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(54) Benævnelse: **A roof window with a water diversion member**

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(57) Sammendrag:

**A roof window with a ventilation passage (52) provided between a frame top covering member (41) on the frame top member (11) and the sash top member (21) and a diversion member (6) provided between the pane (3) and the frame top covering member (41). The diversion member has a first portion (61), which is attached directly or indirectly to the sash top member (21), and a second portion (62) projecting from the first portion in a direction away from the frame top member and the pane. The second portion of the diversion member covers for the ventilation opening (51) when seen in a direction parallel to the pane, but leaves an opening when seen in a direction perpendicular to the pane. The second portion of the diversion member (6) preferably has the shape of a gutter and locking members (9) may be used for retaining the diversion member.**

Fortsættes ...

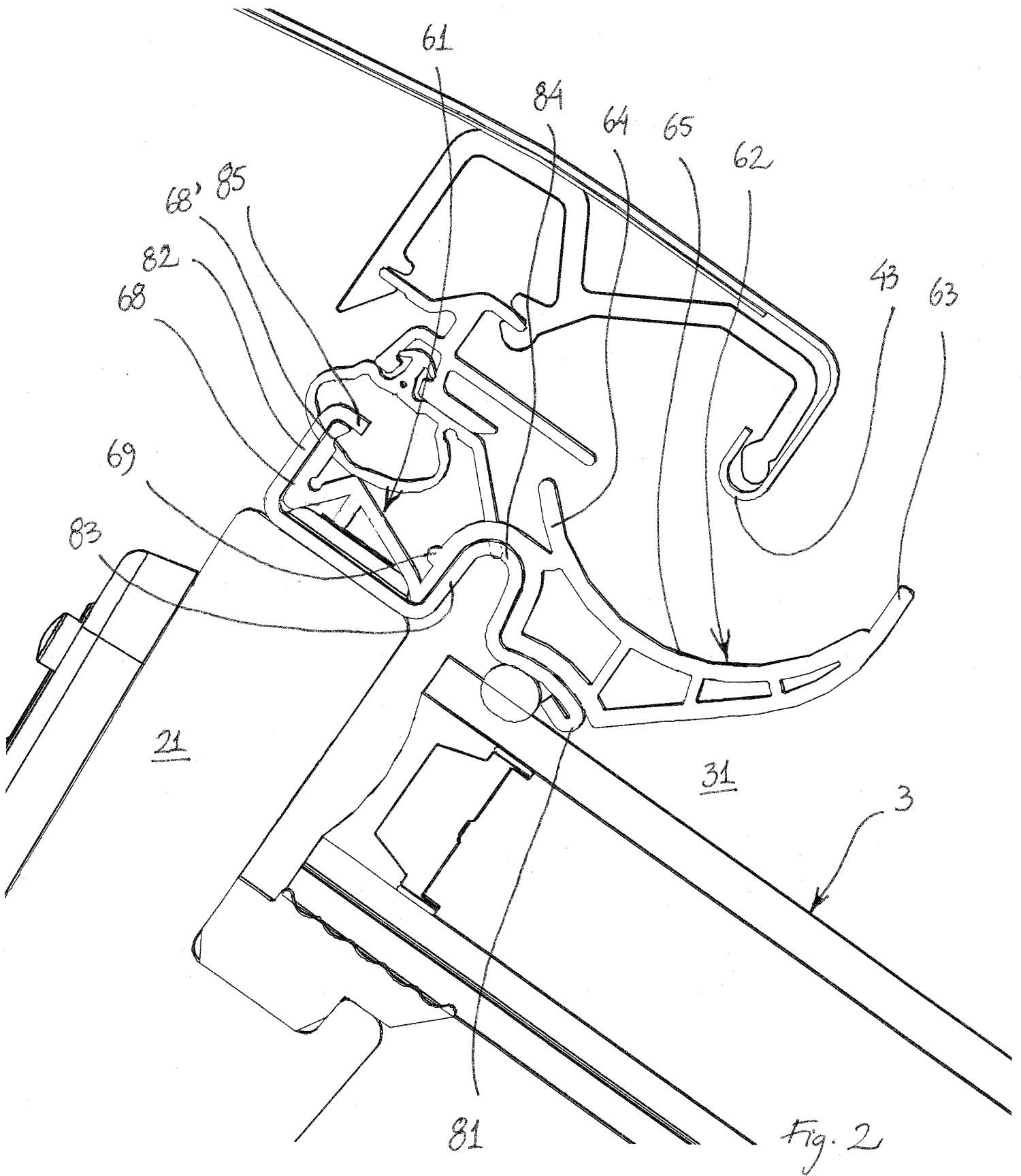


Fig. 2

The present invention relates to a roof window, comprising a frame, a sash carrying a pane and a covering including a frame top covering member arranged on an exterior side of a frame top member and covering an exterior  
5 side of a sash top member, where a ventilation passage with an exterior ventilation opening is provided between the frame top covering member and the sash top member. In addition to the top member, the frame and the sash normally each comprise a bottom member and two side members forming rectangular units and the window has an interior side intended to face the interior of a building and exterior side intended to face the exterior of the building.  
10 ing.

Windows of this type are known for example from W02008/133539A2 and EP2317026B1, where the amount of air passing through the ventilation passages are regulated by baffles, but windows with a permanent unob-  
15 structed ventilation passage are also known.

These windows function very well with regards to ventilation, but heavy winds may force water into the ventilation opening. This causes deterioration of the window and in some cases the water even reaches the interior of the building via the ventilation passage. This problem is particularly pronounced when the window is mounted in a low inclination roof and when the ventilation passage is without restriction means, such as baffles, or when these are left open.  
20

Water diversion means are known for example from NO751527A, where a diversion member is arranged to drain excess water from the edges  
25 of the pane and of the window, however for such a type of window, ventilation is not a goal, and as such, the diversion member is arranged in a way, which limits the possibility of ventilation.

It is therefore the object of the invention to provide a window where the risk of water entering the ventilation passage via the ventilation opening is  
30 reduced without affecting the ventilation properties considerably.

This object is achieved with a roof window as defined in claim 1.

With the substantially wedge-shaped space formed between the second portion and the exterior side of the pane, i.e. below the first portion in

the mounted state, any water on the exterior surface of the pane, which is forced upwards by wind, will end up at the space between the second portion of the diversion member and the exterior side of the pane and hence be prevented from entering the ventilation opening, which is located on the opposite  
5 side of the second portion. Thus the water will only be able to penetrate into the ventilation passage if it builds up to a level, which is higher above the exterior surface of the pane than the free distal edge of the second portion of the diversion member.

Embodiments of the invention are mentioned on the dependent  
10 claims.

Preferably the angle between the overall direction of the second portion of the diversion member and the exterior side of the pane is approximately 45 degrees. This will provide a good balance between the need for maintaining a suitable ventilation opening and preventing water from entering  
15 the construction, but it is envisaged that any angle between 20 and 70 degrees may provide satisfactory results.

The frame top covering member usually has a leg projecting from an exterior portion of the covering member towards the pane so that the ventilation opening is defined as the gap between the lower edge of this leg and the  
20 exterior surface of the pane or a glazing profile overlapping the edge of the pane. The first portion of the diversion member will then normally be located underneath the frame top covering member, behind the projecting leg, while the second portion will be located on the opposite side of the leg above the exterior pane surface and not covered by the frame top covering member.

The fact that the diversion member extends across the width of the  
25 window is not to be understood as if it has to extend over the entire width of the window, but to ensure a good visual impression of the window this will usually be the case. If the ventilation opening is present over only a part or parts of the width of the window it may be sufficient to provide the diversion  
30 member or members at these parts. Likewise it is to be understood that the first portion and the second portion do not need to have the same length. On the contrary, the first portion may in some cases advantageously be inter-

rupted at a distance from the ends of the second portion to facilitate attachment of the diversion member and give room for other parts of the window.

Despite the fact that water will only very rarely overflow the distal edge of the second portion of the diversion member, water will nonetheless  
5 reach the side of the second portion facing away from the pane. Precipitation hits this side directly and water will be draining off from the exterior side of the frame top covering member. To enable the diversion member to reliably drain off such water, the second portion preferably has the shape of a gutter, which is open towards the exterior side of the window and open at the ends. This  
10 allows a considerable amount of water to collect in the gutter and to be drained off at the ends, where it will run out onto the pane or onto glazing profiles, diversion members or the like used as at sides of the window.

It is also possible to provide one or more drainage opening(s) at the bottom of the gutter, preferably at a distance from its ends, and allowing water  
15 in the gutter to drain out onto the exterior surface of the pane. This will of course involve the risk of water penetrating from the pane and into the gutter, but in case of extreme wind or water pressure on the pane this may be advantageous since it will reduce the pressure on the diversion member and hence potentially prevent it from being torn loose.

20 To provide optimal water tightness and flexibility, the diversion member is preferably made from synthetic rubber, such as rubber polymer modified bitumen (RPMB), polyurethane (PUR), ethylene propylene diene monomer (EPDM), nitrile rubber or silicone rubber, but it is also possible to make it from a more rigid material, such as polypropylene (PP), polyethylene (PE) or  
25 polyvinylchloride (PVC). Combinations, such as a rubber member with a strengthening inlay of plastic or metal, may of course also be applied. In any case the material(s) chosen should be able to endure exposure to water and UV radiation over an extended period of time.

In many types of windows the pane is fixed to the sash by means of  
30 a glazing profile, which is provided on the exterior side of the sash top member and overlapping an edge of the pane, so that the pane is clamped between the glazing profile and the sash top member. The glazing profile thus

overlaps the narrow space between the pane and the sash and is usually attached to an exterior surface of the sash, which is substantially at level with the exterior side of the pane. Like glazing profiles are used at the bottom and sides of the window.

5           Due to its position in the window and since it is usually formed with grooves extending in its length direction and open towards the exterior, the glazing profile constitutes an optimal point of attachment for the diversion member. It may, however, also be attached directly to the sash, for example if using a moulded plastic sash, where the pane is attached by adhesion and  
10 there is no need for a glazing profile.

          When attached to the glazing profile, the diversion member is preferably made with at least one local or longitudinal projection, bead or staggered section fitting into the groove. If the diversion member is made from rubber and the projection, bead or staggered section is made slightly over-  
15 size in relation to the groove, the diversion member may be held in place solely by friction. It is, however, also possible to use at least one locking member fixed in the glazing profile in a tight-fitting manner thereby retaining the diversion member in the groove. Such a locking member may serve solely to close off the opening of the groove, but the diversion member may also be  
20 clamped between the glazing profile and the locking member.

          One embodiment of a locking member is a rounded non-circular plate member having a first width, which smaller than the width of the opening of the groove in the glazing profile, and a second width which is substantially equal to or slightly larger than the opening of the groove. Such a locking  
25 member can be easily inserted in the groove and then turned into a tight-fitting engagement with the glazing profile, where its second width is substantially perpendicular to the length direction of the groove. To facilitate the turning to the tight-fitting fixed state the plate members are preferably provided with for example a recess or slit which can be engaged by a screw driver or a  
30 projecting flange or the like allowing it to be turned by hand or using tongs.

          The diversion member may be provided with one or more local or longitudinal projections and/or grooves, which help keep the locking mem-

ber(s) in place.

Attachment of the diversion member to the glazing profile also facilitates the possibility for retrofitting it on existing windows. This may be easily done by removing the frame top covering member of an existing window, attaching the diversion member to the existing glazing profile and then remounting the frame top covering.

Depending on its design, the diversion member may contribute to improving security by making it more difficult to insert a tool through the ventilation passage to activate the windows operator and open the window.

Furthermore, the diversion member may contribute to the noise damping and/or insulating properties of the window.

In the following the invention will be described in further detail with reference to a non-limiting embodiment shown in the drawing, where:

Fig. 1 is a cross-sectional sketch of the top of a centre-hung window, Fig. 2 is an enlargement of a section of Fig. 1,

Fig. 3 shows the upper left-hand corner of a window in a perspective view seen from the exterior side, where all covering members have been removed to expose the diversion member,

Fig. 4 is a perspective view of a diversion member on a glazing profile with a locking member in the not yet fixed state,

Fig. 5 corresponds to Fig. 4 but with the locking member in the fixed state,

Fig. 6 shows an another embodiment of a locking member,

Fig. 7 shows the locking member in Fig. 6 arranged on a diversion member in the not yet fixed state as in Fig. 4, but seen in a direction perpendicular to the plane of the pane, and

Fig. 8 corresponds to Fig. 7 but with the locking member in the fixed state.

A window according to the invention includes a frame 1 and a sash 2 represented in Figs 1 and 2 by a frame top member 11 and a sash top member 21. A ventilation flap 25 and a handle bar 26 on the sash top member is connected to a locking assembly 7 interconnecting the frame and the sash

top members in a manner known per se.

The pane 3 is attached to the sash top member 21 with a glazing profile 8 and it is to be understood that similar profiles are used at the sides as shown in Fig. 3 and at the bottom of the window.

5 Attached to the exterior side of the frame top member 11 is a frame top covering member 41, which covers the spacing between the frame top member 11 and the sash top member 21 as well as the glazing profile 8. A leg 42 of the covering member 41 projects towards the pane 3 so that a lower edge 43 thereof is located directly above the outer edge 81 of the glazing profile.  
10

In this embodiment a gaskets carrier 44 carrying a sealing gasket 45 is provided on the interior side of the frame top covering member 41 so that the sealing gasket is in engagement with an upstanding leg 82 of the glazing profile 8 in the closed state of the window. Though the sealing gasket is here  
15 shown in its initial state it is to be understood that it will be compressed by the contact with the glazing profile. Likewise it is to be understood that the window may also be made without such a sealing gasket and carrier and/or that a ventilation restriction means such as the baffle systems described in W008133539A1 and EP2317026B1 may be provided.

20 A gasket-like diversion member 6 is arranged in the glazing profile 8 with a first portion 61 arranged in a groove in the glazing profile formed by the inner upper leg 82 and a second upstanding leg 83 formed by a bent section 84. As may be seen, the shape of the interior side of the diversion member corresponds closely to the shape of the exterior side of the glazing profile,  
25 which provide for an easy and reliable attachment. The diversion member could however also be attached to the exterior side of the pane 3 or directly to the sash top member 21, which might for example be the case if the pane were attached without the use of a glazing profile. Likewise, it is to be understood that the diversion may be in contact with the pane even if attached to a  
30 glazing profile as shown.

A second portion 62 of the diversion member projects from the bent section 84 out over the exterior side of the pane 3 and an angle  $\alpha$  thereto so

that a wedge shaped space 31 is formed between the second portion and the pane. The second portion could in principle be at straight section or have a triangular cross-sectional shape, but in this embodiment it is curved so that the section closest to the distal edge 63 is substantially perpendicular to the  
5 plane of the pane.

As may be seen, the ventilation opening 51 formed between the lower edge 43 of the projecting leg 42 of the frame top covering member 41 and the lower edge 81 of the glazing profile is completely covered when seen in a direction in parallel with the pane 3 as indicated to by the arrow A. When  
10 seen in a direction perpendicular to the pane as indicated by the arrow B, however, an opening of the same size as the original ventilation opening 51 is present between the distal edge 63 of the second portion 62 of the diversion member 6 and the projecting leg 42 of the frame top covering member 41. This means that amount of air, which can pass through the ventilation open-  
15 ing 51 and hence the ventilation passage 52 is substantially the same as without the diversion member.

A curved shape is also found on the exterior side 65 of the second portion, which ends in a projection 64 at the proximal edge above the bent section 84 of the glazing profile, so that the exterior side forms a gutter. This  
20 gutter is substantially centred under the lower edge 43 of the projecting leg 42 of the frame top covering member 41 and is therefore capable of collecting water draining off from the frame top covering member.

In the embodiment shown the diversion member 6 is of a hollow design with intermediate walls interconnection two surface walls of the second  
25 portion 62. This design is particularly suited for giving a rubber member dimensional stability, but it is to be understood that it may also be used with different materials and/or that the diversion member may be solid, made for example of rubber foam. Moreover, the diversion member may be made with inlays of different kinds and materials in order to achieve the desired proper-  
30 ties.

Turning now to Fig. 3, the upper left-hand corner of a window is shown with the covering members removed so that the gutter formed by the

exterior side 65 of the second portion 62 of the diversion member is clearly seen.

In this embodiment, water in the gutter may be drained off as shown by the arrows C either by flowing over the end edges 66 (only one of which  
5 are visible) of the diversion member and onto the glazing profiles 8 at the sides of the window or through drainage openings 67 penetrating through the second portion. It would, however also be possible to make the gutter with closed ends or without the drainage openings. The drainage openings shown here are relative small to hinder water from penetrating into the gutter from  
10 below, but it would also be possible to provide them with a valve function.

The first portion 61 is here somewhat shorter than the second portion 62 of the diversion member to facilitate assembly of the window, but this need not be the case.

In some cases the friction between the diversion member 6 and the  
15 glazing profile 8 may be sufficient to establish a reliable connection. Nonetheless it is preferred to secure the diversion member either by adhesion or by mechanical means. One example of such a mechanical locking member is shown in Figs 4 and 5. It consists of an oval plate member 9 with a first width  $d_1$ , which is slightly smaller than the width  $w$  of the opening of the groove in  
20 the glazing profile, and a second width  $d_2$ , which is equal to or slightly larger than the width of the opening. For attaching the locking member 9 it is inserted in the groove with it largest width substantially in parallel with the longitudinal direction of the groove as shown in Fig. 4. It is then turned approximately 90 degrees to the position in Fig. 5, where it is clamped in a tight-fitting  
25 manner between the two legs of the glazing profile forming the groove. A common screw driver engaging the slit 91 at the centre of the plate may be used for turning it.

In the embodiment shown, the projecting leg 82 of the glazing profile 8 has a bent edge 85 projecting over the groove and defining a groove opening with a width  $w$ , which is smaller than the width at the bottom of the groove.  
30 This bent edge contributes to retaining the locking member 9 in the fixed state by preventing it from moving upwards out of the groove.

As will be seen the diversion member 6 is here of a design covering the inner surface of the groove, i.e. the exterior side of the glazing profile 8, resulting in the actual width  $w$  of the groove opening being somewhat smaller than the distance between the walls of the glazing profile 8. Whenever reference is made to "the width of the opening of the groove in the glazing profile" it is to be understood as meaning the actual available width of the opening.

The first portion of the diversion member is here made with a leg 68 lying closely against the inner side of the upper leg 82 on the glazing profile and is retained by the bent edge 85. When made of rubber, it serves as an anti-slip member contributing to keeping the locking member 9 in place. In addition, a small groove 68' in the leg 68 and a bead 69 on the diversion member at the opposite side of the groove are specially adapted for retaining a plate-shaped locking member. This means that the first portion 61 of the diversion member is clamped between the glazing profile 8 and the plate member 9, thus contributing to increased friction between the glazing profile and the diversion member and consequently a more secure attachment. The resilience of a rubber diversion member will help to establish a tight-fitting engagement between the glazing profile, the diversion member and the locking member.

Another embodiment of a locking member 109 is shown in Figs 6-8, where like features have been given the same reference numbers as in Figs 1-5, but with 100 added. Where nothing else is stated, such features have the same properties as explained above with reference to Figs 1-5.

As may be seen the locking member 109 is of an elongated rounded shape with a slit 191 at the centre just as the one in Figs 4 and 5 and it is inserted and locked in the same way. The difference lies in the shape of the sides coming into engagement with the diversion member 106 and/or glazing profile 108, when the locking member is turned. In this embodiment, these sides have been made with concave recesses 192, so that two contact points 193 are formed at the transition between the longer convex sides 194 and the recesses 192 forming the shorter concave sides. When the locking member is turned, this shape means that there are two points of contact on each side,

which leads to a particularly secure attachment of the locking member and hence the diversion member. Not only is the contact surface and hence the friction larger; the distance between the contact points also prevents the locking member from gradually and unintentionally moving towards the unsecured  
5 position under the influence of thermal expansion, the tension of the material of the diversion member and the glazing list, etc.

If using a different kind of locking member, such as a spring member, which is inserted in a compressed state and then allowed to expand in the groove, different embodiments of the diversion member and possibly also the  
10 glazing profile may be advantageous or even needed.

Here the invention has been illustrated with reference to a centre-hung roof window, where the top members of the frame and the sash move away from each other when the window is opened, but it may also be used on other types of windows such as top-hung windows, windows having a hinge  
15 axis between the centre and the top or a dual function window capable of being operated both as centre-hung and top-hung.

The diversion member has been described with reference to its primary intended use, i.e. to divert water, which is pressed upwards on the exterior surface of the pane. It will, however, be understood that the diversion  
20 member will also divert air and that it may therefore contribute to preventing draught caused by wind blowing directly into the ventilation opening and potentially improve the insulating properties of the window.

## P A T E N T K R A V

1. Tagvindue med en indvendig side, der er beregnet til at vende imod det indvendige af en bygning, og en udvendig side, der er beregnet til at vende imod det udvendige i forhold til bygningen, omfattende en karm (1), en ramme (2), der bærer en rude (3), og en beklædning omfattende et karmtopbeklædningselement (41), der er indrettet på en udvendig side af et karmtopelement (11) og dækker en udvendig side af et rammetopelement (21), hvor der er tilvejebragt en ventilationspassage (52) med en udvendig ventilationsåbning (51) imellem karmtopbeklædningselementet (41) og rammetopelementet (21),

hvor et afledningselement (6;106) er tilvejebragt mellem ruden (3) og karmtopbeklædningselementet (41) og strækker sig over bredden af vinduet i hovedsagen parallelt med rammetopelementet (21), hvilket afledningselement har en første del (61), der er fastgjort direkte eller indirekte til rammetopelementet (21), og en anden del (62) med en fri distal kant (63) og en fastgjort proximal kant, hvilken anden del danner en forlængelse af den første del i en retning væk fra karmtopbeklædningselementet og ruden, således at den i hovedsagen dækker for ventilationsåbningen (51) når set i en retning (A), der er parallel med ruden, men efterlader en åbning når set i en retning (B), der er vinkelret på ruden, og hvor der er dannet et mellemrum (31) mellem den anden del og den udvendige side af ruden, hvilket mellemrum har et i hovedsagen kileformet tværsnit i et plan, der er vinkelret på længdeaksen for karmtopelementet.

2. Tagvindue ifølge krav 1, hvor en vinkel ( $\alpha$ ) mellem en overordnet retning for den anden del (62) af afledningselementet og den udvendige side af ruden (3) er 20-70 grader, fortrinsvis omkring 45 grader.

3. Tagvindue ifølge et hvilket som helst af de foregående krav, hvor den anden del (62) af afledningselementet (6;106) har facon som en rende, der er åben imod vinduets udvendige side og fortrinsvis åben ved enderne (66).

4. Tagvindue ifølge krav 3, hvor der er tilvejebragt en eller flere drænåbning(er) (67) ved bunden af renden, hvilke(n) drænåbning(er) tillader vand i renden at dræne ud på den udvendige overflade af ruden (3).

5. Tagvindue ifølge et hvilket som helst af de foregående krav, hvor afledningselementet (6;106) er lavet af syntetisk gummi.

6. Tagvindue ifølge et hvilket som helst af de foregående krav, hvor afledningselementet (6;106) er fastgjort til en glasliste (8), som er tilvejebragt  
5 på den udvendige side af rammetopelementet (21) og overlapper en kant af ruden (3), således at ruden er klemt fast imellem glaslisten og rammetopelementet.

7. Tagvindue ifølge krav 6, hvor den første del (61) af afledningselementet (6;106) er tilvejebragt i en rille i glaslisten (8), hvilken rille er åben  
10 imod det udvendige, og hvor mindst et låseelement (9;109) er fastgjort i glaslisten på en stramtsiddende måde, hvorved afledningselementet (6;106) fastholdes i rillen, idet afledningselementet (6;106) eventuelt er klemt fast imellem glaslisten (8) og låseelementet (9;109).

8. Tagvindue ifølge krav 7, hvor låseelementet (9;109) er et afrundet  
15 ikke-cirkulært pladeelement, der har en første bredde ( $d_1$ ), der er mindre end bredden ( $w$ ) af åbningen hos rillen i glaslisten (8), og en anden bredde ( $d_2$ ), der i hovedsagen svarer til eller er en smule større end åbningen hos rillen, og hvor, i den fastgjorte tilstand, låseelementet er anbragt med dets anden bredde i hovedsagen vinkelret på længderetningen for rillen i glaslisten.

9. Tagvindue ifølge krav 7 eller 8, hvor et eller flere fremspring  
20 og/eller riller (68',69) hos afledningselementet (6;106) hjælper til at holde låseelementet/-erne (9;109) på plads.

10. Tagvindue ifølge et hvilket som helst af de foregående krav omfattende et sæt af pivothængsler, der er anbragt i hovedsagen midtvejs imellem  
25 toppen og bunden af rammen, således at vinduet er center-hængt.

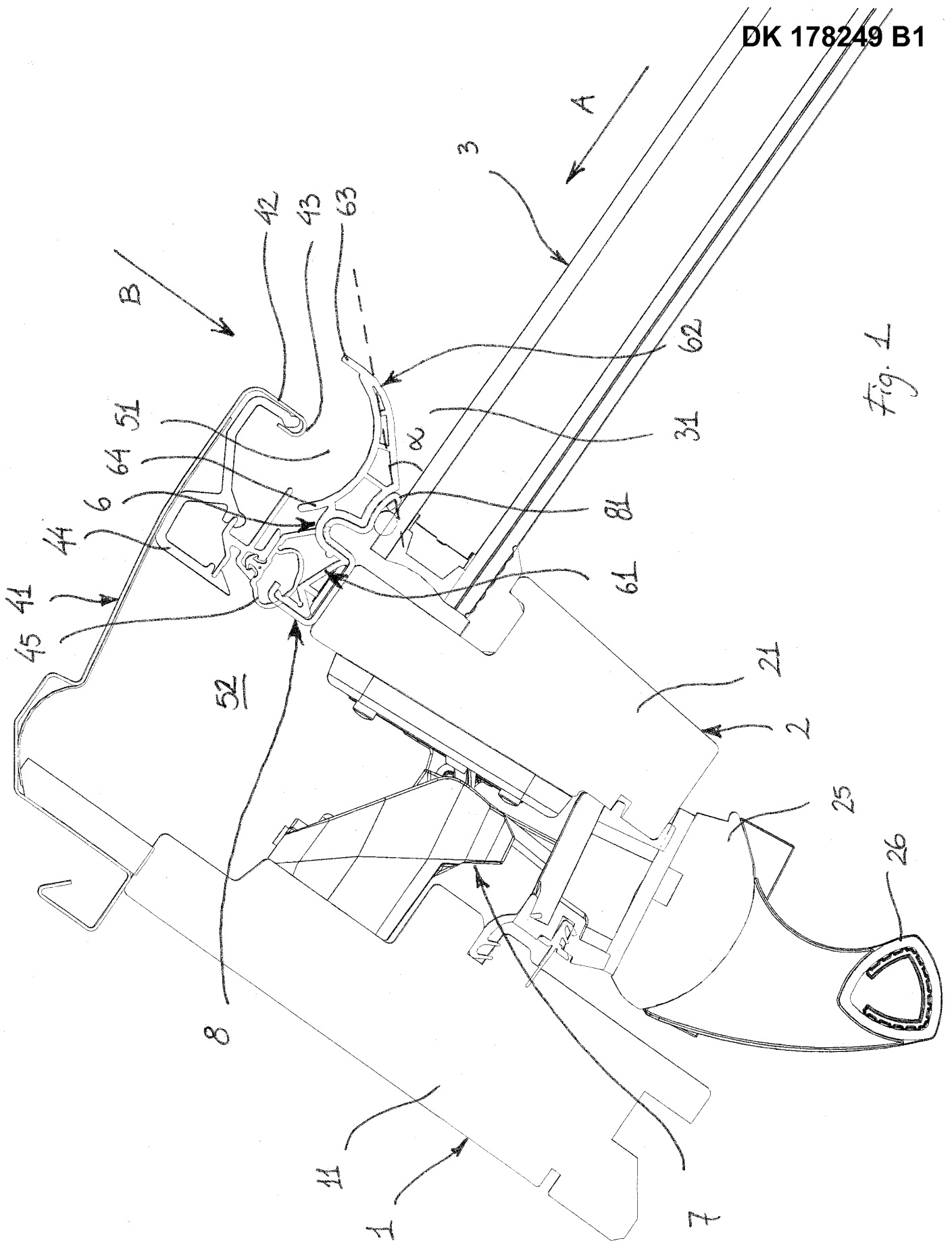


Fig. 1

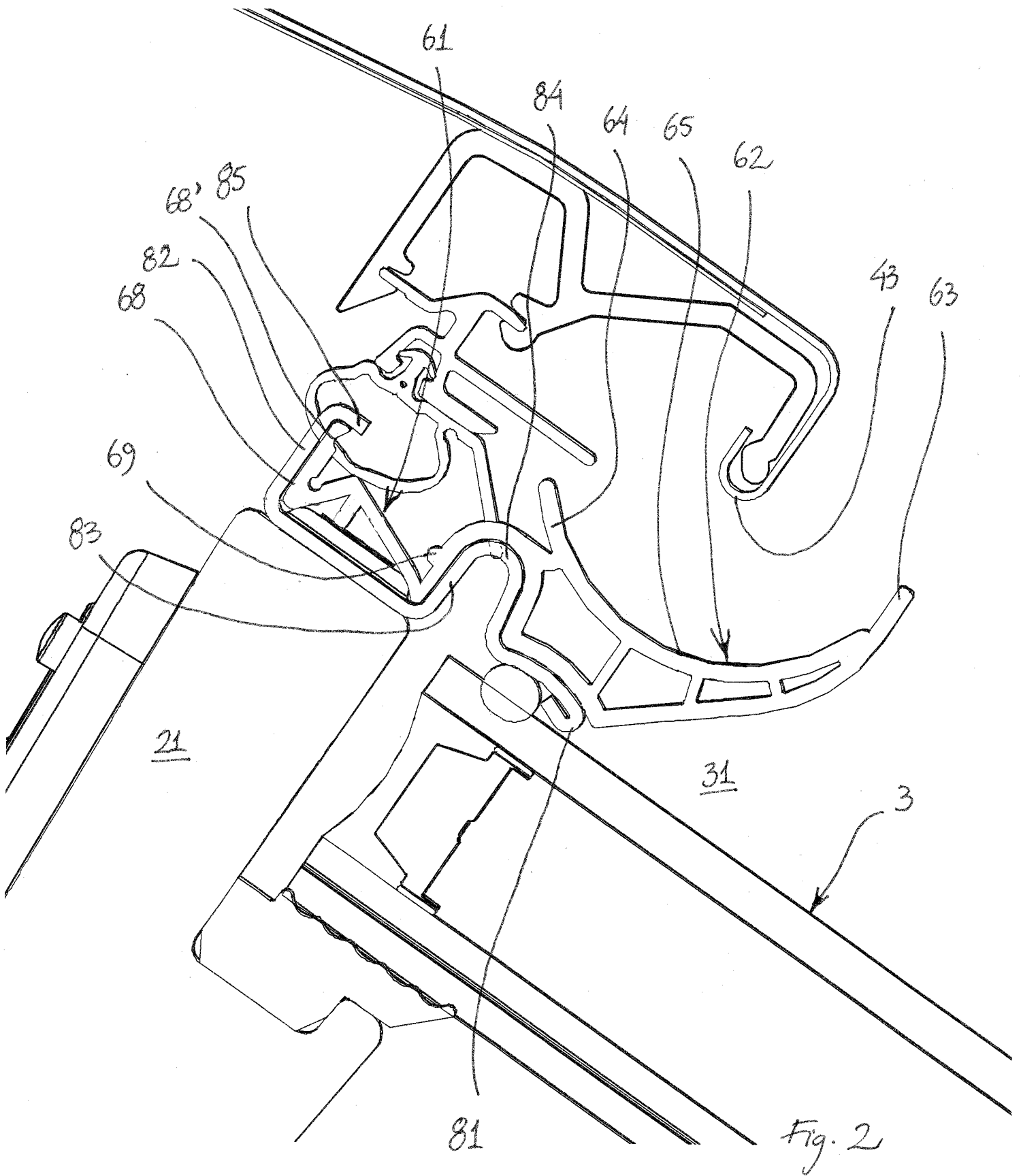


Fig. 2

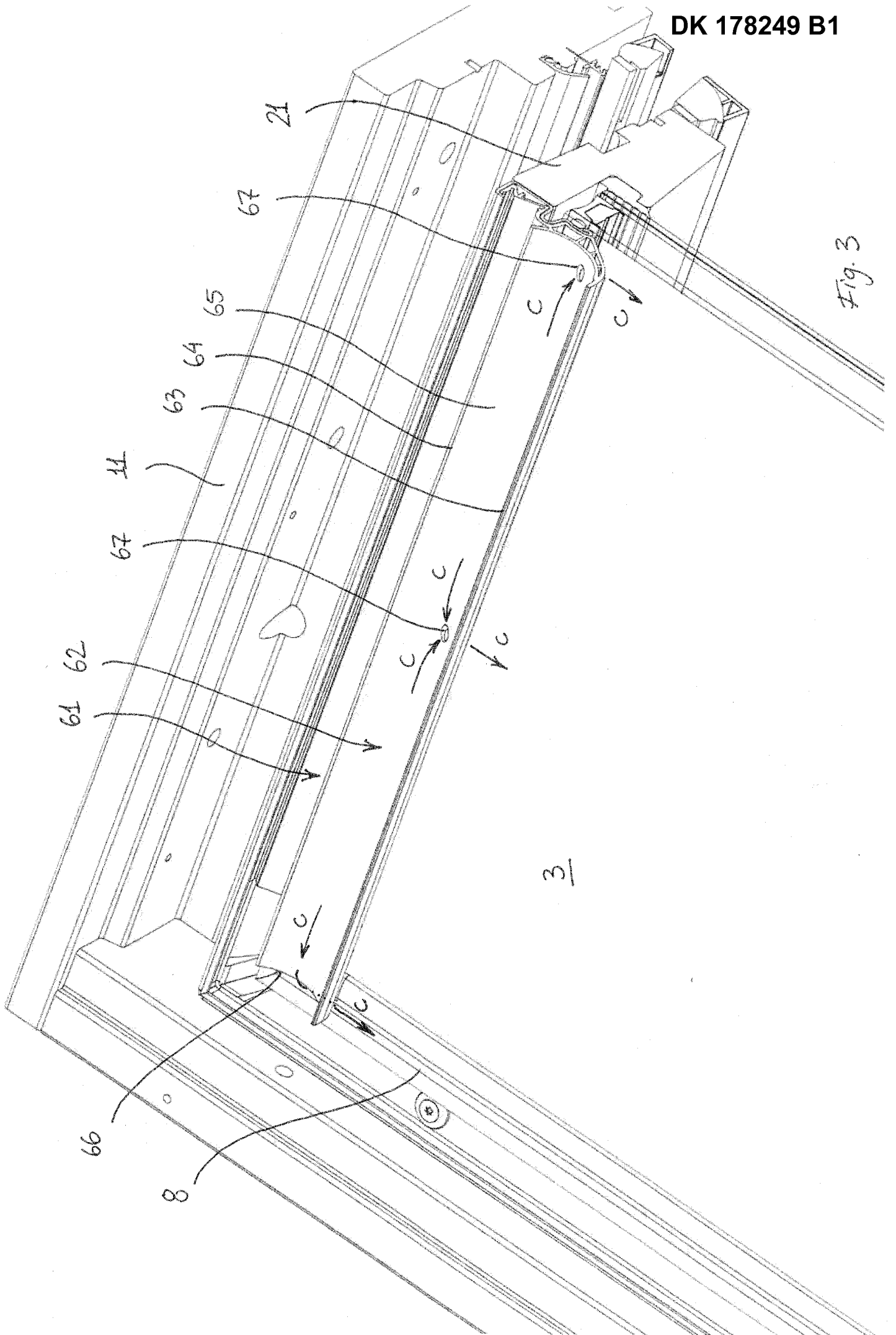


Fig. 3

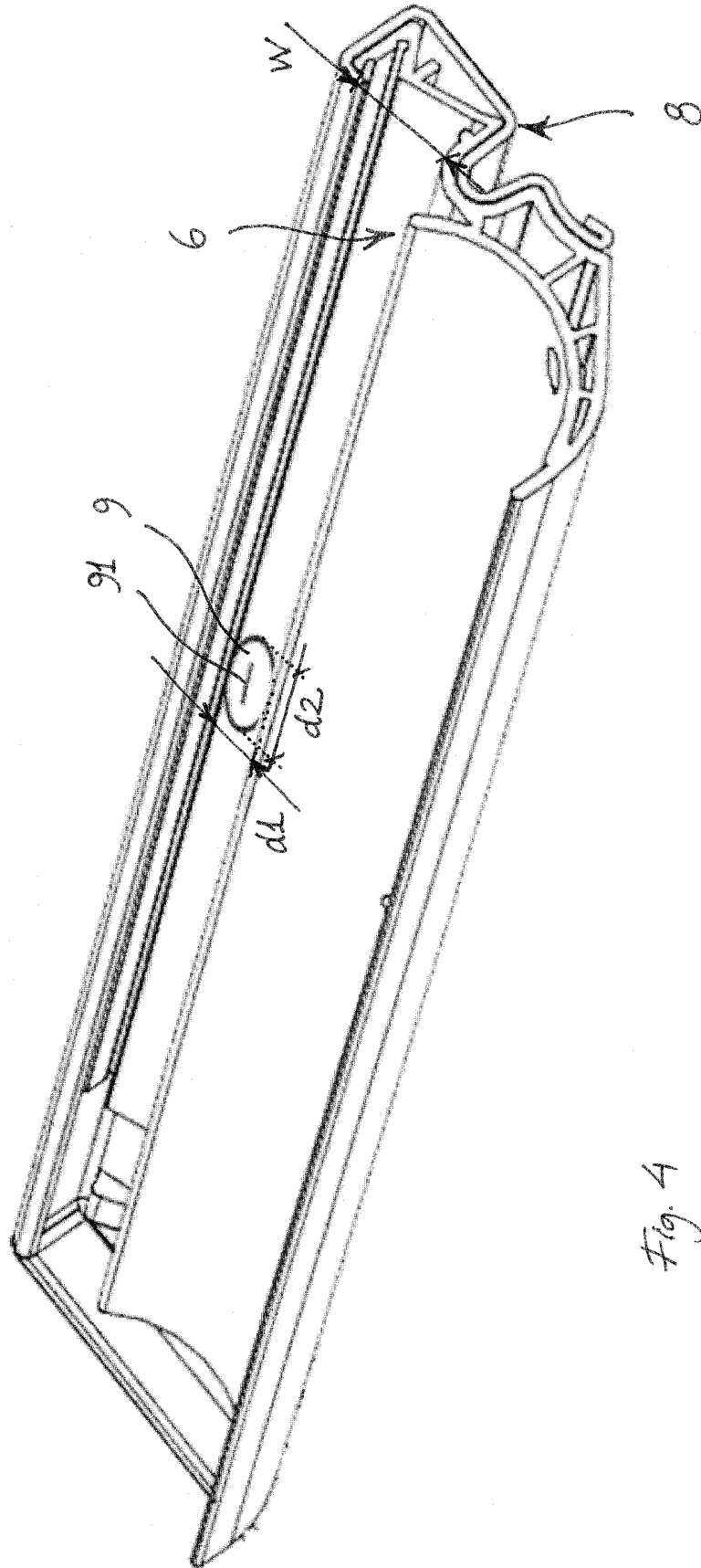


Fig. 4

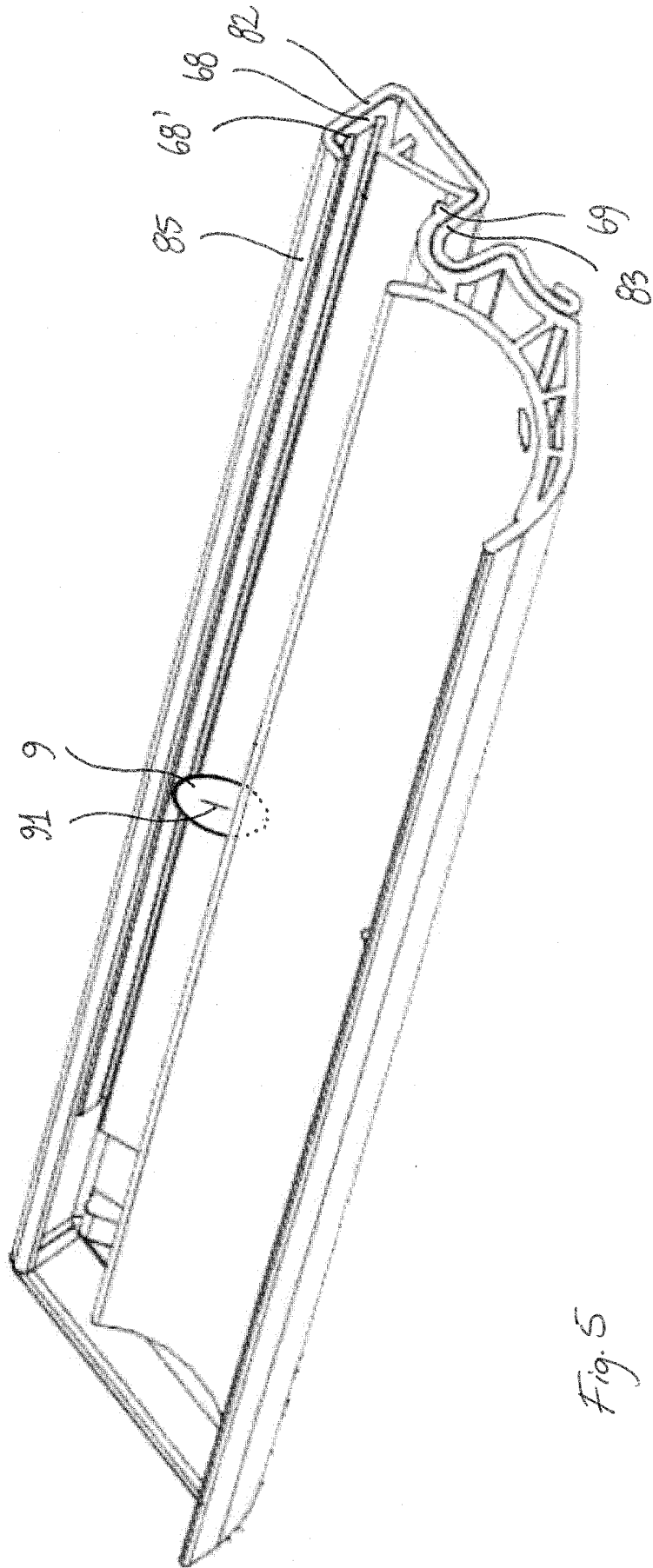
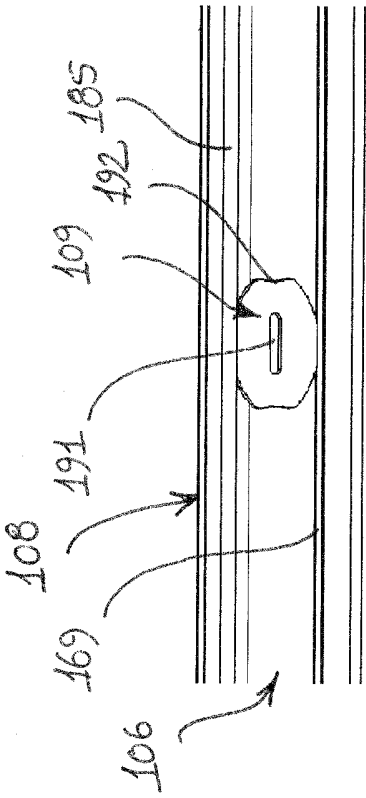
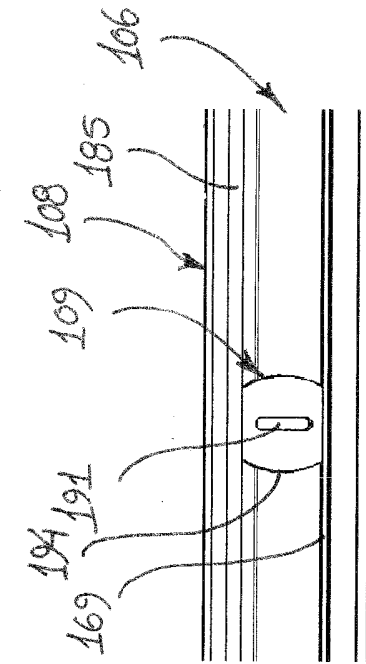


Fig. 5



165

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Fig. 7

Fig. 8

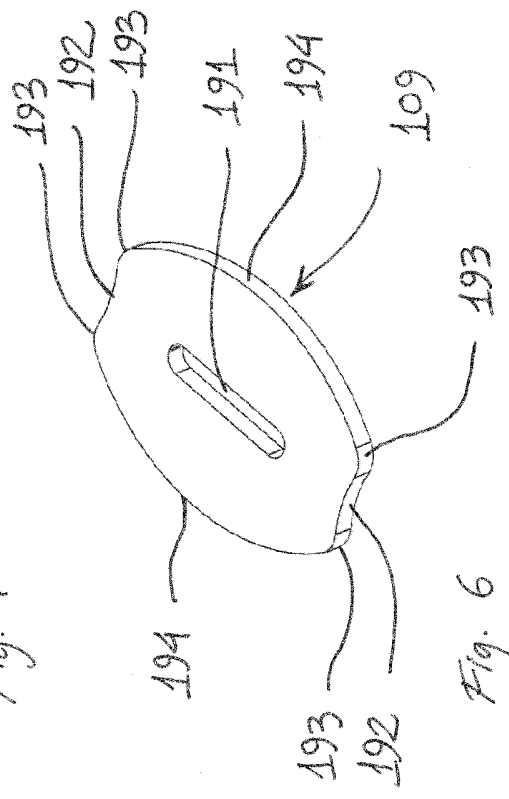


Fig. 6