembly comprises a set of receiver brackets 7 configured to be connected to the facing side members 113, 122 of neighbouring window units 11, 12 and a cover plate 8 configured to be brought into releasable engagement with the set of receiver brackets 7. For comparison a prior art cover arrangement of a commercially available product traded under the name VELUX® Dormer is shown in Fig. 28a and Fig. 28b.

[0053] Referring briefly to Fig. 29, the set of receiver brackets 7 here includes four items. The number may be chosen in dependence of the height of the window units and hence of the roof window system; however, four receiver brackets have been found appropriate for most sizes window units.

[0054] As shown, each receiver bracket 7 is adapted to be installed in a groove 17 in adjacent frame members 113, 122 of neighbouring window units 11, 12. This groove 17 is as mentioned in the above circumferential and typically provided in the frame of most roof windows. Where the groove 17 at the top, bottom and outermost frame members serves to receive the lining panel 95, the groove 17 of the adjacent frame members serves to receive the receiver brackets 7. Each receiver bracket 7 comprises a base portion 70 from which a set of two second mounting elements 71 protrude to form rounded shapes, a second engagement portion 72 being here

formed near an end of the respective second mounting element 71. Furthermore, each receiver bracket 7 comprises a leg 73 at an end of the second engagement portion 72 opposite the base portion 70. The engagement portions 72 and the legs 73 are advantageously symmetrically placed such that the position can be reversed upside-down. Each leg 73 is received in the groove 17 of the respective frame member 113, 122. In order to fasten the legs 73 to the material of the frame member, one or more holes 74 are provided in each leg 73 as shown in Fig. 30 in which two holes 74 are provided and configured to receive fastening means such as screws (not shown).

[0055] The cover plate 8 comprises a base portion 80 from which a set of two first mounting elements 81 protrude, a first engagement portion 82 being preferably formed near a free end of the respective first mounting element 81.

[0056] The cover plate 8 comprises an additional leg 83, preferably provided with a hook 84. Referring to Fig. 27 showing the engaged position, it is seen that the hook 84 is placed close to the frame members such that the entry to the groove 17 is also covered. It is furthermore seen that a side edge 801 of the base portion is located beyond the position of the respective first mounting element 81. In this way, the cover element 8 overlaps not only the entire spacing SP but also the portion of the side members 113, 122 in which the groove 17 is located.

[0057] Common to all frame members in the embodiment shown, however, is that the circumferential groove 17 also receives the vapour barrier collar 97. The exact configuration of the vapour barrier collar 97 could in principle be chosen in any suitable way but it is preferred that that not only the top, bottom and outermost side members of the window units are provided with portions of the vapour barrier collar 97, but also the spacing SP between facing side members of the two neighbouring window units 11 and 12 as indicated in Fig. 26. The vapour barrier collar 97 is here formed as a strip spanning the spacing SP between the neighbouring window units 11 and 12. In order to provide a tight sealing, a gasket 971 is included in the vapour barrier collar 97. The legs 73 of the receiver bracket 7 are thus positioned such that the gasket 971 is squeezed between the leg 73 and the bottom of the groove 17.

[0058] To ensure the releasable engagement, the cover plate 8 comprises a first mounting element 81 and the receiver bracket 7 comprises a complementary second mounting element 71, and the first mounting element and the second mounting element are adapted to be brought into contact with one another. The first mounting element 81 and the second mounting element 71 comprises such complementary shapes that movement of the cover plate 8 relative to the receiver bracket or receiver brackets 7 in a mounting direction is possible while movement in the opposite direction is at least temporarily prevented by a first engagement portion 82 on the first mounting element 81 brought into engagement with a second engagement portion 72 on the second mounting element 71 to ensure a snap or clip engagement. In principle the first mounting element 81 and the second mounting element 71 could be provided at one longitudinal edge of the cover plate 8 and the receiver bracket 7, respectively; however, it is preferred that they as shown are symmetrically placed along both side edges.

[0059] In the embodiment shown, the first and second engagement portions 82, 72 are formed as mutually cooperating shapes including a protrusion, an indent, a wave shaped, a barb, a hook-shaped element, a catch-shaped element, a T-shaped cross-section, a V-shaped cross section and an arrow-shaped cross section or any combination thereof. The dimensions of the various parts are typically chosen in accordance with the material chosen. It is also seen that the first mounting element 81 forms an angle α with a direction perpendicular to the base portion 80 of the cover plate 8. The angle α is small, typically about 2 to 5°, and ascertains that safe guidance of the cover plate 8 over the receiver brackets 7 is ensured.

[0060] The first mounting elements 81 may be said to have the form of a track configured to be guided over and received, partially or fully, by the second mounting elements 71.

[0061] Once the desired number of receiver brackets 7 have been connected to the facing side members 113, 122, by introducing screws or other fastening means through the holes 74 in the legs 73 and further into the side members 113, 122, the cover plate 8 is placed such that the first mounting elements 81 with the respective first engagement portions 82 are guided over the second mounting elements 71 of the receiver brackets 7, until the first engagement portions 82 snap behind the second engagement portions 72. During this operation, the legs 73 also function as a stop of the movement such that the installer will experience a clear indication, for instance in the form of a distinct sound, that the mounted condition has been reached.

[0062] Each receiver bracket 7 is made of a robust material such as metal or an alloy or a plastic compound or a combination thereof, preferably extruded. The cover plate 8 is typically made of a metal or an alloy or a plastic compound or wood a combination thereof.

[0063] While the cover plate 8 may in principle be disengaged from the receiver bracket or brackets 7 in any suitable way, a demount tool 85 is provided in an embodiment of the roof window system according to the invention. As shown in Figs 31 and 32, the demount tool 85 comprises a substantially plane base 850. From the base 850, a first flange 851 protrudes at a rounded section 852, ending in an edge 8511. A second flange 853 protrudes from the base 850 at a distance from the first flange 851. The second flange 853 ends in an edge 8531 slightly beyond the edge 8511 of the first flange 851. A grip opening 854 is provided in the base 850.

[0064] In case it is desired to remove the cover plate 8, the first flange 851 of the demount tool 85 is introduced into the gap behind the leg 83 of the cover plate 8, at the

position of the hook 84. During this operation, the second flange 853 of the demount tool 85 overlaps the base portion 80 of the cover plate in the area of the side edge 801 while the base 850 of the demount tool 85 is substantially perpendicular to the plane of the base portion 80. The user then rotates the demount tool 85 outwards, i.e. in the direction away from the base portion 80 of the cover plate 8, by way of a lever rotating about the rounded section 852 which in turn abuts a surface of the side member 113, 122 in question. The applied moment releases the engagement between the cover plate 8 and the receiver bracket 7. If needed, the process is repeated at the position of each receiver bracket 7 and at both side edges 801 of the cover plate 8.

[0065] Another embodiment of a demount tool 86 is shown in Figs 33 and 34. The demount tool 86 comprises a base 860. From the base 860, a flange 861 protrudes while a handle portion 864 is formed oppositely to the flange 861. In case the cover plate 8 is to be removed, the flange 861 of the demount tool 86 is introduced into the gap behind the cover plate 8 and the engagement between the cover plate 8 and the receiver bracket 7 is released by handling the demount tool 86. An opening 865 is provided in the handle portion 864 in order to allow hanging the demount tool 86 on for instance a hook in-between uses. On the back side of the demount tool 86, shown in Fig. 34, reinforcement ribs 866 are provided to incur rigidity to the demount tool 86.

[0066] The invention is not limited to the embodiments shown and described in the above, but various modifications and combinations may be carried out within the limits defined by the claims.

List of reference numerals

[0067]

1 roof window system
- 11 first window unit
- 111 top member
- 112 side member
- 113 side member
- 114 bottom member
- 12 second window unit
- 121 top member
- 122 side member
- 123 side member
- 124 bottom member
- 15 window installation bracket
- 17 groove

2 roof structure
- 20 rafter
- 21 rafter
- 22 batten(s)
- 23 upper horizontal trimmer
- 24 lower horizontal trimmer
- 25 vertical trimmer
- 26 underroofing
- 27 vapour barrier membrane
- 28 auxiliary batten piece(s)
- 29 installation batten(s)

3 support assembly
- 31 upper support beam
- 311 top surface
- 312 side surface
- 313 side surface
- 314 bottom surface
- 32 lower support beam

4 mounting bracket
- 41 base
- 411 first edge
- 412 second edge
- 413 hole in base
- 42 leg(s)
- 421 bottom edge
- 422 inner free side edge portion
- 423 upper edge
- 424 outer edge
- 425 notch
- 426 hole(s) in leg
- 427 oblong aperture
- 428 larger hole in leg
- 43 upstanding flange(s)
- 431 first transition edge of upstanding flange 43 to base 41
- 432 second transition edge of upstanding flange 43 to leg 42
- 433 inclined edge portion
- 434 upper edge
- 435 outer edge
- 436 hole(s) in upstanding flange(s)

5 insulating assembly
- 50 insulating frame
- 511 first top member
- 5115 facing edge
- 512 second top member
- 5121 insulating element
- 5122 supporting rail
- 5125 facing edge
- 52 side member
- 53 side member
- 541 first bottom member
- 542 second bottom member
- 55 transition member
- 551 insulating element
- 5511 enlarged lower section
- 5512 upper section
- 5513 inclined edge
- 5514 ledge
- 5515 slot
- 552 engagement element
- 5521 first leg
- 5522 second leg
- 5523 lug
- 56 transition member
- 57 connector bracket

6, 6b stabilizing rail
61, 61b insulating profile
611 base section
612 ledge
613 shoulder
614 cut-out (top)
615 cut-out (bottom)
62, 62b strengthening profile
621 connection flange
622 fastening flange
623 set of lugs
624 set of holes (top)
625 set of holes (bottom)
626 set of apertures
627 fastening means (screws)

1006 stabilizing rail (2nd embodiment) 1061 insulating profile 1062 strengthening profile
1006b second stabilizing rail 1062b strengthening profile of second stabilizing rail

2006 stabilizing rail (3rd embodiment)
2061 insulating profile
2611 base section
2616 upper section
2062 strengthening profile
2621 connection flange
2627 folded flange portion
2006b second stabilizing rail

7 receiver brackets
70 base portion
71 second mounting element
72 second engagement portion
73 leg
74 hole(s)

8 cover plate
80 base portion
801 side edge of base portion
81 first mounting element
82 first engagement portion
83 leg
84 hook

85 demount tool
850 base
851 first flange
8511 edge of first flange
852 rounded section
853 second flange
8531 edge of second flange
854 grip opening

86 demount tool (other embodiment)
860 base
861 flange
864 handle portion
865 opening
866 reinforcement ribs

91 flashing arrangement
92 flashing arrangement
93 flashing arrangment
94 flashing arrangement
95 lining panel
96 underroof collar
97 vapour barrier collar
971 gasket

SP spacing
G gap
D depth
HWU common height of window units
W1 width of first window unit
W2 width of second window unit
W combined width
DWU common depth of window units
wk width (large)
wb width (small)
dk depth (large)
db depth (small)
tk thickness (large)
tb thickness (small)
α angle

Claims

1. A roof window system (1) comprising at least two window units (11, 12) configured to be built in side by side, separated by a spacing (SP), in a roof structure (2) of a roof, in particular comprising an inclined roof surface, each window unit (11, 12) comprising a top member (111, 121), two side members (112, 113, 122, 123), and a bottom member (114, 124), the side members defining a common height (H) and depth (D) of the roof window system, said roof window system (1) furthermore comprising a stabilizing assembly positioned in the spacing (SP) between neighbouring window units (11, 12) in the mounted condition of the roof window system,
wherein

the stabilizing assembly has a generally longitudinal extension and comprises a set of stabilizing rails (6; 6b; 1006; 1006b; 2006; 2006b),
each stabilizing rail includes a strengthening profile (62),
at least one of the stabilizing rails (6, 6b; 1006; 2006) of said set includes an insulating profile (61; 1061; 2061) fastened to the strengthening profile (62; 1062; 2062) of said at least one stabilizing rail,
the strengthening profile (62; 1062; 2062) of each stabilizing rail (6; 6b; 1006; 1006b; 2006;

2006b) comprises means for connection to the side member (113, 122) of a respective one window unit (11, 12) of neighbouring window units (11, 12), wherein the strengthening profile (62) comprises a connection flange (621) with connection means (623, 624, 625, 626) for the connection of the stabilizing rail (6; 1006; 2006) to the window unit (11), and
the insulating profile (61; 1061; 2061) of the at least one stabilizing rail provided with an insulating profile has such a thickness (tk, tb) and such a depth (dk, db) that the insulating profile or insulating profiles substantially span/s the gap (G) and the depth (D) of the spacing (SP) between facing side members (113, 122) of neighbouring window units (11, 12) in the mounted condition of the roof window system (1),
the stabilizing rail (6; 1006; 2006) has a length substantially corresponding to the common height (H) of the roof window system (1),
characterised in that
the insulating profile (61) has a length corresponding to the full length of the stabilizing rail (6; 1006; 2006) and the strengthening profile (62) has a length which is shorter than the full length of the stabilizing rail (6), preferably leaving an end portion at each end of the stabilizing rail (6) in which the insulating profile (61) protrudes beyond opposing ends of the strengthening profile (62), the length of said end portions being preferably about 10 to 60 mm, more preferably about 40 mm.

2. A roof window system according to claim 1, wherein the connection means comprise a set of lugs (623) protruding from a surface of the connection flange (521) configured to face the side member (113) of the window unit (11) to which the stabilizing rail (6; 1006; 2006) is connected.

3. A roof window system according to any of the preceding claims, wherein the connection means comprise at least one set of holes (624, 625) and/or set of apertures (626) for receiving fastening means and/or fittings, the position and number of the at least one set of holes or apertures (624, 625, 626) preferably depending on the common height (H) of the roof window system (1).

4. A roof window system according to any one of the preceding claims, wherein the strengthening profile (62) of the stabilizing rail (6; 1006) comprises a fastening flange (622) extending substantially perpendicularly to the connection flange (621), thus forming an L-shape, the fastening flange (622) being fastened to the insulating profile (61) at an under side, facing away from the connection flange (621), preferably by means of adhesion.

5. A roof window system according to claim 4, wherein the insulating profile (61) of the stabilizing rail (6; 1006; 2006) comprises a base section (611) defining said pre-defined thickness (tk, tb).

6. A roof window system according to claim 5, wherein the insulating profile (61) of the stabilizing rail (6) comprises a ledge (612) and a shoulder portion (613) above the base section (611), and wherein the fastening flange (622) is positioned on the ledge (612) such that an upper side of the fastening flange (622) is substantially flush with an upper side of the shoulder portion (613).

7. A roof window system according to any one of the preceding claims, wherein the stabilizing rail (6; 1006; 2006) is configured to cooperate with an insulating assembly (5) comprising an insulating frame (50) extending along a periphery of the window units (11, 12) including the top members, the outer side members (112, 123) of outermost window units (11, 12) and spanning the combined width (W) and the common height (H) of the roof window system in the mounted condition, and wherein the insulating profile (61) comprises a cut out (614, 615) at one or both opposing ends of the stabilizing rail (6; 1006; 2006).

8. A roof window system according to claim 7, wherein the insulating assembly (5) comprises two transition members (55, 56) each comprising an insulating element (551) having an enlarged lower section (5511) and an upper section (5512), the enlarged lower section (5511) being provided with an inclined edge (5513) such that a ledge (5514) is formed, the ledge (5514) preferably surrounding the upper section (5512) on an inner face and end faces, and wherein each cut-out (614, 615) of the insulating profile (61) of the stabilizing rail (6; 1006; 2006) is configured to abut the upper section (5512) above the ledge (5514) and the lower section (5511) of the respective transition member (55, 56) of the insulating assembly (5).

9. A roof window system according to any one of the preceding claims, wherein the insulating profile (2061) of the stabilizing rail (2006) comprises a base section (2611) defining said pre-defined thickness (tb) and an upper section (2615) having a smaller thickness, and wherein the connection flange (2621) of the strengthening profile (2062) comprises a folded flange portion (2627), the connection flange (2621) and the folded flange portion (2627) form fastening surfaces relative to the upper section (2615) of the insulating profile (2061).

10. A roof window system according to any one of the preceding claims, wherein the insulating profile (61) of the stabilizing rail (6) is made from a dimensionally stable material having good thermal insulating prop-

erties, preferably a polymer foam, such as extruded polyethylene (PE), polypropylene (PP), polyurethane (PU), polyvinylchloride (PVC), expanded polystyrene (EPS), extruded polystyrene (XPS) or mineral wool.

11. A roof window system according to any one of the preceding claims, wherein the strengthening profile (62) is made from a composite or metal material, such as steel.

12. A roof window system according to any one of the preceding claims, wherein the set of stabilizing rails of the stabilizing assembly comprises two substantially identical, mirror-imaged stabilizing rails (6, 6b), and wherein the thickness (tk, tb) of the insulating profile (61, 61b) of each stabilizing rail (6, 6b) substantially corresponds to half of the dimension of the gap (G) of the spacing (SP) between facing side members (113, 122) of neighbouring window units (11, 12) in the mounted condition of the roof window system (1).

13. A roof window system according to any one of claims 1 to 11 , wherein the set of stabilizing rails of the stabilizing assembly comprises a first stabilizing rail (1006, 2006) with an insulating element (1061, 2061) fastened to the strengthening profile (1062, 2062) and a second stabilizing rail (1006b, 2006b) comprising only the strengthening profile (1062, 2062), and wherein the thickness (tk, tb) of the insulating profile (1061, 2062) of the first stabilizing rail (1006, 2006) substantially corresponds to the dimension of the gap (G) of the spacing (SP) between facing side members (113, 122) of neighbouring window units (11, 12) in the mounted condition of the roof window system (1).

Patentansprüche

1. Dachfenstersystem (1), umfassend mindestens zwei Fenstereinheiten (11, 12), die dazu ausgestaltet sind, nebeneinander und durch einen Abstand (SP) getrennt in eine Dachstruktur (2) eines Dachs eingebaut zu werden, insbesondere umfassend eine geneigte Dachfläche, wobei jede Fenstereinheit (11, 12) ein oberes Glied (111, 121), zwei Seitenglieder (112, 113, 122, 123) und ein unteres Glied (114, 124) umfasst, wobei die Seitenglieder eine gemeinsame Höhe (H) und Tiefe (D) des Dachfenstersystems definieren, wobei das Dachfenstersystem (1) ferner eine Stabilisierungsanordnung umfasst, die in dem montierten Zustand des Dachfenstersystems in dem Abstand (SP) zwischen benachbarten Fenstereinheiten (11, 12) positioniert ist,
wobei
die Stabilisierungsanordnung eine allgemein längliche Erstreckung aufweist und einen Satz Stabilisierungsschienen (6; 6b; 1006; 1006b; 2006; 2006b) umfasst,
jede Stabilisierungsschiene ein Verstärkungsprofil (62) umfasst,
mindestens eine der Stabilisierungsschienen (6; 6b; 1006; 2006) des Satzes ein Isolierprofil (61; 1061; 2061) umfasst, das an dem Verstärkungsprofil (62; 1062; 2062) der mindestens einen Stabilisierungsschiene befestigt ist,
das Verstärkungsprofil (62; 1062; 2062) jeder Stabilisierungsschiene (6; 6b; 1006; 1006b; 2006; 2006b) Mittel zur Verbindung mit dem Seitenglied (113, 122) einer jeweiligen Fenstereinheit (11, 12) benachbarter Fenstereinheiten (11, 12) umfasst, wobei das Verstärkungsprofil (62) einen Verbindungflansch (621) mit Verbindungsmitteln (623, 624, 625, 626) für die Verbindung der Stabilisierungsschiene (6; 1006; 2006) mit der Fenstereinheit (11) umfasst, und das Isolierprofil (61; 1061; 2061) der mindestens einen Stabilisierungsschiene, die mit einem Isolierprofil versehen ist, solch eine Dicke (tk, tb) und solch eine Tiefe (dk, db) aufweist, dass das Isolierprofil oder die Isolierprofile im Wesentlichen den Spalt (G) und die Tiefe (D) des Abstands (SP) zwischen einander zugewandten Seitengliedern (113, 122) benachbarter Fenstereinheiten (11, 12) in dem montierten Zustand des Dachfenstersystems (1) überspannt/überspannen,
die Stabilisierungsschiene (6; 1006; 2006) eine Länge aufweist, die im Wesentlichen der gemeinsamen Höhe (H) des Dachfenstersystems (1) entspricht,
dadurch gekennzeichnet, dass
das Isolierprofil (61) eine Länge aufweist, die der vollen Länge der Stabilisierungsschiene (6; 1006; 2006) entspricht, und das Verstärkungsprofil (62) eine Länge aufweist, die kürzer als die volle Länge der Stabilisierungsschiene (6) ist, wobei vorzugsweise ein Endabschnitt an jedem Ende der Stabilisierungsschiene (6) belassen wird, in dem das Isolierprofil (61) über gegenüberliegende Enden des Verstärkungsprofils (62) hinausragt, wobei die Länge der Endabschnitte vorzugsweise ungefähr 10 bis 60 mm und bevorzugter ungefähr 40 mm beträgt.

2. Dachfenstersystem nach Anspruch 1, wobei die Verbindungsmittel einen Satz Laschen (623) umfassen, die von einer Fläche des Verbindungsflanschs (521) vorragen, der dazu ausgestaltet ist, dem Seitenglied (113) der Fenstereinheit (11), mit der die Stabilisierungsschiene (6; 1006; 2006) verbunden ist, zugewandt zu sein.

3. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei die Verbindungsmittel mindestens einen Satz Löcher (624, 625) und/oder einen Satz Öffnungen (626) zur Aufnahme von Befestigungsmitteln und/oder Beschlägen umfassen, wobei die Position und Anzahl des mindestens einen Satzes Löcher oder Öffnungen (624, 625, 626) vorzugsweise von der gemeinsamen Höhe (H) des Dachfenstersystems (1) abhängen.

4. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei das Verstärkungsprofil (62) der Stabilisierungsschiene (6; 1006) einen Befestigungsflansch (622) umfasst, der sich im Wesentlichen senkrecht zu dem Verbindungsflansch (621) erstreckt und somit eine L-Form bildet, wobei der Befestigungsflansch (622) vorzugsweise mittels Verklebens an einer Unterseite an dem Isolierprofil (61) befestigt und von dem Verbindungsflansch (621) abgewandt ist.

5. Dachfenstersystem nach Anspruch 4, wobei das Isolierprofil (61) der Stabilisierungsschiene (6; 1006; 2006) einen Basisabschnitt (611) umfasst, der die vordefinierte Dicke (tk, tb) definiert.

6. Dachfenstersystem nach Anspruch 5, wobei das Isolierprofil (61) der Stabilisierungsschiene (6) einen Absatz (612) und einen Schulterabschnitt (613) über dem Basisabschnitt (611) umfasst und wobei der Befestigungsflansch (622) so auf dem Absatz (612) positioniert ist, dass eine obere Seite des Befestigungsflanschs (622) mit einer oberen Seite des Schulterabschnitts (613) im Wesentlichen bündig ist.

7. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei die Stabilisierungsschiene (6; 1006; 2006) dazu ausgestaltet ist, mit einer Isolieranordnung (5) zusammenzuwirken, die einen Isolierrahmen (50) umfasst, der sich entlang eines Umfangs der Fenstereinheiten (11, 12), einschließlich der oberen Glieder, der äußeren Seitenglieder (112, 123) der am weitesten außen liegenden Fenstereinheiten (11, 12) erstreckt und die kombinierte Breite (W) und die gemeinsame Höhe (H) des Dachfenstersystems in dem montierten Zustand überspannt, und wobei das Isolierprofil (61) einen Ausschnitt (614, 615) an einem oder beiden gegenüberliegenden Enden der Stabilisierungsschiene (6; 1006; 2006) umfasst.

8. Dachfenstersystem nach Anspruch 7, wobei die Isolieranordnung (5) zwei Übergangsglieder (55, 56) umfasst, die jeweils ein Isolierelement (551) umfassen, das einen verbreiterten unteren Abschnitt (5511) und einen oberen Abschnitt (5512) aufweist, wobei der verbreiterte untere Abschnitt (5511) mit einem geneigten Rand (5513) versehen ist, so dass ein Absatz (5514) gebildet wird, wobei der Absatz (5514) vorzugsweise den oberen Abschnitt (5512) an einer inneren Fläche und an Endflächen umgibt, und wobei jeder Ausschnitt (614, 615) des Isolierprofils (61) der Stabilisierungsschiene (6; 1006; 2006) dazu ausgestaltet ist, an dem oberen Abschnitt (5512) über dem Absatz (5514) und dem unteren Abschnitt (5511) des jeweiligen Übergangsglieds (55, 56) der Isolieranordnung (5) anzuliegen.

9. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei das Isolierprofil (2061) der Stabilisierungsschiene (2006) einen Basisabschnitt (2611), der die vordefinierte Dicke (tb) definiert, und einen oberen Abschnitt (2615) mit einer geringeren Dicke umfasst, und wobei der Verbindungsflansch (2621) des Verstärkungsprofils (2062) einen gefalteten Flanschabschnitt (2627) umfasst, wobei der Verbindungsflansch (2621) und der gefaltete Flanschabschnitt (2627) bezüglich des oberen Abschnitts (2615) des Isolierprofils (2061) Befestigungsflächen bilden.

10. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei das Isolierprofil (61) der Stabilisierungsschiene (6) aus einem formstabilen Material mit guten Wärmedämmeigenschaften, vorzugsweise einem Polymerschaumstoff wie extrudiertem Polyethylen (PE), Polypropylen (PP), Polyurethan (PU), Polyvinylchlorid (PVC), Polystyrolschaum (EPS), extrudiertem Polystyrol (XPS) oder Mineralwolle hergestellt ist.

11. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei das Verstärkungsprofil (62) aus einem Verbundstoff- oder einem metallischen Material wie Stahl hergestellt ist.

12. Dachfenstersystem nach einem der vorhergehenden Ansprüche, wobei der Satz Stabilisierungsschienen der Stabilisierungsanordnung zwei im Wesentlichen identische spiegelverkehrte Stabilisierungsschienen (6, 6b) umfasst, und wobei die Dicke (tk, tb) des Isolierprofils (61, 61b) jeder Stabilisierungsschiene (6, 6b) im Wesentlichen der Hälfte der Abmessung des Spalts (G) des Abstands (SP) zwischen einander zugewandten Seitengliedern (113, 122) benachbarter Fenstereinheiten (11, 12) in dem montierten Zustand des Dachfenstersystems (1) entspricht.

13. Dachfenstersystem nach einem der Ansprüche 1 bis 11, wobei der Satz von Stabilisierungsschienen der Stabilisierungsanordnung eine erste Stabilisierungsschiene (1006, 2006) mit einem Isolierelement (1061, 2061), das an dem Verstärkungsprofil (1062, 2062) befestigt ist, und eine zweite Stabilisierungsschiene (1006b, 2006b), die nur das Verstärkungs-

profil (1062, 2062) umfasst, umfasst, und wobei die Dicke (tk, tb) des Isolierprofils (1061, 2062) der ersten Stabilisierungsschiene (1006, 2006) im Wesentlichen der Abmessung des Spalts (G) des Abstands (SP) zwischen einander zugewandten Seitengliedern (113, 112) benachbarter Fenstereinheiten (11, 12) in dem montierten Zustand des Dachfenstersystems (1) entspricht.

Revendications

1. Système de fenêtre de toit (1) comprenant au moins deux unités fenêtre (11, 12) conçues pour être montées côte à côte, séparées par un espacement (SP), dans une structure de toit (2) d'un toit, en particulier comprenant une surface de toit inclinée, chaque unité fenêtre (11, 12) comprenant un élément supérieur (111, 121), deux éléments latéraux (112, 113, 122, 123), et un élément inférieur (114, 124), les éléments latéraux définissant une hauteur (H) et une profondeur (D) communes du système de fenêtre de toit, ledit système de fenêtre de toit (1) comprenant en outre un ensemble de stabilisation positionné dans l'espacement (SP) entre des unités fenêtre (11, 12) voisines à l'état monté du système de fenêtre de toit,

   l'ensemble de stabilisation ayant une extension généralement longitudinale et comprenant un ensemble de rails de stabilisation (6 ; 6b ; 1006 ; 1006b ; 2006 ; 2006b),
   chaque rail de stabilisation comprenant un profilé de renforcement (62),
   au moins l'un parmi les rails de stabilisation (6, 6b ; 1006 ; 2006) dudit ensemble comprenant un profilé isolant (61 ; 1061 ; 2061) fixé au profilé de renforcement (62 ; 1062 ; 2062) dudit au moins un rail de stabilisation,
   le profilé de renforcement (62 ; 1062 ; 2062) de chaque rail de stabilisation (6 ; 6b ; 1006 ; 1006b ; 2006 ; 2006b) comprenant des moyens destinés à relier à l'élément latéral (113, 122) une unité fenêtre (11, 12) respective d'unités fenêtre (11, 12) voisines, le profilé de renforcement (62) comprenant une bride de liaison (621) doté de moyens de liaison (623, 624, 625, 626) pour la liaison du rail de stabilisation (6 ; 1006 ; 2006) à l'unité fenêtre (11), et
   le profilé isolant (61 ; 1061 ; 2061) de l'au moins un rail de stabilisation pourvu d'un profilé isolant ayant une épaisseur (tk, tb) et une profondeur (dk, db) telles que le ou les profilés isolants couvrent sensiblement l'espace (G) et la profondeur (D) de l'espacement (SP) entre les éléments latéraux (113, 122) en regard d'unités fenêtre (11, 12) voisines à l'état monté du système de fenêtre de toit (1),
   le rail de stabilisation (6 ; 1006 ; 2006) ayant une longueur correspondant sensiblement à la hauteur commune (H) du système de fenêtre de toit (1),
   caractérisé en ce que
   le profilé isolant (61) a une longueur correspondant à la longueur totale du rail de stabilisation (6 ; 1006 ; 2006) et le profilé de renforcement (62) a une longueur qui est inférieure à la longueur totale du rail de stabilisation (6), laissant de préférence une partie d'extrémité au niveau de chaque extrémité du rail de stabilisation (6) dans laquelle le profilé isolant (61) fait saillie des extrémités opposées du profilé de renforcement (62), la longueur desdites parties d'extrémité étant de préférence comprise entre environ 10 à 60 mm, plus préférentiellement d'environ 40 mm.

2. Système de fenêtre de toit selon la revendication 1, les moyens de liaison comprenant un ensemble d'ergots (623) faisant saillie d'une surface de la bride de liaison (521) conçue pour faire face à l'élément latéral (113) de l'unité fenêtre (11) à laquelle le rail de stabilisation (6 ; 1006 ; 2006) est relié.

3. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, les moyens de liaison comprenant au moins un ensemble de trous (624, 625) et/ou un ensemble d'ouvertures (626) destiné à recevoir des moyens de fixation et/ou des raccords, la position et le nombre de l'au moins un ensemble de trous ou d'ouvertures (624, 625, 626) dépendant de préférence de la hauteur commune (H) du système de fenêtre de toit (1).

4. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, le profilé de renforcement (62) du rail de stabilisation (6 ; 1006) comprenant une bride de fixation (622) s'étendant sensiblement perpendiculairement à la bride de liaison (621), formant ainsi une forme en L, la bride de fixation (622) étant fixée au profilé isolant (61) sur un côté inférieur, opposé à la bride de liaison (621), de préférence par collage.

5. Système de fenêtre de toit selon la revendication 4, le profilé isolant (61) du rail de stabilisation (6 ; 1006 ; 2006) comprenant une section de base (611) définissant ladite épaisseur (tk, tb) prédéfinie.

6. Système de fenêtre de toit selon la revendication 5, le profilé isolant (61) du rail de stabilisation (6) comprenant un rebord (612) et une partie épaulement (613) au-dessus de la section de base (611), et la bride de fixation (622) étant positionnée sur le rebord (612) de sorte qu'un côté supérieur de la bride de fixation (622) soit sensiblement au même niveau qu'un côté supérieur de la partie épaulement (613).

7. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, le rail de stabilisation (6 ; 1006 ; 2006) étant conçu pour coopérer avec un ensemble isolant (5) comprenant un cadre isolant (50) s'étendant le long d'une périphérie des unités fenêtre (11, 12), y compris les éléments supérieurs, les éléments latéraux extérieurs (112, 123) des unités fenêtre (11, 12) les plus à l'extérieur et couvrant la largeur combinée (W) et la hauteur commune (H) du système de fenêtre de toit à l'état monté, et le profilé isolant (61) comprenant une découpe (614, 615) au niveau de l'une ou des deux extrémités opposées du rail de stabilisation (6 ; 1006 ; 2006).

8. Système de fenêtre de toit selon la revendication 7, l'ensemble isolant (5) comprenant deux éléments de transition (55, 56) comprenant chacun un élément isolant (551) ayant une section inférieure élargie (5511) et une section supérieure (5512), la section inférieure élargie (5511) étant pourvue d'un bord incliné (5513) de sorte à former un rebord (5514), le rebord (5514) entourant de préférence la section supérieure (5512) sur une face intérieure et des faces d'extrémité, et chaque découpe (614, 615) du profilé isolant (61) du rail de stabilisation (6 ; 1006 ; 2006) étant conçue pour venir en butée contre la section supérieure (5512) au-dessus du rebord (5514) et contre la section inférieure (5511) de l'élément de transition (55, 56) respectif de l'ensemble isolant (5).

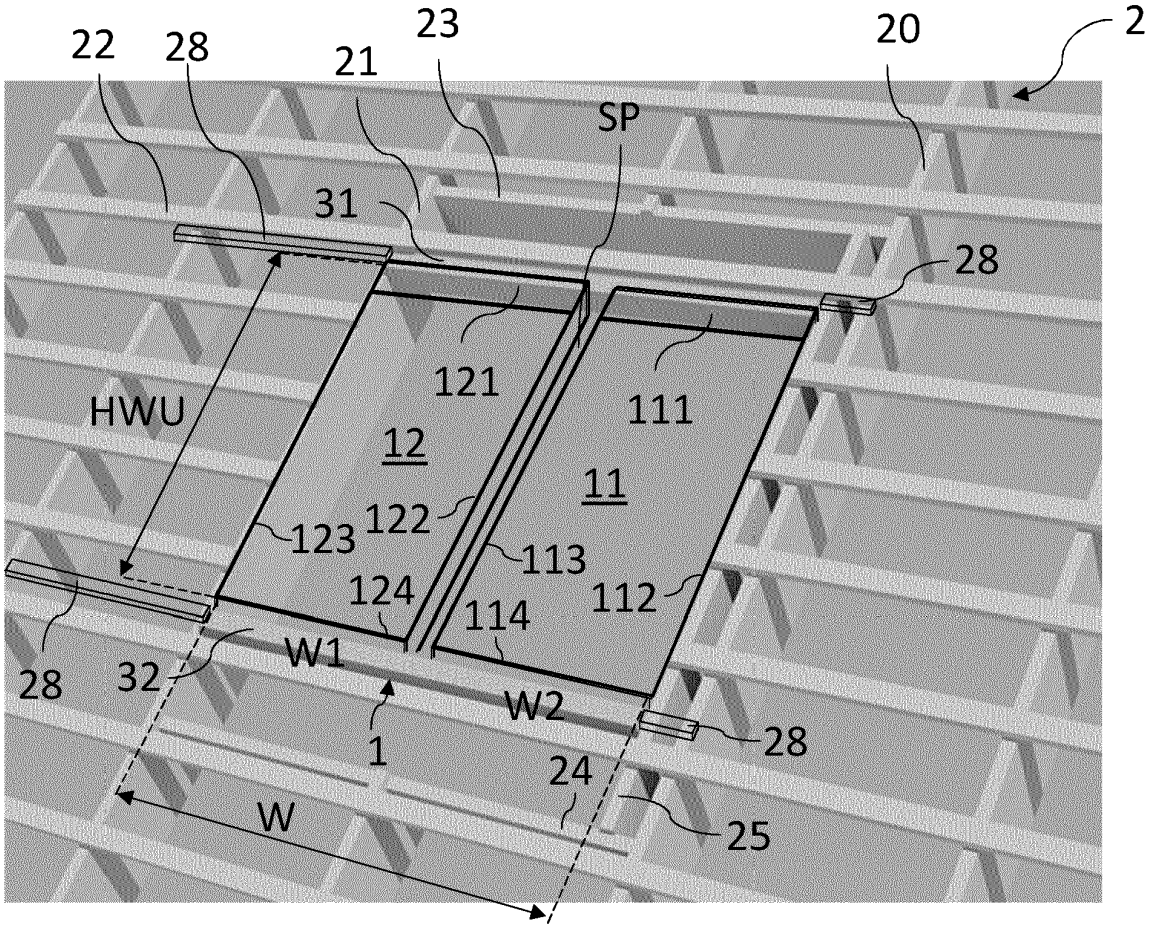
9. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, le profilé isolant (2061) du rail de stabilisation (2006) comprenant une section de base (2611) définissant ladite épaisseur prédéfinie (tb) et une section supérieure (2615) ayant une épaisseur inférieure, et la bride de liaison (2621) du profilé de renforcement (2062) comprenant une partie de bride repliée (2627), la bride de liaison (2621) et la partie de bride repliée (2627) formant des surfaces de fixation par rapport à la section supérieure (2615) du profilé isolant (2061).

10. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, le profilé isolant (61) du rail de stabilisation (6) étant fabriqué en un matériau indéformable présentant de bonnes propriétés d'isolation thermique, de préférence une mousse polymère, telle que du polyéthylène (PE) extrudé, du polypropylène (PP), du polyuréthane (PU), du polychlorure de vinyle (PVC), du polystyrène expansé (EPS), du polystyrène extrudé (XPS) ou de la laine minérale.

11. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, le profilé de renforcement (62) étant en un matériau composite ou métallique, comme l'acier.

12. Système de fenêtre de toit selon l'une quelconque des revendications précédentes, l'ensemble de rails de stabilisation de l'ensemble de stabilisation comprenant deux rails de stabilisation (6, 6b) sensiblement identiques en miroir, et l'épaisseur (tk, tb) du profilé isolant (61, 61b) de chaque rail de stabilisation (6, 6b) correspondant sensiblement à la moitié de la dimension de l'espace (G) de l'espacement (SP) entre des éléments latéraux (113, 122) en regard des unités fenêtre (11, 12) voisines à l'état monté du système de fenêtre de toit (1) .

13. Système de fenêtre de toit selon l'une quelconque des revendications 1 à 11 , l'ensemble de rails de stabilisation de l'ensemble de stabilisation comprenant un premier rail de stabilisation (1006, 2006) doté d'un élément isolant (1061, 2061) fixé au profilé de renforcement (1062, 2062) et un second rail de stabilisation (1006b, 2006b) comprenant uniquement le profilé de renforcement (1062, 2062), et l'épaisseur (tk, tb) du profilé isolant (1061, 2062) du premier rail de stabilisation (1006, 2006) correspondant sensiblement à la dimension de l'espace (G) de l'espacement (SP) entre les éléments latéraux (113, 122) en regard d'unités fenêtre (11, 12) voisines à l'état monté du système de fenêtre de toit (1).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28
21
23
20
2
SP
31
28
121
111
HWU
12
11
122
123
113
124
112
114
W1
W2
28
32
1
28
24
25
W

Fig. 1

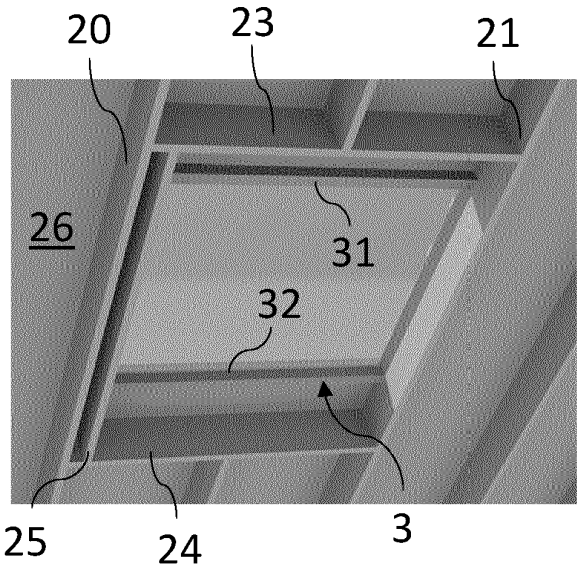
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Fig. 2

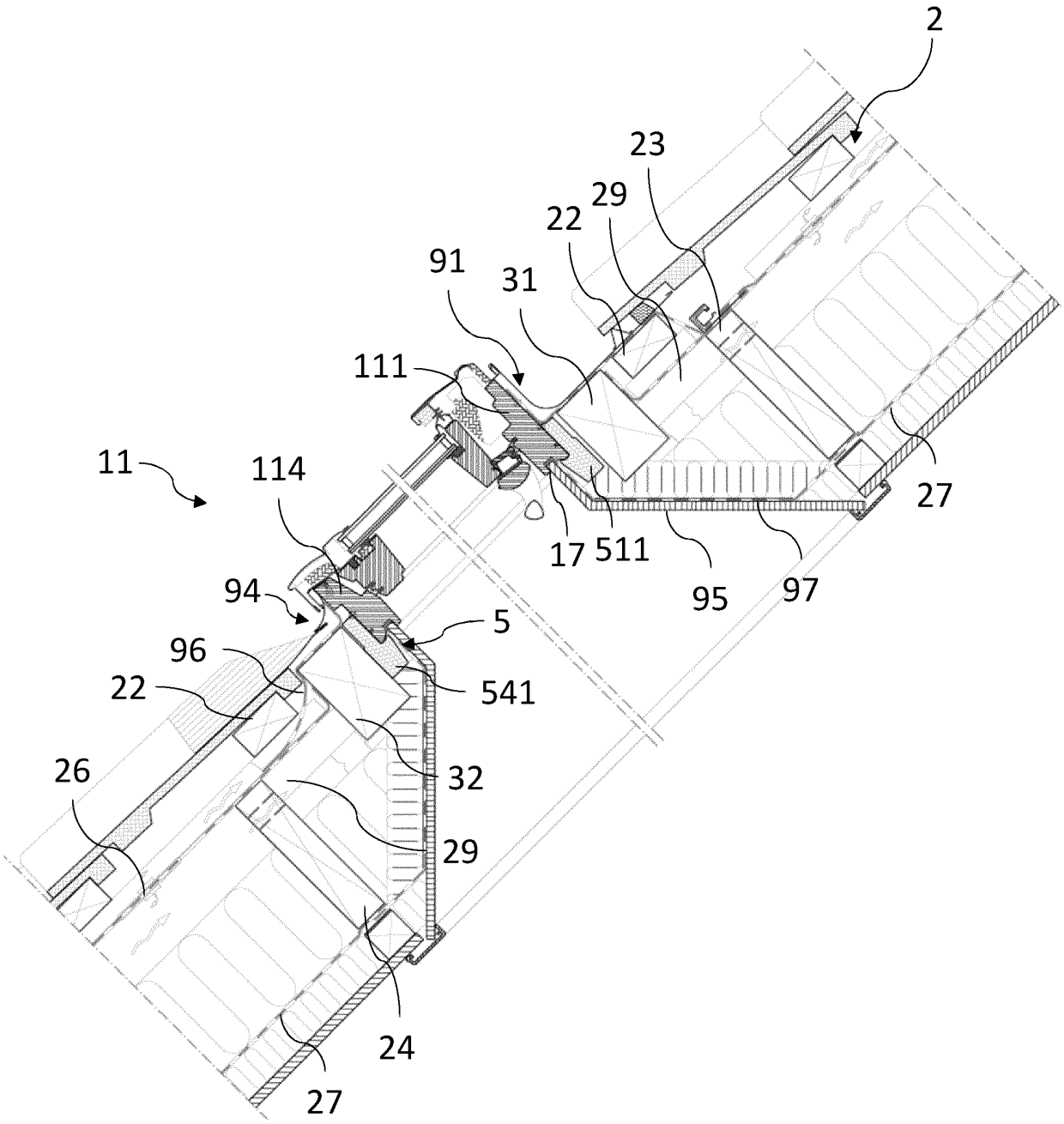
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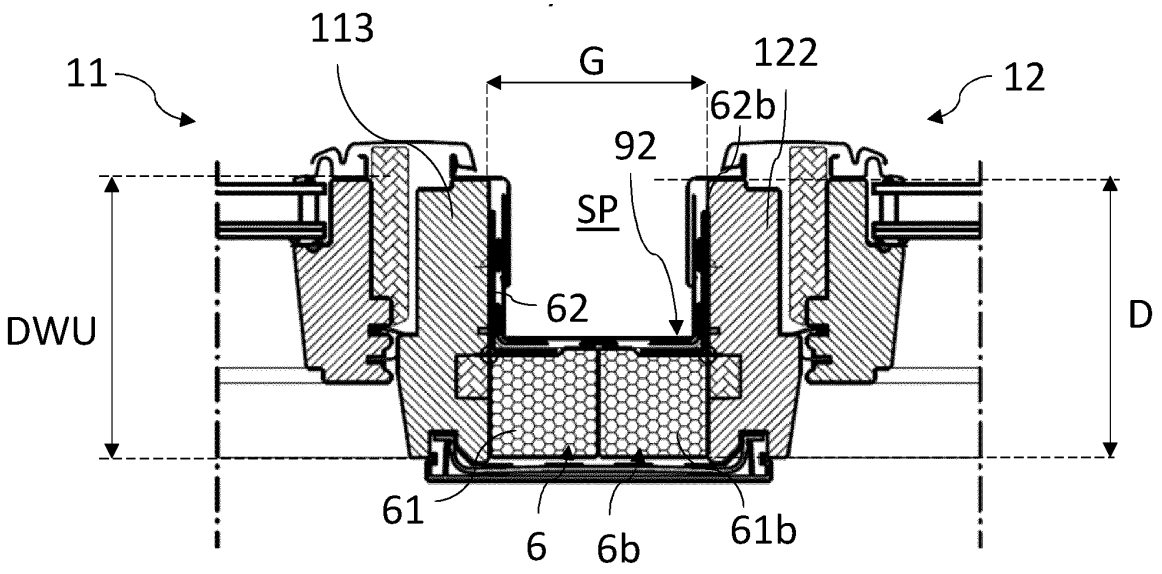
Fig. 3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62b
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DWU
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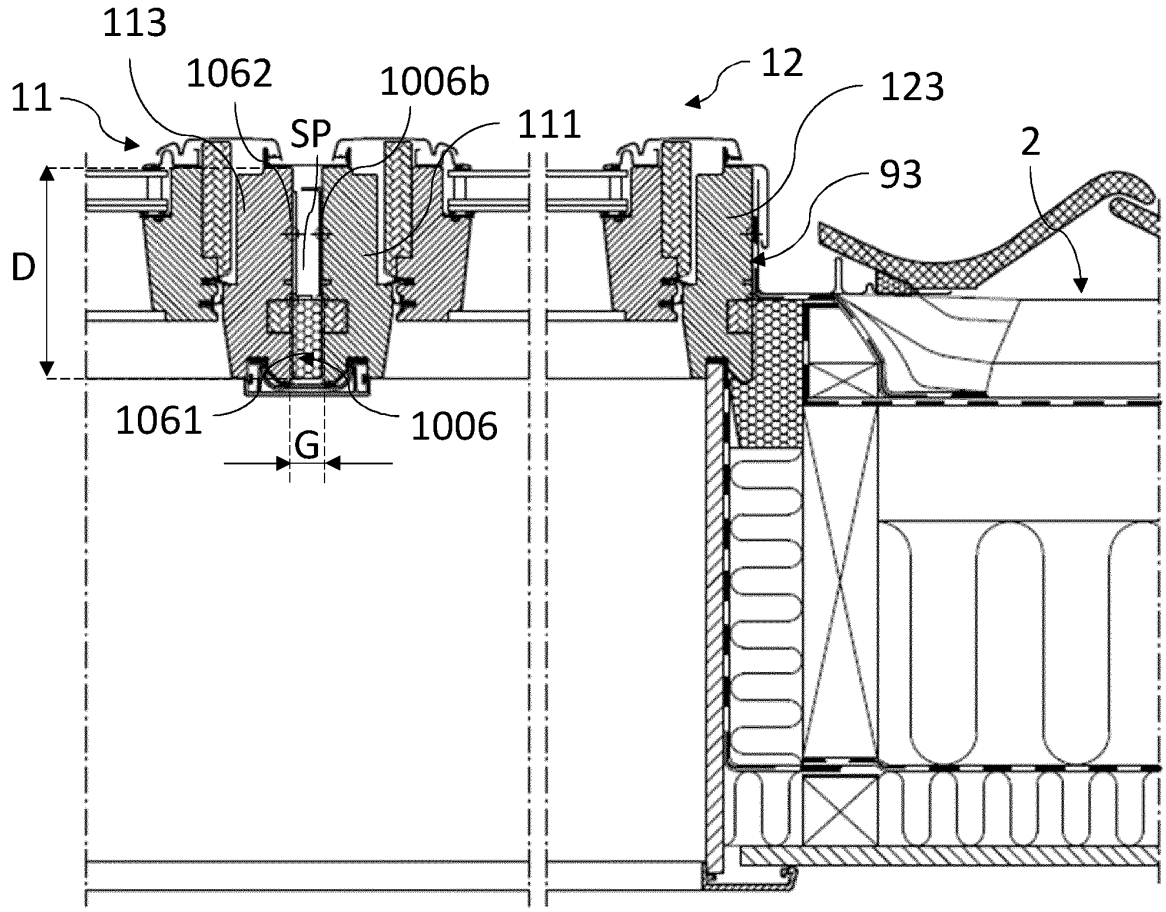
D
61
6
6b
61b

Fig. 4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SP
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D
1061
1006
G

Fig. 5

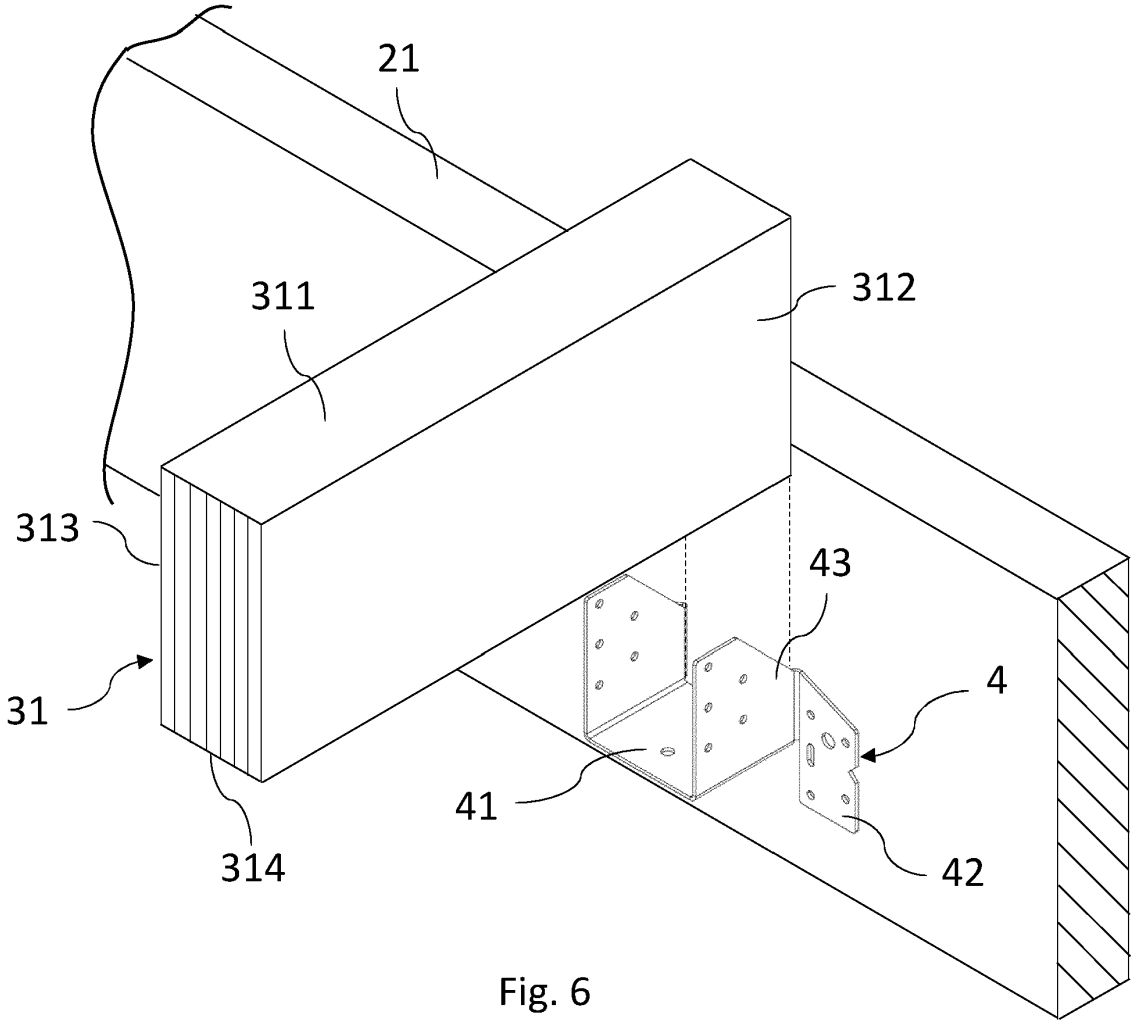
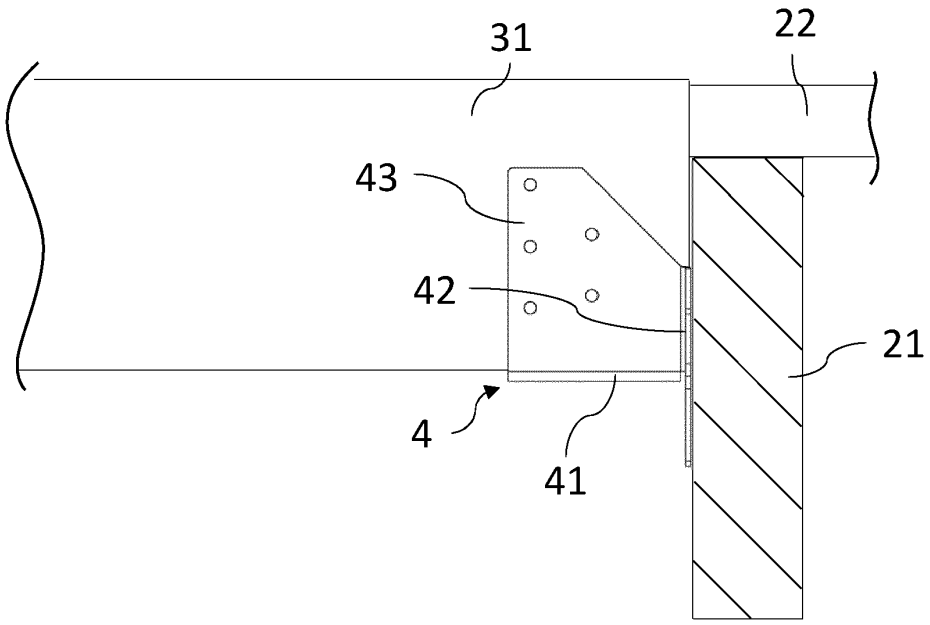


Fig. 6



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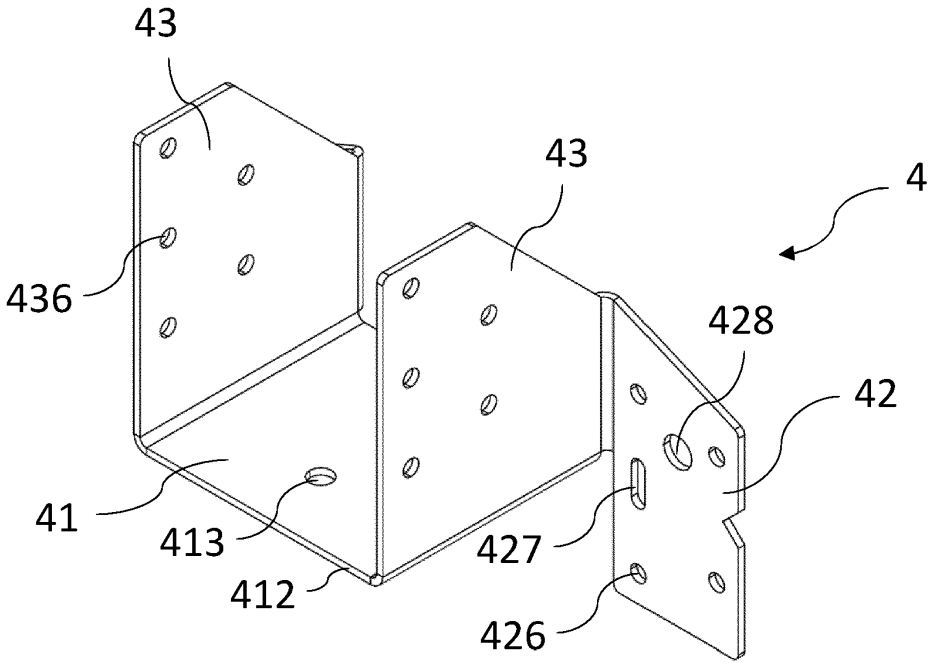
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Fig. 8

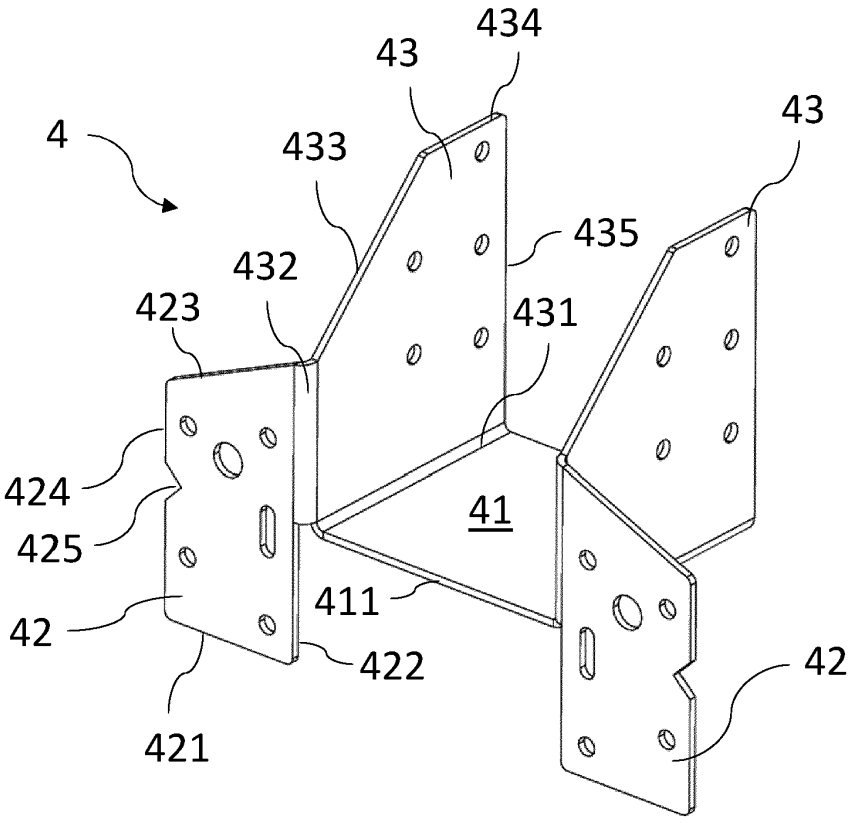
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Fig. 9

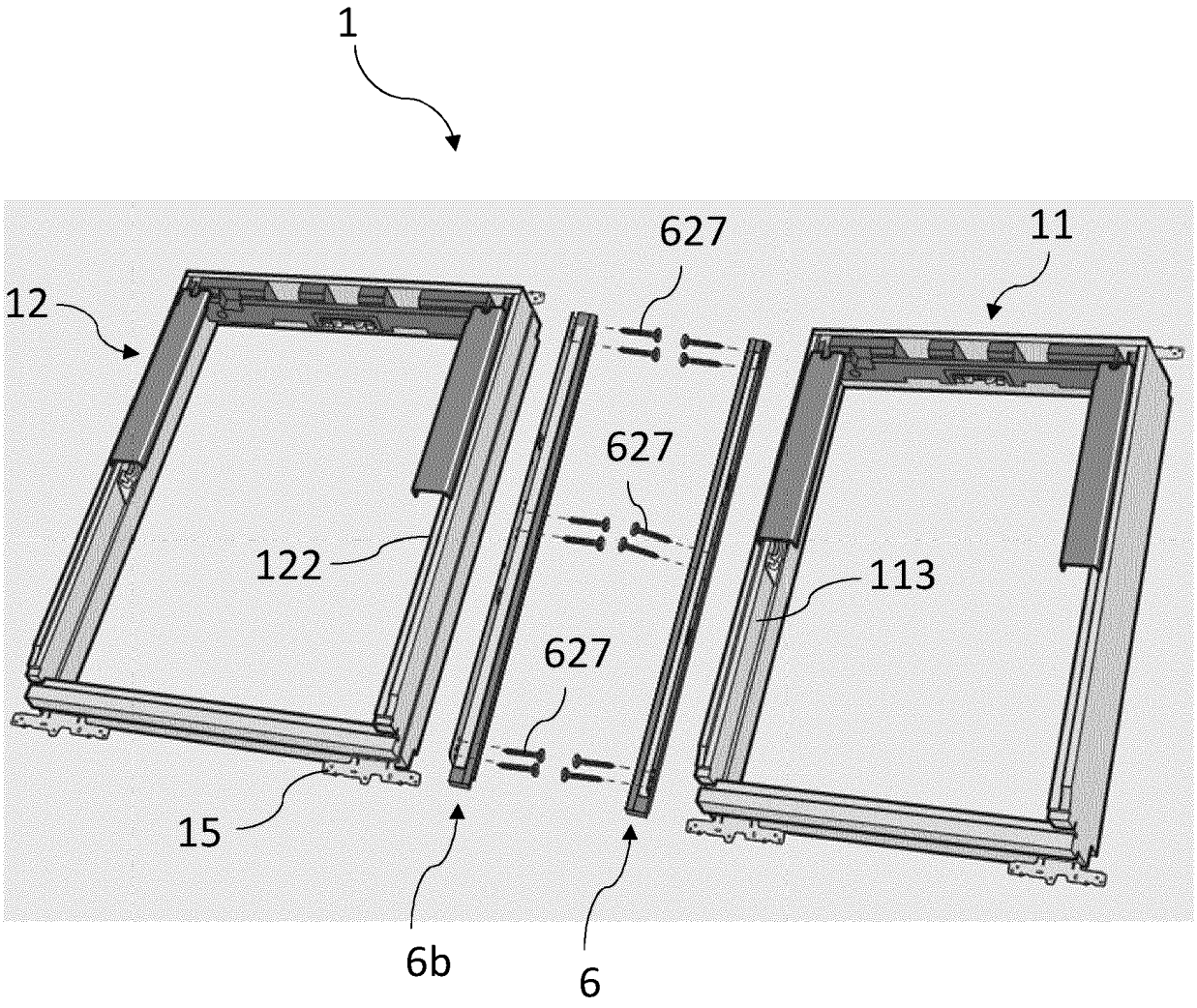


Fig. 10

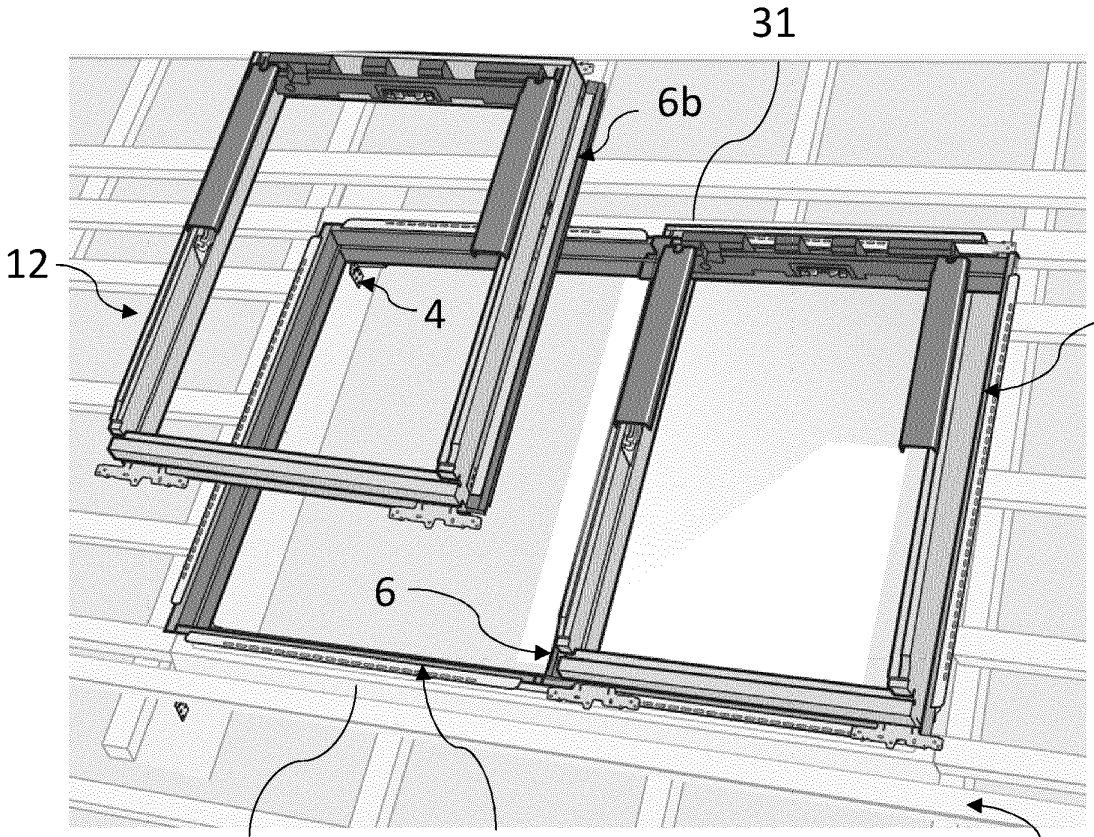
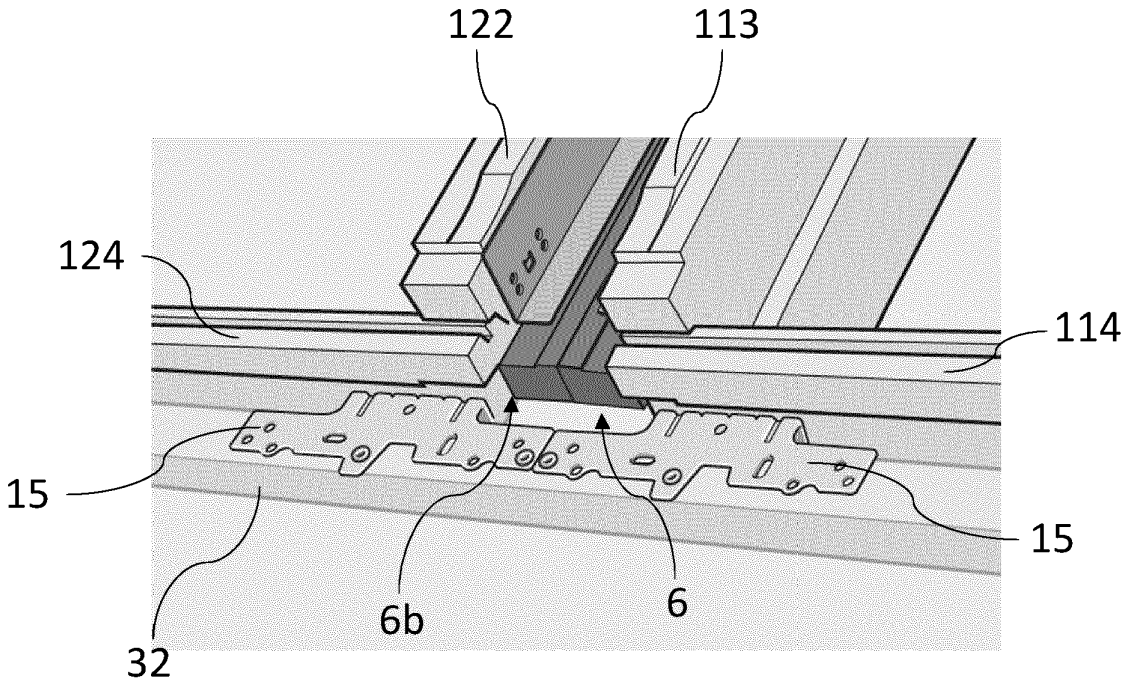


Fig. 11



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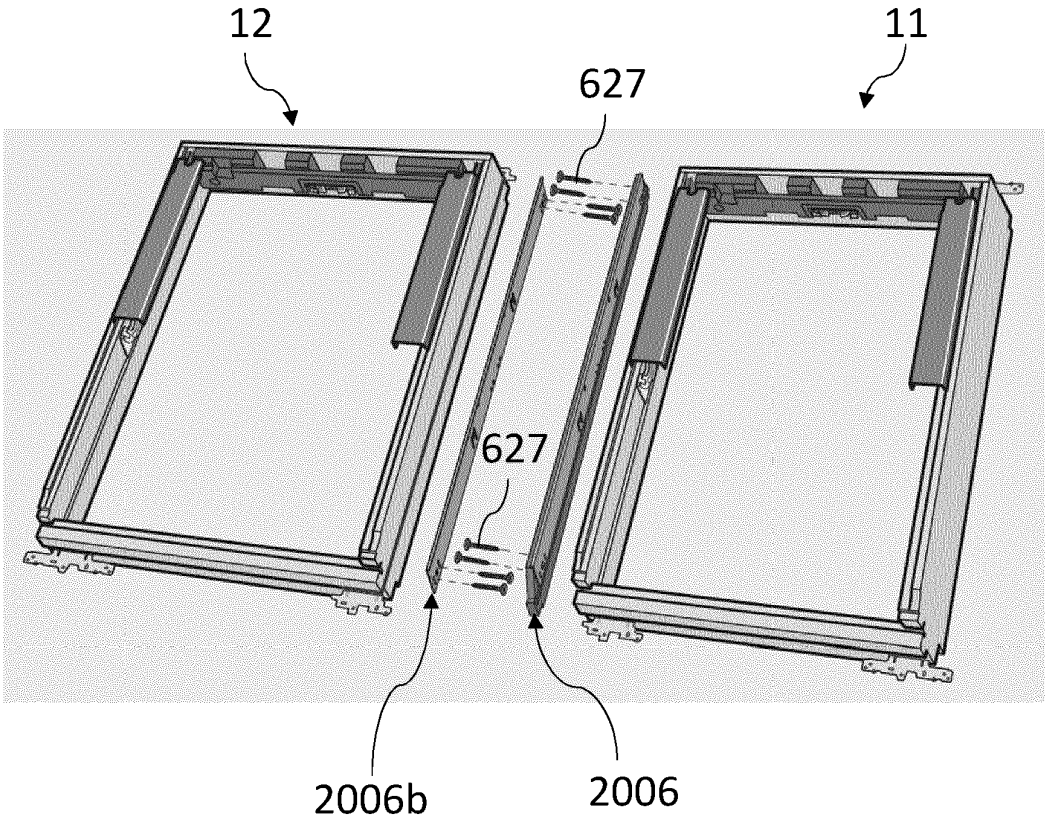


Fig. 13

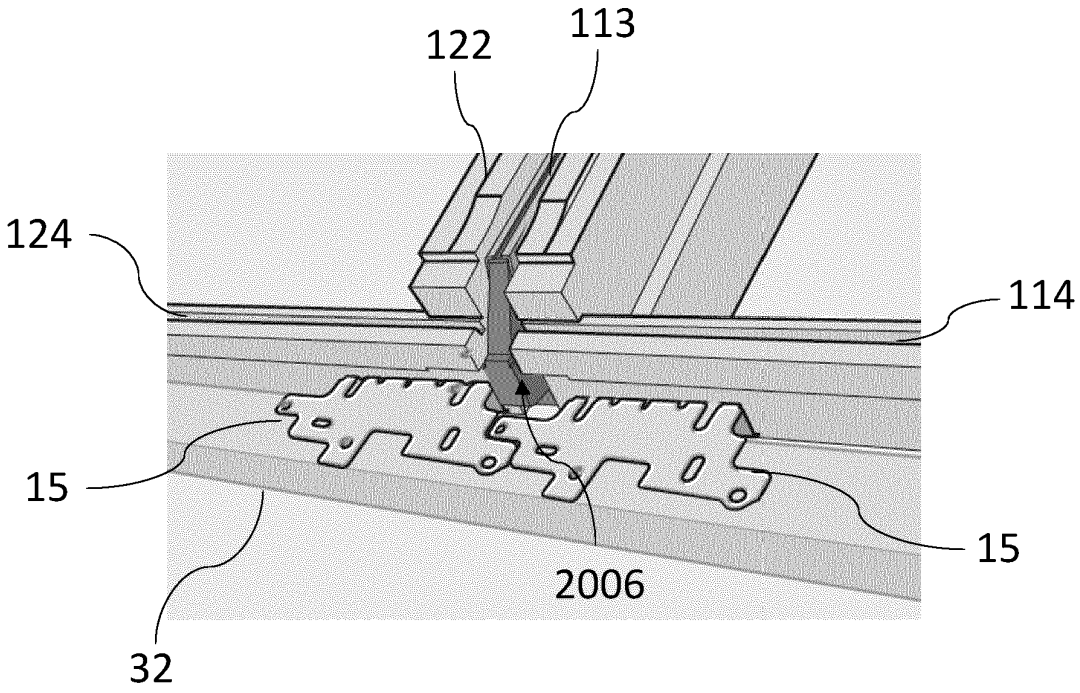


Fig. 14

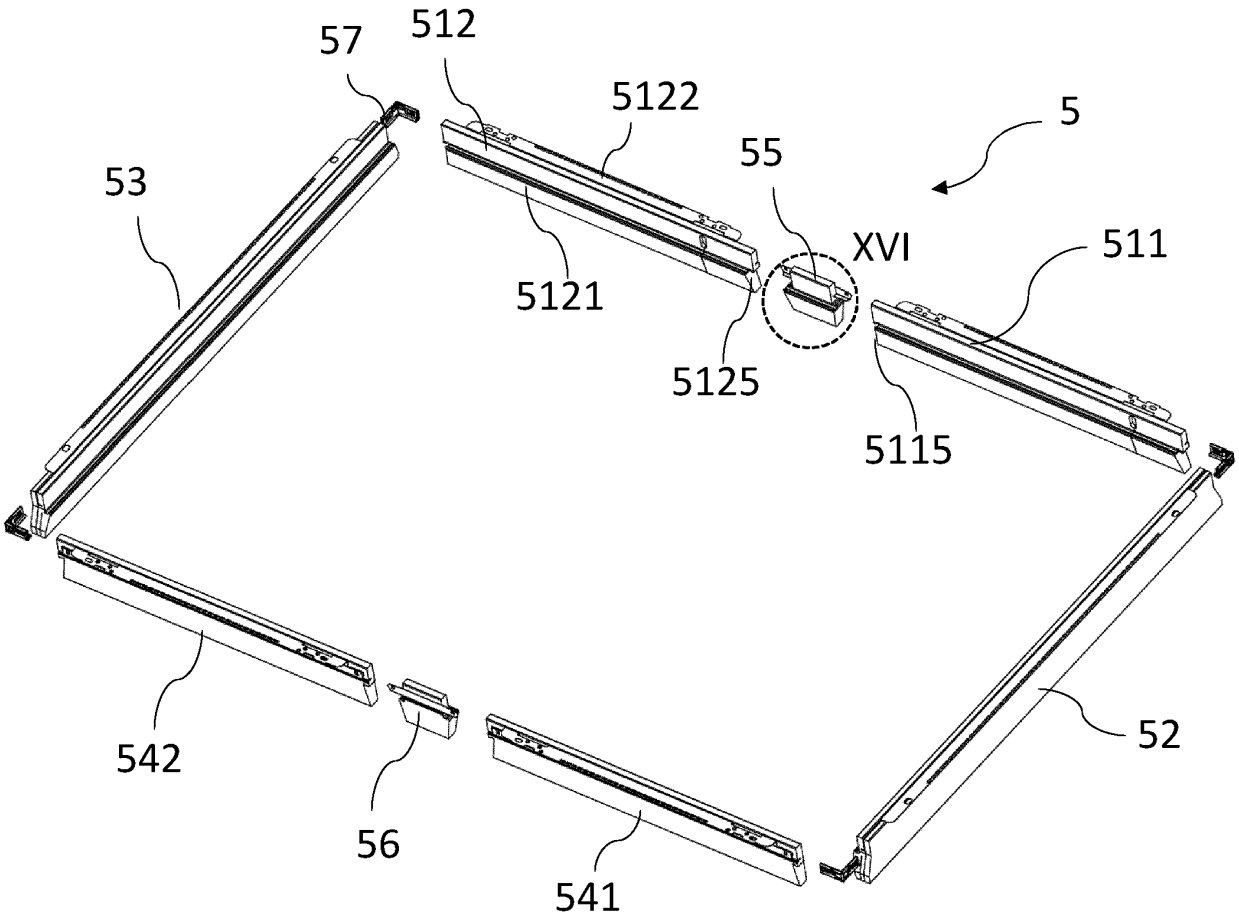


Fig. 15

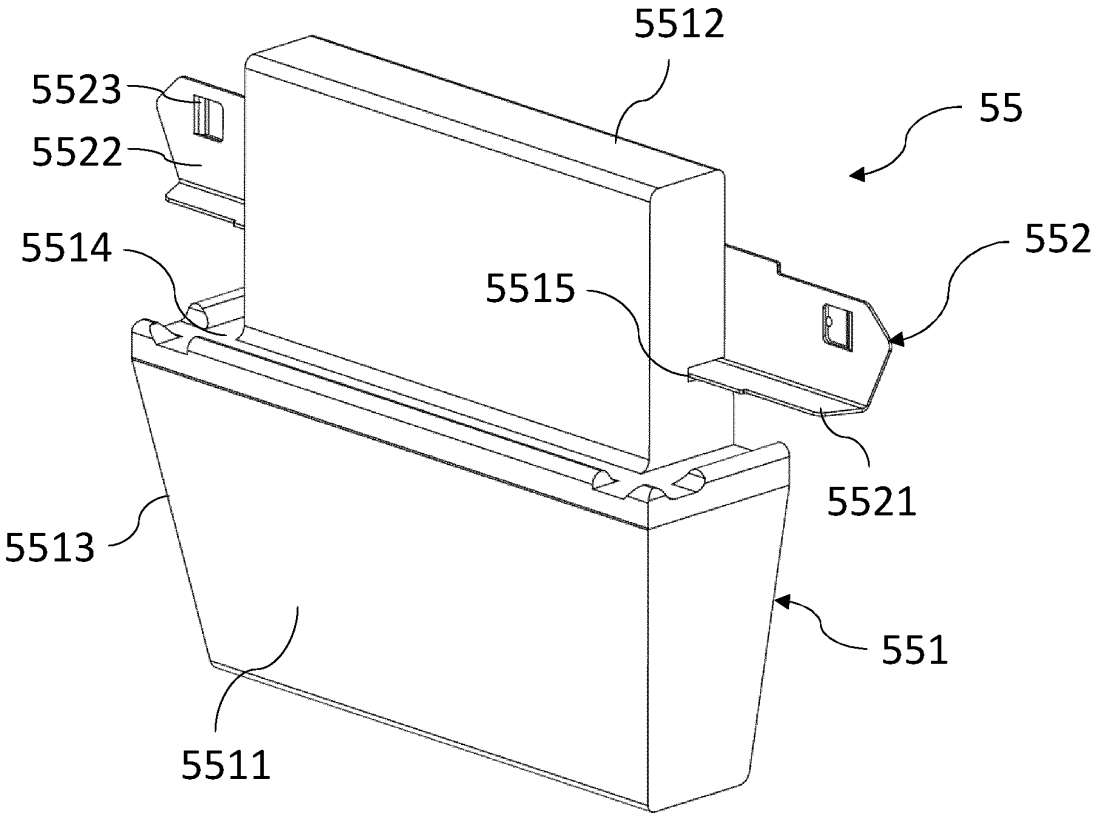


Fig. 16

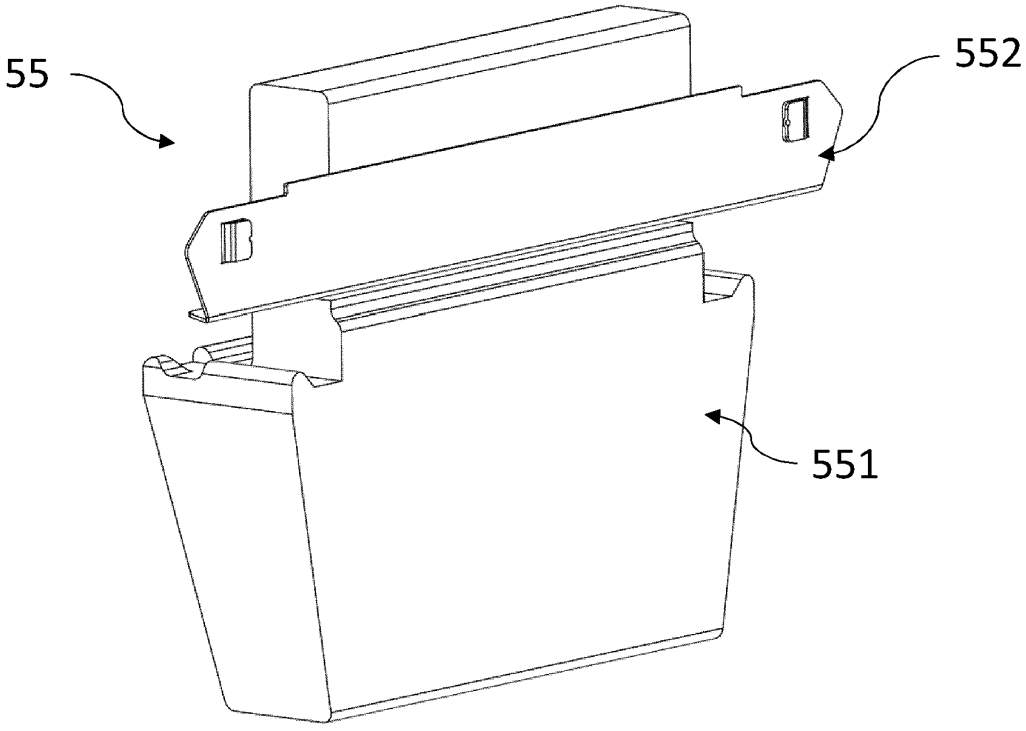


Fig. 17

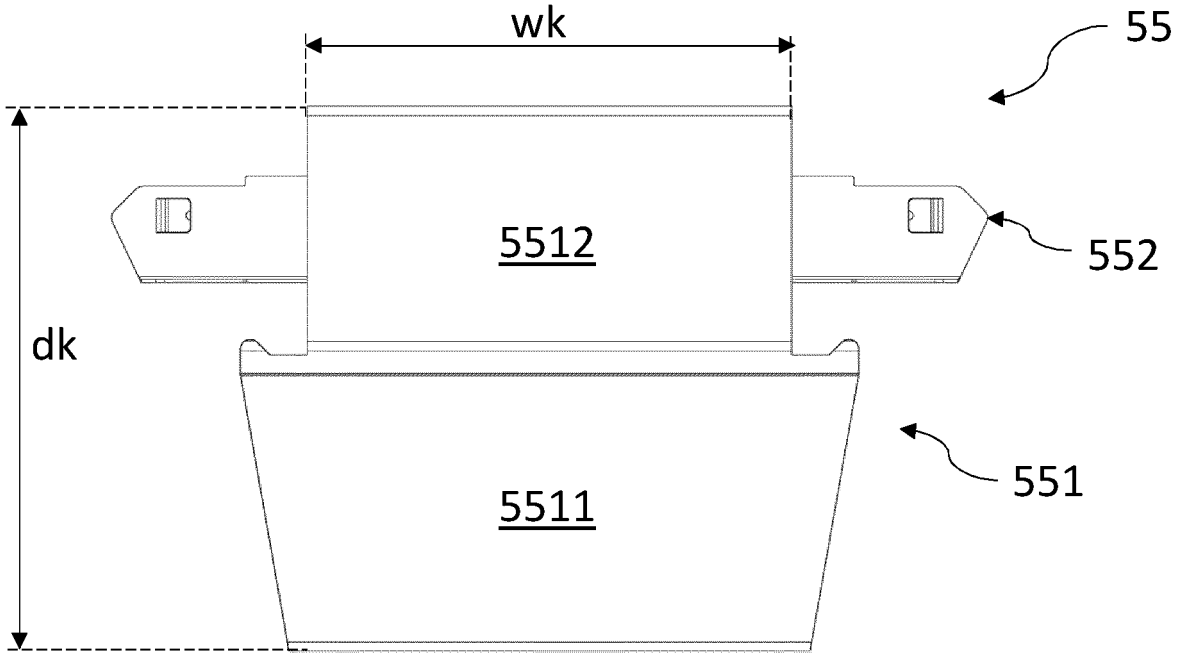


Fig. 18

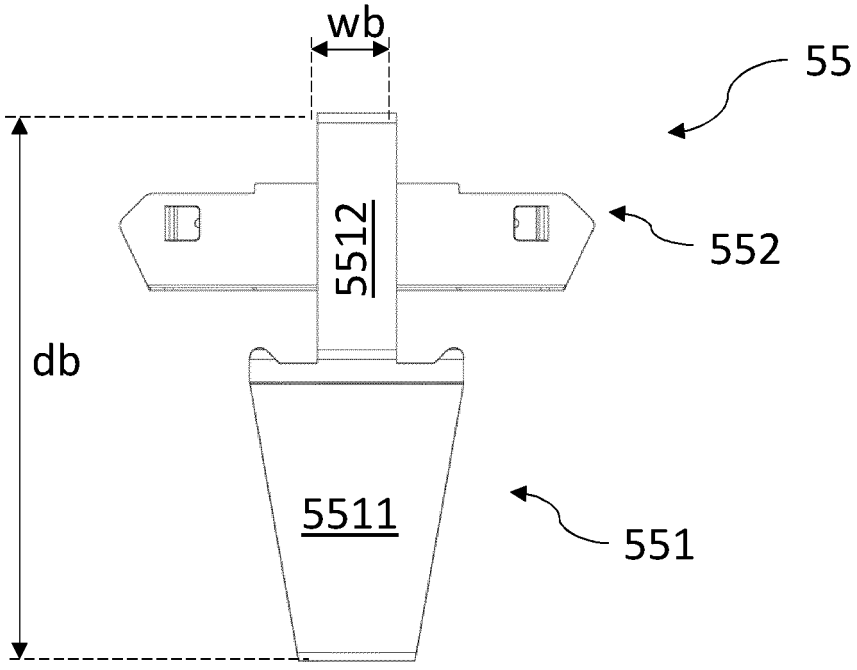


Fig. 19

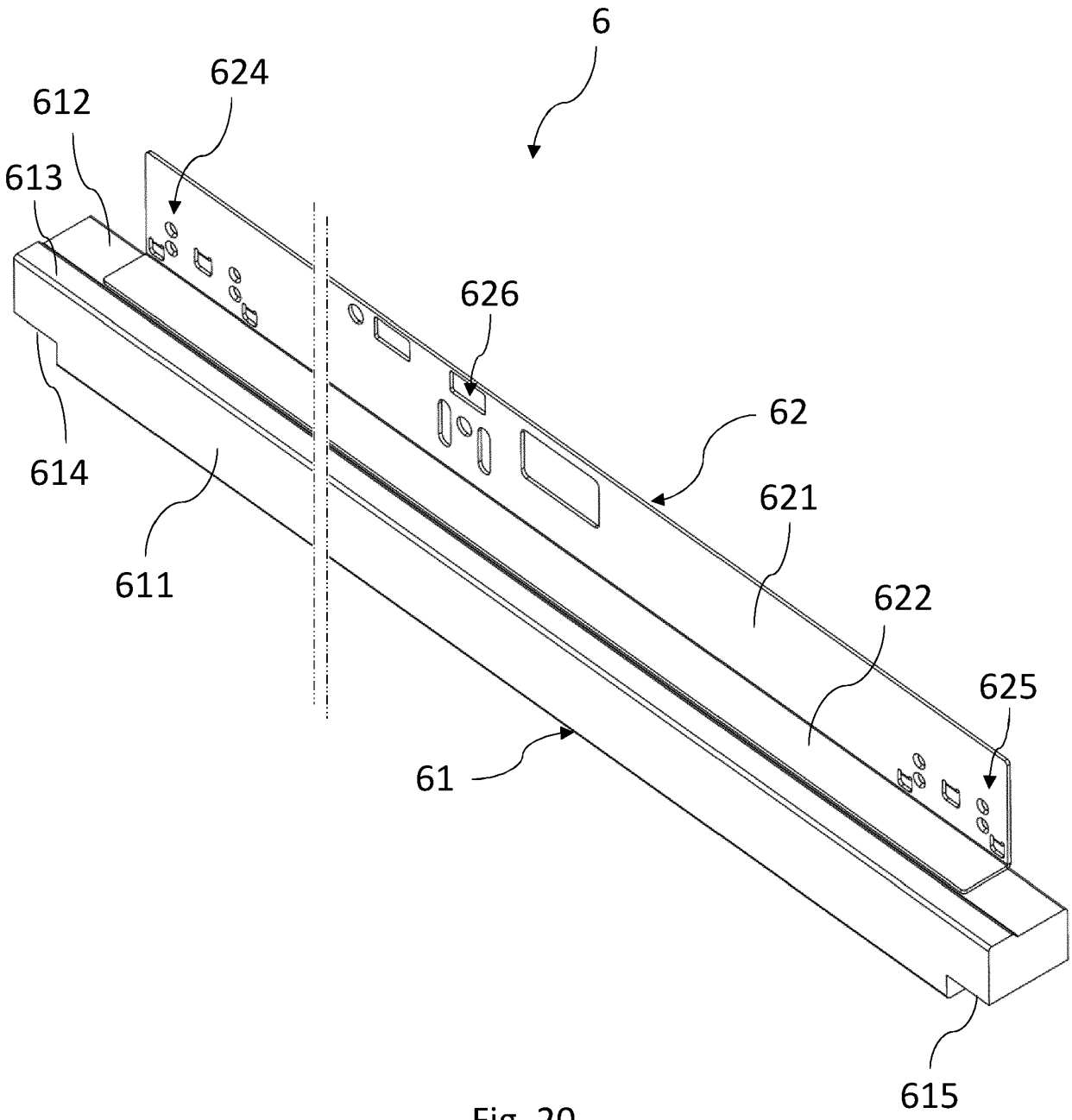


Fig. 20

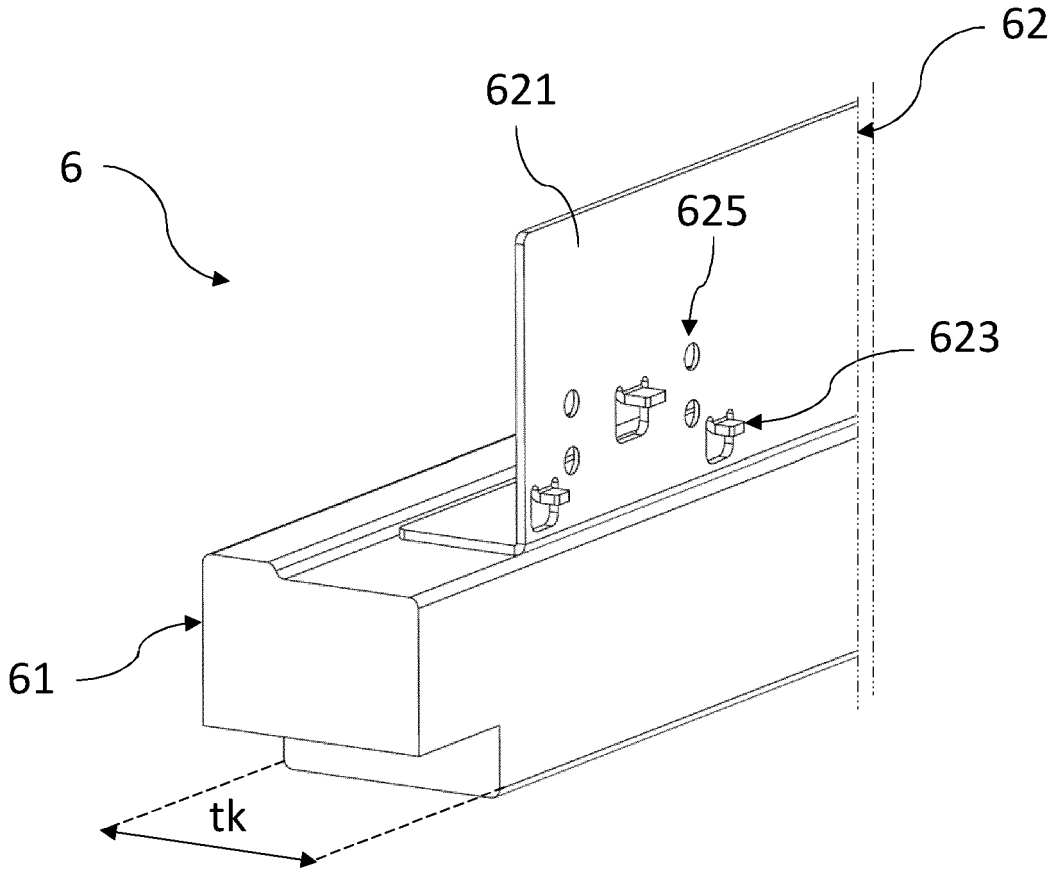


Fig. 21

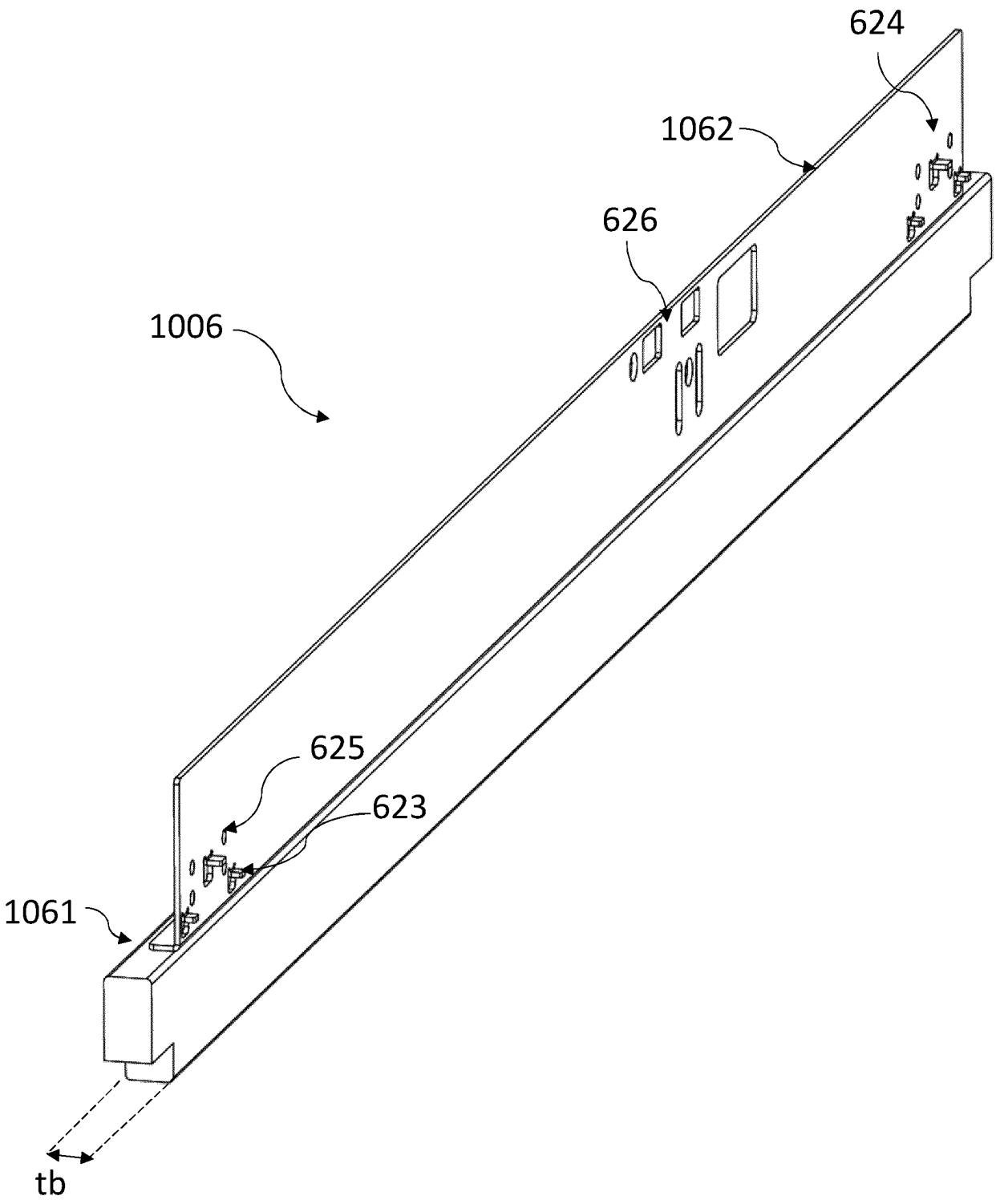


Fig. 22

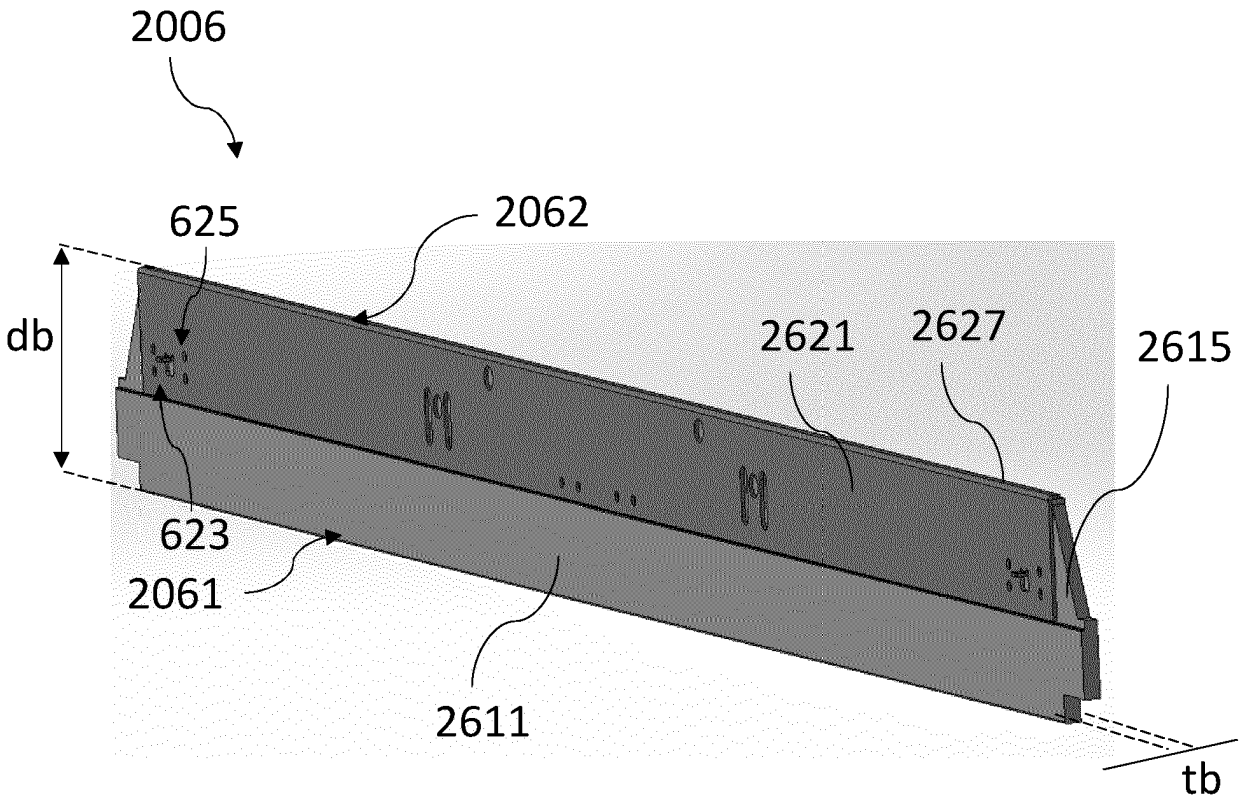
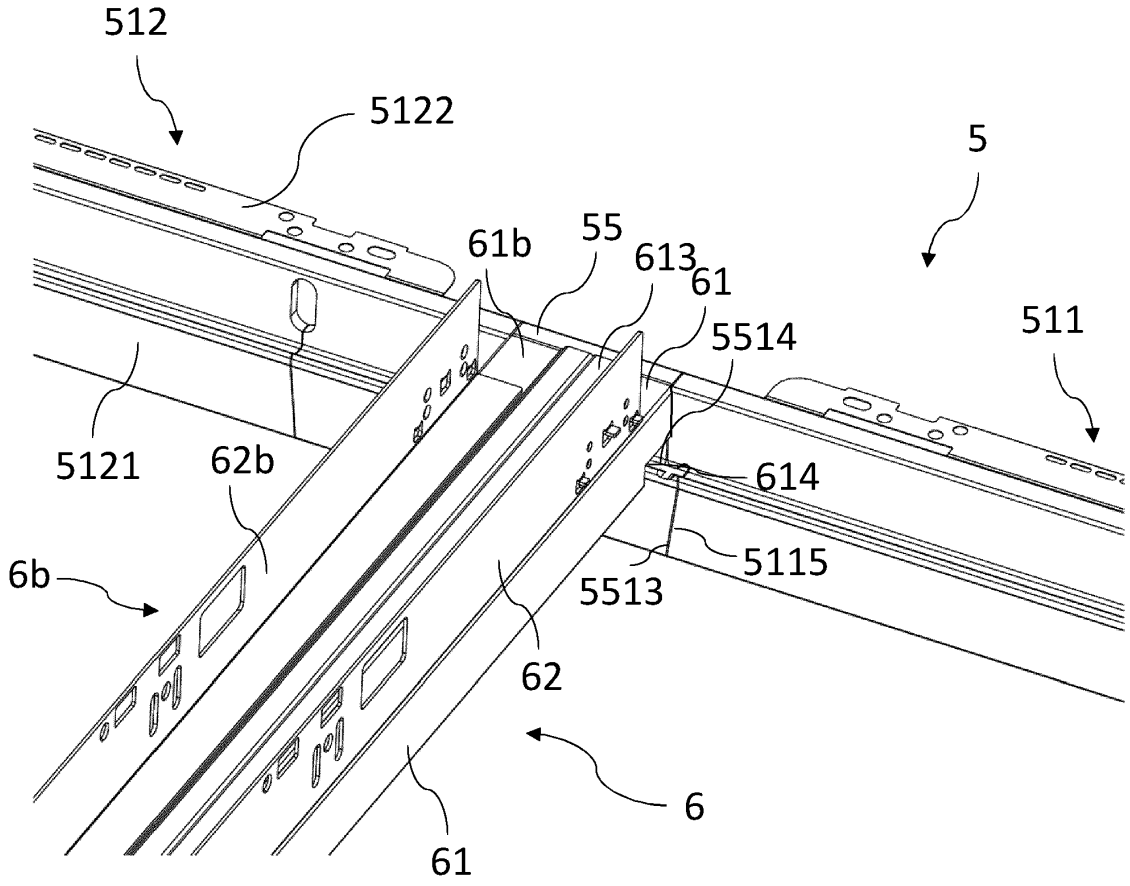


Fig. 23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62b
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6b
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61

Fig. 24

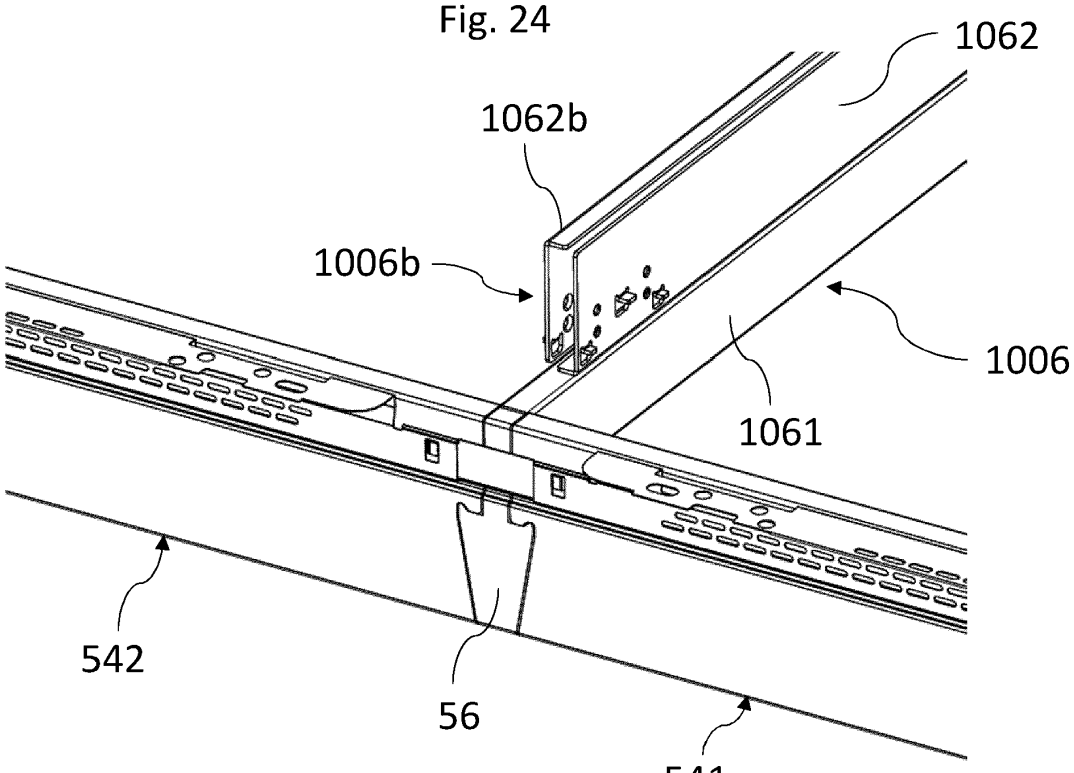
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Fig. 25

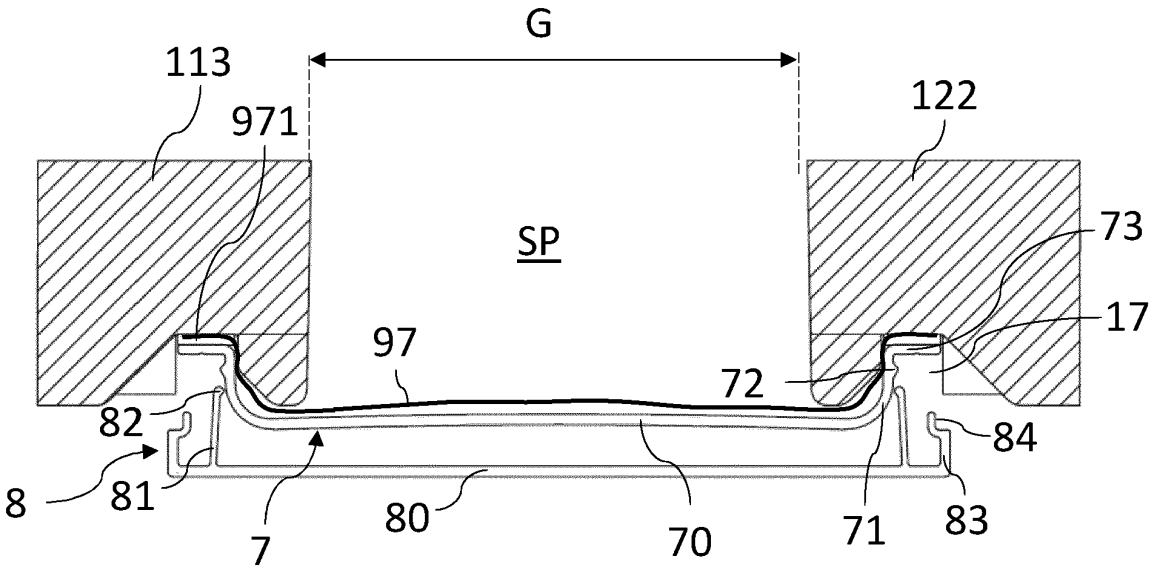
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Fig. 26

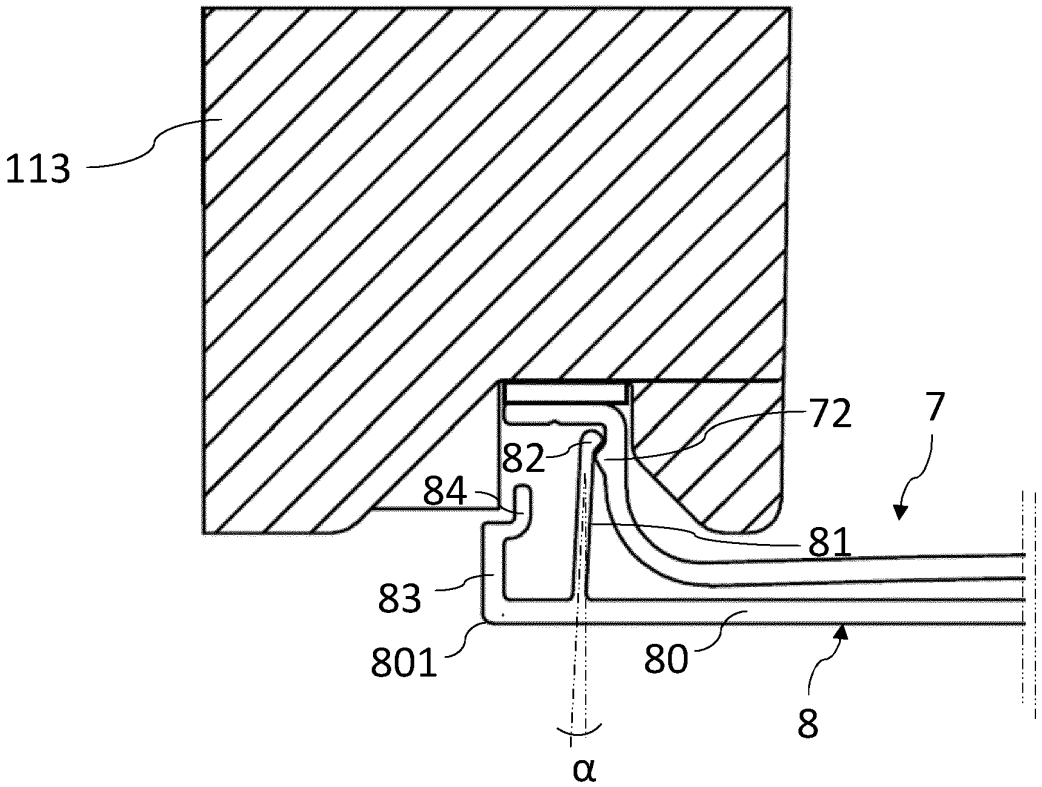
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Fig. 27

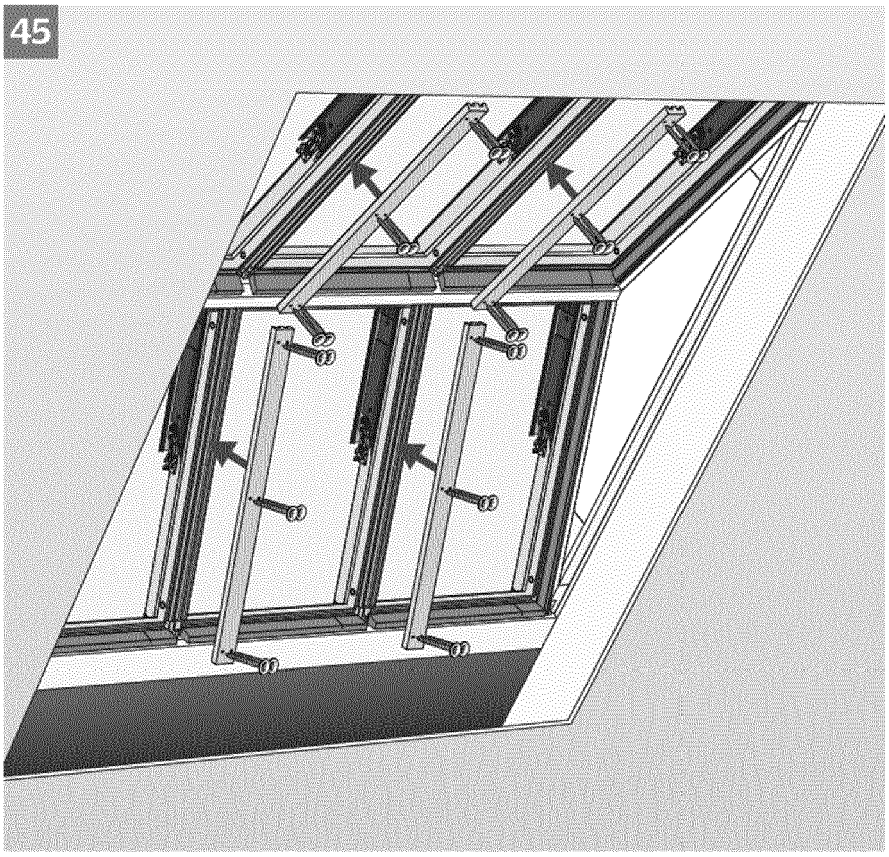

Fig. 28a (PRIOR ART)

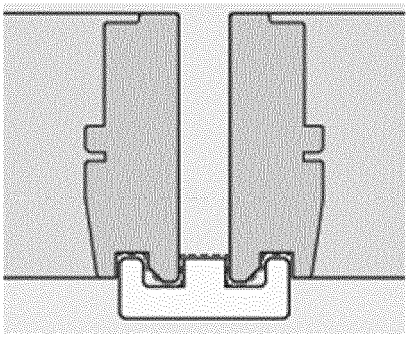

Fig. 28b (PRIOR ART)

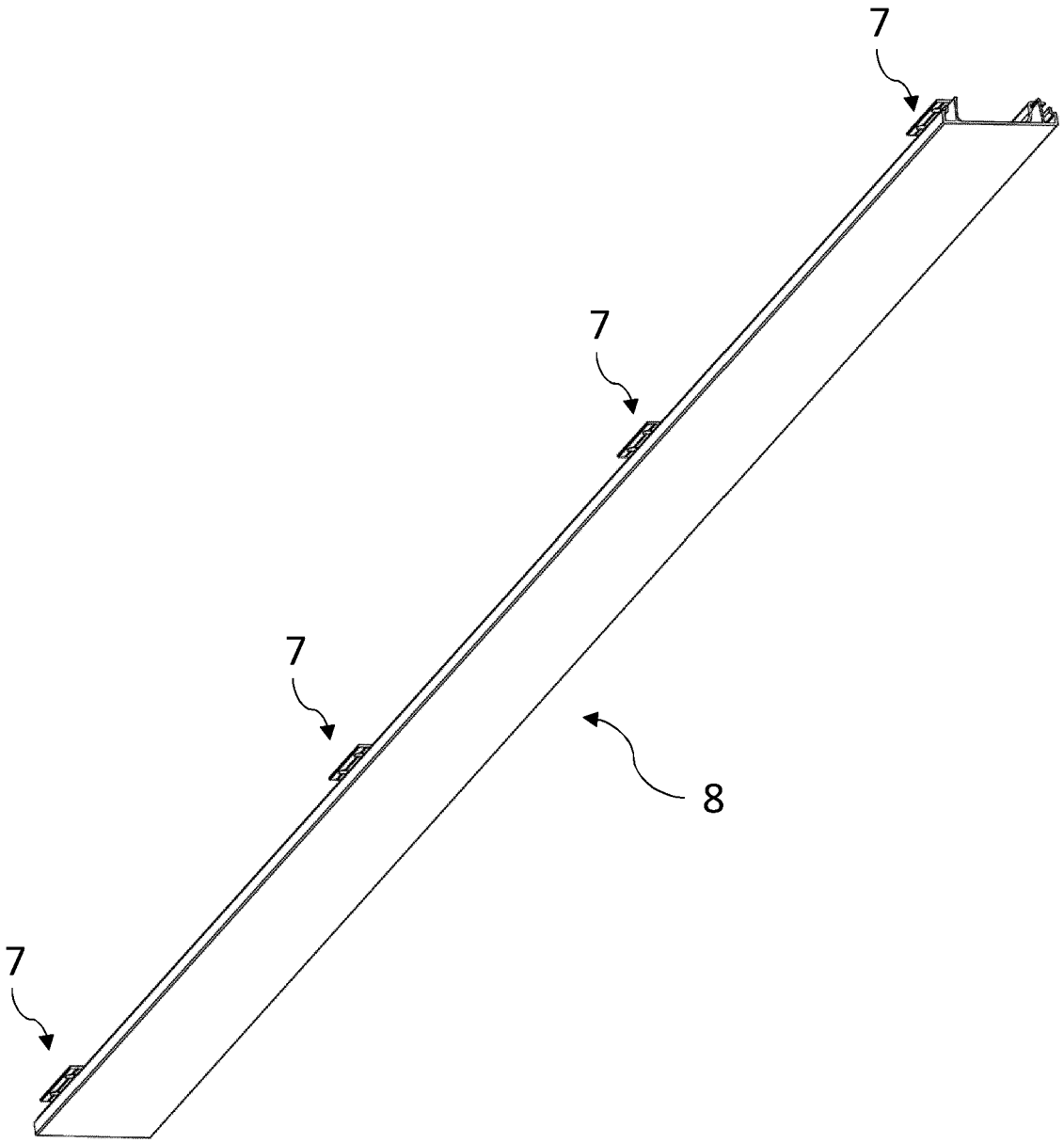

Fig. 29

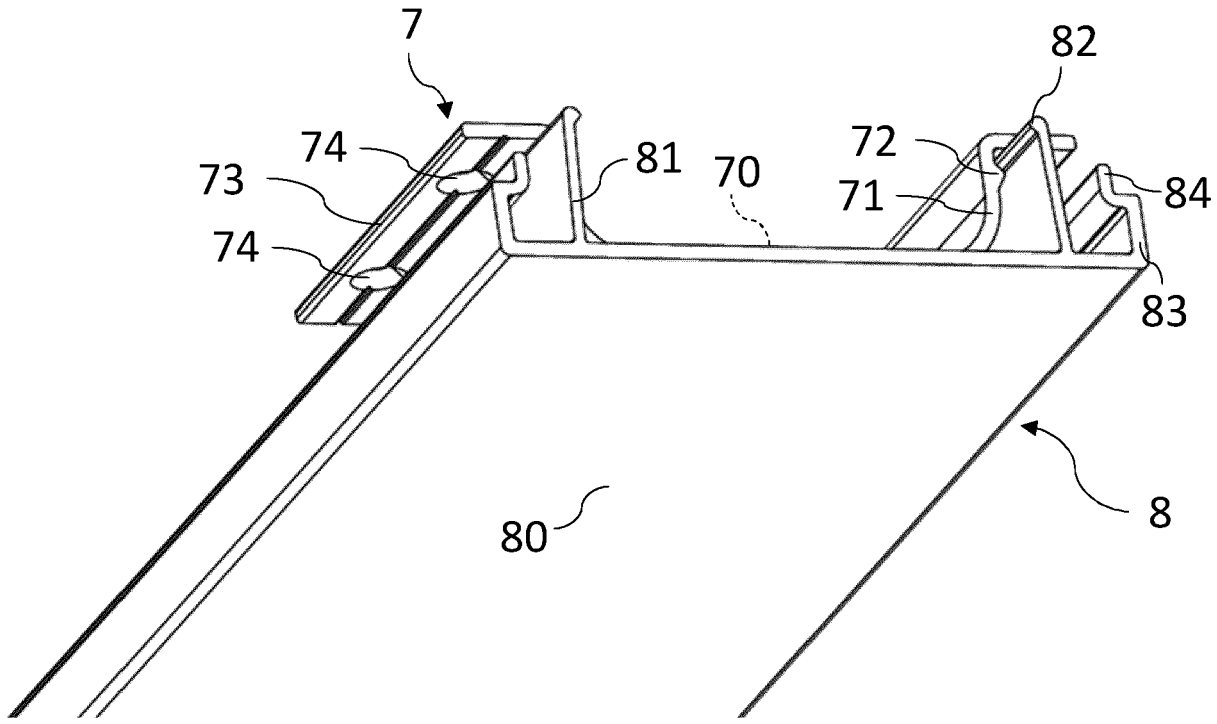

Fig. 30

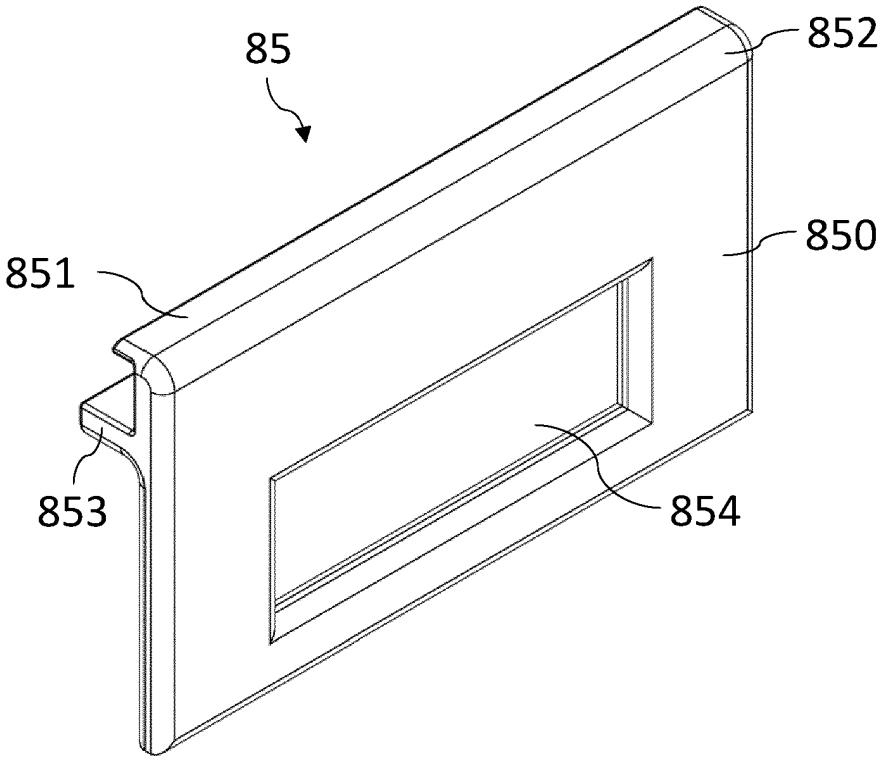

Fig. 31

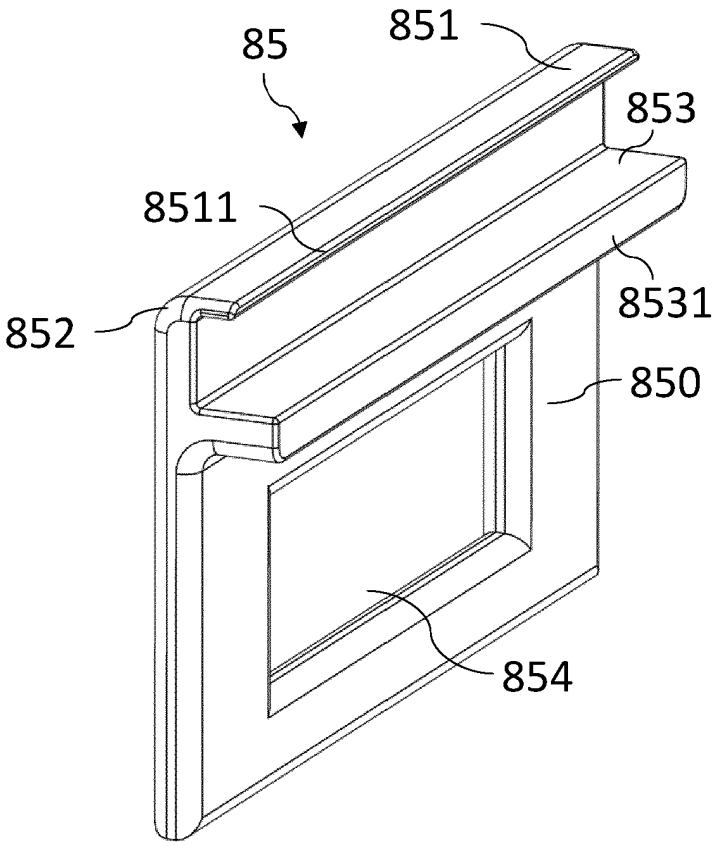

Fig. 32

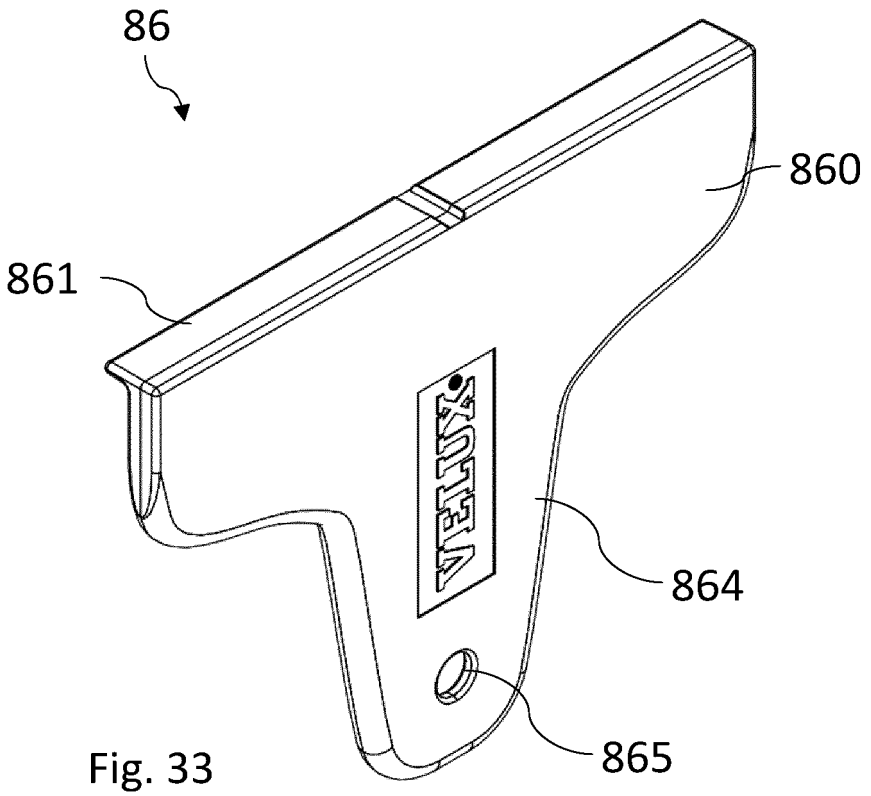

Fig. 33

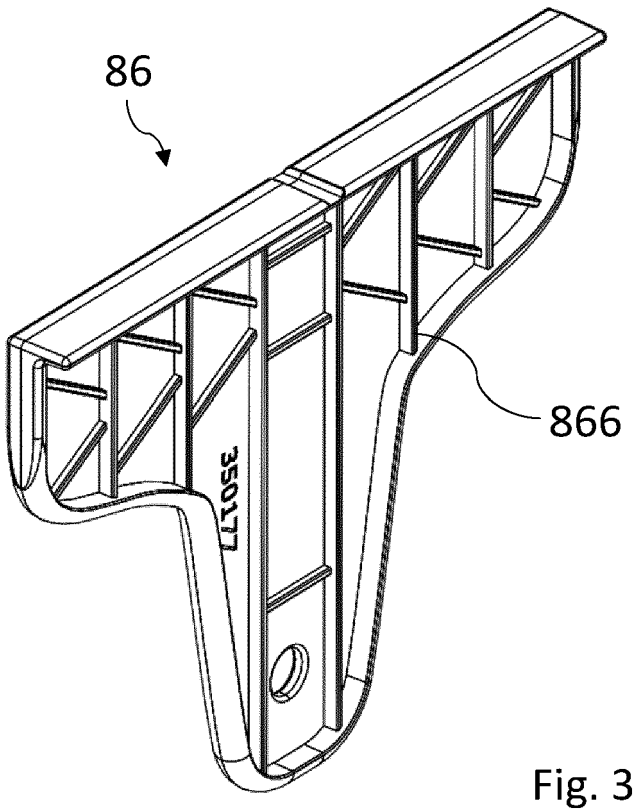

Fig. 34

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1581706 B1 **[0003]**
- EP 2568094 A1 **[0005]**
- EP 2677092 B1 **[0033]**