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(54) Titel: **Flashing Assembly for a roof Penetrating Structure**

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WO 01/65029 A1
FR 2916464 A1
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(57) Sammendrag:
This disclosure concerns a flashing assembly for use with a roof penetrating structure, preferably a window, in an inclined roof of a building, comprising a sealing member, a skirt member and a flashing member, wherein a bend portion of the flashing member is bent in the exterior direction into a channel for draining water, the channel extending along the third edge of the flashing member, wherein the third edge and the first edge of the flashing member are at least partly converging in the inclination direction. The disclosure further concerns a method for manufacturing a flashing assembly.

Fortsættes...

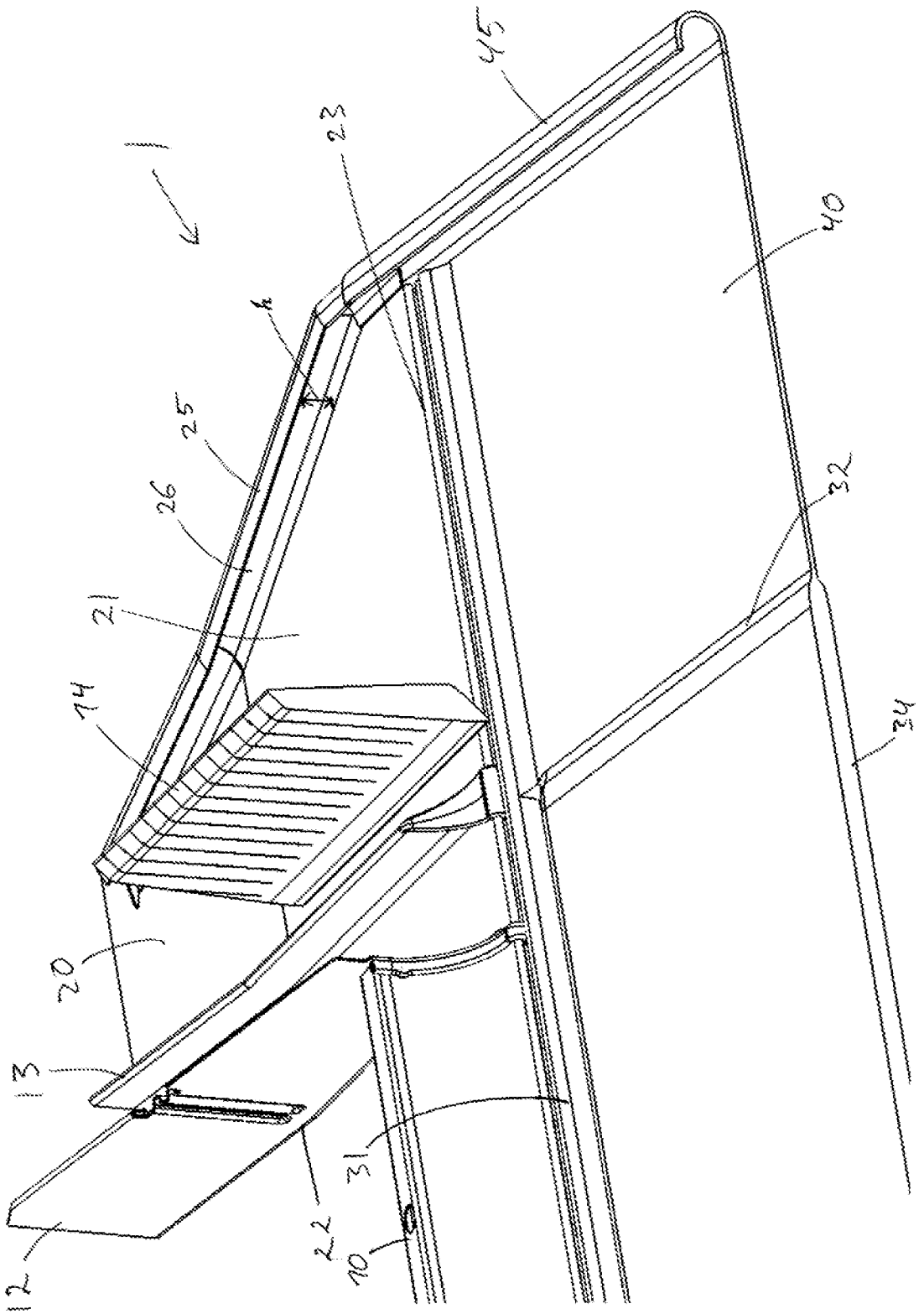


Fig. 1

Technical field

The present invention relates to a flashing assembly for use with a roof penetrating structure, preferably a window, in an inclined roof of a building, the inclined roof having an inclination direction and having roof covering elements, the roof penetrating structure comprising a top member and a bottom member extending across the inclination direction, and a first side member and a second side member connecting the top member with the bottom member extending in the inclination direction, the top, bottom and side members having an interior side for facing in an interior direction towards an interior of the building in a mounted condition and an exterior side for facing in an exterior direction opposite the interior direction in the mounted condition, the flashing assembly comprising:

- a sealing member comprising a first sealing member portion, a second sealing member portion and a third sealing member portion, the first sealing member portion being configured for attachment to the bottom member of the roof penetrating structure, wherein, in an attached state, the first sealing member portion at least partly extends along the bottom member of the roof penetrating structure and the second sealing member portion at least partly extends along the first side member of the roof penetrating structure and the third sealing member portion at least partly extends along the second side member of the roof penetrating structure,

- a skirt member having a first edge attached to the sealing member in a mounted condition, and a fourth edge, opposite the first edge, and a second and a third edge connecting the first edge with the fourth edge, preferably the second and the third edges are substantially perpendicularly to the first edge, wherein the skirt member is configured for at least partly covering the roof covering elements positioned below the bottom member of the roof penetrating structure, the skirt member further comprising a flange member positioned at the second and/or third edge in parallel with the inclination of the roof in the mounted condition,

- a first flashing member having a first edge, a second edge and a third edge, wherein the first edge of the flashing member is adapted for being

attached to the third sealing member portion and the second edge is adapted for being attached to the flange member of the skirt member, wherein the third edge of the flashing member opposes the first edge of the flashing member.

Background

A flashing is typically used to seal the joints between the roof penetrating structure and the surrounding roof structure. To this end, a flashing typically comprises a skirt member arranged at the bottom member of the roof penetrating structure and flashing members arranged at the side members of the roof penetrating structure to provide a weathertight seal at the bottom and side members respectively.

Flashing members, are typically made of a sheet metal and comprise a surface adapted for being positioned below the roof covering elements and a plate member to be attached to a sealing member or the roof penetrating structure. An upright edge on the flashing member assists with impeding passage of wind and/or water. A flashing not only plays an important role in sealing the joints between the roof penetrating structure and the surrounding roof structure, but also in blocking precipitation and wind from entering into the roof structure. Without flashing members, these areas would be very exposed to the surrounding weather conditions and may negatively impact the insulation and durability properties of the roof and roof penetrating structure e.g. due to rain entering into the roof structure. Therefore, flashing members are important for providing a weathertight seal between the roof penetrating structure and the adjacent roof structure. A prior art flashing assembly for a roof window, can be found in WO 01/65029.

Practice, however, has shown that, particularly in inclined roofs with a pitch lower than the around 15 degrees and other circumstances where the roof is particularly exposed to wind and weather, rain may still enter into the roof structure in spite of flashings being installed. Therefore, there is a need for a flashing with improved weatherproofing abilities.

The object of the invention is therefore to provide an improved flashing without the above mentioned drawbacks.

Summary

According to a first aspect of this invention, this object is met by an invention according to the introduction wherein a bend portion of the flashing member is bent in the exterior direction into a channel for draining water, the channel extending along the third edge of the flashing member, wherein the third edge and the first edge of the flashing member are at least partly converging in the inclination direction.

The channel may extend along substantially the entire third edge of the flashing member.

The flashing member comprising a channel may have the advantage of improved water and/or wind tightness as water and/or wind may be prevented from passing over the flashing member which may be the case for a flashing member with a typical upright perpendicular edge instead of a channel. A further advantage may be that water may be channelled to flow in a specific direction or path e.g. towards a particular draining area below the flashing member. This may be a direction away from the roof structure and/or downwards along the inclination of the roof structure.

Further still, the channel may have the advantage that the channel is more resilient and/or durable and/or less susceptible to being deformed e.g. during installation or maintenance. This may have the advantage of making the flashing member more structurally rigid.

Wind can be particularly impactful for inclined roofs and roof structures at inclinations below 15 degrees. Here inclined roofs and components thereof are particularly exposed to wind at angles that allow rain to enter the roof structure e.g. between the roof covering elements.

“Extending across” may be understood as extending in a direction transverse to the inclination direction of the inclined roof. The top and bottom member may extend substantially perpendicular to the inclination direction of the inclined roof.

The first and second side members may extend substantially in parallel with the inclination direction of the roof. The first and second side mem-

bers may extend substantially perpendicularly to the top and bottom members. The first edge of the flashing member is preferably parallel to the first and second side members. The channel may provide an abutment surface for a roof covering element.

The channel has a substantially U-shaped cross-section. Alternatively, the channel may have two substantially parallel side segments connected by a middle segment that is substantially perpendicular to the side segments. The two side segments may be parallel with the inclined roof.

A length of the channel may face towards at least one or more of the third sealing member portion, the skirt member and the flange member. The length of the channel is the longest dimension of the channel and the length may thus be larger than the width and the height.

This may have the advantage of improving weathertightness particularly in the event where the roof covering elements lift such as in heavy winds, as the U-shape of the channel enables the channel to flex slightly and follow the movement of the roof covering elements and so maintain its function.

The bend portion may be bent more than 90 degrees. The bend portion may be bent more than 90 degrees, but less than 180 degrees. The bend portion may comprise two or more bends. The sum of the bend angles of the two or more bends may equal more than 90 degrees, but less than 180 degrees or less. The bend portion may also be bent in a curve.

Throughout this disclosure, the term “bend angle” may be understood as the angle by which the bend portion is bent.

Two or more of the sealing member, skirt member, flashing member and flange member may be in one piece.

This may improve weathertightness as leaks at seams or joints may be avoided.

Throughout this disclosure, the term “weathertightness” may be understood as a seal or tightness against precipitation and wind.

The channel may have a height extending from the third edge in the exterior direction of at least 30 mm.

The height of the channel may be at least 35, 40 mm, or preferably at

least 45 mm. Preferably between 30 mm and 45 mm.

The skirt member is of a corrugated sheet material.

This way the skirt member may be pressed into the troughs of and undulated roof, such that a tight fit is provided between the skirt member and the roof covering elements.

The bend portion may have a flat length extending substantially perpendicularly from the third edge of at least 30 mm.

The flat length of the bend portion may be at least 35 mm such as 40 mm, 45 mm, 50 mm, 55 mm, 60 mm and 65 mm. Preferably between 35 mm and 50 mm.

The flat length may be understood as the height of the bend portion before bending.

The flat length of the bend portion extending at least 30 mm from the third edge from the main portion may have the advantage that the bend portion may be efficiently bent into the shaped channel. The bend portion having a flat length of at least 45 mm has shown to allow bending of the bend portion into a substantially U-shaped channel with especially effective wind and precipitation blocking properties as well as durability.

The flange member is flat.

Throughout this disclosure, the term “flat” may be understood as the flange member of the skirt member being plane and/or non-corrugated. It may be a section of corrugated sheet material that has been stretched to a plane sheet material.

The flat surface as opposed to the corrugated surface makes it possible to bring the roof covering element being positioned above the flange member closer to roof covering element(s) positioned below the flange member. Thus a tighter fit is provided which is particularly visible in low pitched roofs and in connection with small windows.

The flange member may be made of the same material as the skirt member.

The flange member comprises a bend portion, positioned in extension of the bend portion of the flashing member, extending along an edge of

the flange member opposite the second or third edge of the skirt member respectively, wherein the bend portion of the flange member is bent in the exterior direction into a channel for draining water.

This may have the advantage of further improving the weathertightness of the flashing assembly as the area covered by a channel may be increased. Furthermore, water drained in the channel of the flashing member may be guided/drained away more effectively by extending into the channel of the flange member of the skirt member.

The flashing member may be configured to be at least partially positioned below roof covering elements, preferably completely positioned below the roof covering elements.

This may have the advantage of improving the weathertightness of the roof structure below the roofing covering elements, by preventing ingress of precipitation or the like.

The third edge of the flashing member may extend at an angle to the respective side member in a plane substantially perpendicular to the interior and exterior direction, the angle having a magnitude of 10-80 degrees. The angle may vary or it may be the same along the length of third edge.

This may improve the weathertightness of the roof structure as the channel extending along the third edge of the flashing member may be positioned with the optimum angle to prevent ingress of precipitation into the roof structure.

The angle may have a magnitude of 20-70, 30-60, 40-50, 42-48 or substantially 45 degrees to the respective side member.

The flashing member is substantially made of metal, preferably aluminium. But copper, steel, zinc or alloys thereof may also be used.

The flashing assembly may comprise a second flashing member being substantially mirror-inverted to the first flashing member, wherein the first edge is adapted for being attached to the second sealing member portion.

This may have the advantage of improved weathertightness of the roofing structure as both sides of the roof penetrating structure may be protected by a flashing member.

A second aspect of the invention related to a method for manufacturing a flashing assembly according to the first aspect, comprising the step of:

- bending the bend portion of the flashing member in the exterior direction into a channel for draining water, wherein a length of the channel faces towards at least one, preferably both of the sealing member and the skirt member.

In this way, a flashing with improved weathertightness may be manufactured.

The method may comprise the further step of:

- bending a bend portion of the flange member in the exterior direction into a channel for draining water, wherein the bend portion of the flange member is positioned in extension of the bend portion of the flashing member, preferably performing the step of bending the bend portion of the flashing member and the bend portion of skirt member at the same time.

This may have the advantage of providing a more weathertight flashing.

Bending of the flange member and the flashing member may be performed in one process step.

This may have the advantage of providing a more effective manufacture of the flashing. It may have the further advantage of providing a more weathertight flashing as bending the bend portion of the flashing member and the skirt in the same step may provide a more weathertight seal between them.

Brief description of drawings

The flashing assembly will now be described in greater detail based on non-limiting exemplary embodiments and with reference to the drawings, on which:

Fig. 1 shows an embodiment of a flashing assembly according to the present invention in a perspective view,

Fig. 2 shows the flashing assembly shown in Fig. 1 in a second perspective view, and

Fig. 3 shows the flashing assembly shown in Fig. 1 in a perspective

view in a mounted condition.

Similar reference numerals are used for similar elements across the various embodiments and figures described herein.

Detailed description

Fig. 1 shows a flashing assembly 1 comprising a sealing member having a first sealing member portion in the form of a rail element 10, a second sealing member portion 12, and a skirt member 30. The rail element 10 is attached to a skirt member 30 along a first edge 31 thereof. The flashing assembly further comprises a flashing member 20, comprising a number of sub-elements 13, 14, which are known per se.

The flashing member 20 further comprises a main portion 21, which in a mounted state extends in an inclination direction ID, a first edge 22, a second edge 23, a third edge 24, and a bend portion 25, forming, i.e. bent into, a channel 26. The first edge 22 extends along and is connected to the second sealing member portion 12. The second sealing member portion 12 is here formed in one piece with flashing member main portion 21.

The channel 26 is U-shaped and extends along the third edge 24 of the flashing member 20. The bend portion 25 is formed in one-piece with main portion 21. The bend portion 25 extends, when the flashing assembly 1 is in a mounted condition, towards the exterior and is bent towards the main portion 21. In other words, the bend portion 25 faces towards the skirt member 30 and the second sealing member portion 12. The channel 26 has a height h of 30 mm measured from the main portion 21 towards the exterior. In other words, the channel may comprise a first surface which faces towards a second surface of the bend portion 25, extending in parallel to and arranged exteriorly of the first surface. The channel height h, i.e. a gap between these two surfaces, is 30 mm. In other embodiments, the channel height h may be less than 30 mm, such as 28 mm, 26 mm, 24 mm, 22 mm, or less, or more than 30 mm, such as 32 mm, 34 mm, 36 mm, 38 mm, or more. The flat length of the bend portion 25 is 45 mm to accommodate the channel height of 30 mm.

Fig. 2, shows a different perspective view of the embodiment of the

flashing assembly 1 shown in Fig. 1. The skirt member 30 comprises a second edge 32 connected to a first flange member 40 of the flashing assembly 1. The first flange member 40 is further connected to the second edge 23 of the flashing member 20. Fig. 3 shows a perspective view of the flashing assembly as shown in Fig. 1 in a mounted condition. The skirt member 30 further comprises a third edge 33 connected to a second flange member 41, and a fourth edge 34. The first edge 31 is arranged above the fourth edge 34 in an inclination direction ID and interconnected to the fourth edge 34 along the second 32 and third edges 33. The second flange member 41 is connected to a second flashing member (not shown) in a similar manner as the first flange member 40 is connected to the first flashing member 20. The second flange member 41 comprises similar features to the first flange member 40. The skirt member 30 is made from a corrugated sheet material.

The first flange member 40 comprises, as seen in Fig. 3, a bend 45, which is positioned in extension of the first flange member 40. The bend 45 extends along an edge of the first flange member 40 opposite a flange member edge connected to the skirt second edge 32. The bend 45 is formed in one piece with the first flange member 40 and further extends into the bend portion 25 of the first flashing member 20. The bend 45 delimits a flange channel extending into the channel 26 of the flashing member 20, as seen in Fig. 2. Thereby an uninterrupted channel is provided in the inclination direction ID along the plane of the roof. The bend 45 is bent towards, i.e. faces, the skirt member 30. The second flange member 41 similarly comprises a bend 46, which, extends along an edge of the second flange member 41 opposite a second flange member edge connected to the skirt third edge 33. The bend 46 is similarly formed in one piece with the second flange member 41 and further extends into a bend portion and channel of the second flashing member. The bend 46 is bent towards, i.e. faces, the skirt member 30. The flange channels formed by the bends 45, 46 of the flange members 40, 41 each have the same height as the flashing member channel 26.

In Fig. 3, a roof penetrating structure 19 in the form of a window is mounted in the roof 50. The window comprises a first side 16 and a second

side 18, connected by a bottom member 17 and a top member (not shown). The roof 50 is inclined in the inclination direction ID and is covered by undulated roof covering elements 51 in the form of tiles. The flange members 40, 41 are easily formed according to the shape of the tile, and the tile resting above the flange members 40, 41 are brought close to the tile the flange members 40, 41 rests upon. The flange members 40, 41 may be stretched so that it can reach over the undulated roof covering elements 51. The flange members are not corrugated, but is a flat piece of material. A close fitting flashing assembly is thereby provided. The rail element 10 serves as connecting element between the skirt member 30 and, for example, a bottom 17 of a frame of a roof window, where the roof penetrating structure 19 is a roof window. As seen in Fig. 3, the roof covering elements 51 may slightly deform a portion of the flange member bends 45, 46, which, nonetheless, each provide a flange member channel extending into a respective channel 26. The bends 45, 46 in the flange member may be dispensed with.

P A T E N T K R A V

1. Inddækningssæt (1) til brug med en taggennembrydende konstruktion (19), fortrinsvis et vindue, i et skråt tag af en bygning, hvor det skrå tag har en hældningsretning (ID) og har tagbeklædningselementer (51), hvor den taggennembrydende konstruktion (19) omfatter et topstykke og et bundstykke (17), der strækker sig på tværs af hældningsretningen, og et første sidestykke og et andet sidestykke, der forbinder topstykket med bundstykket (17), strækkende sig i hældningsretningen (ID), hvor top-, bund- (17) og sidestykkerne har en indvendig side til at vende i en indvendig retning imod et indre af bygningen i en monteret tilstand og en udvendig side til at vende i en udvendig retning modsat den indvendige retning i den monterede tilstand, hvor inddækningssættet (1) omfatter:

- en tætningskomponent omfattende et første tætningskomponentafsnit (10), et andet tætningskomponentafsnit (12) og et tredje tætningskomponentafsnit, hvor det første tætningskomponentafsnit (10) er udformet til fastgørelse til bundstykket (17) af den taggennembrydende konstruktion (19), hvor det første tætningskomponentafsnit (10) i en fastgjort tilstand i det mindste delvist strækker sig langs bundstykket (17) af den taggennembrydende konstruktion (19), og det andet tætningskomponentafsnit (12) i det mindste delvist strækker sig langs det første sidestykke af den taggennembrydende konstruktion (19), og det tredje tætningskomponentafsnit i det mindste delvist strækker sig langs det andet sidestykke af den taggennembrydende konstruktion (19),

- en skørtkomponent (30) havende en første kant (31), der er fastgjort til tætningskomponenten i en monteret tilstand, og en fjerde kant (34) modsat den første kant (31), og en anden (32) og en tredje kant (33), der forbinder den første kant (31) med den fjerde kant, hvor den anden (32) og den tredje (33) kant fortrinsvis er i hovedsagen vinkelrette på den første kant (31), hvor skørtkomponenten (30) er af et korrugeret plademateriale og er udformet til i det mindste delvist at dække de tagbeklædningselementer (51), der er beliggende under bundstykket (17) af den taggennembrydende konstruktion (19) i hældningsretningen (ID), hvor skørtkomponenten (30) yderligere omfatter en flangekomponent (40) beliggende ved den anden (32) og/eller tredje (33) kant parallelt med tagets hældning i den monterede tilstand,

- en første inddækningskomponent (20) havende en første kant (22), en anden kant (23) og en tredje kant (24), hvor den første kant (22) af inddækningskomponenten (20) er indrettet til at blive fastgjort til det tredje tætningskomponentafsnit, og den anden kant (23) er indrettet til at blive fastgjort til flangekomponenten (40) af skørtkomponenten (30), hvor den tredje kant af inddækningskomponenten (20) er modstående den første kant (22) af inddækningskomponenten (20), k e n d e t e g n e t ved, at flangekomponenten (40) er flad, og et bøjet afsnit (25) af inddækningskomponenten (20) er bøjet i den udvendige retning til en kanal (26) til dræning af vand, hvor kanalen (26) er i hovedsagen U-formet, hvilket tillader kanalen at give en smule efter og følge en bevægelse af tagbe-

klædningselementerne (51) og således bibeholde sin funktion, hvor kanalen (26) strækker sig langs den tredje kant (24) af inddækningskomponenten (20), hvor den tredje kant (24) og den første kant (22) af inddækningskomponenten (20) er i det mindste delvist konvergerende i hældningsretningen (ID), og hvor inddækningskomponenten (20) er i hovedsagen lavet af metal, fortrinsvis aluminium,

hvor flangekomponenten (40) omfatter en bøjning (45), beliggende i forlængelse af det bøjede afsnit (25) af inddækningskomponenten (20), strækkende sig langs en kant af flangekomponenten modsat henholdsvis den anden (32) eller tredje (33) kant af skørtkomponenten (30), hvor det bøjede afsnit (45) af flangekomponenten (40) er bøjet i den udvendige retning til en kanal til dræning af vand.

2. Inddækningssæt (1) ifølge krav 1, hvor en længde af kanalen (26) vender imod mindst et af det tredje tætningskomponentafsnit, skørtkomponenten (30) og flangekomponenten (40).

3. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, hvor to eller flere af tætningskomponenten, skørtkomponenten (30), inddækningskomponenten (20) og flangekomponenten (40) er i et stykke.

4. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, hvor kanalen (26) har en højde, der strækker sig fra den tredje kant i den udvendige retning, på mindst 30 mm.

5. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, hvor flangekomponenten (40) er lavet af det samme materiale som skørtkomponenten (30).

6. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, hvor inddækningskomponenten (20) er udformet til at være i det mindste delvis beliggende under tagbeklædningselementer (51), fortrinsvis fuldstændigt beliggende under tagbeklædningselementerne (51).

7. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, hvor den tredje kant (24) af inddækningskomponenten (20) strækker sig i en vinkel i forhold til det respektive sidestykke i et plan i hovedsagen vinkelret på den indvendige og udvendige retning, hvor vinklen har en størrelse på 10-80 grader.

8. Inddækningssæt (1) ifølge et hvilket som helst af de foregående krav, omfattende en anden inddækningskomponent, der er i hovedsagen spejlvendt af den første inddækningskomponent (20), hvor den første kant (22) er indrettet til at blive fastgjort til det andet tætningskomponentafsnit (12).

9. Fremgangsmåde til fremstilling af et inddækningssæt (1) ifølge et hvilket som helst af kravene 1 til 8, omfattende trinnene at:

- bøje det bøjede afsnit (25) af inddækningskomponenten (20) i den udvendige retning til en kanal til dræning af vand, hvor en længde af kanalen vender imod mindst en, fortrinsvis begge af tætningskomponenten og skørtkomponenten (30).

10. Fremgangsmåde ifølge krav 9, omfattende det yderligere trin at:

- bøje et bøjet afsnit (45) af flangekomponenten (40) i den udvendige retning til en kanal til dræning af vand, hvor det bøjede afsnit (45) af flangekomponenten (40) er beliggende i forlængelse af det bøjede afsnit (25) af inddækningskomponenten (20), idet trinnene i krav 9 og i krav 10 fortrinsvis udføres på samme tid.

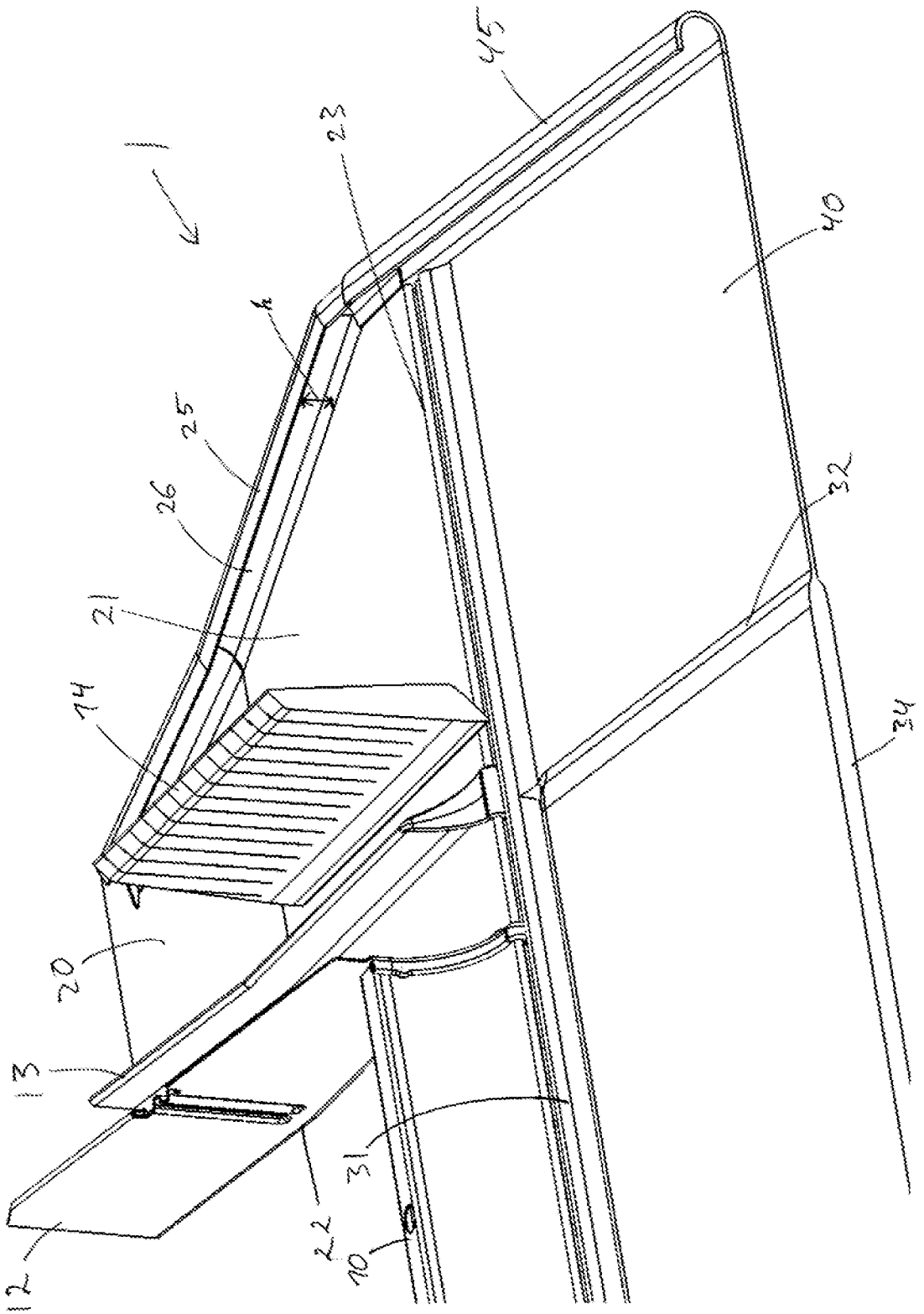


Fig. 1

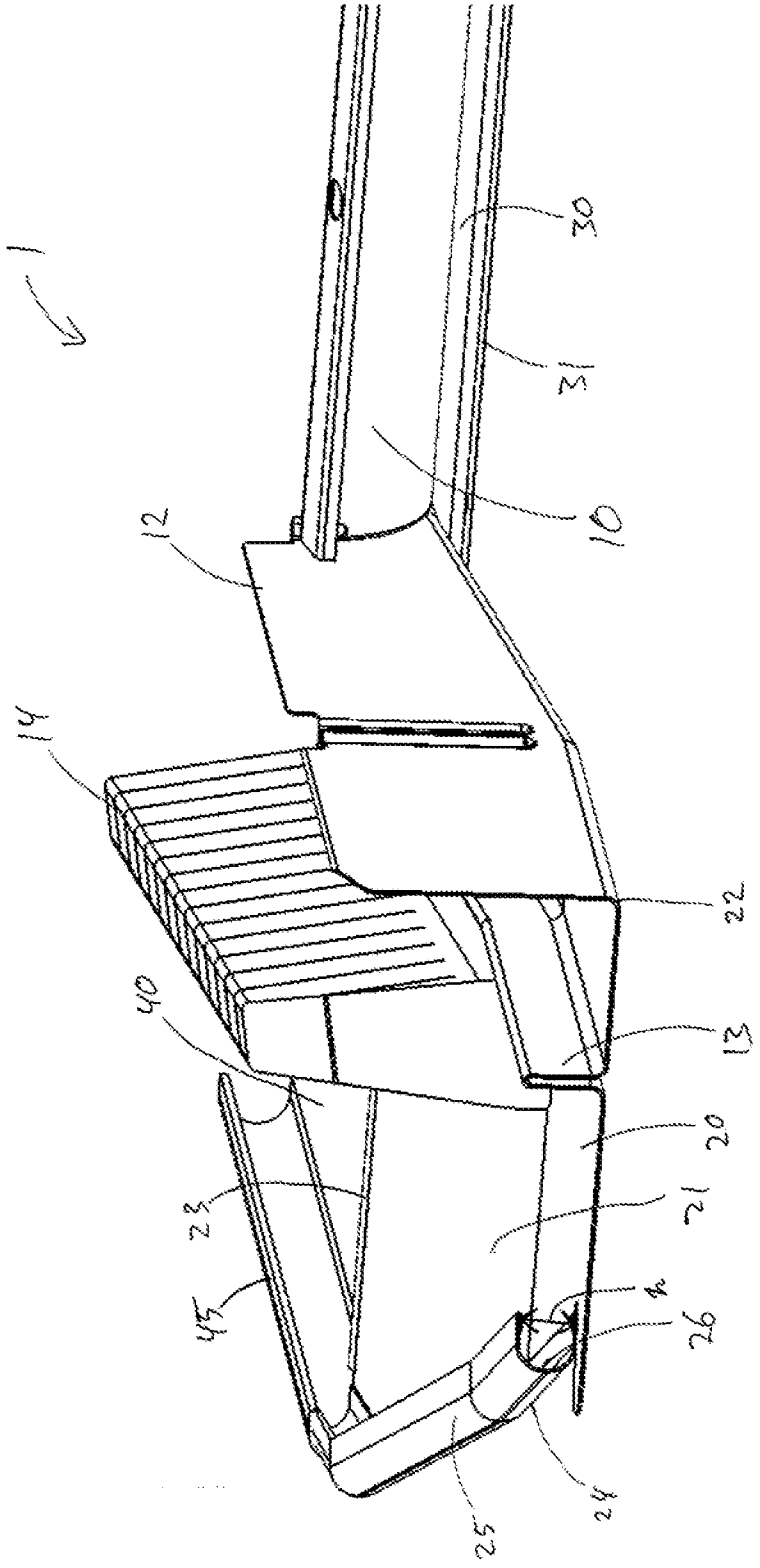


Fig. 2

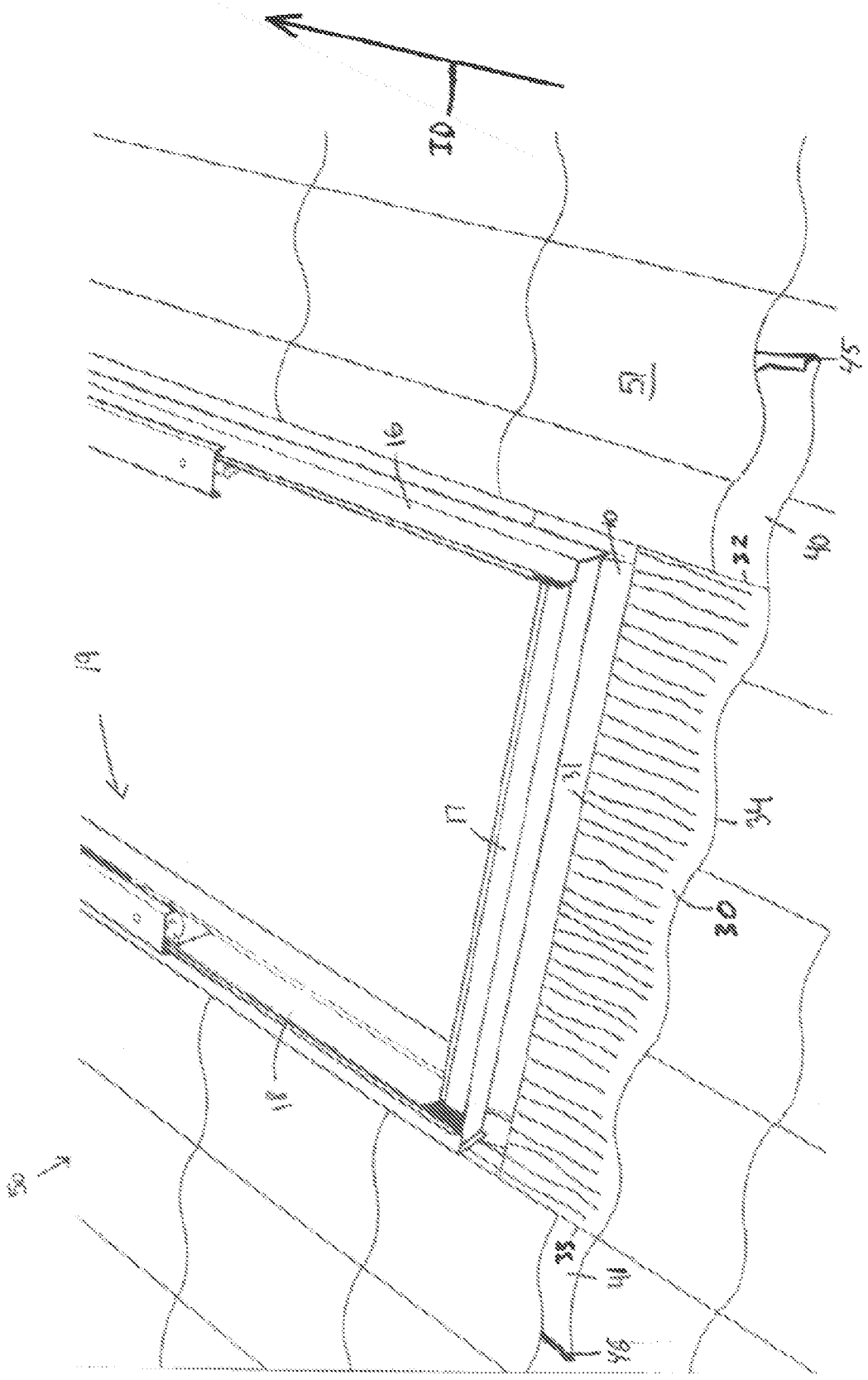


Fig. 3

DANISH PATENT AND TRADEMARK OFFICE

SUPPLEMENTAL SEARCH REPORT - PATENT	Application No. PA 2019 70589

A. CLASSIFICATION OF SUBJECT MATTER

E04D 13/03 (2006.01) E04D 13/14 (2006.01)

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

PCT-minimum documentation searched (classification system followed by classification symbols)

IPC, CPC: E04D

Documentation searched other than PCT-minimum documentation

DK, NO, SE, FI: IPC-classes as above.

Electronic database consulted during the search (name of database and, where practicable, search terms used)

EPOQUE, WPI, Fulltext: English.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.
	No new relevant documents were found in the supplemental search.	

☐ Further documents are listed in the continuation of Box C.

*	Special categories of cited documents:	"P"	Document published prior to the filing date but later than the priority date claimed.
"A"	Document defining the general state of the art which is not considered to be of particular relevance.	"T"	Document not in conflict with the application but cited to understand the principle or theory underlying the invention.
"D"	Document cited in the application.	"X"	Document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone.
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SUPPLEMENTAL SEARCH REPORT - PATENT		Application No. PA 2019 70589
C (Continued). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.