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(54) **A ROOF WINDOW WITH IMPROVED INSULATION AND SEALING PROPERTIES, AND A METHOD OF ASSEMBLING SUCH A ROOF WINDOW**

DACHFENSTER MIT VERBESSERTEN ISOLATIONS- UND DICHTUNGSEIGENSCHAFTEN UND VERFAHREN ZUM ZUSAMMENBAU EINES SOLCHEN DACHFENSTERS

FENÊTRE DE TOIT AYANT DES PROPRIÉTÉS D'ISOLATION ET D'ÉTANCHÉITÉ AMÉLIORÉES, ET PROCÉDÉ D'ASSEMBLAGE D'UNE TELLE FENÊTRE DE TOIT

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## Description

### Technical Field

[0001] The present invention relates to a roof window comprising a frame, a sash, a set of covering members, a glazing profile and a set of dampening and/or insulating members. The invention also relates to a method of assembling such a roof window.

### Background Art

[0002] When installing windows in a roof, it is first and foremost vital to ensure that the roof window itself is tight, just as the connection between the window frame and the surrounding roofing material needs to be weatherproof. At the same time, the insulation properties of the window need to meet certain standards, and the manufacturing and installation of the roof window need to be carried out cost- and time-efficiently.

[0003] To fulfil these requirements, the design of the roof window is critical for optimal performance. Examples of prior art roof windows setting out to improve the performance on several of these parameters are found in i.a. EP 2 738 339 B1. Even though these roof windows have proven to function very well in practice, there is still room for improvement.

### Summary of Invention

[0004] With this background, it is therefore an object of the invention to provide a roof window by which it is possible to improve weatherproof properties without compromising other parameters as functionality, transport, installation, use or manufacturing.

[0005] This and further objects are achieved with a roof window according to claim 1, wherein the set of covering members comprises a bottom sash covering, and wherein the at least one dampening and/or insulating member comprises a sash profile seal configured to be attached to the lower end of the glazing profile for at least a proportion of the length where the glazing profile is overlapping with the bottom sash covering in the assembled state,

the sash profile seal comprises a base portion, an inner leg portion, and an outer leg portion to fit the sash profile seal on to the glazing profile, the sash profile seal furthermore comprises an outer top outwards flange, the sash profile seal furthermore comprises an outer top inwards engagement portion with a C-shaped incision to engage with a protruding flange of the glazing profile, the bottom sash covering comprises an upstanding flange provided with a cut-out, the cut-out being configured to receive the sash profile seal, and that the sash profile seal has a pre-defined height (HO) below the outer top outwards flange, and wherein

said pre-defined height (HO) and a thickness of the base portion are chosen such that the outer leg portion is stretched relative to the glazing profile to bring the outer top outwards flange in abutment with the upstanding flange. The dampening and/or insulating members can be attached to one or multiple positions of the mentioned window components. It is furthermore possible to combine the attachment of more than one dampening and/or insulating member or to combine the attachment of dampening and/or insulating members on different window components. For manufacturing purposes, it is an advantage that the set of dampening and/or insulating members is configured to be attached to the roof window component in question in a separate assembling step, such that it is possible to handle the dampening and/or insulating member and the roof window component as a single unit in subsequent assembly steps. By forming a tight connection between the dampening and/or insulating members and the glazing profile, side sash covering or top frame covering member, the weatherproof properties of the window are improved by sealing the space between at least two window components.

[0006] The dampening and/or insulating member may possess any degree of compressibility to fit the requirements at the given position.

[0007] In the present context, the term "attached" is to be interpreted to encompassing any connection between two separate elements.

[0008] By compressing said sash profile seal against the glazing profile, the space around the lower end of the glazing profile and surrounding window components, which has a complex geometry and which furthermore due to i.a. manufacturing tolerances may vary between individual roof windows, is filled out and the risk of leaks etc. is minimized. Surrounding roof window components can be the bottom sash covering, side sash covering, additional dampening and/or insulating members or other components. The said sash profile seal therefore ensures a weather-proof connection between the components.

[0009] In principle, the dampening and/or insulating member may be attached to the roof window component in any suitable manner. In a presently preferred embodiment, the connection is carried out by mechanical fastening means, adhesion, or form-fitting, or a combination thereof. In this way, full flexibility is obtained.

[0010] In presently preferred further developments, the sash profile seal may be provided with an inner top flange, which in an advantageous manner is allowed to abut a portion of the glazing profile in the assembled state of the sealing profile.

[0011] The sash profile seal advantageously comprises a top width exceeding a bottom width, a base portion, an inner leg portion, an outer leg portion, an outer top portion, an inner top portion, an outer flange, an inner

flange and an engagement portion to fit the sash profile seal on to the glazing profile. By providing an engagement portion, the sash profile seal is effectively attached to the glazing profile during manufacturing. The flanges, base portion and leg portion ensure a tight transition to the bottom sash covering, side sash covering, further dampening and/or insulating members or other surrounding roof window components. The shape of the sash profile seal provides a weather-proof connection between the components and ensures easy attachment during manufacturing or installation.

**[0012]** The width of the sash profile seal as well as the thickness of the leg portions, base portion, engagement portion and flanges can be adapted to the size of the window components. The length of the sash profile seal can vary and can be chosen independently from the width. Preferably, however, the length is of the same order of magnitude as the bottom width.

**[0013]** In a further embodiment, said dampening and/or insulating member is attached to the underside of the side sash covering to cover a screw hole. The said dampening and/or insulating member can be elastic and can stick to the side sash covering member for easier handling. Said dampening and/or insulating member seals the space between surrounding components and fixing means perforating the dampening and/or insulating member. The dampening and/or insulating member can also be attached to already existing holes to insulate the holes and to prevent the flow of air or water therein.

**[0014]** In a preferred further development of the above embodiment of above invention, said dampening and/or insulating member is a sealing pad comprising acrylic foam tape, butyl or silicone foam tape.

**[0015]** In another embodiment, said dampening and/or insulating member is a foam-packing attached along the longitudinal side of a two-piece top frame covering member to prevent airflow via the space between the two frame top covering members of a top-hung window. The top-hung window is preferably of the kind comprising an intermediate frame and which is top-hung during normal use, but which pivots for cleaning. The size of the foam-packing is chosen to preferably fill out a maximum space between the two frame top covering members without interfering with the agility of the roof window or its surrounding components. The longitudinal proportion of the foam-packing spans preferably over the complete longitudinal proportion of the surrounding top frame covering members. The foam-packing can be cut out of larger mats before being installed. By providing fixing means, the foam-packing can be attached to the top frame covering or surrounding insulation proportions. By attaching the foam-packing, it prevents airflow between the space of the two top frame covering members and seals a top-hung window comparably efficient to a centre pivot window without compromising agility of the top frame covering members.

**[0016]** In further embodiments, the above-mentioned dampening and/or insulating members may be combined

with additional dampening and/or insulating member attached to the underside of a side sash covering and at least one said dampening and/or insulating member is extending in length direction of the side sash covering or is located at a lower end of the side sash cover. The strips can be chosen from several materials with differential thickness and can be attached to the side sash covering by fixing means. To ease the manufacturing process, the strips can be cut out of larger mats with a desired thickness. To ensure optimal sealing, the thickness, measurements, shape and place of attachment of the strips can vary between different roof window sizes and types. Attaching the strips to the bottom side of a side sash covering seals the space between the surrounding components and prevents rain water or water from melting ice or snow from entering the undefined space between the surrounding components. The sealing between the roof window components is particularly efficient when the strips on the side sash covering are combined with the sash profile seal on the glazing profile.

**[0017]** In a preferred embodiment of above mentioned inventions at least one said dampening and/or insulating member is made of chloroprene, silicone, ethylene propylene diene monomer (EPDM), polyurethane (PU) or polyethylene (PE).

**[0018]** The dampening and/or insulation effect of the chosen material can be improved by using versions with trapped air, e.g. foam materials. The density of the dampening and/or insulating member and the proportion of trapped air or other gases in the dampening and/or insulating member can vary. Air or other gases can be trapped in the dampening and/or insulating member by closed or semi-closed cells. Such materials allow compression without comprising durability, dampening and/or insulation.

**[0019]** The chosen materials have the advantage to be resistant to water and wind, making them long-lasting and suitable materials for dampening and/or insulation. Using soft foam materials in proximity to movable window components hinders air-flow in surrounding undefined space without compromising the agility of the movable window components.

**[0020]** In a second aspect, a method of assembling a roof window is provided.

**[0021]** Other presently preferred embodiments and further advantages will be apparent from the subsequent detailed description and drawings.

## Brief Description of Drawings

**[0022]** In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is a perspective view of a prior art roof window; Fig. 2 is a partial perspective view of a first embodiment of the roof window according to the invention; Fig. 3 is an exploded partial perspective view of de-

tails of the roof window in the first embodiment of Fig. 2;

Figs. 4 and 5 are perspective views, from different angles, of the sash profile seal of the roof window in the first embodiment;

Fig. 6 is an end view of the glazing profile and a sash profile seal of the roof window in a second embodiment which is not part of the claimed invention;

Fig. 7 is an exploded partial perspective view of details of the roof window in the second embodiment; Fig. 8 is a schematic cross-sectional view of details of the roof window in a third embodiment which is not part of the claimed invention;

Fig. 9 is a schematic cross-sectional view of a sash profile seal in the third embodiment;

Fig. 10 is an exploded partial perspective view of another detail of the roof window according to the invention;

Fig. 11 is an exploded partial perspective view of a further detail of the roof window according to the invention; and

Fig. 12 is a cross-sectional view of another detail of the roof window according to the invention.

#### Description of Embodiments

**[0023]** Referring initially to Fig. 1 in which a prior art roof window 10 is shown. Details of this roof window 10 are shown and described in the above-mentioned EP 2 738 339 B1 to which reference is hereby made. In a manner known *per se*, the roof window 10 comprises a sash 2 connected to a frame 1 via a hinge 5. The frame 1 comprises frame members 11, 12, 13, 14 and frame covering members 31, 32, 33, 34. The sash 2 comprises a ventilation flap 25, a handle bar 26, sash members 21, 22, 23, 24, and sash coverings 42, 43, 44.

**[0024]** Turning now to Fig. 2, a corresponding partial perspective view of the lower right-hand corner of a roof window in a first embodiment of the present invention is shown. Details not shown or described in detail correspond to the prior art roof window described in the above and/or are readily apparent to the person skilled in the art. Elements having the same or analogous function have the same reference numerals. Thus, the roof window 10 comprises a frame 12, 14 with a mounting bracket 15, a side frame covering 35, a bottom sash covering 42, a side sash member 24, a pane 6 and a glazing profile 8. The side sash covering 44 has been removed for clarity reasons.

**[0025]** A set of dampening and/or insulating members 7 is provided in accordance with the invention, and in the first embodiment such a dampening and/or insulating member comprises a sash profile seal 75 attached to the lower end of the glazing profile 8.

**[0026]** The exploded partial perspective view Fig. 3 shows a side sash covering 44, a glazing profile 8 with a sash profile seal 75, and a bottom sash covering 42 on which a pin 425 is provided. Referring now also to Fig.

10, the pin 425 is configured to interact with a key-hole shaped aperture 443 in a resilient flange 442 on the side sash covering 44 to provide a snapping engagement which secures the side sash covering 44 to the sash in a manner known *per se* from Applicant's international publication WO 99/51831 A1. As will be described in further detail below, the sash profile seal 75 is shaped to fit the form of the glazing profile 8. The length of the sash profile seal 75 is defined to at least cover a proportion of the area where the glazing profile 8 overlaps with the bottom sash covering 42. In the assembled state the sash profile seal 75 can fill out the interspace between the glazing profile 8 and the bottom sash covering 42 and/or the glazing profile 8 and the side sash covering 44. The bottom sash covering 42 here comprises an upstanding flange 42a provided with a cut-out 420 configured to receive the sash profile seal 75.

**[0027]** Figs 4 and Fig. 5 refer to the same first embodiment of a sash profile seal 75. The figures show two detailed perspectives of a sash profile seal 75 of a length L comprising a base portion 751, an inner leg portion 752, an outer leg portion 753, an inner top flange 754, an outer top outwards flange 755, and an outer top inwards engagement proportion 756. The bottom base portion 751 defines a bottom width W2. The distance between the edges of the flanges 754, 755 defines a top width W1. An inner width W0 of the sash profile seal 75 is defined by the distance between the facing sides of the leg portions 752, 753. The leg portions 752, 753 thus form a canal configured to accommodate the glazing profile 8 in a manner to be described in further detail below. Further details shown in these figures include showing a pre-defined height H1 at the inner leg portion 752, here including the inner top flange 754. The pre-defined height H1 and a thickness of the base portion 751 are preferably chosen such that the inner leg portion 752 including the inner top flange 754 are compressed relative to the glazing profile 8. Furthermore, it is shown how the sash profile seal 75 has a pre-defined height H0 below the outer top outwards flange 755, the pre-defined height H0 and a thickness of the base portion 751 being chosen such that the outer leg portion 753 is stretched relative to the glazing profile 8 to bring the outer top outwards flange 755 in abutment with the upstanding flange 42a.

**[0028]** In the embodiment shown, the outer top inwards engagement portion 756 is provided with a C-shaped incision 757 to engage with a protruding flange 87 of the glazing profile 8. Although this provides for an increased retention of the sash profile seal 75 during manufacture, it has proven to counteract proper compression of the sash profile seal.

**[0029]** Further details of not claimed second and third embodiments will now be described with particular reference to Figs 6 to 9. Only differences relative to the first embodiment will be described in detail. Elements having the same or analogous function are denoted by the same reference numerals as in the first embodiment to which 100 and 200, respectively, has been added.

**[0030]** In Fig. 6, details of the glazing profile 8 are shown. In the embodiment shown, the glazing profile 8 has a base 81, an inner leg 82, an outer leg 83, a transition portion 84, and an apex portion 85. Additionally, a curved end portion 86 and a protruding flange 87 are present. The base 81 defines a width WGP of the glazing profile 8, configured to interact with the sash profile seal 75. It is noted that the glazing profile 8 has a larger total width, taking into account also the curved end portion 86. The inner leg 82 defines an inner height HGPI and the outer leg 83 defines an outer height HGPO.

**[0031]** The sash profile seal 175 is shown in a state of delivery, i.e. before assembly in which it is attached to the bottom sash covering 42 and/or the glazing profile 8. As in the first embodiment, pre-defined heights HO and HI are defined, just as inner width W0 between the leg portions 1752 and 1753. As indicated, the inner width W0 in the shown un-compressed state is smaller than the width WGP of the glazing profile 8. The dimensions of the sash profile seal 175 may in principle be chosen arbitrarily as long as a good fit with the components of the roof window is achieved. However, it is preferred that the height HI and thickness of the base portion 1751 are chosen such that the inner top flange 1754 is pressed against the transition portion 84 of the glazing profile 8 such that a tight circumferential fit of the sash profile seal 175 against the inner leg 82 and the base 81 is ensured. On the outer side, the height HO is chosen such that the outer top outwards flange 1755 is pressed against the upstanding flange 42a of the bottom sash covering 42, thereby also ensuring a tight circumferential fit of the sash profile seal 75 against the outer leg 82 of the glazing profile 8. The thickness of the respective inner and outer leg portions 1752 and 1753 are also chosen suitably to ensure that the sash profile seal 175 is centred on the glazing profile 8, with substantially equal compression being present at each side.

**[0032]** Referring now to Fig. 7, details of the bottom sash covering 42 are shown, which may be of relevance to any of the first, second and third embodiments of the sash profile seal 75; 175; 275 of the roof window 10, but also of further, non-shown embodiments thereof. Here, it is shown how the cut-out 420 in the upstanding flange 42a has a bottom edge 421, an inner edge 422 and an outer edge 423. The dimensions and shape of the cut-out 420 are advantageously configured such that the sash profile seal is compressed in the interspace between the cut-out 420 and the glazing profile 8 in the assembled state of the roof window 10. In order to facilitate the mounting and steer the compression, it is particularly advantageous if one or both of the edges is/are inclined away from the cut-out 420 by a pre-defined angle. Here, the outer edge 423 forms an angle  $\alpha_3$  with the vertical. The angle may be chosen in accordance to other dimensions, but typical values lie in the range 2 to 10°, here about 5°. The inner edge 422 could be provided with an inclination of similar magnitude or a different one. Also visible in Fig. 7 is a tab 424 protruding from the bottom

edge 421. The tab 424 may serve as an additional support of the sash profile seal 75; 175; 275. As a difference from the first embodiment, it is noted that no outer top inwards engagement portion is provided to engage with the protruding flange 87 of the glazing profile 8 is present.

**[0033]** Turning to Fig. 8, a second embodiment of the sash profile seal 275 is shown. The basic configuration of the sash profile seal 275 including base portion 2751, inner leg portion 2752 and outer leg portion 2753 corresponds to that of the first and second embodiments. An inner top flange 2754 is provided as well, and an outer top outwards flange 2755 as in the second embodiment. Furthermore, an outer top inwards flange 2758 is provided. The outer top inwards flange 2758 abuts the upper side of the protruding flange 87 of the glazing profile 8 in the assembled state. In Fig. 8, the sash profile seal 275 is schematically shown in a hypothetical condition, before being compressed to conform to the shape of the glazing profile 8, the bottom sash covering 42 and possibly other components of the roof window 10. A further detail includes that at least one leg portion, here both of the inner leg portion 2752 and the outer leg portion 2753 are inclined outwards relative to the base portion 2751 by a predefined angle  $\beta_2$ ,  $\beta_3$  with the vertical. The angle may be chosen in accordance with the dimensions of the remaining components of the roof window and of the sash profile seal 275 itself, but typical values lie in the range 2 to 10°, here about 5°. In this way, a V-shape of the sash profile seal 275 is achieved which has proven to function particularly well with regard to mounting, adaptation and sealing properties.

**[0034]** Fig. 9 shows a schematic view of the sash profile seal 275 in its delivery condition. During the manufacturing of the sash profile seal 275, typically by means of extrusion to achieve a suitable density, the inner and outer leg portions 2752, 2753 assume a position in which they form a curve towards the canal defined between the leg portions to enhance the fit and retention on the glazing profile 8 even further.

**[0035]** Fig. 10 refers to further details of the roof window of the invention and shows an exploded partial perspective view of the side sash covering 44 with flange 442 and key-hole shaped aperture 443 on a lower end 441 of the side sash covering 44. The sash profile seal 75 of the first embodiment is configured to cooperate with the addition dampening and/or insulating members generally designated 7 of this further embodiment comprising and a rectangular strip 43 and an inner strip 72 as well as an outer strip 71. The rectangular strip 43 is attached to the side sash covering 44 under the key-hole shaped aperture 443, inserted in the direction of arrow A. The outer and inner strip 71, 72 serve as first and second exterior side dampening and/or insulating members along the longitudinal axis of the side sash covering 44, respectively. The inner strip 72 is attached to the side sash covering 44 along the flange 442. The outer strip 71 is attached to the side sash covering 44 in parallel to, but with distance to the inner strip 72. In combination with

embodiments of the sash profile seal having an outer top outwards flange, this flange abuts at least one strip of the set of strips 71, 72, 73 to enhance the seal even further.

**[0036]** Fig. 11 refers to a further detail of the roof window of the invention and shows an exploded partial perspective view of a sealing pad 76 forming part of the set of dampening and/or insulating members of the roof window in accordance with the invention. The sealing pad 76 is provided in the vicinity of a screw hole 444 of in the side sash covering 44. The size of the sealing pad 76 exceeds the area of the screw hole 444 and covers additional area of the side sash covering 44.

**[0037]** The sealing pad may in principle have any suitable configuration and in the embodiment shown it has a thickness of preferably 1 mm, more preferably 1.5 mm, and most preferably 2 mm and can be of various cross-section shapes including a rectangular or rounded cross-sector shape. The elastic sealing pad tolerances compression and movements without losing its function for sealing. During thrilling through the sealing pad, a minimum of sealing pad material or no sealing pad material is transferred to the thrill. This ensures an easy and fast manufacturing and/or installation since the thrilling devices need a minimum amount of cleaning or replacement. A screw driven through the sealing pad pulls down proportions of the sealing pad into the screw hole and provides additional sealing between the under-side of the side sash covering, screw, screw hole and the surroundings thereof. The sealing pads can be provided on rolls for easy storage and easy, efficient window manufacturing. Furthermore, the rolls comprising the sealing pads can be transported to already installed roof windows to upgrade the dampening and/or insulation thereof.

**[0038]** Another detail of the roof window of the invention is shown in Fig. 12. Fig. 12 is a cross-sectional view of a roof window which is top-hung during normal use but which pivots for cleaning. The covering members at the top of the window thus comprises two components, relative to the one-part top frame covering 31 shown in Fig. 1, and are here denoted first top frame covering member 311 and second top frame covering 312. The set of dampening and/or insulating members here comprises a foam padding 77 attached to the first top frame covering member 311 as well as a spacing 9 between the first top frame covering member 311 and the second top frame covering member 312. Also visible in Fig. 8 is the handle bar 26, sash top member 21, ventilation flap 25 and a frame top member 11.

**[0039]** 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

**[0040]**

|        |                                           |
|--------|-------------------------------------------|
| 10     | roof window                               |
| 1      | frame                                     |
| 11     | frame top member                          |
| 12     | frame bottom member                       |
| 5 13   | frame side member                         |
| 14     | frame side member                         |
| 15     | mounting bracket                          |
| 2      | sash                                      |
| 21     | sash top member                           |
| 10 22  | sash bottom member                        |
| 23     | sash side member                          |
| 24     | sash side member                          |
| 25     | ventilation flap                          |
| 26     | handle bar                                |
| 15 31  | top frame covering member (top casing)    |
| 311    | first top frame covering member (Fig. 8)  |
| 312    | second top frame covering member (Fig. 8) |
| 32     | bottom frame covering                     |
| 33     | side frame covering (cladding)            |
| 20 34  | side frame covering (cladding)            |
| 35     | side frame covering                       |
| 42     | bottom sash covering                      |
| 42a    | upstanding flange                         |
| 25 420 | cut-out (Figs 3 and 7)                    |
| 421    | bottom edge of cut-out (Fig. 7)           |
| 422    | inner edge of cut-out (Fig. 7)            |
| 423    | outer edge of cut-out (Fig. 7)            |
| 424    | tab (Fig. 7)                              |
| 30 425 | pin (Fig. 3)                              |
| 43     | side sash covering (cladding)             |
| 44     | side sash covering (cladding)             |
| 35 441 | lower end (Fig. 6)                        |
| 442    | resilient flange (Fig. 6)                 |
| 443    | key-hole shaped aperture (Fig. 6)         |
| 444    | screw hole (Fig. 7)                       |
| 40 5   | hinge                                     |
| 6      | pane                                      |
| 7      | dampening and/or insulating members       |
| 71     | outer strip                               |
| 72     | inner strip                               |
| 45 73  | rectangular strip                         |
| 74     | gasket                                    |
| 75     | sash profile seal (first embodiment)      |
|        | 751 base portion                          |
|        | 752 inner leg portion                     |
| 50 753 | outer leg portion                         |
|        | 754 inner top flange                      |
|        | 755 outer top outwards flange             |
|        | 756 outer top inwards engagement portion  |
|        | 757 C-shaped incision                     |
| 55 175 | sash profile seal (second embodiment)     |
|        | 1751 base portion                         |
|        | 1752 inner leg portion                    |
|        | 1753 outer leg portion                    |

|            |                                                             |    |
|------------|-------------------------------------------------------------|----|
|            | 1754 inner top flange                                       |    |
|            | 1755 outer top outwards flange                              |    |
| 275        | sash profile seal (third embodiment)                        |    |
|            | 2751 base portion                                           |    |
|            | 2752 inner leg portion                                      | 5  |
|            | 2753 outer leg portion                                      |    |
|            | 2754 inner top flange                                       |    |
|            | 2755 outer top outwards flange                              |    |
|            | 2758 outer top inwards flange                               |    |
| 76         | sealing pad                                                 | 10 |
| 77         | foam-packing                                                |    |
| 8          | glazing profile                                             |    |
|            | 81 base                                                     |    |
|            | 82 inner leg                                                |    |
|            | 83 outer leg                                                | 15 |
|            | 84 transition portion                                       |    |
|            | 85 apex portion                                             |    |
|            | 86 curved end portion                                       |    |
|            | 87 protruding flange                                        |    |
| 9          | space                                                       | 20 |
| W0         | Inner width of sash profile seal                            |    |
| W1         | top width of sash profile seal                              |    |
| W2         | bottom width of sash profile seal                           |    |
| HO         | height of outer leg portion                                 |    |
| HI         | height of inner leg portion                                 | 25 |
| L          | length of sash profile seal                                 |    |
| WGP        | width of glazing profile                                    |    |
| HGPI       | inner height of glazing profile                             |    |
| HGPO       | outer height of glazing profile                             |    |
| A          | arrow                                                       | 30 |
| $\alpha_2$ | angle (outer edge of cut-out)                               |    |
| $\beta_2$  | angle (inner leg of inner leg portion of sash profile seal) |    |
| $\beta_3$  | angle (outer leg of inner leg portion of sash profile seal) | 35 |
| $\gamma$   | angle (base portion)                                        |    |

## Claims

1. A roof window (10) comprising a frame (1), a sash (2), a set of covering members (4), a glazing profile (8) and a set of dampening and/or insulating members (7), the set of dampening and/or insulating members (7) comprises at least one member (75, 76, 77) attached to a respective roof window component comprising the glazing profile (8), a side sash covering (44) and/or a top frame covering member (311, 312), in an assembled state of the roof window,

**characterised in that** the set of covering members (4) comprises a bottom sash covering (42), and wherein the at least one dampening and/or insulating member comprises a sash profile seal (75; 175; 275) configured to be attached to the lower end of the glazing profile (8) for at least a proportion of the length where the glazing profile (8) is overlapping with the bottom sash covering

(42) in the assembled state, the sash profile seal (75; 175; 275) comprises a base portion (751; 1751; 2751), an inner leg portion (752; 1752; 2752), and an outer leg portion (753; 1753; 2753) to fit the sash profile seal (75; 175; 275) on to the glazing profile (8), the sash profile seal (75; 175; 275) furthermore comprises an outer top outwards flange (755; 1755; 2755), the sash profile seal (75) furthermore comprises an outer top inwards engagement portion (756) with a C-shaped incision (757) to engage with a protruding flange (87) of the glazing profile (8), the bottom sash covering (42) comprises an upstanding flange (42a) provided with a cut-out (420), the cut-out (420) being configured to receive the sash profile seal (75; 175; 275), and that the sash profile seal (75; 175; 275) has a pre-defined height (HO) below the outer top outwards flange (755; 1755; 2755), and wherein said pre-defined height (HO) and a thickness of the base portion (751; 1751; 2751) are chosen such that the outer leg portion (753; 1753; 2753) is stretched relative to the glazing profile (8) to bring the outer top outwards flange (755; 1755; 2755) in abutment with the upstanding flange (42a).

2. A roof window (10) according to claim 1, wherein the at least one dampening and/or insulating member (75, 76, 77) is attached to the respective roof window component by means of mechanical fastening means, adhesion or form-fitting, or a combination thereof.

3. A roof window (10) according to any one of the preceding claims, wherein the sash profile seal (75; 175; 275) furthermore comprises an inner top flange (754; 1754; 2754).

4. A roof window (10) according to any one of the preceding claims, wherein the sash profile seal (275) furthermore comprises an outer top inwards flange (2758).

5. A roof window (10) according to any one of the preceding claims, wherein said sash profile seal (75; 175; 275) has an inner width (W0) between the inner leg portion (752; 1752; 2752) and the outer leg portion (753; 1753; 2753) substantially matching a width (WGP) of the glazing profile (8) in the assembled state of the roof window.

6. A roof window (10) according to claim 5, wherein said sash profile seal (75; 175; 275) has a top width (W1) exceeding a bottom width (W2) and the inner width (W0) and a length (L) of the same order of

magnitude as the bottom width (W2).

7. A roof window (10) according to any one of the preceding claims, wherein the sash profile seal (75; 175; 275) is made from a compressible material and is compressed by 20 to 60%, preferably about 40%. 5
8. A roof window (10) according to any one of the preceding claims, wherein the dimensions of the inner leg portion (752; 1752; 2752) and the outer leg portion (753; 1753; 2753) are chosen such that the compression is substantially equal in the inner leg portion (752; 1752; 2752) and the outer leg portion (753; 1753; 2753) in the assembled state of the roof window. 10
9. A roof window (10) according to any one of the preceding claims, wherein the sash profile seal (75; 175; 275) has a pre-defined height (HI) at the inner leg portion (752; 1752; 2752), optionally including an inner top flange (754; 1754; 2754), and wherein said pre-defined height (HI) and a thickness of the base portion (751; 1751; 2751) are chosen such that the inner leg portion (752; 1752; 2752), optionally including the inner top flange (754; 1754; 2754), are compressed relative to the glazing profile (8). 20 25
10. A roof window (10) according to any one of the preceding claims, wherein the glazing profile (8) has a base (81), an inner leg (82), an outer leg (83), a transition portion (84), and an apex portion (85), optionally a curved end portion (86) and/or a protruding flange (87), the base defining a width (WGP) of the glazing profile (8), the inner leg (82) defining an inner height (HGPI) and the outer leg (83) defining an outer height (HGPO). 30 35
11. A roof window (10) according to claims 9 and 10, wherein the inner leg portion (752; 1752; 2752) and/or an inner top flange (754; 1754; 2754) is/are abut against an underside of the transition portion (84). 40
12. A roof window (10) according to any one of the preceding claims, wherein the cut-out (420) has a bottom edge (421), an inner edge (422) and an outer edge (423) and is configured with such dimensions that the sash profile seal (75; 175; 275) is compressed in the interspace between the cut-out (420) and the glazing profile (8) in the assembled state of the roof window (10). 45 50
13. A roof window (10) according to claim 12, wherein at least one edge of the inner edge (422) and the outer edge (423) is inclined away from the cut-out (420) by a pre-defined angle ( $\alpha 3$ ). 55
14. A roof window (10) according to any one of the pre-

ceding claims, wherein at least one leg portion of the inner leg portion (2752) and the outer leg portion (2753) is inclined outwards relative to the base portion (2751) by a predefined angle ( $\beta 2$ ,  $\beta 3$ ).

15. A roof window (10) according to claim 14, wherein said dampening and/or insulating member is a sealing pad (76) comprising acrylic foam tape, butyl or silicone foam tape.
16. A roof window (10) according to any of the preceding claims, wherein at least one said dampening and/or insulating member is made of chloroprene, silicone, ethylene propylene diene monomer (EPDM), polyurethane (PU) or polyethylene (PE).
17. Method of assembling a roof window (10) according to any one of the preceding claims, whereby the at least one dampening and/or insulating member (71, 72, 73, 75; 175; 275, 76, 77) is attached to the respective roof window component in a first step, and the at least one dampening and/or insulating member (75, 76, 77) and the respective roof window component are attached to the remaining roof window components in a second step.

#### Patentansprüche

1. Dachfenster (10), umfassend einen Rahmen (1), einen Flügel (2), einen Satz Abdeckglieder (4), ein Verglasungsprofil (8) und einen Satz dämmende und/oder isolierende Glieder (7), wobei der Satz dämmende und/oder isolierende Glieder (7) mindestens ein Glied (75, 76, 77) umfasst, das an einer jeweiligen Dachfensterkomponente angebracht ist und das Verglasungsprofil (8), eine Seitenflügelabdeckung (44) und/oder ein oberes Rahmenabdeckglied (311, 312) in einem zusammengebauten Zustand des Dachfensters umfasst,

#### dadurch gekennzeichnet, dass

der Satz Abdeckglieder (4) eine untere Flügelabdeckung (42) umfasst und wobei das mindestens eine dämmende und/oder isolierende Glied eine Flügelprofildichtung (75; 175; 275) umfasst, die dazu ausgestaltet ist, über mindestens einen Teil der Länge an dem unteren Ende des Verglasungsprofils (8), wo sich das Verglasungsprofil (8) und die untere Flügelabdeckung (42) im zusammengebauten Zustand einander überlappen, angebracht zu werden, die Flügelprofildichtung (75; 175; 275) einen Basisabschnitt (751; 1751; 2751), einen inneren Schenkelabschnitt (752; 1752; 2752) und einen äußeren Schenkelabschnitt (753; 1753; 2753) umfasst, um die Flügelprofildichtung (75; 175; 275) an dem Verglasungsprofil (8) anzubringen,

- die Flügelprofilabdichtung (75; 175; 275) ferner einen äußeren oberen Auswärtsflansch (755; 1755; 2755) umfasst,  
 die Flügelprofilabdichtung (75) ferner einen äußeren oberen Einwärtsingriffsabschnitt (756) mit einem C-förmigen Einschnitt (757) umfasst, um mit einem vorragenden Flansch (87) des Verglasungsprofils (8) in Eingriff zu kommen,  
 die untere Flügelabdeckung (42) einen nach oben stehenden Flansch (42a) umfasst, der mit einem Ausschnitt (420) versehen ist, wobei der Ausschnitt (420) zur Aufnahme der Flügelprofilabdichtung (75; 175; 275) ausgestaltet ist, und dass  
 die Flügelprofilabdichtung (75; 175; 275) eine vordefinierte Höhe (HO) unter dem äußeren oberen Auswärtsflansch (755; 1755; 2755) hat und wobei die vordefinierte Höhe (HO) und eine Dicke des Basisabschnitts (751; 1751; 2751) so gewählt sind, dass der äußere Schenkelabschnitt (753; 1753; 2753) bezüglich des Verglasungsprofils (8) gedehnt ist, um den äußeren oberen Auswärtsflansch (755; 1755; 2755) in Anlage mit dem nach oben stehenden Flansch (42a) zu bringen.
2. Dachfenster (10) nach Anspruch 1, wobei das mindestens eine dämmende und/oder isolierende Glied (75, 76, 77) mittels mechanischer Befestigungsmittel, Klebung oder Formschluss oder einer Kombination daraus an der jeweiligen Dachfensterkomponente angebracht ist.
  3. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Flügelprofilabdichtung (75; 175; 275) ferner einen inneren oberen Flansch (754; 1754; 2754) umfasst.
  4. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Flügelprofilabdichtung (275) ferner einen äußeren oberen Einwärtsflansch (2758) umfasst.
  5. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Flügelprofilabdichtung (75; 175; 275) eine innere Breite (W0) zwischen dem inneren Schenkelabschnitt (752; 1752; 2752) und dem äußeren Schenkelabschnitt (753; 1753; 2753) hat, die einer Breite (WGP) des Verglasungsprofils (8) in dem zusammengebauten Zustand des Dachfensters im Wesentlichen entspricht.
  6. Dachfenster (10) nach Anspruch 5, wobei die Flügelprofilabdichtung (75; 175; 275) eine obere Breite (W1) hat, die größer als die untere Breite (W2) und die innere Breite (W0) ist, und eine Länge (L) derselben Größenordnung wie die untere Breite (W2).
  7. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Flügelprofilabdichtung (75; 175; 275) aus einem komprimierbaren Material hergestellt ist und um 20 bis 60%, vorzugsweise ungefähr 40%, komprimiert wird.
  8. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Abmessungen des inneren Schenkelabschnitts (752; 1752; 2752) und des äußeren Schenkelabschnitts (753; 1753; 2753) so gewählt sind, dass die Komprimierung an dem inneren Schenkelabschnitt (752; 1752; 2752) und dem äußeren Schenkelabschnitt (753; 1753; 2753) in dem zusammengebauten Zustand des Dachfensters im Wesentlichen gleich sind.
  9. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei die Flügelprofilabdichtung (75; 175; 275) eine vordefinierte Höhe (HI) an dem inneren Schenkelabschnitt (752; 1752; 2752) hat, optional einschließlich eines inneren oberen Flanschs (754; 1754; 2754), und wobei die vordefinierte Höhe (HI) und eine Dicke des Basisabschnitts (751; 1751; 2751) so gewählt sind, dass der innere Schenkelabschnitt (752; 1752; 2752), optional einschließlich des inneren oberen Flanschs (754; 1754; 2754), bezüglich des Verglasungsprofils (8) komprimiert werden.
  10. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei das Verglasungsprofil (8) eine Basis (81), einen inneren Schenkel (82), einen äußeren Schenkel (83), einen Übergangsabschnitt (84) und einen Scheitelabschnitt (85), optional einen gekrümmten Endabschnitt (86) und/oder einen vorragenden Flansch (87) hat, wobei die Basis eine Breite (WGP) des Verglasungsprofils (8) definiert, der innere Schenkel (82) eine innere Höhe (HGPI) definiert und der äußere Schenkel (83) eine äußere Höhe (HGPO) definiert.
  11. Dachfenster (10) nach Ansprüchen 9 und 10, wobei der innere Schenkelabschnitt (752; 1752; 2752) und/oder ein innerer oberer Flansch (754; 1754; 2754) an einer Unterseite des Übergangsabschnitts (84) anliegen.
  12. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei der Ausschnitt (420) einen unteren Rand (421), einen inneren Rand (422) und einen äußeren Rand (423) hat und mit solchen Abmessungen ausgestaltet ist, dass die Flügelprofilabdichtung (75; 175; 275) in dem Zwischenraum zwischen dem Ausschnitt (420) und dem Verglasungsprofil (8) in dem zusammengebauten Zustand des Dachfensters (10) komprimiert wird.
  13. Dachfenster (10) nach Anspruch 12, wobei mindestens ein Rand des inneren Rands (422) und des äußeren Rands (423) an einer Unterseite des Übergangsabschnitts (84) anliegen.

ßeren Rands (423) in einem vordefinierten Winkel ( $\alpha_3$ ) von dem Ausschnitt (420) weg geneigt ist.

14. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei mindestens ein Schenkelabschnitt des inneren Schenkelabschnitts (2752) und des äußeren Schenkelabschnitts (2753) in einem vordefinierten Winkel ( $\beta_2, \beta_3$ ) bezüglich des Basisabschnitts (2751) nach außen geneigt ist. 5
15. Dachfenster (10) nach Anspruch 14, wobei das dämmende und/oder isolierende Glied ein Dichtungsskissen (76) ist, das Acrylschaumstoffband, Butyl- oder Silikonschaumstoffband umfasst. 10
16. Dachfenster (10) nach einem der vorhergehenden Ansprüche, wobei mindestens ein dämmendes und/oder isolierendes Glied aus Chloropren, Silikon, Ethylen-Propylen-Dien-Monomer, Polyurethan (PU) oder Polyethylen (PE) hergestellt ist. 15
17. Verfahren zum Zusammenbau eines Dachfensters (10) nach einem der vorhergehenden Ansprüche, wobei das mindestens eine dämmende und/oder isolierende Glied (71, 72, 73, 75; 175, 275, 76, 77) in einem ersten Schritt an der jeweiligen Dachfensterkomponente angebracht wird und das mindestens eine dämmende und/oder isolierende Glied (75, 76, 77) und die jeweilige Dachfensterkomponente in einem zweiten Schritt an den restlichen Dachfensterkomponenten angebracht werden. 20

## Revendications

1. Fenêtre de toit (10) comprenant un cadre (1), un châssis (2), un ensemble d'éléments de recouvrement (4), un profilé de vitrage (8) et un ensemble d'éléments d'amortissement et/ou d'isolation (7), l'ensemble d'éléments d'amortissement et/ou d'isolation (7) comprenant au moins un élément (75, 76, 77) attaché à un composant de fenêtre de toit respectif comprenant le profilé de vitrage (8), un élément de recouvrement de châssis latéral (44) et/ou un élément de recouvrement de cadre supérieur (311, 312), dans un état assemblé de la fenêtre de toit, 35

**caractérisée en ce que** l'ensemble d'éléments de recouvrement (4) comprend un élément de recouvrement de châssis inférieur (42), et l'au moins un élément d'amortissement et/ou d'isolation comprend un élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) conçu pour être attaché à l'extrémité inférieure du profilé de vitrage (8) sur au moins une partie de la longueur sur laquelle le profilé de vitrage (8) est en superposition avec l'élément de recouvrement de 50

châssis inférieur (42) dans l'état assemblé, l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) comprend une partie base (751 ; 1751 ; 2751), une partie branche intérieure (752 ; 1752 ; 2752) et une partie branche extérieure (753 ; 1753 ; 2753) pour adapter l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) sur le profilé de vitrage (8), l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) comprend en outre un rebord extérieur supérieur s'étendant vers l'extérieur (755 ; 1755 ; 2755), l'élément d'étanchéité de profilé de châssis (75) comprend en outre une partie de mise en prise extérieure supérieure s'étendant vers l'intérieur (756) comportant une entaille en forme de C (757) destinée à entrer en prise avec un rebord saillant (87) du profilé de vitrage (8), l'élément de recouvrement de châssis inférieur (42) comprend un rebord vertical (42a) pourvu d'une échancrure (420), l'échancrure (420) étant conçue pour recevoir l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275), et **en ce que** l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) présente une hauteur prédéfinie (HO) sous le rebord extérieur supérieur s'étendant vers l'extérieur (755 ; 1755 ; 2755), et ladite hauteur prédéfinie (HO) et une épaisseur de la partie base (751 ; 1751 ; 2751) étant choisies de telle sorte que la partie branche extérieure (753 ; 1753 ; 2753) soit étirée par rapport au profilé de vitrage (8) de façon à amener le rebord extérieur supérieur s'étendant vers l'extérieur (755 ; 1755 ; 2755) en appui contre le rebord vertical (42a). 35

2. Fenêtre de toit (10) selon la revendication 1, dans laquelle l'au moins un élément d'amortissement et/ou d'isolation (75, 76, 77) est attaché au composant de fenêtre de toit respectif à l'aide de moyens de fixation mécaniques, par adhésion ou par accouplement géométrique, ou une combinaison de ces méthodes. 40
3. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) comprend en outre un rebord intérieur supérieur (754 ; 1754 ; 2754). 45
4. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle l'élément d'étanchéité de profilé de châssis (275) comprend en outre un rebord extérieur supérieur s'étendant vers l'intérieur (2758). 50
5. Fenêtre de toit (10) selon l'une quelconque des re-

- vendications précédentes, dans laquelle ledit élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) présente une largeur intérieure (W0) entre la partie branche intérieure (752 ; 1752 ; 2752) et la partie branche extérieure (753 ; 1753 ; 2753) correspondant essentiellement à une largeur (WGP) du profilé de vitrage (8) dans l'état assemblé de la fenêtre de toit.
6. Fenêtre de toit (10) selon la revendication 5, dans laquelle ledit élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) présente une largeur supérieure (W1) plus grande qu'une largeur inférieure (W2) et que la largeur intérieure (W0) et une longueur (L) du même ordre de grandeur que la largeur inférieure (W2).
  7. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) est fait d'un matériau compressible et est comprimé de 20 à 60 %, de préférence d'environ 40 %.
  8. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle la partie branche intérieure (752 ; 1752 ; 2752) et la partie branche extérieure (753 ; 1753 ; 2753) sont choisies de telle sorte que la compression soit essentiellement égale dans la partie branche intérieure (752 ; 1752 ; 2752) et la partie branche extérieure (753 ; 1753 ; 2753) dans l'état assemblé de la fenêtre de toit.
  9. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle ledit élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) présente une hauteur prédéfinie (HI) au niveau de la partie branche intérieure (752 ; 1752 ; 2752), comprenant éventuellement un rebord intérieur supérieur (754 ; 1754 ; 2754), et ladite hauteur prédéfinie (HI) et une épaisseur de la partie base (751 ; 1751 ; 2751) étant choisies de telle sorte que la partie branche intérieure (752 ; 1752 ; 2752), comprenant éventuellement le rebord intérieur supérieur (754 ; 1754 ; 2754), soit comprimée par rapport au profilé de vitrage (8).
  10. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle le profilé de vitrage (8) comporte une base (81), une branche intérieure (82), une branche extérieure (83), une partie de transition (84) et une partie sommet (85), éventuellement une partie d'extrémité incurvée (86) et/ou un rebord saillant (87), la base définissant une largeur (WGP) du profilé de vitrage (8), la branche intérieure (82) définissant une hauteur intérieure (HG-PI) et la branche extérieure (83) définissant une hauteur extérieure (HGPO).
  11. Fenêtre de toit (10) selon les revendications 9 et 10, dans laquelle la partie branche intérieure (752 ; 1752 ; 2752) et/ou un rebord intérieur supérieur (754 ; 1754 ; 2754) est/sont en appui contre une face inférieure de la partie de transition (84).
  12. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle l'échancrure (420) comporte un bord inférieur (421), un bord intérieur (422) et un bord extérieur (423) et est conçue avec des dimensions telles que l'élément d'étanchéité de profilé de châssis (75 ; 175 ; 275) soit comprimé dans l'intervalle entre l'échancrure (420) et le profilé de vitrage (8) dans l'état assemblé de la fenêtre de toit (10).
  13. Fenêtre de toit (10) selon la revendication 12, dans laquelle au moins l'un du bord intérieur (422) et du bord extérieur (423) est incliné dans une direction s'éloignant de l'échancrure (420) d'un angle ( $\alpha$ 3) prédéfini.
  14. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle au moins une partie branche parmi la partie branche intérieure (2752) et la partie branche extérieure (2753) est inclinée vers l'extérieur par rapport à la partie base (2751) d'un angle ( $\beta$ 2,  $\beta$ 3) prédéfini.
  15. Fenêtre de toit (10) selon la revendication 14, dans laquelle ledit élément d'amortissement et/ou d'isolation est un coussinet d'étanchéité (76) comprenant un ruban de mousse acrylique, un ruban de mousse butyle ou un ruban de mousse de silicone.
  16. Fenêtre de toit (10) selon l'une quelconque des revendications précédentes, dans laquelle au moins un desdits éléments d'amortissement et/ou d'isolation est fait de chloroprène, silicone, terpolymère d'éthylène-propylène-diène (EPDM), polyuréthane (PU) ou polyéthylène (PE).
  17. Procédé d'assemblage d'une fenêtre de toit (10) selon l'une quelconque des revendications précédentes, selon lequel l'au moins un élément d'amortissement et/ou d'isolation (71, 72, 73, 75 ; 175 ; 275, 76, 77) est attaché au composant de fenêtre de toit respectif dans une première étape, et l'au moins un élément d'amortissement et/ou d'isolation (75, 76, 77) et le composant de fenêtre de toit respectif sont attachés aux composants de fenêtre de toit restants dans une seconde étape.

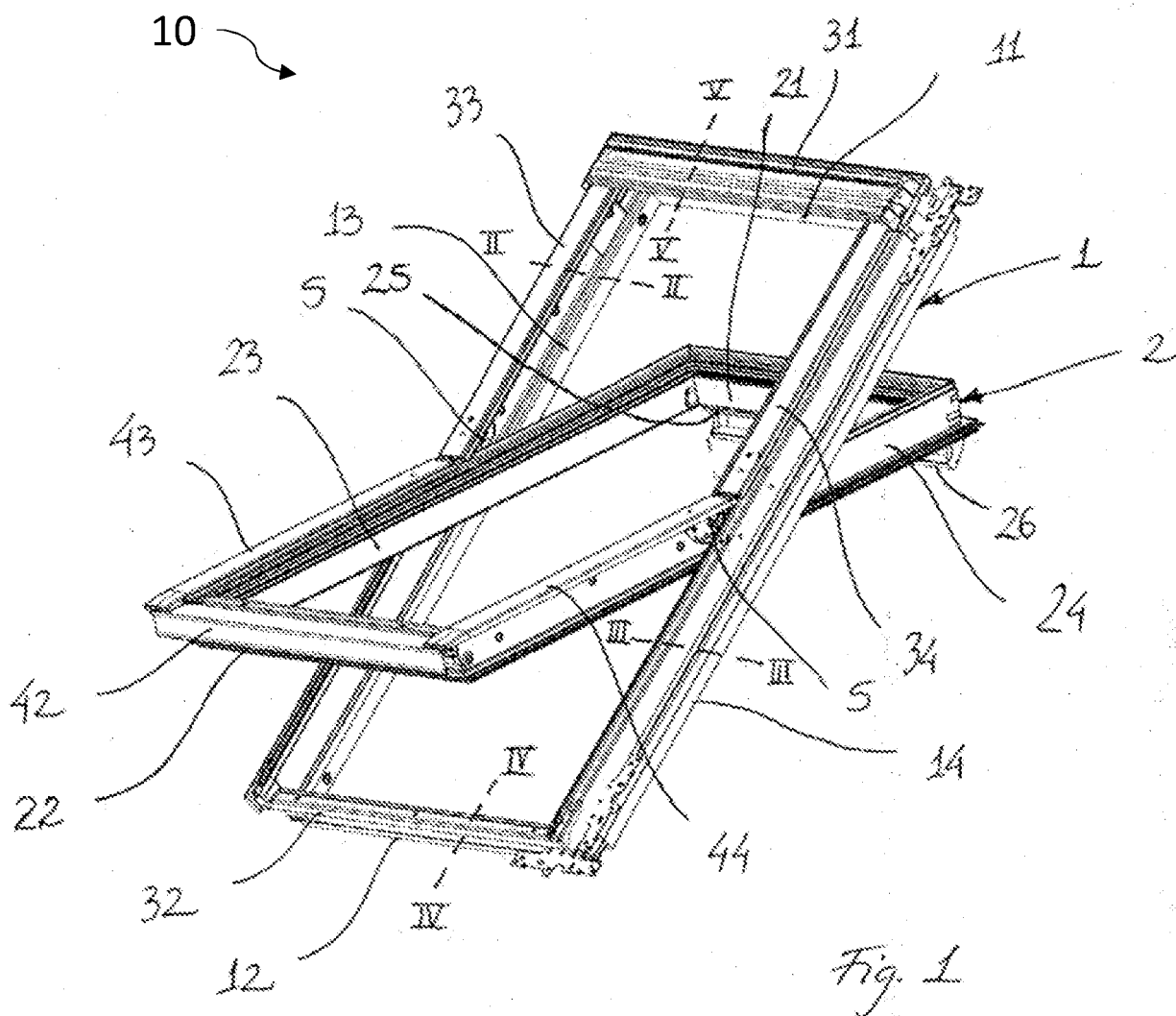


Fig. 1 (PRIOR ART)

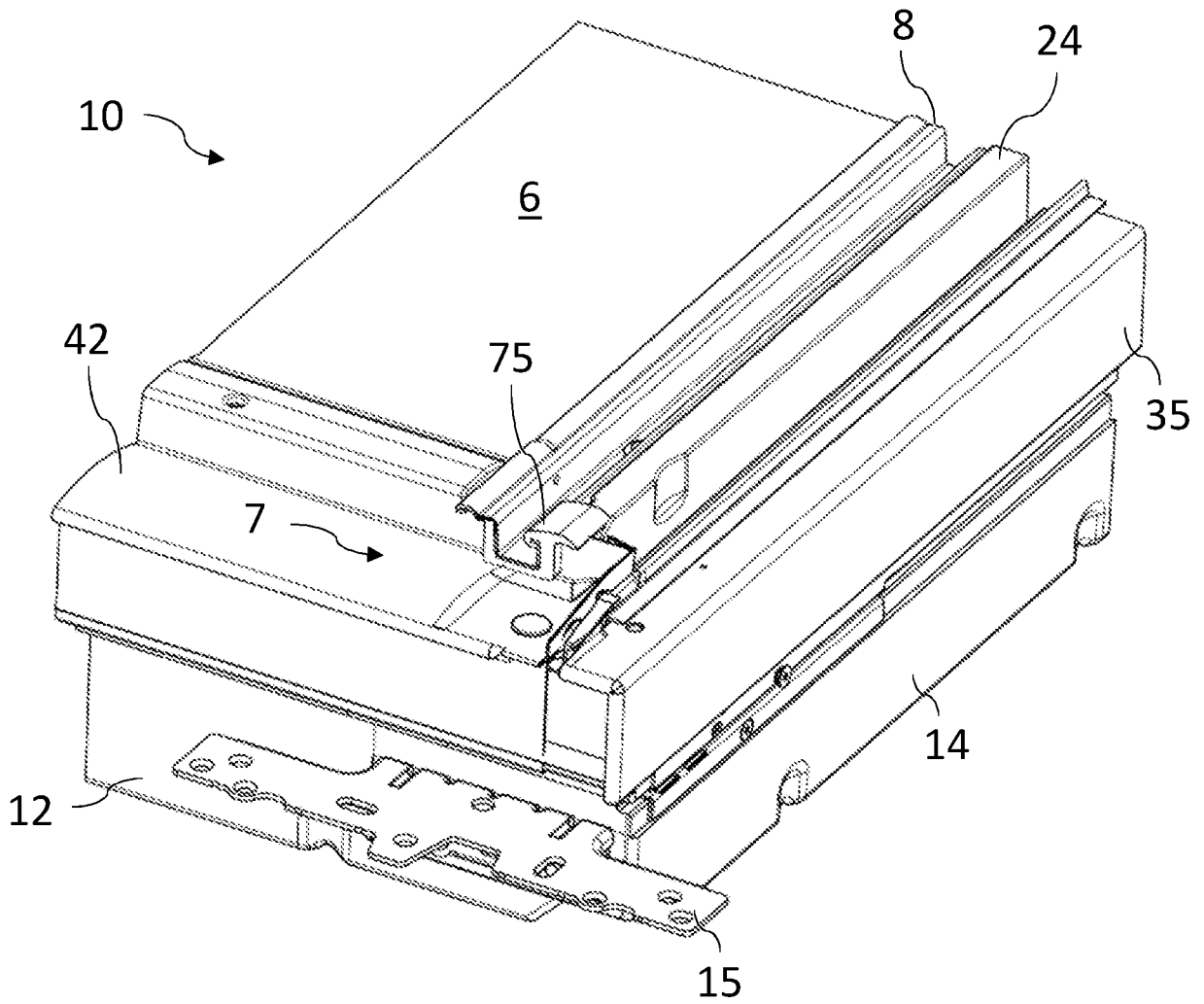


Fig. 2

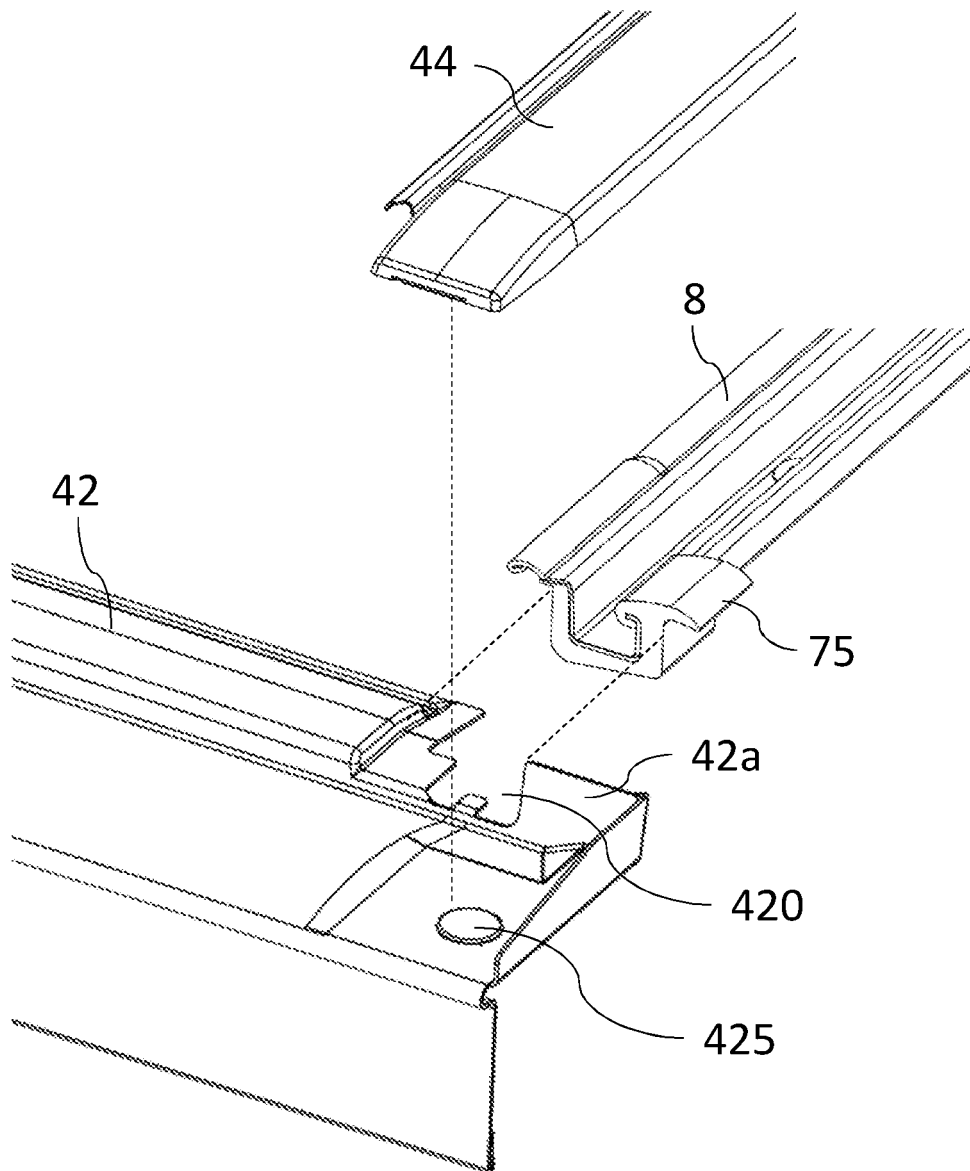


Fig. 3

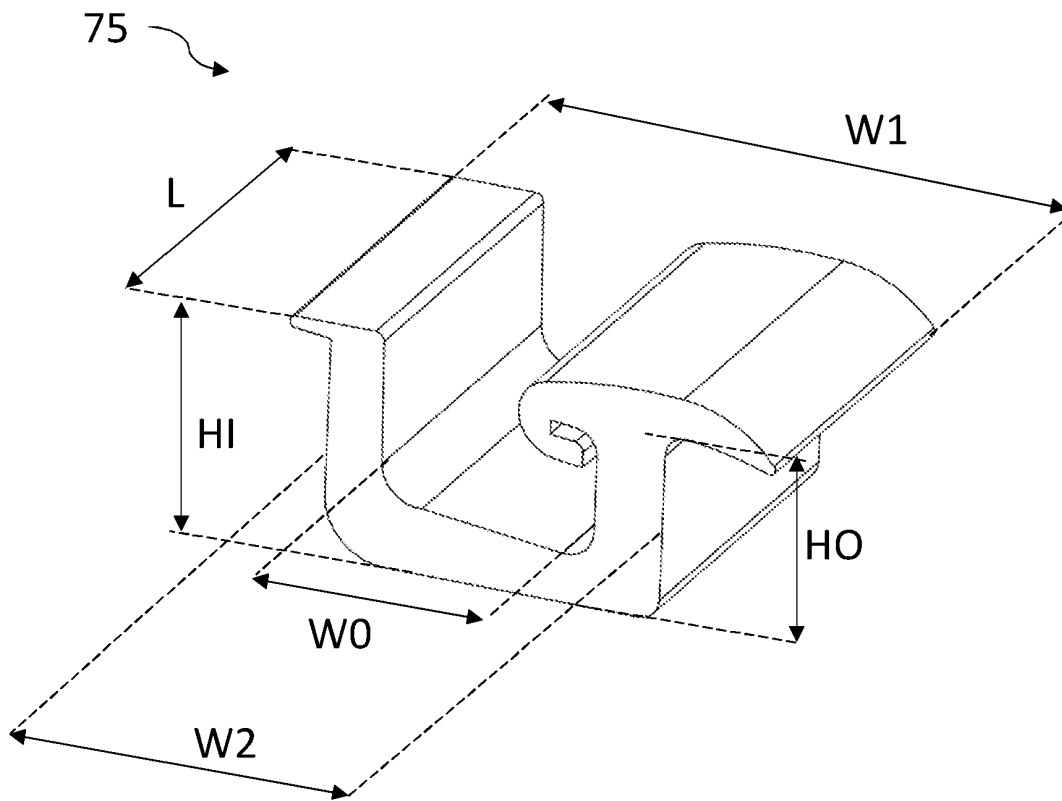


Fig. 4

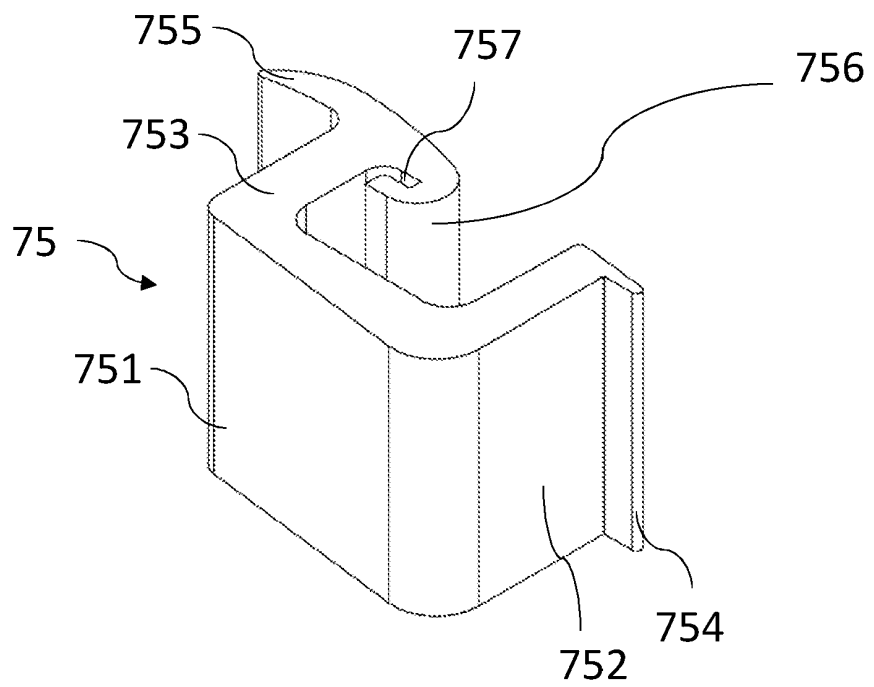


Fig. 5

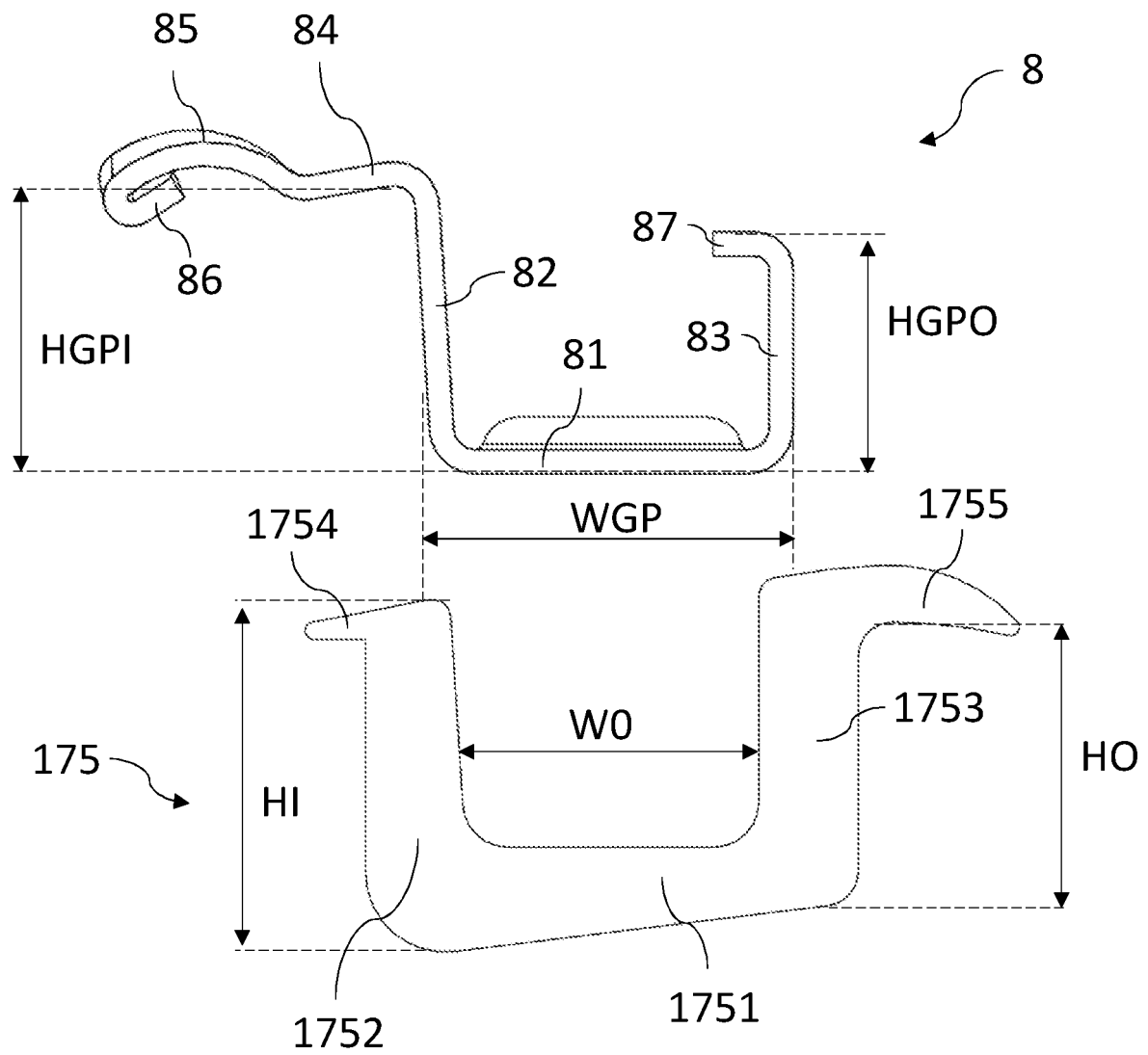


Fig. 6

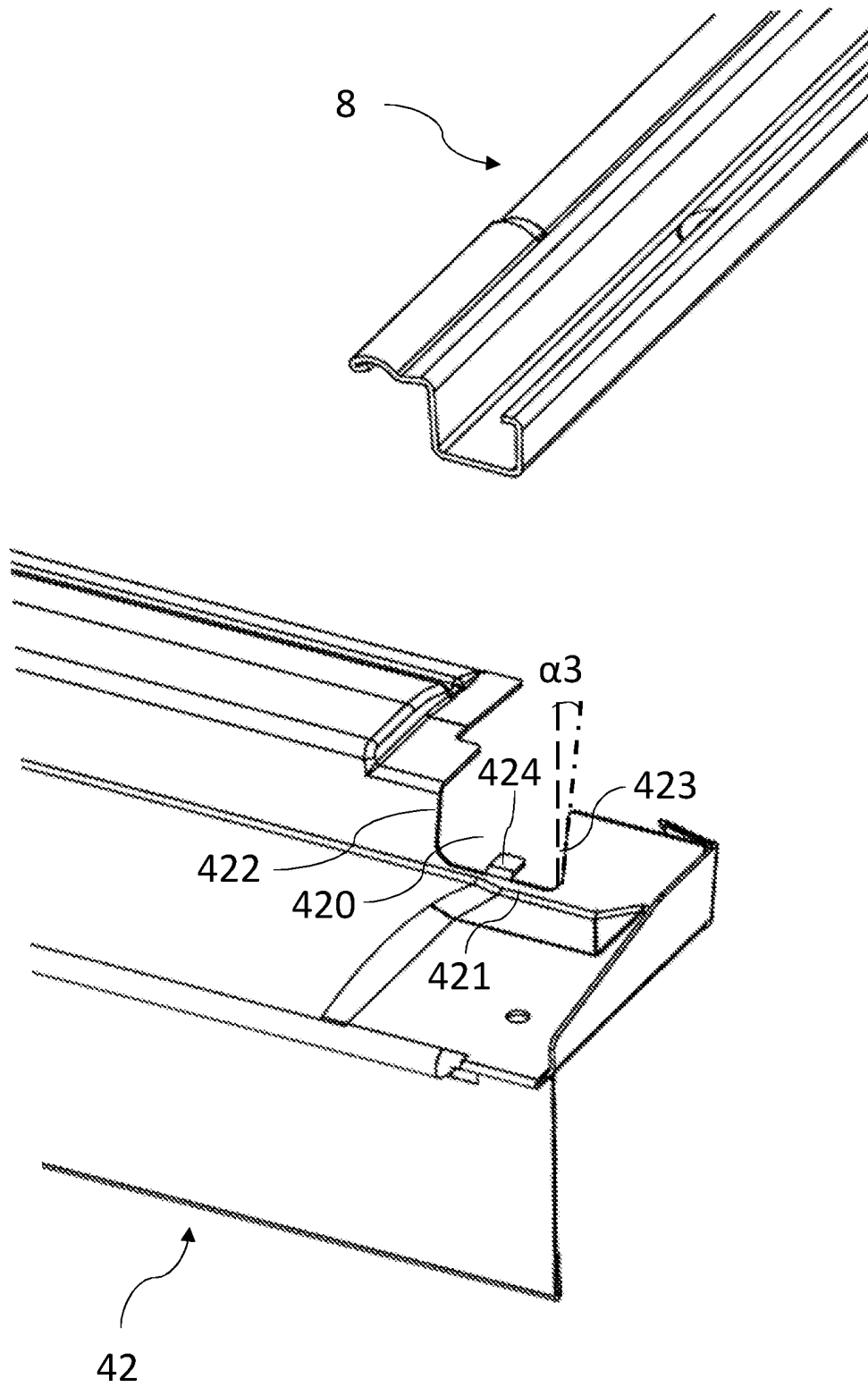


Fig. 7

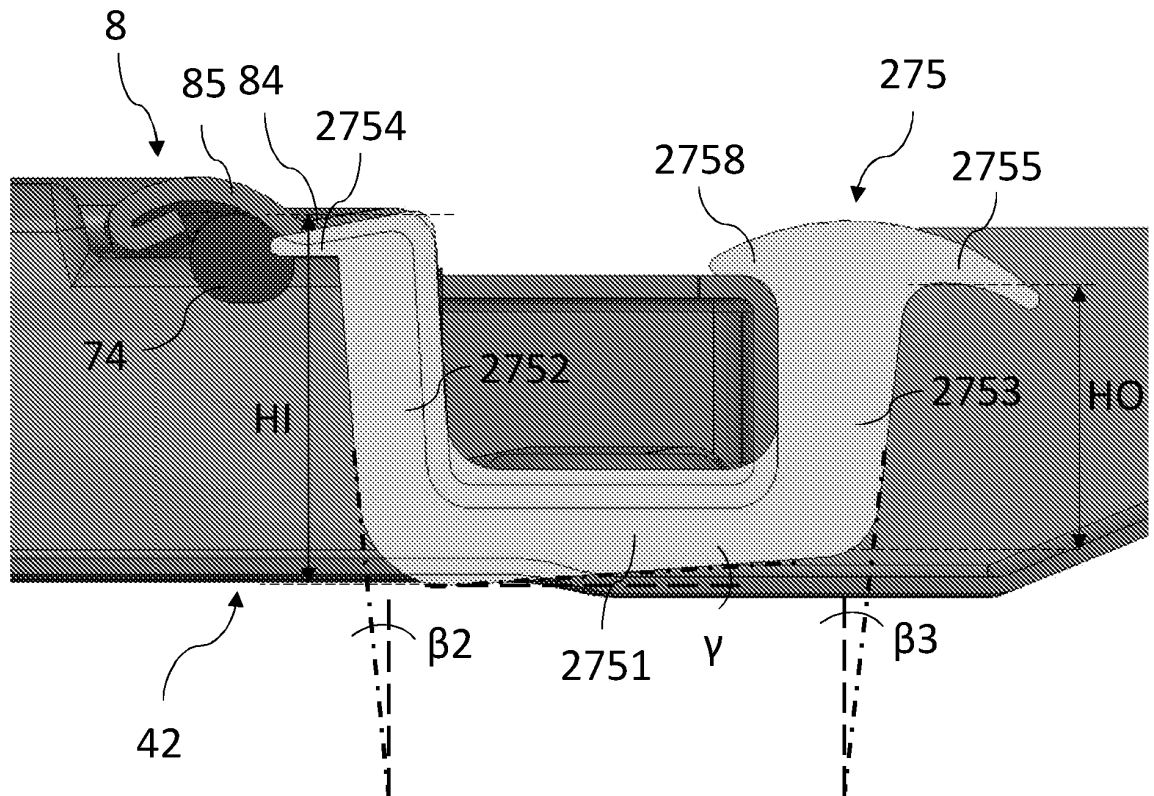


Fig. 8

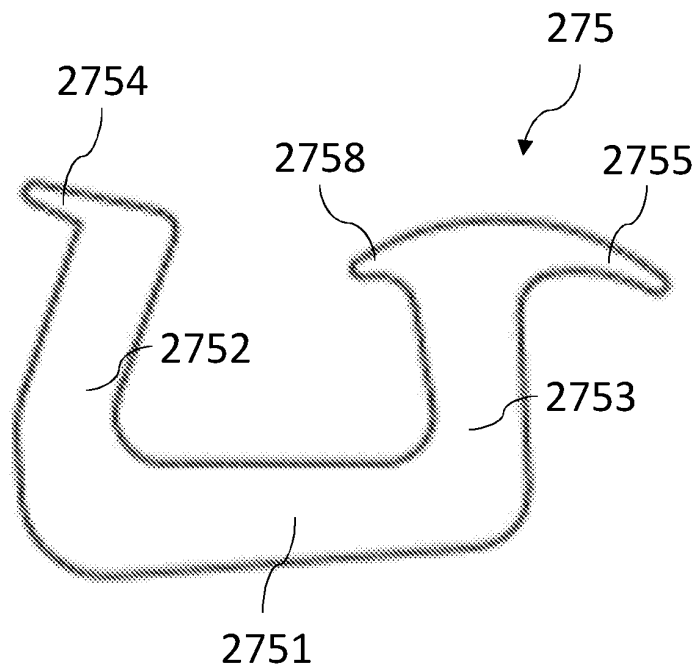


Fig. 9

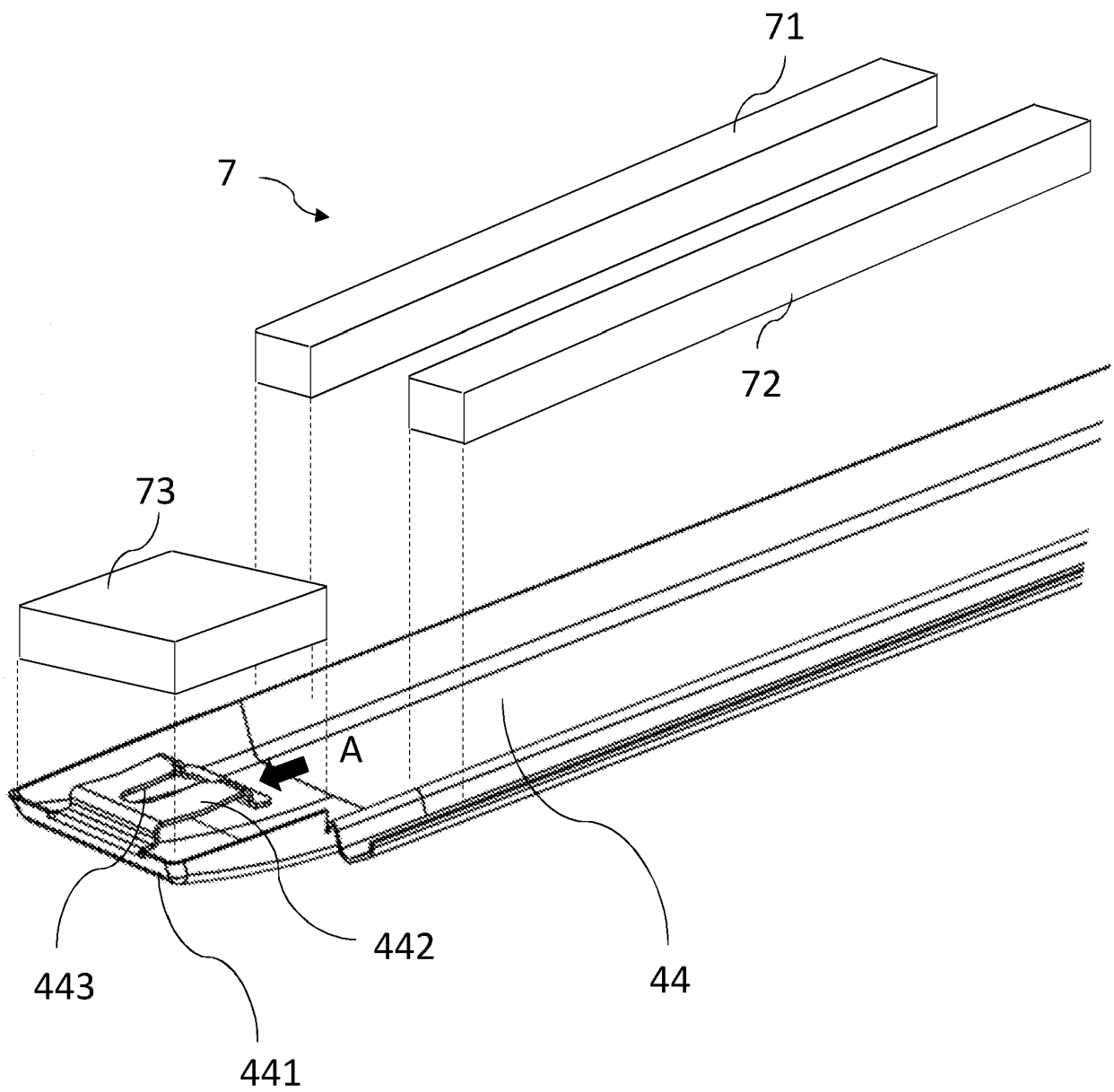


Fig. 10

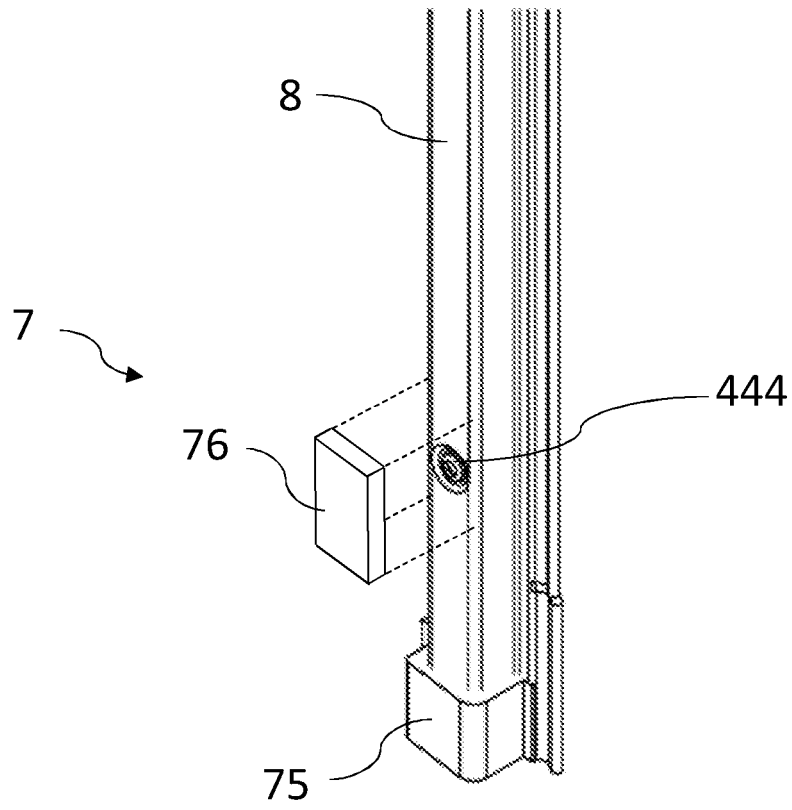


Fig. 11

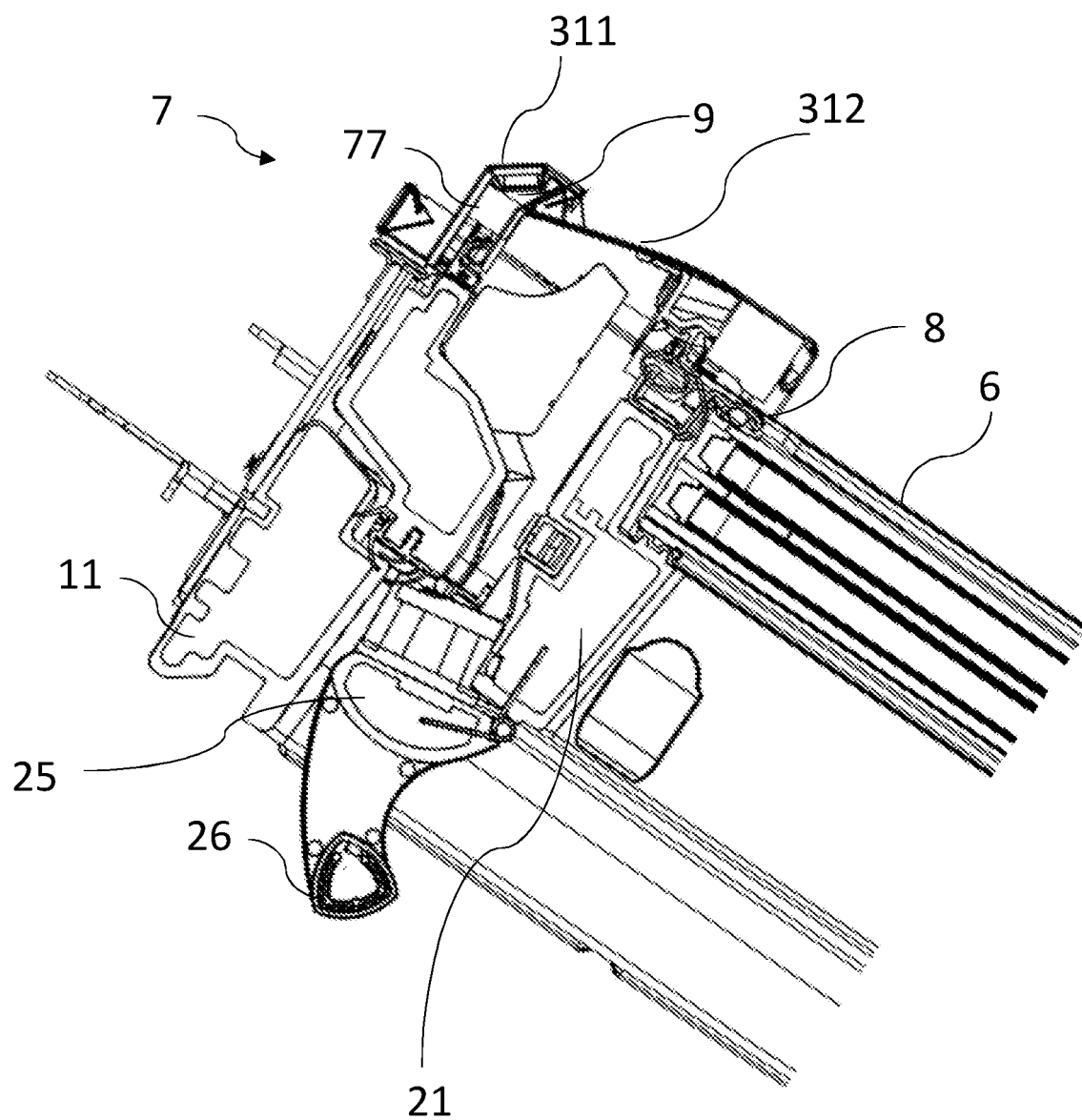


Fig. 12

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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