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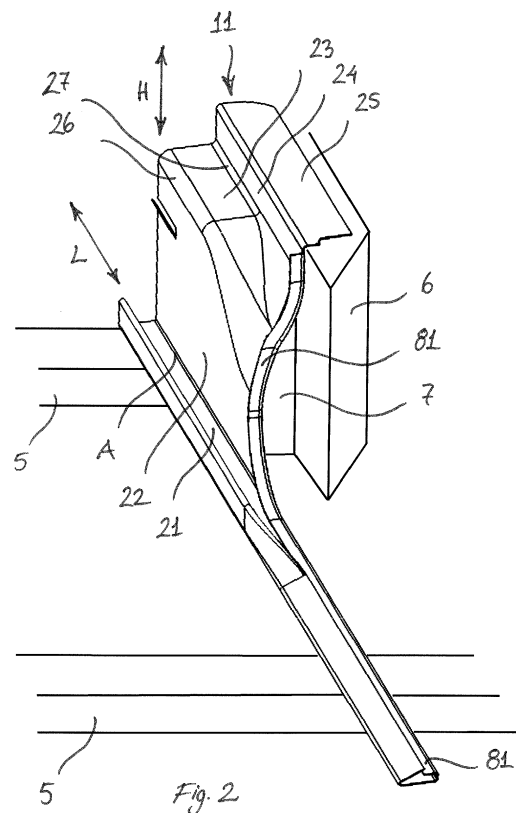
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(54) **A FLASHING ELEMENT FOR A ROOF WINDOW AND A METHOD FOR MAKING A FLASHING ELEMENT**

(57) A flashing element for a roof window and a method for making it is disclosed. It comprises a flashing member having a first leg configured to lie in plane with a roof surface in the mounted state, and a second leg configured to extend up along the outer side of an adjacent window frame member. It further comprises a third leg extending from an end of the second leg opposite from the first leg and in a direction opposite that of the first leg, the third leg being configured to cover an insulating member arranged between the second leg and the roof window. In order to give room for the mounting of accessories to the roof window, the height of the second leg at a first section of at least one flashing member is different from the height of the second leg at a second section of this flashing member.



## Description

**[0001]** The present invention relates to a flashing element for a roof window adapted for being installed in an inclined roof surface and having a frame comprising a plurality of frame members delimiting a frame opening, each frame member having an outer side facing away from the frame opening, said flashing element comprising at least one flashing member having a first leg being configured to lie substantially in plane with the roof surface in the mounted state, and a second leg being substantially perpendicular to the first leg and extending in a height direction of the flashing element and being configured to extend up along the outer side of an adjacent frame member in the mounted state, a joint between the first leg and the second leg defining a length direction of the flashing member, and where at least one flashing member further comprises a third leg extending from an end of the second leg opposite from the first leg and in a direction opposite from that of the first leg, the third leg being configured to cover an insulating member arranged between the second leg and the roof window in the mounted state, the distance between the first leg and the third leg defining a height of the second leg. The invention further relates to a method of making such a flashing element.

**[0002]** One of the first examples of a roof window mounted with insulating material extending above the roof structure, upwards along the outer sides of the roof window frame and with a flashing assembly extending over this insulating material is known from DE19653007A1. This provided a considerable improvement of the thermal insulating properties of the mounted roof window as heat loss through the part of the window projecting above the roof structure was now reduced. A later example of a similar structure, where the insulating material is provided on the interior side of the flashing is known from EP 3133222A1. This ensures that the insulation is not forgotten or arranged incorrectly. In both cases, however, the finished structure has considerably larger outer dimensions than the roof window itself. This not only influences the visual appearance of the window. It also means that accessories designed to be used together with the roof window may no longer fit. Particularly it is a problem that roller shutters and like screening devices, which are often retrofitted on the roof windows, need to be provided in two different versions; one configured to fit the size of the roof window and one configured to fit the roof window when mounted with insulation extending upwards along the outer sides of the frame.

**[0003]** It is therefore the object of the invention to provide a flashing element for a roof window, which allows a good thermal insulation of the roof window, while still allowing the use of standard accessories designed for roof window without insulating members at the outer side of the frame.

**[0004]** This is achieved with a flashing element where the height of the second leg at a first section of at least one flashing member is different from the height of the second leg at a second section of said at least one flashing member. By making the second leg shorter at one or more selected sections of the flashing element the third leg comes closer to the roof structure, exposing a part of the window frame, which would otherwise be covered by insulating material, hence leaving room for accessories, such as a roller shutter. This will of course influence the insulating properties of the roof window, but as the reduction of the amount of insulating material is only local and as the alternative is often to remove or leave out the insulating members altogether, this has been found to be acceptable. Moreover, experiments have shown that in most roof windows the upper and outer parts of the window frame, i.e. the part facing away from the window pane and away from the roof structure in the mounted state, have substantially the same temperature as the surroundings, and the effect of the uppermost part of the insulating member is therefore considerably less than that of the lowermost part closest to the roof structure.

**[0005]** It is noted that the first and second sections are to be understood as separate sections of the same flashing member. This means that they are not overlapping but are either adjacent to each other when seen in the length direction of the flashing element or displaced in relation to each other, for example by the provision of a third section between them as will be described below. It does not entail that they constitute to physically separated members.

**[0006]** Whenever reference is made to directions such as upwards or downwards, upper or lower these refer to the height direction of the flashing element as defined by the orientation of the second leg in the mounted state, i.e. a direction perpendicular to the plane of the roof structure in the mounted state. Likewise, the terms inner and outer refer to the window frame, the inner facing towards the frame opening and the outer facing away from the frame opening. The terms top and bottom are used to indicate items being located at the top and the bottom, respectively, of a roof window when mounted in an inclined roof structure.

**[0007]** In one embodiment, the flashing element is a top flashing element comprising a top flashing member adapted for being arranged above the roof window in the mounted state extending along a top frame member of the roof window and at least one side flashing member extending from the top flashing member and being adapted for extending along a side frame member of the roof window in the mounted state, where the top flashing member and the side flashing member are permanently interconnected at a corner joint, and where the first section is located closest to the corner joint while the second section is located further from the corner joint when seen in the length direction of the flashing element. In other words, the second leg has a different height at the corner than along the side and/or top of the roof window. This is advantageous as the corner is often used as a point of attachment for accessories, and the second leg will then usually have a smaller height at the first section than at the second section to give room for such attachment.

It may, however, also be necessary to give room for accessories, such as motors or locking assemblies, at the centre or elsewhere along the length of a frame member, in which case the second leg has a smaller height at the second section than at the first section.

**[0008]** If the accessory is a roller shutter or like screening arrangement it may need to move when the roof window is opened and closed. In such cases it may be advantageous that the height of the second leg is reduced over the entire top flashing member and at the first section of the side flashing member.

**[0009]** Regardless if the flashing element is a top flashing element as described above or another type of flashing element, it may further comprise a third section between the first section and the second section where the height of the second leg increases continuously. This has several advantages. One is that the risk of un-tightness due to joints or stresses in the flashing material at an abrupt transition between sections is reduced. Another that the risk of dirt collecting on the flashing element at such a transition is reduced. A still further advantage is that smooth transitions are often considered aesthetically pleasing.

**[0010]** In one embodiment the height of the second leg is constant throughout the second section. This provides for a minimalistic design, which may be advantageous both from a technical point of view, facilitating manufacture and assembly, and from an aesthetic point of view. As an example, a side flashing element or a side flashing member of a top flashing element as described above may have a first section with a relatively small second leg at one end, which is configured to be located at a corner of a roof window frame in the mounted state, while the rest of the side flashing element or side flashing member constitutes a second section with a larger second leg. This embodiment may also include a third section as described above.

**[0011]** The third leg need not be perpendicular to the second leg. Apart from contributing to a desired aesthetic impression, an angled third leg may contribute to establishing a smooth transition between sections having second legs of different heights and/or sections where the third leg is of different width. In one embodiment the third leg extends at an angle of 30-70 degrees in relation to the second leg at the first section and is perpendicular to second leg at the second section, preferably approximately 60 degrees. The angle of the third leg will then increase continuously over the third section.

**[0012]** In a presently preferred embodiment of a top flashing element including a top flashing member and a side flashing member as described above and which is configured for use with a standard roof window for use in a residential building, the distance from the second leg of the top flashing member to the second section of the side flashing member when seen in the length direction of the side flashing member is 50-100 mm, preferably approximately 75 mm.

**[0013]** In a presently preferred embodiment of a top flashing element including a top flashing member and a side flashing member as described above and which is configured for use with a standard roof window for use in a residential building, the height of the second leg is 30-50 mm in the first section and 60-90 mm in the second section.

**[0014]** If the height of the second leg is smaller than the height of the part of the roof window frame extending above the roof structure it may be advantageous that the flashing element further comprises a fourth leg extending from the third leg in parallel with the second leg away from the first leg, said fourth leg being configured to abut the outer side of an adjacent frame member in the mounted state. This fourth leg will then wholly or partially cover and protect the part of the roof window frame not covered by the second and third legs. A fourth leg does not need to extend over the entire length of the flashing element or member and/or may have different heights at different sections.

**[0015]** In order to provide further protection of the roof window frame or facilitate the mounting of the flashing element, the flashing element may further comprise a fifth leg extending from the second or fourth leg in parallel with and away from the first leg, said fifth leg being configured to abut an exterior side of an adjacent frame member in the mounted state. Covering the exterior side of roof window frame in this way at least partially provides protection in itself, but also provides an overlap with covering and/or cladding members used on the roof window frame. Moreover, the abutment of the fifth leg will provide a positioning of the flashing element in the height direction, which together with the abutment of the first leg against the roof structure will provide a precise positioning of the flashing element. Particularly this dual positioning will prevent errors in mounting caused by warping, flattening or other unintentional deformation of the flashing element.

**[0016]** A flashing element as described above may be made by a method where a top flashing member and one or more side flashing member(s) are provided with bent edges, where the bent edges are brought into engagement with each other, and where the bent edges are fixated in relation to each other by pressing and/or welding. The engagement between bent edges allows the interconnection of members with different and/or complex geometries in a reliable and weather-proof manner.

**[0017]** Providing flashing members with continuous bent edges, which are interconnected for forming a joint between flashing members, means that the flashing members can move somewhat in relation to each other during the interconnection process. This not only allows the flashing members to be easily positioned in relation to each other but also allows the material of the flashing members to displace during the process, thus potentially reducing the formation of stresses in the material.

**[0018]** In a presently preferred embodiment the top flashing member and/or the side flashing member(s) is/are shaped

by pressing, roll-forming, and/or drawing. This may be done before the flashing members are interconnected, but is also possible to shape the flashing members simultaneously with interconnection and/or with the fixation of bent edges in relation to each other. In a presently preferred embodiment, bends delimiting the third leg from the second leg and forming fourth and fifth legs are made simultaneously with the fixation of the bent edges forming the joint.

**[0019]** By integrating the shaping of one or both flashing members and the formation and fixation of the joint in one continuous process, the making of the flashing element can be wholly or partially automated so that it requires no or little human intervention. This allows highly efficient manufacture at industrial scale.

**[0020]** These methods of manufacture also apply to flashing elements composed of other types of flashing members.

**[0021]** Though the invention is here described with reference to flashing elements and members, which are configured for use with a standard type roof window and to allow easy retrofitting of roller shutters it is to be understood that it also lends itself to other purposes. The invention may for example be used for providing flashing assemblies allowing easy mounting of solar panels on or next to roof windows, the installation of motors or other electrical components, and of course also the provision of other types of screening arrangements such as sun blinds or insect nets.

**[0022]** In the following the invention will be described in more detail with reference to embodiments shown in the drawing, where:

Fig. 1 show a first embodiment of a flashing element according to the invention in a side view,

Fig. 2 shows the flashing element in Fig. 1 in a perspective view,

Fig. 3 is a cross-section along the line B-B in Fig. 1,

Fig. 4 shows a top flashing element comprising a flashing member identical to the flashing element as shown in Figs 1 and 2 in a perspective view, and

Figs 5 and 6 show the top flashing member of the top flashing element in Fig. 3 from above and from below, respectively, in a partially cut-away perspective view.

**[0023]** A flashing element 1 according to the invention is shown in Figs 1 and 2. It consists of a single side flashing member 11 having a first leg 21 which is resting on a roof structure, here represented by two battens 5 in Fig. 2. The first leg is thus lying substantially in plane with the roof surface in the mounted state. The flashing element 1 further includes a second leg 22 being substantially perpendicular to the first leg. The second leg extends up along the outer side of an adjacent window frame member 6, which forms part of a roof window frame comprising a plurality of other frame members (not shown) and delimits a frame opening. The joint A between the first leg 21 and the second leg 22 defines a length direction L of the flashing element 1.

**[0024]** Moving further up in Figs 1 and 2, the flashing element 1 further includes a third leg 23 extending from an end of the second leg 22 opposite from the first leg 21 and in a direction opposite from that of the first leg. The third leg covers an insulating member 7 arranged between the second leg 22 and the frame member 6 of the roof window. The insulating member 7 may be part of an insulating frame extending around the entire roof window frame.

**[0025]** The second leg 22 extends in a height direction H of the flashing element and the distance between the first leg 21 and the third leg 23 defines the height of the second leg.

**[0026]** In Fig. 1 the flashing element 1 has been divided in the four sections marked I, II, III, and IV. These sections are virtual and thus not to be regarded as involving a physical separation.

**[0027]** In section I the height  $h_1$  of the second leg 22 is the smallest and in section II the height  $h_2$  of the second leg is the largest. In section III the height of the second leg increases continuously thereby providing a smooth transition between section I, constituting a first section, and section II, constituting a second section. Section IV is configured for interconnection with another flashing member as will be described below and has no second leg, only a bent edge 81 adapted for establishing an interconnection.

**[0028]** Fig. 3 shows a cross-section along the line B-B in Fig. 1. From this it is clearly seen that the third leg 23 extends at an angle C of approximately 60 degrees in relation to the second leg 22 at section I, serving as a first section, and that this angle increases gradually over section III, serving as a third section, until reaching 90 degrees at section II, serving as a second section. It is also seen how the transitions from the second leg 22 to the third leg 23 and from the third leg to the fourth leg 24 are relatively soft at section I in comparison to the sharper bends 26, 27 at section II seen in the background.

**[0029]** The flashing element in Figs 1-3 may serve as a side flashing member 11 in a top flashing element 10 as shown in Fig. 4. This top flashing element further comprises a top flashing member 12 and is adapted for being arranged above the roof window in the mounted state extending along a top frame member of the roof window with the side flashing member 11 extending along a side frame member of the roof window (not shown). The side flashing member 11 and the top flashing member 12 are permanently interconnected at a corner joint 8. This joint is formed by bent edges 81, 82 on the two flashing member being brought into engagement, the two bent edges hooking into each other, and then flattening the joint, thereby fixating the two edges by friction. The bent edge 82 on the top flashing member 12 is seen in Figs 5 and 6, which show the top flashing from above and from below, respectively, in a partially cut-away perspective

view. Bent edge 83 is intended to serve as a water deflector, but may also serve interconnecting purposes. A similar bent edge (not shown) can for example be used for connecting a skirt member to a bottom flashing member.

**[0030]** Using continuous bent edges, each extending along the majority of a side of a flashing member as the ones shown in the drawing and which are interconnected for forming a joint between flashing members allows the flashing members to be interconnected in an industrial process with no or little human intervention. The bent edges allow a certain mutual movement between the flashing members during the process, which is advantageous when the shaping of one or both flashing members and the formation and fixation of the joint are part of one continuous process, which can be wholly or partially automated. This applies independently of the other features described with reference to the specific embodiments.

**[0031]** Even though the top flashing element 10 in Fig. 4 is shown with only one side flashing member 11 it is to be understood that side flashing members may be provided at both ends. Such two side flashing members may be identical but mirror inverted, or of different designs if the two sides of the roof window, which with the flashing element is to be used, face different surfaces. A top flashing element with two side flashing members 11 is suitable for use with roof windows mounted alone or above other windows, whereas a top flashing element 10 with only one side flashing member may be used when roof windows are mounted closely side-by-side.

**[0032]** As is seen in Fig. 4 the height of the second leg 22 of the top flashing member 12 is constant over its entire length and corresponds to the height of the second leg of the side flashing member 11 in the first section I. This means that a standard type roller shutter configured for a roof window without insulating material between the flashing assembly and the window frame may be mounted on top of the top flashing element 10 without the need for adaptations or replacement of components. The extend of the first and third sections I, III of the side flashing member(s) 11 determines how much room is available along the side of the roof window and may vary depending on the type of roof window, the climate zone in which it is mounted, and other factors influencing the need for insulation and/or accessories.

**[0033]** Even though the drawing shows only side flashing elements and members 1, 11 with variations in the height of the second leg 22 it is to be understood that this may also be the case on other flashing elements and/or members, including top flashing elements or members and bottom flashing elements or members (not shown) adapted for use at the bottom of a roof window mounted in an inclined roof when seen in the direction of inclination of the roof. Likewise, it is to be understood that the height or width of first 21, third 23, fourth 24 and fifth legs 25 may also vary, that angles between legs may vary and that legs 21, 22, 23, 24, 25 do not necessarily need to be straight.

#### List of reference numbers

1	Flashing element	Inddækningsselement
10	Top flashing element	Topinddækningsselement
11	Side flashing member	Sideinddækningskomponent
12	Top flashing member	Topinddækningskomponent
21	First leg	Første ben
22	Second leg	Andet ben
23	Third leg	Tredje ben
24	Fourth leg	Fjerde ben
25	Fifth leg	Femte ben
26	Bend	Buk
27	Bend	Buk
5	Battens	Lægter
6	Window frame member	Vindueskarmstykke
7	insulating member	Insulatingkomponent
8	Joint	Samling
81	Bent edge	Bukket kant
82	Bent edge	Bukket kant
83	Bent edge	Bukket kant
I	First section	Første afsnit
II	Second section	Andet afsnit
III	Third section	Tredje afsnit
IV	Fourth section	Fjerde afsnit
A	Joint	Samling
B	Cross-section	Tværsnit
C	Angle between legs	Vinkel imellem ben

(continued)

L	Length direction	Længderetning
H	Height direction	Højderetning
h <sub>1</sub>	Height	Højde
h <sub>2</sub>	Height	Højde

## Claims

1. A flashing element for a roof window adapted for being installed in an inclined roof surface and having a frame comprising a plurality of frame members delimiting a frame opening, each frame member having an outer side facing away from the frame opening, said flashing element comprising at least one flashing member having a first leg being configured to lie substantially in plane with the roof surface in the mounted state, and a second leg being substantially perpendicular to the first leg and extending in a height direction of the flashing element and being configured to extend up along the outer side of an adjacent frame member in the mounted state, a joint between the first leg and the second leg defining a length direction of the flashing member, and where at least one flashing member further comprises a third leg extending from an end of the second leg opposite from the first leg and in a direction opposite that of the first leg, the third leg being configured to cover an insulating member arranged between the second leg and the roof window in the mounted state, the distance between the first leg and the third leg defining a height of the second leg,  
**characterized in that** the height of the second leg at a first section of at least one flashing member is different from the height of the second leg at a second section of said at least one flashing member.
2. A flashing element according to claim 1, comprising a top flashing member adapted for being arranged above the roof window in the mounted state extending along a top frame member of the roof window and at least one side flashing member extending from the top flashing member and being adapted for extending along a side frame member of the roof window in the mounted state, where the top flashing member and the side flashing member are permanently interconnected at a corner joint, and where the first section is located closest to the corner joint while the second section is located further from the corner joint when seen in the length direction.
3. A flashing element according to claim 1 or 2, further comprising a third section between the first section and the second section where the height of the second leg increases continuously.
4. A flashing element according to one or more of claims 1-3, where the height of the second leg is constant throughout the second section.
5. A flashing element according to one or more of claims 1-4, where the third leg extends at an angle of 30-70 degrees in relation to the second leg at the first section and is perpendicular to second leg at the second section.
6. A flashing element according to one or more of claims 1-5, where the distance from the second leg of the top flashing member to the second section of the side flashing member when seen in the length direction of the side flashing member is 50-100 mm, preferably approximately 75 mm.
7. A flashing element according to one or more of claims 1-6, where the height of the second leg is 30-50 mm in the first section and 60-90 mm in the second section.
8. A flashing element according to one or more of claims 1-7, where further comprising a fourth leg extending from the third leg in parallel with the second leg away from the first leg, said fourth leg being configured to abut the outer side of an adjacent frame member in the mounted state.
9. A flashing element according to one or more of claims 1-8, further comprising a fifth leg extending from the second or fourth leg in parallel with and away from the first leg, said fifth leg being configured to abut an exterior side of an adjacent frame member in the mounted state.
10. A method for making a flashing element according to one or more of claims 1-9, where a top flashing member and one or more side flashing member(s) are provided with bent edges, where the bent edges are interconnected with each other for forming a joint between the flashing members, and where the bent edges are fixated in relation to

each other by pressing and/or welding.

- 11.** A method according to claim 10, where the top flashing member and/or the side flashing member(s) is/are shaped by pressing, roll-forming, and/or drawing.

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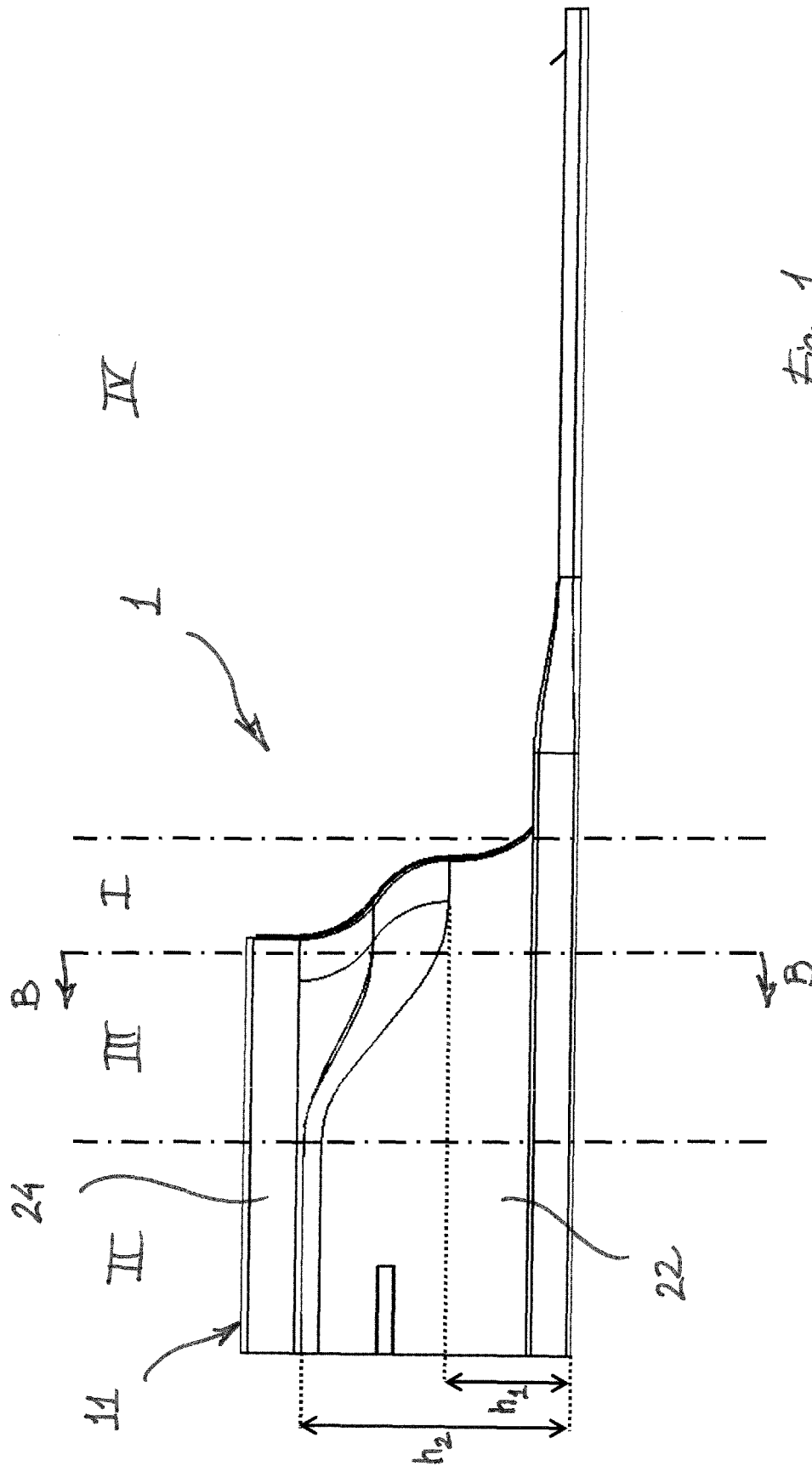
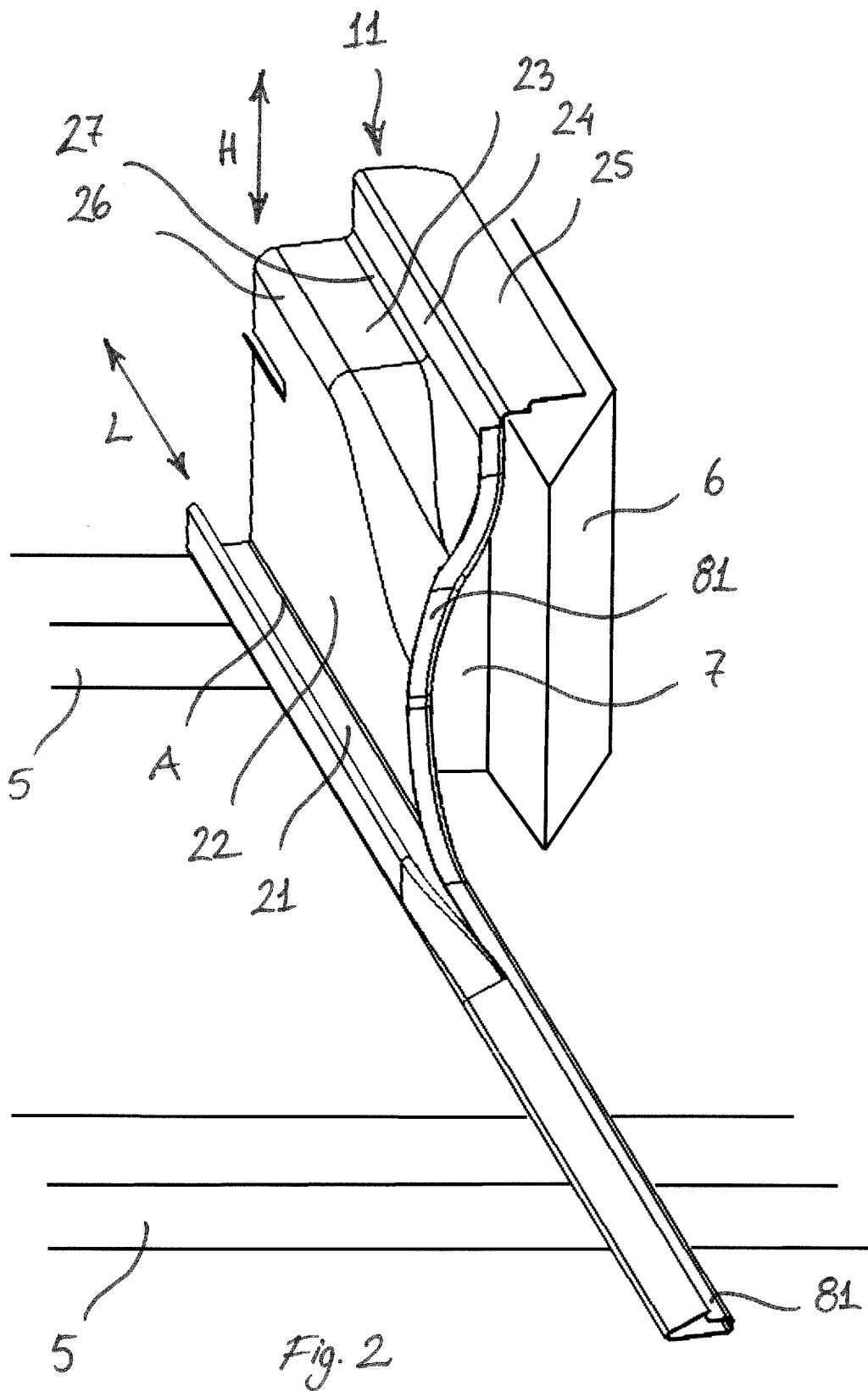
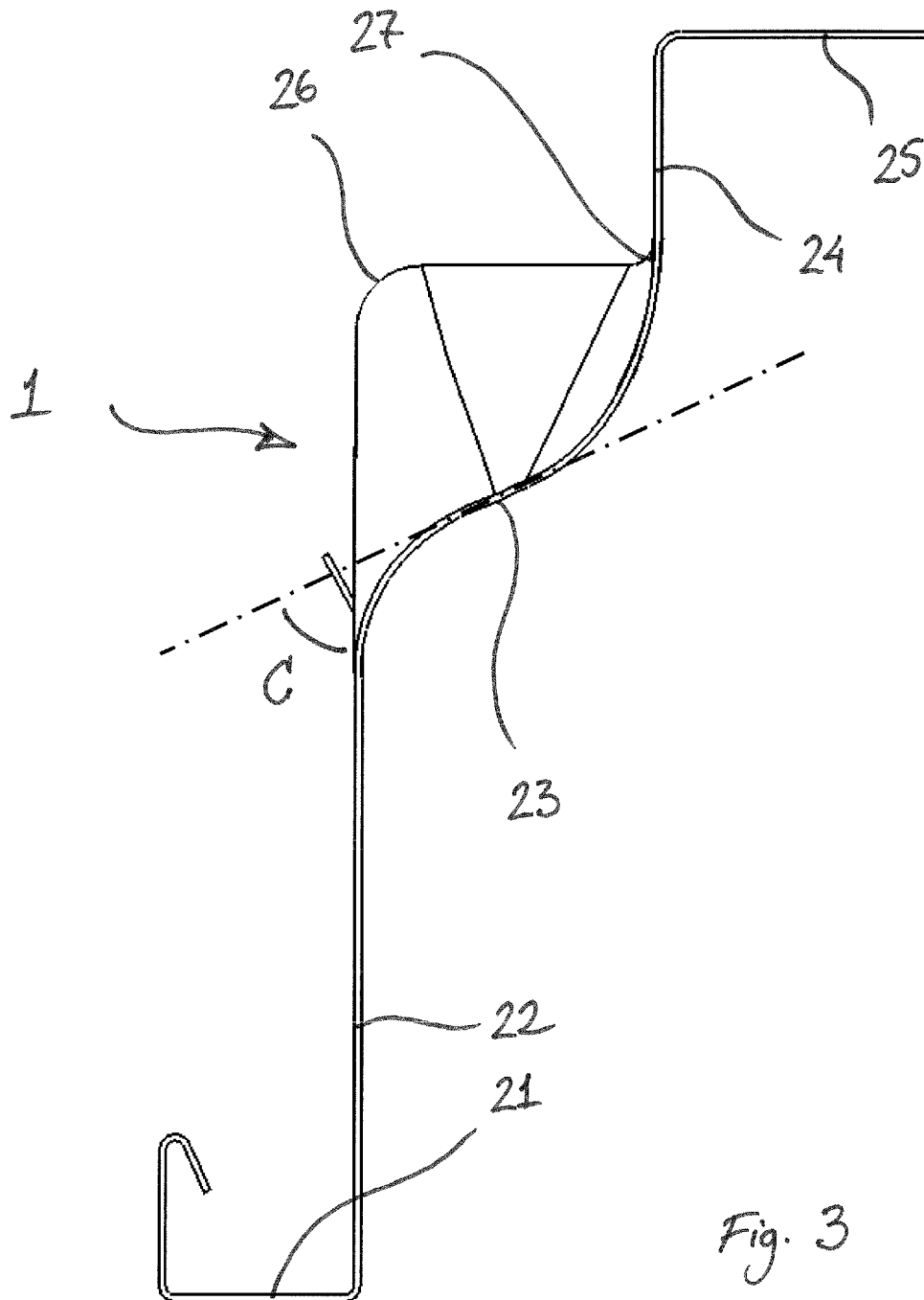
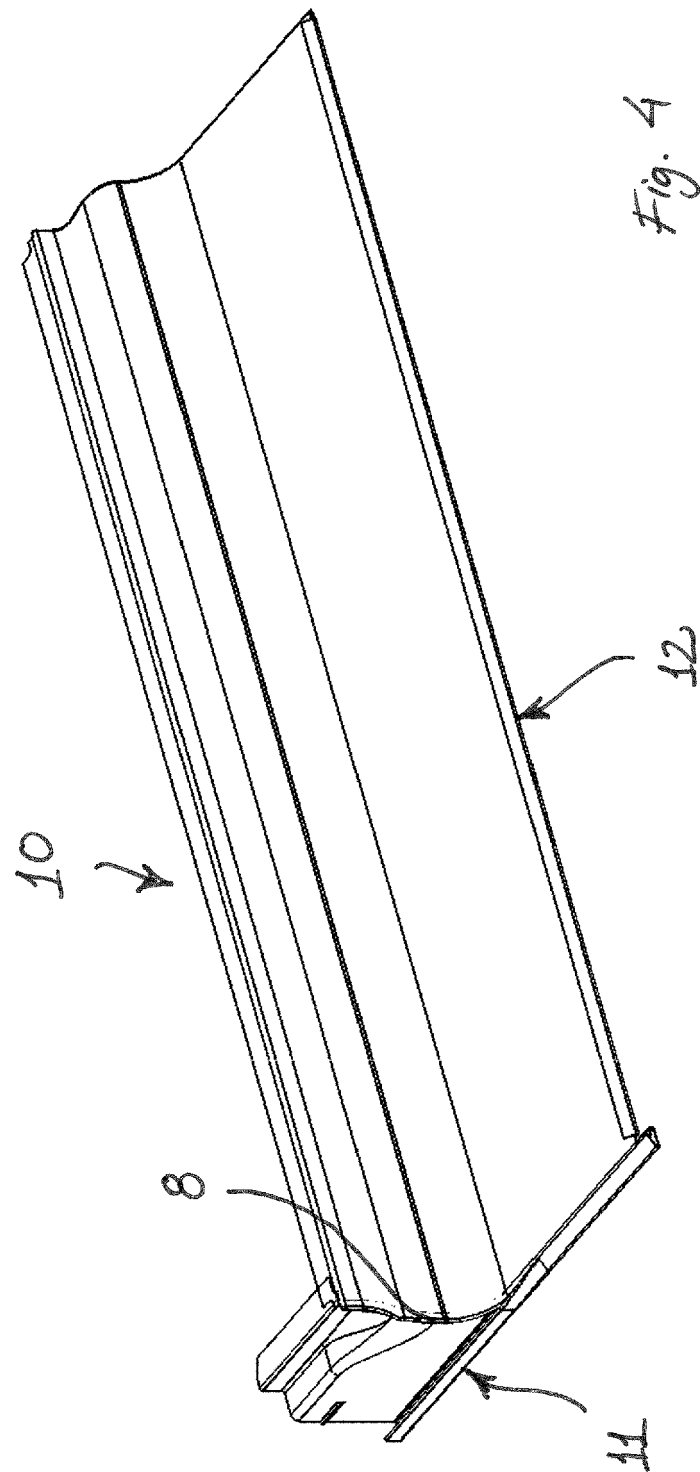


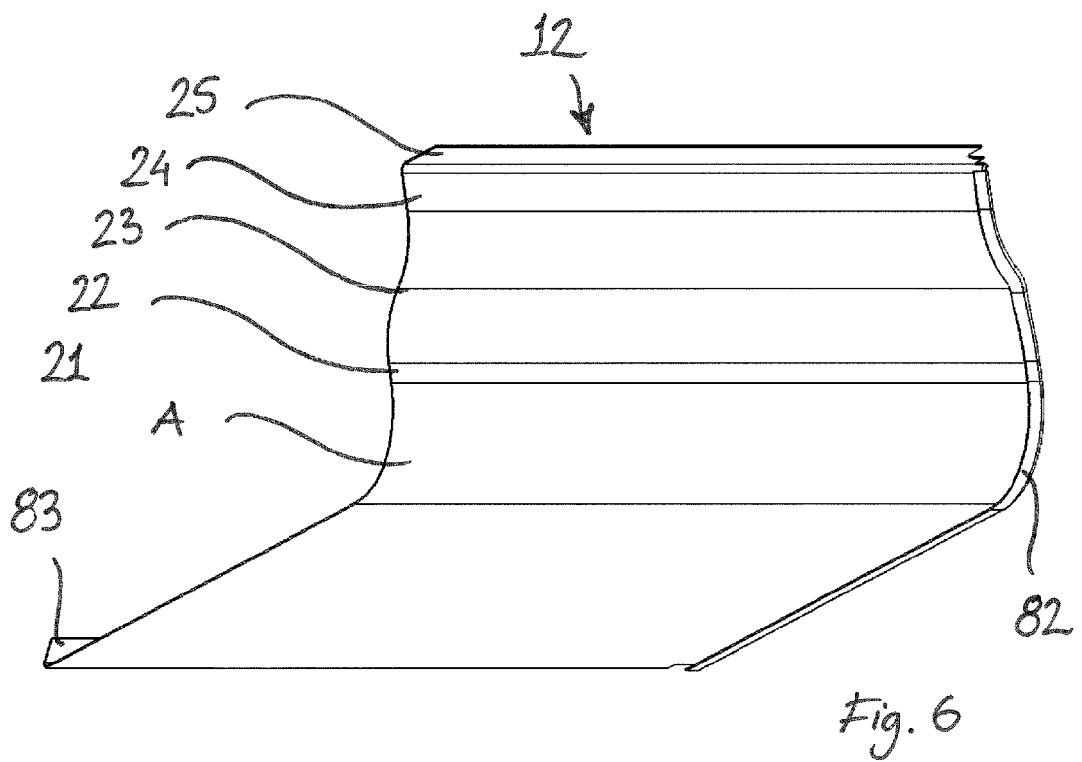
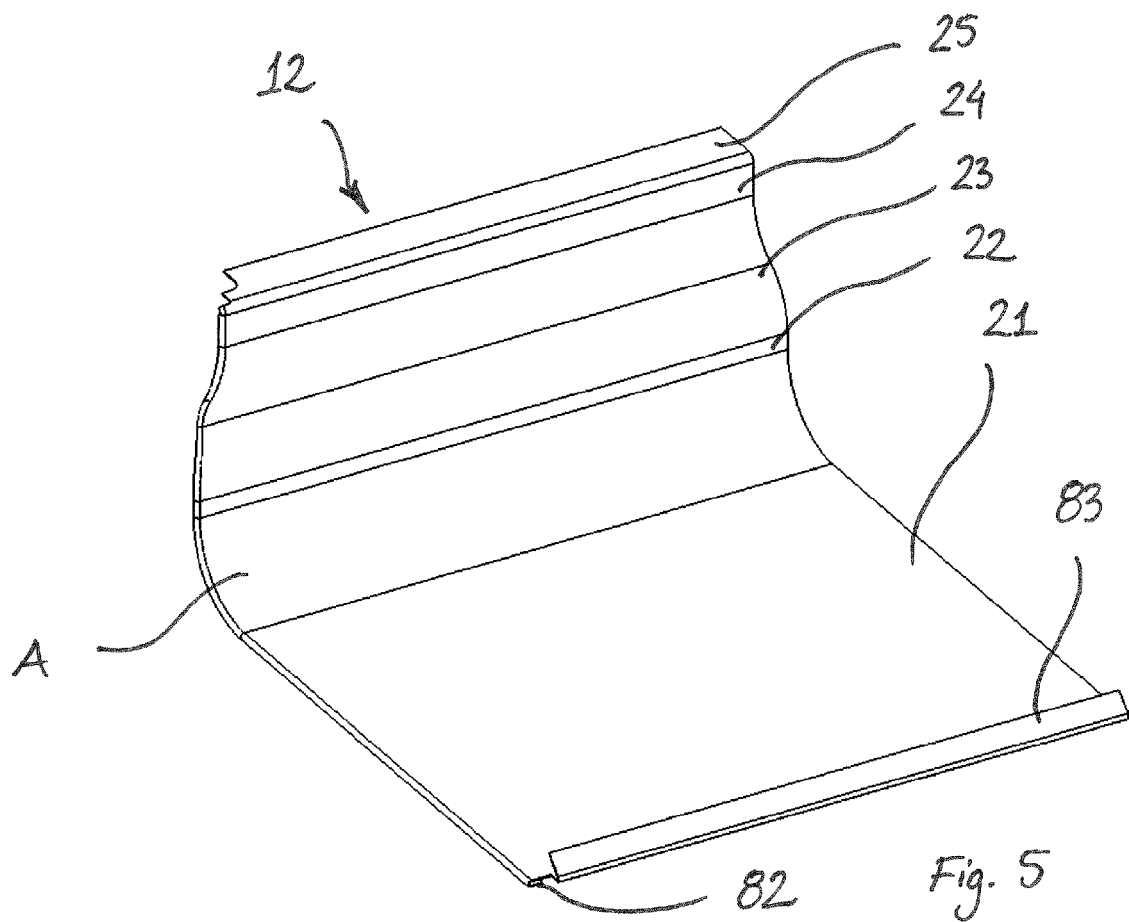
Fig. 1













## EUROPEAN SEARCH REPORT

 Application Number  
 EP 19 21 7538

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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	EP 3 061 885 A1 (VKR HOLDING AS [DK]) 31 August 2016 (2016-08-31) * figures 13-14 *	1-4,6-11	INV. E04D13/147 E04D13/03
A	----- * figures 13-14 *	5	
X	EP 3 012 382 A1 (GODEST FT [FR]) 27 April 2016 (2016-04-27) * figure 12 *	1,3,4	
X	----- EP 2 525 014 A2 (FAKRO PP SPOLKA ZOO [PL]) 21 November 2012 (2012-11-21) * figures 2-3 *	1,3,4	
A	----- FR 2 402 044 A1 (MINES FOND ZINC VIEILLE [FR]) 30 March 1979 (1979-03-30) * figures 1-2 *	6,7	
A,D	----- DE 196 53 007 A1 (KUEBLE MARKUS [DE]) 25 June 1998 (1998-06-25) * figure 2 *	9	
A	----- EP 2 759 654 A1 (VKR HOLDING AS [DK]) 30 July 2014 (2014-07-30) * paragraph [0013]; figure 3 *	10,11	TECHNICAL FIELDS SEARCHED (IPC) E04D E06B
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>12 March 2020</b>	Examiner <b>Leroux, Corentine</b>
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	

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 EPO FORM 1503 03.02 (P04C01)

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

EP 19 21 7538

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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12-03-2020

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3061885 A1	31-08-2016	DK 201570107 A1 EP 3061885 A1 PL 3061885 T3	12-09-2016 31-08-2016 30-03-2018
EP 3012382 A1	27-04-2016	EP 3012382 A1 PL 3012382 T3	27-04-2016 29-12-2017
EP 2525014 A2	21-11-2012	EP 2525014 A2 PL 220274 B1	21-11-2012 30-09-2015
FR 2402044 A1	30-03-1979	NONE	
DE 19653007 A1	25-06-1998	NONE	
EP 2759654 A1	30-07-2014	DK 178016 B1 EP 2759654 A1 PL 2759654 T3	16-03-2015 30-07-2014 29-09-2017

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- DE 19653007 A1 [0002]
- EP 3133222 A1 [0002]