



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.01.2020 Bulletin 2020/03

(51) Int Cl.:
E04D 13/147 (2006.01)

(21) Application number: **19184954.6**

(22) Date of filing: **08.07.2019**

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

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(30) Priority: **09.07.2018 DK PA201870477**

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(54) **AN UNDER FLASHING CORNER ELEMENT; KITS OF ELEMENTS; AND A METHOD OF FLASHING A LOWER PART OF A ROOF ELEMENT**

(57) An under flashing corner element (19) for supporting roofing felt at a lower corner of e.g. a roof window in a sloping roof covered by roofing felt, comprises a plane, generally L-shaped, first portion (21) extending in a first plane and comprising a side leg (23); a bottom leg (25) with an inner side edge (27); and a plane, sloping portion (31) extending from the inner side edge (27) and sloping downwards from the first plane at an acute angle

to a second side edge (33). The sloping portion (31) further comprises a proximal side edge (35) extending from the first side edge (27) to the second side edge (33) and a distal side edge (37) extending from the first side edge (27) to the second side edge (33). One or more stabilising portions (39, 43) are extending from the sloping portion (31) towards the first plane.

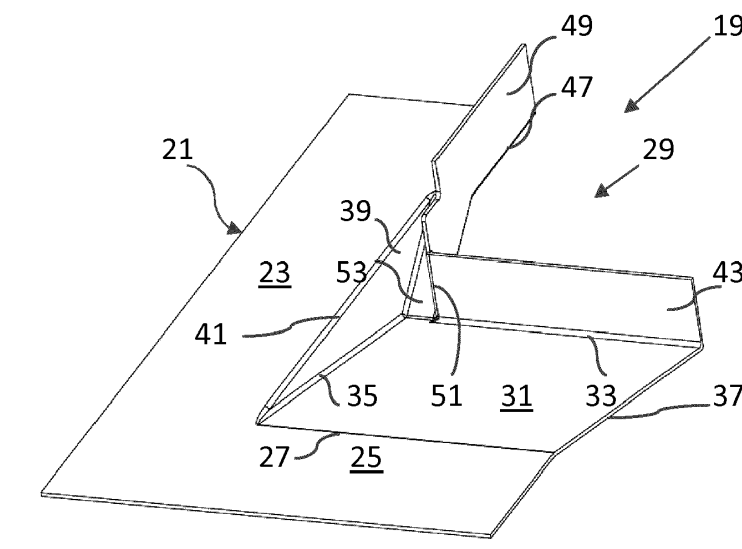


Fig. 1

Description

[0001] The present invention relates in general to installation of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt.

[0002] Especially, the present invention relates to an under flashing corner element for supporting roofing felt at a lower corner of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, said roof element comprising a side face extending generally in a sloping direction of the roof and a lower face extending generally perpendicular to the sloping direction.

[0003] Further, the invention relates to a kit of under flashing corner elements, a front edge flashing kit for flashing a lower part of a roof element, and a method of flashing a lower part of a roof element.

[0004] Different arrangements are known for flashing roof elements, such as roof windows, in sloping roofs with different coverings such as tiles, slate, roofing felt, etc.

[0005] Roof elements, such as roof windows, in sloping roofs are installed in different manners, whereby the roof element is protruding more or less from the surface or plane of the roof. Especially in the so-called "Encastree" manner the roof element does not protrude as far above the plane of the roof as is normally the case.

[0006] Different flashing arrangements are developed for different manners of installation and for different coverings since different manners of installation and different coverings pose different difficulties for the installation procedure and flashing.

[0007] WO 99/27211 A1 discloses a kit of elements and a method of using the kit for flashing a roof-penetrating element in a roof covered by roofing felt, with the roof-penetrating element installed in a normal manner. This kit of elements and its way of use is however not applicable to a roof element installed in the "Encastree" manner i.e. in a lowered position relative to the normal position.

[0008] When flashing a roof element, such as a roof window, in a sloping roof, usually a kit of flashing members is used, said kit comprising an upper flashing member, two side flashing members, and a bottom flashing member, said flashing members, respectively, having a generally L-shaped cross-section with a first leg configured to be arranged against a side of the roof element and a second leg configured to extend parallel to a plane of the roof covering, whereby the second legs of the upper flashing member and the side flashing members are configured to be at least in part positioned beneath the roof covering and the bottom flashing member comprises a second leg, possibly including a flexible skirt, configured to be at least in part positioned above the roof covering to seal between the roof element and the roof covering. Such kit of flashing members is also useable with the present invention.

[0009] When installing a roof element in the "Encas-

tree" manner, the sides of the roof element, including the side faces and the lower face of the roof element, and especially the lower face, is positioned mainly below the plane of the roof covering and accordingly the bottom flashing member, also known as "front edge flashing element", must provide for "lifting" water drained by the flashing up to the plane of the roof covering. Since the roof is sloping with a minimum slope of e.g. 20° the drained water will still be flowing downwards while flowing over a "lifting" portion of the bottom flashing member.

[0010] However, a gap is needed between the lower face of the roof element and the adjacent edge of an opening in the roof surface in which the roof element is installed to provide space for the "lifting" portion of the bottom flashing member. Still, the roof covering, i.e. the roofing felt, should be extended to the lower surface of the roof element and support for, or lack of support for the roofing felt between the lower surface of the roof element and the adjacent edge of the opening in the roof surface is a problem.

[0011] It is an object of the present invention to facilitate flashing of a roof element installed in a lowered position in a sloping roof with a roof covering comprising roofing felt.

[0012] This is obtained by an under flashing corner element comprising a plane, generally L-shaped, first portion, extending in a first plane, said first portion comprising, due to the L-shape, a side leg and a bottom leg, said bottom leg comprising an inner side edge at a concave side of the L-shape;

a plane, sloping portion extending from the inner side edge and sloping downwards from the first plane at an acute angle, preferably between 5° and 45°, more preferably between 10° and 25°, in a direction of the concave side of the L-shape to a second side edge, the sloping portion comprising a proximal side edge extending from the first side edge to the second side edge and a distal side edge extending from the first side edge to the second side edge;

one or more stabilising portions extending from the sloping portion towards the first plane; and

by the side leg comprising a protruding portion extending on the concave side of the L-shape to a protruding edge and being adapted for abutting against the side face of the roof element. Hereby it is possible during a flashing process to install an under flashing corner element by resting the L-shaped first portion against the surface of a roofing material substrate, such as boards, letting the sloping portion extend into a gap between a roof element and an adjacent edge of an opening in which the roof element is being installed whereby the sloping portion may support roofing felt. The protruding portion provides for positioning the under flashing corner element during installation by abutting the protruding edge against the side face of the roof element.

[0013] In a practical embodiment the first side edge and the second side edge are parallel.

[0014] In a practical embodiment the stabilising portions comprise a side leg connecting portion connecting the sloping portion and the side leg. This provides for rigidity of the sloping portion.

[0015] In a practical embodiment the side leg connecting portion extends in a second plane perpendicular to the first plane.

[0016] In a practical embodiment the second plane extends parallel to the proximal side edge, and preferably the second plane comprises the proximal side edge.

[0017] In a further practical embodiment, the side leg connecting portion extends to a side edge portion of the side leg. This provides for a shape easy to mould thus facilitating production of the under flashing corner element.

[0018] In a practical embodiment the stabilising portions comprise a cross portion extending from the second side edge in a direction towards the first plane. This provides for rigidity of the sloping portion in an installed position.

[0019] In an embodiment the protruding edge extends parallel to the second plane.

[0020] In a further embodiment a plane side portion is extending from the protruding edge in a plane parallel to the second plane.

[0021] In an embodiment comprising a cross portion and a side portion, the cross portion and the side portion are connected along a corner line extending at an angle to the first plane. Hereby more rigidity of the under flashing corner element is provided for.

[0022] In a further embodiment a second sloping portion is extending between the side leg connecting portion and the side portion. Hereby the under flashing corner element may be watertight.

[0023] The under flashing corner element may be constituted as a thin shell element whereby all the mentioned portions of the under flashing corner element may be thin planar portions, and the under flashing corner element may be made of a plastics material.

[0024] Further the object is fulfilled by a kit of under flashing corner elements comprising a first under flashing corner element according to the invention and configured to fit at a left side lower corner of a roof element; and a second under flashing corner element according to the invention and configured to fit at a right side lower corner of the roof element.

[0025] In an embodiment the kit further comprises a profiled, bridging element configured to overlap at least partially the first sloping portions of the under flashing corner elements and bridge a gap between the two under flashing corner elements in an installed position. Hereby further support for the roofing felt is provided for.

[0026] In an embodiment the bridging element comprises at least one of a portion configured to overlap at least partially the bottom legs of the under flashing corner elements and bridge a gap between the two under flashing corner elements in an installed position, and a portion extending the length of the bridging element and config-

ured to abut on the lower face of the roof element. This provides for rigidity of the support for the roofing felt even when the bridging element is a thin shell element.

[0027] Further the object is fulfilled by a front edge flashing kit for flashing a lower part of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, comprising a front edge flashing member or bottom flashing member; side flashing members; and a kit according to the invention.

[0028] In an embodiment the front edge flashing kit further comprising at least one spacer. Hereby the provision of a suitable gap between the lower face of the roof element and the adjacent edge of the opening in the roof in which the roof element is being installed, is facilitated.

[0029] Finally, the object is fulfilled by a method of flashing a lower part of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, using a front edge flashing kit according to the invention, comprising the steps of:

providing an opening in a sloping roof surface configured for applying roofing felt;
positioning the roof element in the opening thereby providing a prescribed space between a lower face of the roof element and a preferably horizontal, lower edge of the opening;
installing under flashing corner elements at the left and right lower corners of the roof element;
installing a bridging element at least partly overlapping the under flashing corner elements and bridging the gap between the under flashing corner elements;
applying roofing felt below the roof element; and
installing the front edge flashing element.

[0030] In the following the invention will be explained in further detail by way of a non-limiting example of an embodiment having reference to the accompanying, schematic drawings, in which

Fig. 1 shows a perspective view of an under flashing corner element;
Fig. 2 shows a side view of the under flashing corner element;
Fig. 3 shows a top view of the under flashing corner element;
Fig. 4 illustrates a step of installation of a roof window;
Fig. 5 illustrates an alternative to the step in Fig. 4;
Fig. 6 shows a blank for a spacer;
Fig. 7 shows the blank of Fig. 6 folded into a spacer;
Fig. 8 illustrates later steps of the installation of the roof window;
Fig. 9 shows a bridging element; and
Fig. 10 illustrates still later steps of the installation of the roof window.

[0031] The drawings illustrate different steps of installation of a roof element, for the example a roof window,

in a sloping roof with a covering of roofing felt, and an under flashing corner element according to the present invention, which is used for the installation. The roof window is installed in the "Encastree" manner i.e. in lowered position.

[0032] The roof window comprises a frame 1 which is seen in Fig. 10 and in part in Figs. 4, 5 and 8. The frame 1 comprises two opposite side faces 3 extending generally in a sloping direction 5 of the roof and a lower face 7 extending generally perpendicular to the sloping direction 5.

[0033] The sloping roof comprises roof boards 9 as a substrate for the covering, i.e. the roofing felt. The roof boards 9 may e.g. be plywood sheets or wood boards as it is known in the art. Roofing felt often comes as rolls of sheet and for a complete roof covering the roofing felt often comprises two layers, namely a lower layer of under felt and a top layer of top felt. More layers of felt may be provided and under felt may be dispensed with. The present invention is not limited to a certain number of layers of felt.

[0034] For the installation of the roof window, an opening with dimensions prescribed for the specific window and the manner of installation is provided in the roof surface, i.e. in the roof boards 9 and possibly in a layer of under felt present on the roof boards, and the window frame 1, possibly together with an insulation frame 10, is installed in the opening. During installation of the window frame 1 care should be taken that a prescribed space or distance is present between the lower face 7 of the window frame 1 and an adjacent lower edge 11 of the opening. The purpose for this space will be explained below.

[0035] Fig. 4 shows the lower left corner of the window frame 1 positioned in the opening and shows a spacer 13 provided by the artisan installing the window to ensure the distance between the lower face of the frame (and the insulation frame 10) and the adjacent edge 11.

[0036] Fig. 5 illustrates an alternative in which a spacer 13a is provided as a part of a kit of parts for flashing the lower part of the window. Thus the spacer 13a is provided from a blank 15 of cardboard, see Fig. 6, that has been folded as seen in Fig. 7.

[0037] Once the window frame 1 has been fixed to the roof boards 9 by means of brackets 17, as it is well known in the art, the spacers 13, 13a are removed.

[0038] Figs. 1 to 3 show an under flashing corner element 19 for installation under a flashing element and under roofing felt at lower corners of a roof element, in the present example the roof window and especially the frame 1 thereof. In the following the under flashing corner element will shortly be designated "corner element".

[0039] The corner element 19 comprises a plane, generally L-shaped, first portion 21, which extends in a first plane, and the first portion 21 comprises, due to the L-shape, a side leg 23 and a bottom leg 25. The bottom leg 25 has an inner side edge 27 at a concave side 29 of the L-shape. The corner element further has a plane,

sloping portion 31 which extends from the inner, or first, side edge 27 and slopes downwards from the first plane at an acute angle in a direction of the concave side 29 of the L-shape to a second side edge 33. The sloping portion 31 has a proximal side edge 35 extending from the first side edge 27 to the second side edge 33 and a distal side edge 37 extending likewise from the first side edge 27 to the second side edge 33. The corner element 19 has one or more stabilising portions extending from the sloping portion 31 towards the first plane.

[0040] In the embodiment shown the first side edge 27 and the second side edge 33 are parallel.

[0041] In the embodiment shown the stabilising portions comprise a side leg connecting portion 39 connecting the sloping portion 31 and the side leg 23. This side leg connecting portion 39 extends in a second plane perpendicular to the first plane. Further, in the embodiment shown the second plane extends parallel to the proximal side edge 35 which is in fact positioned in the second plane. As further seen in Fig. 1, in the present embodiment, the side leg connecting portion 39 extends to a side edge portion 41 of the side leg 23.

[0042] In the present embodiment the stabilising portions also comprise a cross portion 43 extending from the second side edge 33 in a direction towards the first plane.

[0043] In the present embodiment the side leg 23 comprises a protruding portion 45 extending on the concave side 29 of the L-shape to a protruding edge 47, which in the present embodiment extends parallel to the second plane, and a plane side portion 49 is extending from the protruding edge 47 in a plane parallel to the second plane.

[0044] In the present embodiment the cross portion 43 and the side portion 49 are connected along a corner line 51 extending at an angle to the first plane, which is determined by the actual angles of the cross portion 43 and the side portion 49 relative to the first plane.

[0045] In the present embodiment a second sloping portion 53 is extending between the side leg connecting portion 39 and the side portion 49 and further between the protruding portion 45 and the first sloping portion 31, whereby the corner element 19 is watertight within its periphery.

[0046] Fig. 8 shows the corner element 19 and a similar, but mirror inverted corner element 19a installed at respectively the left and the right lower corner of the frame 1. For each of the corner elements 19 and 19a, the first portion 21 is abutting against the roof surface, the side portion 49 and the protruding edge 47 are abutting against the side face 3 of the window frame, and the cross portion 43 is abutting against the lower face 7. The corner elements 19 and 19a are e.g. fastened by nails, not shown. The first and the second sloping portions 31 and 53, the side leg connecting portion 39, the cross portion 43 and part of the side portion 49 are extending into the opening in the roof surface.

[0047] It is noted that as shown in Fig. 8 under felt 55 has been provided on top of the roof boards 9 below the

window frame 1.

[0048] As seen in Fig. 8, a bridging element 57 has been mounted to fill the gap between on one hand the frame 1 or the insulation frame 10 and the adjacent lower edge 11 of the opening in the roof surface and on the other hand between the sloping portions 31 of the two corner elements 19 and 19a. The bridging element 57 is positioned below and overlapping the sloping portions 31 to which the bridging element 57, in the present example, is fixed by means of screws 59. The bridging element 57 is in this example a wood board provided by the artisan installing the window.

[0049] As an alternative to the board, the bridging element may be constituted by a profiled, bridging element 57a as shown in Fig. 9. The profiled, bridging element 57a has a profile to match the combined profile of the bottom leg 25, the sloping portion 31 and the cross portion 43 of the corner element 19 (see Fig. 2) and a length to overlap in part the corner elements 19 and 19a and be positioned between the respective side leg connecting portions 39 of the two corner elements 19 and 19a.

[0050] The shown bridging element 57a comprise a portion 157 configured to overlap at least partially the bottom legs 25 of the corner elements 19, 19a and bridge the gap between the two corner elements 19, 19a in the installed position, and a portion 257 extending the length of the bridging element 57a and configured to abut on the lower face 7.

[0051] Being profiled and thus configured to abut against the roof surface the profiled, bridging element 57a, together with the corner elements 19 and 19a, provides support for roofing felt adjacent the lower face 7 of the window frame 1.

[0052] The profiled, bridging element 57a is in the example provided as part of a kit of parts for flashing the lower part of the window.

[0053] When the corner elements 19 and 19a and the bridging element 57 or 57a are mounted possibly a layer of under felt may be mounted and a layer of top felt is applied, e.g. by welding as it is well known in the art, below the window frame 1. The top felt is in the example and at the stage of installation shown in Fig. 10, provided as a sheet 61 extending the length of the roof in the sloping direction 5 and three shorter pieces of sheet 61a extending below the window frame 1. On top of the top felt sheets 61a thus installed a bottom flashing member 63 is mounted in a usual manner.

[0054] In addition to the mounting of roofing felt described, strips of under felt is preferably applied along the side faces 3 and above the window frame 1, covering gaps between the frame 1 and the roof surface.

[0055] Subsequently to installation of the bottom flashing member 63, side flashing members and upper flashing member are installed in a usual manner and the top layer of roofing felt is finished, likewise in a usual manner.

[0056] The bottom flashing member 63 is similar to bottom flashing members used for installing e.g. roof windows in the "Encastré" manner in sloping roofs with dif-

ferent roof coverings apart from the fact that the bottom flashing member 63 used in the present example does not comprise a flexible skirt, which is not needed since the bottom flashing member need not adapt to a corrugated surface of the roof covering like it is e.g. the case when the roof covering comprises tiles.

[0057] Thus the bottom flashing member 63 comprises a dipping portion 65 that dips into the roof surface in order to adequately flash the lower face 7 of the frame 1. The dipping portion acts as a "lifting" portion that lifts water drained from the pane (not shown) of the window to the roof surface, as it is known per se. Due to the slope of the roof the surface of the dipping portion will still have an overall downward tilt to drain water down the roof, as indicated by the tilt shown in Fig. 2 for the corner element 19 whose sloping portion 31 has an angle similar to the dipping portion 65.

[0058] The shape of the corner element 19 including the sloping portion 31 provides space for the dipping portion 65 of the bottom flashing member 63 and the prescribed space between the lower face of the roof element/window and the adjacent lower edge of the opening in the roof surface provides space for the part of the corner element 19 comprising the sloping portion 31 and thus for the dipping portion 65 of the bottom flashing member 63.

[0059] The corner element 19 in its above mentioned watertight embodiment provides for covering parts of the transition between the frame 1 of the roof element/window and the surrounding roof boards 9, that are difficult to adequately cover by means of pieces of roofing felt, and the corner elements together with the bridging element provide a stable support for roofing felt adjacent the lower face 7 of the frame 1.

[0060] Though the invention has been described with reference to a roof window it should be noted that the invention is not limited to roof windows, but is likewise applicable to other roof elements and the scope of protection as defined in the claims is not limited by the above example.

Claims

1. An under flashing corner element (19, 19a) for supporting roofing felt (61) at a lower corner of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, said roof element comprising a side face (3) extending generally in a sloping direction (5) of the roof and a lower face (7) extending generally perpendicular to the sloping direction (5), **characterized by** a plane, generally L-shaped, first portion (21), extending in a first plane, said first portion comprising, due to the L-shape, a side leg (23) and a bottom leg (25), said bottom leg comprising an inner side edge (27) at a concave side (29) of the L-shape; a plane, sloping portion (31) extending from the inner

- side edge (27) and sloping downwards from the first plane at an acute angle, preferably between 5° and 45°, more preferably between 10° and 25°, in a direction of the concave side (29) of the L-shape to a second side edge (33), the sloping portion comprising a proximal side edge (35) extending from the first side edge (27) to the second side edge (33) and a distal side edge (37) extending from the first side edge (27) to the second side edge (33); one or more stabilising portions (39, 43) extending from the sloping portion (31) towards the first plane; and by the side leg (23) comprising a protruding portion (45) extending on the concave side (29) of the L-shape to a protruding edge (47) and being adapted for abutting against the side face of the roof element.
2. An under flashing corner element according to claim 1, **characterized in that** the stabilising portions comprise a side leg connecting portion (39) connecting the sloping portion (31) and the side leg (23).
 3. An under flashing corner element according to claim 2, **characterized in that** the side leg connecting portion (39) extends in a second plane perpendicular to the first plane.
 4. An under flashing corner element according to claim 2 or 3, **characterized in that** the side leg connecting portion (39) extends to a side edge portion (41) of the side leg (23).
 5. An under flashing corner element according to any one of claims 1 to 4, **characterized in that** the stabilising portions comprise a cross portion (43) extending from the second side edge (33) in a direction towards the first plane.
 6. An under flashing corner element according to claim 3, **characterized in that** the protruding edge (47) extends parallel to the second plane, and a plane side portion (49) is extending from the protruding edge (47) in a plane parallel to the second plane.
 7. An under flashing corner element according to claim 5 and 6, **characterized in that** the cross portion (43) and the side portion (49) are connected along a corner line (51) extending at an angle to the first plane.
 8. An under flashing corner element according to claim 6 or 7, **characterized in that** a second sloping portion (53) is extending between the side leg connecting portion (39) and the side portion (49).
 9. A kit of under flashing corner elements comprising a first under flashing corner element (19) according to any one of claims 1 to 8 and configured to fit at a left side lower corner of a roof element; and a second under flashing corner element (19a) according to any one of claims 1 to 9 and configured to fit at a right side lower corner of the roof element.
 10. A kit according to claim 9, further comprising a profiled, bridging element (57a) configured to overlap at least partially the first sloping portions of the under flashing corner elements (19, 19a) and bridge a gap between the two under flashing corner elements (19, 19a) in an installed position.
 11. A kit according to claim 10, wherein the bridging element comprises at least one of a portion (157) configured to overlap at least partially the bottom legs (25) of the under flashing corner elements and bridge a gap between the two under flashing corner elements in an installed position, and a portion (257) extending the length of the bridging element and configured to abut on the lower face (7) of the roof element.
 12. A front edge flashing kit for flashing a lower part of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, comprising a front edge flashing element (63); preferably side flashing elements; and a kit according to any one of claims 9 to 11.
 13. A front edge flashing kit according to claim 12, further comprising at least one spacer (13a).
 14. A method of flashing a lower part of a roof element, such as a roof window, in a sloping roof with a roof covering comprising roofing felt, using a front edge flashing kit according to claim 12 or 13, comprising the steps of:
 - providing an opening in a sloping roof surface configured for applying roofing felt;
 - positioning the roof element in the opening thereby providing a prescribed space between a lower face of the roof element and a preferably horizontal, lower edge of the opening;
 - installing under flashing corner elements at the left and right lower corners of the roof element;
 - installing a bridging element at least partly overlapping the under flashing corner elements and bridging the gap between the under flashing corner elements;
 - applying roofing felt below the roof element; and
 - installing the front edge flashing element.

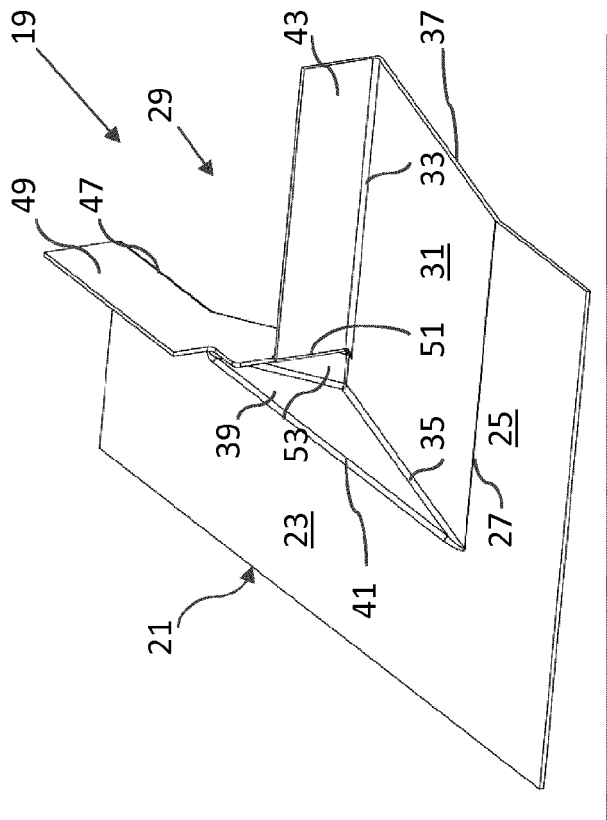


Fig. 1

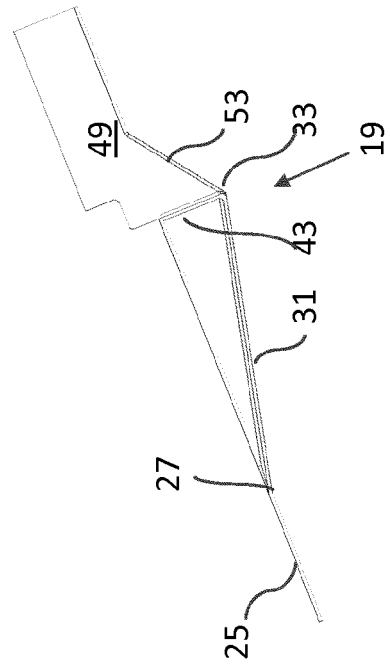


Fig. 2

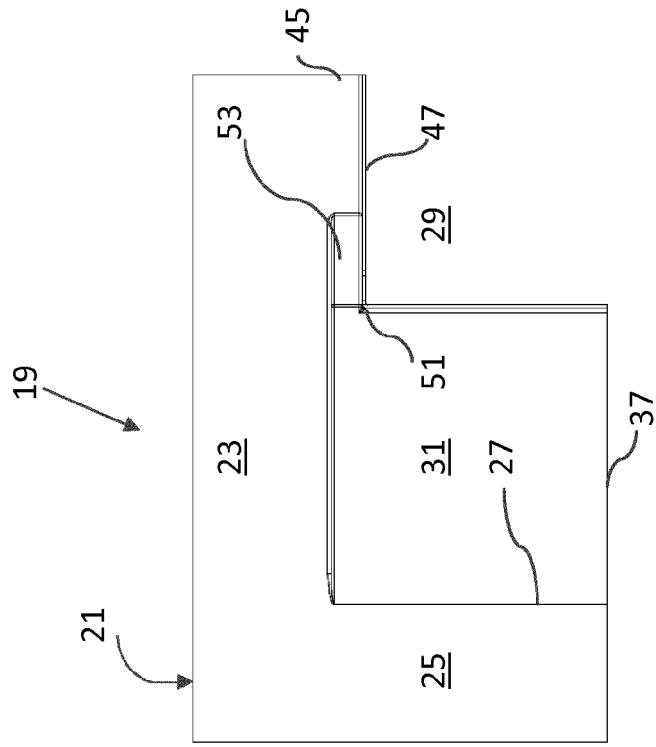


Fig. 3

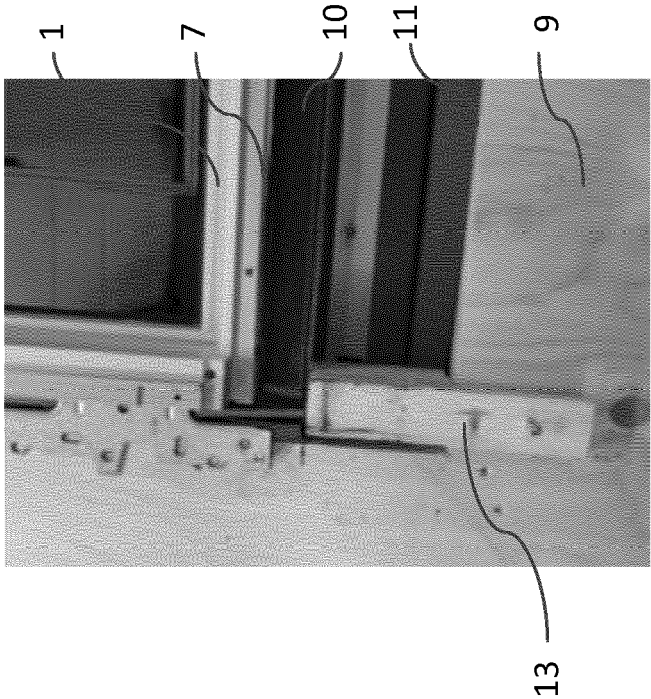


Fig. 4

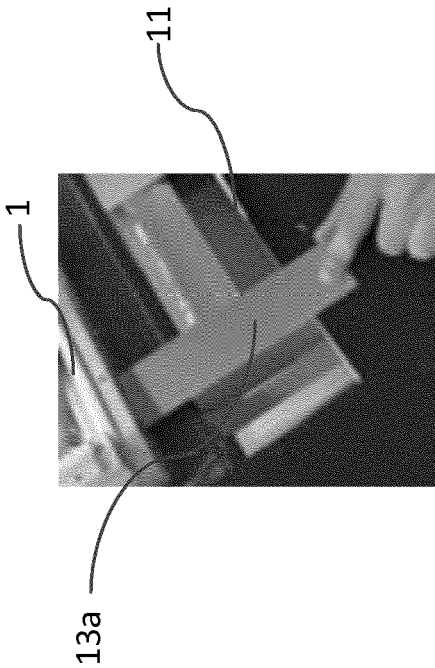


Fig. 5

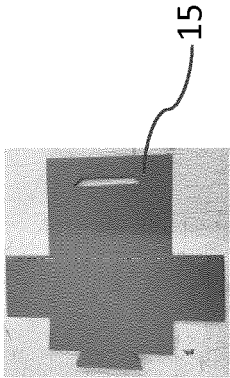


Fig. 6

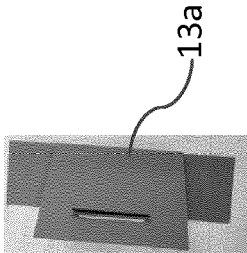


Fig. 7

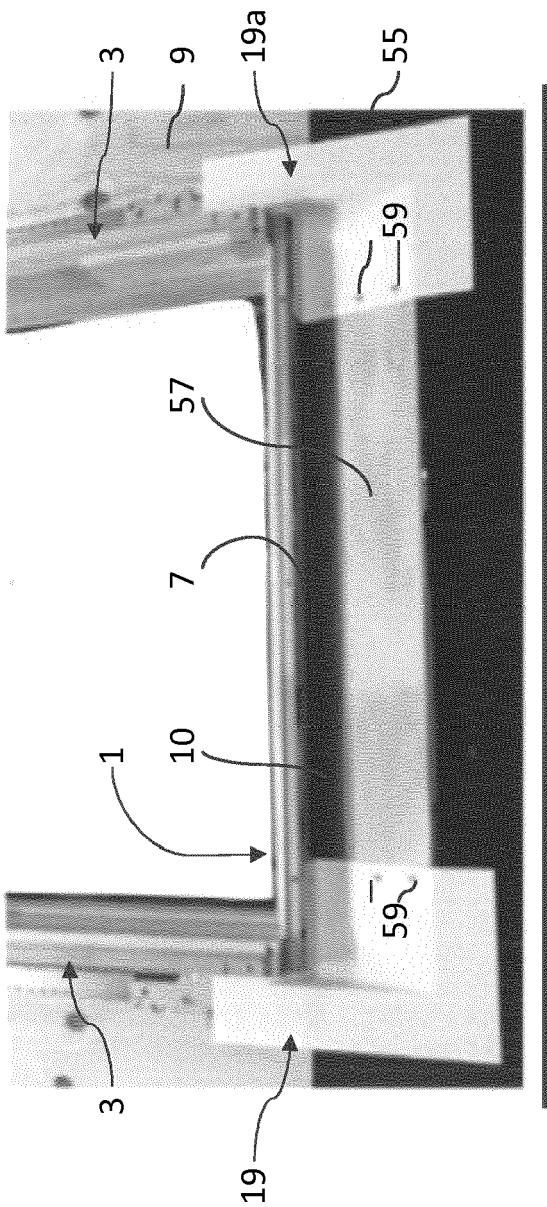


Fig. 8

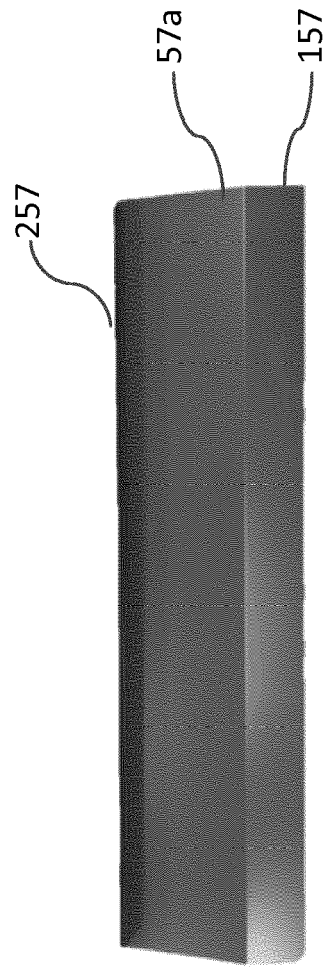


Fig. 9

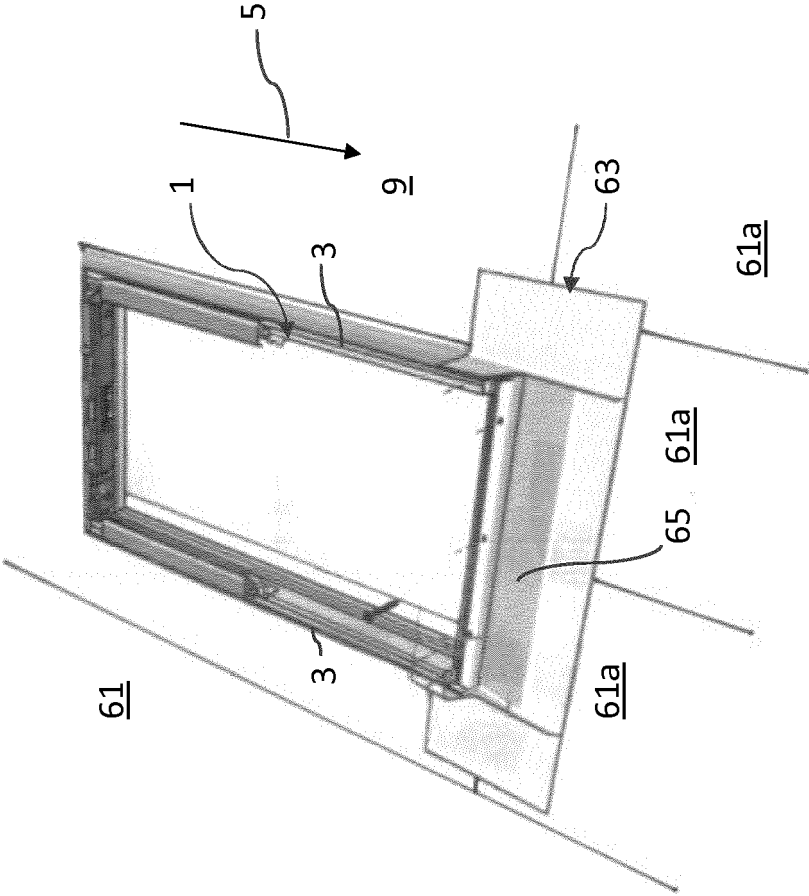


Fig. 10



EUROPEAN SEARCH REPORT

Application Number
EP 19 18 4954

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2004/051026 A1 (VKR HOLDING AS [DK]; LUND JAKOB SWANE [DK]; NIELSEN PER KOFOED [DK]) 17 June 2004 (2004-06-17) * page 2, lines 67-125; figure 3 *	1-7,9-13	INV. E04D13/147
Y		14	
A		8	
Y	GB 1 429 022 A (RASMUSSEN V B K) 24 March 1976 (1976-03-24) * figures *	14	
A	EP 1 550 777 A1 (VKR HOLDING AS [DK]) 6 July 2005 (2005-07-06) * figures *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			E04D F24S
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 November 2019	Examiner Tran, Kim Lien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

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

EP 19 18 4954

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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