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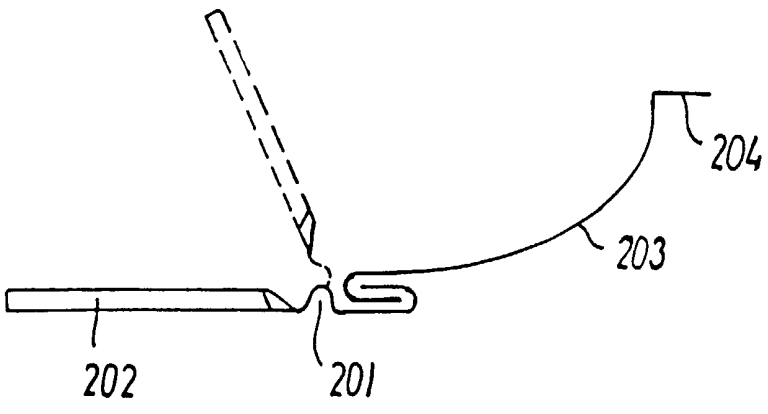
(54) Title: HINGED FLASHING AND A SHEET FLASHING KIT



(57) Abstract: A flashing member with a rail member (101, 203, 303) of a sheet material and a shirt member (102, 202, 302) of another sheet material, a first portion (104) of the skirt being connected to a first portion (110) of the rail by a joint running in a longitudinal direction of the flashing member, a second portion (107) of the skirt having a free edge (103). The flashing member further comprises hinge means (201, 301, 401, 402) allowing at least a portion of the skirt member to bend or pivot relative to the rest of the flashing member, and locking means associated with the hinge means for preventing unintended lifting of said portion of the skirt member after the flashing has been fitted. The invention also comprises a sheet flashing kit comprising at least two sheet flasing members.

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HINGED FLASHING AND A SHEET FLASHING KIT

The invention relates to a flashing member for providing a seal between a roof-penetrating structure and the roof. More specifically, the present invention relates to a flashing member comprising a portion adapted to be placed in close proximity to the upper surface of the roof.

Flashings comprising roof-engaging plate members or skirts are used in the construction of sealed joints between roof surfaces and building structures penetrating them, for example a sealed joint between the main frame of a window installed in an inclined roof and the surrounding roofing, in particular as a skirt-shaped flashing at the lower horizontal member of the main frame, the skirt flashing comprising an upper portion attached to the rail and a lower portion with a free edge to engage with the roof surface.

In many situations the skirt is not merely placed onto the roof surface and then forced downwards to provide a close seal. When the flashing member has been attached to, for example, the lower frame portion of a roof window, the skirt is often bend backwardly in order to properly mount or arrange the roofing material, e.g. tiles, after which the skirt is bend forwardly and the lower free edge is brought into close contact with the roof surface. The bending can take place either between the skirt and the rail or between an upper and lower portion of the skirt. When the skirt material itself is bend, primarily plastic deformation takes place, however, the initial elastic deformation is "stored" resulting in the free edge bouncing back when forced towards the roof surface.

The material for the skirt member has traditionally been constituted by lead plates of a thickness of approximately 1 mm. Lead as a flashing material has a number of advantages as it is very easy to plastically deform with only a very limited elasticity, i.e. the lead plate substantially stays in the form into which it is initially bend without any elastic bouncing back. This inherent feature of lead is of great advantage when a lead skirt as part of an already attached flashing is shaped directly onto for example an undulated roof surface, in which case the skirt cannot be bend in excess in order to compensate for eventual elastic re-bouncing.

Although lead for most purposes is almost non-elastic, there may be a minimal re-bouncing, however, as lead is a very heavy material, gravity alone will help the lead skirt to be elastically bend into close contact with the roof surface. Further, the high density of lead and the corresponding high weight will also prevent the skirt from being bend backwards during storming weather.

Indeed, lead also has some very well known draw backs as it is environmentally harmful, due to its weight expensive to transport and handle and in some aspects difficult to apply, for example when joining together different lead elements. Further, lead may oxidise and subsequently leave streaky deposits on the surrounding roof surface.

In order to avoid the economical and environmental problems constituted by the traditional use of lead in flashing materials, it has been suggested to manufacture flashings as sandwich constructions in which, typically, a stress damping and stabilizing core layer of ductile material completely covered on one side by a foil sheeting. The core layer has typically been made out of polymeric material or bitumen product, and the foil has typically been a thin metal

foil, preferably aluminium foil. Bitumen as a product class is normally adhesive at ambient temperatures which will assure that it will adhere to and stabilize the foil, however, when a non-adhering core material is used it may be necessary to coat the core material with a pressure adhesive coating. Such flashing materials are disclosed in for example Danish Patent Specifications No. 148 064 and No. 145 509 as well as in German patent specification DE-A-4 032 058.

For use on roof surfaces in the form of undulated tiles with very deep troughs, the above discussed sandwich constructions has been developed further into wave-corrugated and pleated designs, in order to obtain a sufficiently manual deformability and stretchability to enable a good fit between the flashing and roofing.

However, even with these improved designs it has turned out to be difficult to obtain a close as well as a permanent fit between the flashing and the roof surface. This is especially true if, as explained above, the skirt is bend backwardly during the mounting procedures in which case it is rather difficult to bring the skirt in a position in which it closely and permanently engages the upper roof surface.

Therefore, having regard to the above, it is the object of the present invention to provide an improved flashing member comprising a rail and a skirt portion, and which allows the skirt or a portion thereof to be bend or pivoted relative to the rail or the remainder of the skirt after the flashing has been installed, yet allows the skirt to thereafter be arranged in close and permanent contact with a roof surface.

According to the invention, the above object is achieved by a flashing member comprising a rail mem-

ber of a sheet material and comprising first and second opposed portions; a skirt member of another sheet material and comprising first and second opposed portions; the first portion of the skirt being connected to the first portion of the rail, by a joint running in a longitudinal direction of the flashing member, the second portion of the skirt having a free edge, said flashing member being characterized by hinge means allowing at least a portion of the skirt member to bend or pivot relative to the rest of the flashing member, and locking means associated with the hinge means for preventing unintended lifting of said portion of the skirt member after the flashing has been fitted. In some embodiments more than one hinge are formed.

Preferred embodiments of the invention are described in the dependent claims 2-12.

DK 173100 B1, which forms the basis for the drafting of claim 1, discloses a flashing member comprising a relatively stiff rail part and a deformable skirt part, which skirt part is attached to an edge part of the rail.

By "hinge means" are meant any arrangement allowing the parts on each side thereof to pivot relative to each other, thus the hinge means may be a hinge in the literal sense of the word or merely a line of weakness facilitating bending.

As will described in further detail below, some types of hinge means, as for instance lines of weakness in the shape of indentations, have, or may be given, the ability to lock themselves when the flashing has been fitted. In these cases the hinge means may be considered as having inherent or build-in locking means. In other cases, however, especially when the hinge means are hinges in the literal sense of word, the locking means may be pins or the like, physically blocking the movement of one or both parts

of the hinge. Thus, the terms "locking means" covers both inherent features as well as actual physical means.

As may be understood from the above, it is an important aspect of the flashing of the present invention that the hinge is arranged to allow the skirt to "lock" in its bend-down position, i.e. a hinge which would allow the skirt or a portion thereof to be pivoted substantially free up- or downwards would rely on additional means for attaching it to the roof surface.

In a first aspect of the present invention the hinge means is an integrated part of the skirt and relies on properties inherent to the skirt material. As described above, it is well known that a flexible skirt member can be bend back and forth, however, after such a bending action the lower free edge of the skirt normally have a tendency to lift away from the roof surface when it is bend back, especially when the skirt is wave-corrugated or pleated in a direction substantially perpendicular to the orientation of the bending line. It is believed that this is due to the complex pattern of strain hardening induced when such corrugated or pleated skirts are bend, this resulting in a high degree of elastic "memory" when the free skirt edge is folded back towards the roof. The present inventors have found that by controlling the area where bending, and especially plastic deformation, takes place, a skirt with a hinge can be provided with only a limited tendency to bounce back.

More specifically, this is achieved by embossing, pressing, stamping or beading (or combination thereof) an indentation or groove across the width of the skirt member. Skirt materials for roof flashings are known which have been processed to have a pattern of "micro" corrugations across the width of the skirt substantially in parallel with the rail. Therefore,

in the context of the present application, the terms "indentation" or "groove" with respect to the hinge means is to be understood as an embossment substantially more pronounced than the general "micro" corrugations, i.e. the skilled person would not be in doubt which embossment represented a hinge according to the present invention. Preferably the hinge indentation or groove has a depth, which is at least twice the depth of these "micro" corrugations.

The forming of an indentation in a flashing along the length of the rail portion is known per se from EP-A-0 120 653, which describes a unitary flashing with a rail part for mounting on a wall and a corrugated skirt part for lying over and engaging a roof covering abutting on the wall. The two parts are positioned at an angle relative to each other and the indentation serves as a line of weakness to allow relative bending of the two parts to a smaller angle to be fit the transition between the roof and the wall when the flashing is mounted.

In preferred embodiments of the present invention the skirt material is of a sandwich construction in which, typically, a stress damping and stabilizing core layer of ductile material is covered on one or both sides by a foil sheeting. The core layer can be made out of polymeric material or bitumen product, and the foil is preferably a thin foil, most preferably a metal foil such as aluminium foil.

In a preferred embodiment the indentation comprises a relatively sharp "edge" or ridge, which serves as a more accurate primary bending line.

In a second aspect of the present invention the hinge is a separate member arranged in the skirt or between the flashing member and the skirt providing a "free" pivoting action with substantially no resistance to bending. In order to lock the skirt in contact with the roof surface additional locking means

is provided, which can be in the form of any convenient means either locking the hinge as such or preventing the pivoting members to pivot relatively to each other.

In preferred embodiments the at least one hinge is arranged in parallel with the rail.

The invention will now be explained in more detail in the following with reference to the schematic drawings, in which

Fig. 1 shows a typical lower flashing member for a roof window;

Fig. 2 shows a flashing member according to a first aspect of the present invention comprising a rail member and a skirt;

Fig. 3 shows an embodiment of the hinge illustrated in Fig. 2;

Fig. 4 shows a further embodiment of the hinge illustrated in Fig. 2;

Fig. 5 shows an alternative embodiment of the hinge illustrated in Fig. 2;

Fig. 6 shows a further alternative embodiment of the hinge illustrated in Fig. 2;

Fig. 7 shows a flashing member according to a second aspect of the present invention comprising a rail member and a skirt; and

Fig. 8 shows a flashing member according the present invention comprising first and second hinges.

Fig. 1 shows a typical lower flashing member 100 for a roof window, comprising a rail element 101 (or sheet element) with a general longitudinal orientation and a skirt element 102. The skirt element comprises an upper portion 104 with an upper edge 105 and a main skirt portion 107 with a lower free edge 103. The rail element comprises a first lower portion 110 with a fold or channel 106 into which the upper edge 105 of the skirt is mounted and subsequently attached (the elements are shown prior to assembling)

as well as an opposed second upper portion 111 with a free edge. Indeed, any suitable method could be used for attaching the skirt to the rail, e.g. by bonding or fastening means such as rivets. The shown skirt is of the wave-undulated type, however, according to the intended use it could be pleated or planar. Irrespective of the specific surface properties of the skirt, it can be said to define a general plane.

Fig. 2 shows in cross-section (taken perpendicular to the longitudinal direction of the rail) a schematic representation of a flashing member according to a first aspect of the present invention in which a hinge 201 between the rail 203 and the skirt 202 is formed directly in the skirt material by an embossed, linear indentation or groove in the upper skirt portion in the vicinity of the lower edge of the rail, this allowing the skirt to be pivoted between a first "initial/final" position (shown in full line) and a second bend-back position (shown in dotted line) in which the skirt is pivoted along the hinge formed therein. The embossed groove 201 may have a depth which is constant across the width of the skirt or which varies. In the shown embodiment the groove is facing downwards, i.e. the embossment is made on the lower surface of the skirt, but the skirt may also be embossed on the upper surface thereof. The latter embodiment is, however, less preferred, as it is less effective at preventing bending. As shown, the skirt is attached to the rail using a fold or channel formed in the lower edge of the rail. The upper edge of the rail may comprise a flange member 204 adapted to engage an upper surface of a roof window frame portion.

Fig. 3 illustrates in greater detail the embossed hinge portion (the rest of the skirt is not shown) of the flashing in Fig. 2. The skirt in which the hinge is made is in the shown embodiment manufac-

tured from a sandwich material in which a stress damping and stabilizing core layer 210 of ductile material is covered on an upper surface with an upper foil sheeting 211 and on a lower surface with a lower foil sheeting 212 thus making up the upper respectively lower surfaces of the skirt member 202. The hinge portion comprises an upper portion 220 facing towards the rail and a lower portion 221 facing towards the free edge of the skirt, between which is arranged a linear (i.e. perpendicular to the plane of the paper) indentation 222 serving as a hinge for bending the first and second hinge portions relative to each other. The hinge comprises upper and lower "legs" 225, 226 which as shown in Fig. 3 are substantially symmetrical.

Fig. 4 illustrates a hinge of the same type as illustrated in Fig. 3, however, in contrast to this the two hinge legs 225, 226 are non-symmetrical with the upper leg 226 being arranged with a more perpendicular orientation relative to the general plane of the skirt. Corresponding to the transition area between the upper 226 and lower 225 legs of the hinge, the lower surface (or lower foil sheeting) thereof is bend more sharply along a longitudinal "edge" or ridge 223, which serves as a "primary" hinge area. By in this way controlling the site for the primary, or initial, bending a hinge is provided which more properly ensures that the free edge of the skirt will not bounce back when it is folded down towards the roof surface after having been bend back. It is believed that this is due to the strain hardening being concentrated along such a sharply bend line. The core layer may be made out of a polymeric material or a bitumen product, and the foil may be a thin metal foil, preferably aluminium foil.

Figs. 5 and 6 show further variations of embossed hinges of the same general type illustrated in

Figs. 3 and 4. The hinge in Fig. 5 is symmetrical as the hinge in Fig. 3, however, it comprises a sharply bend "edge" portion 223 on the lower surface as in the Fig. 4 embodiment. The hinge in Fig. 6 is non-symmetrical as the hinge in Fig. 4, however, the sharply bend edge 223 on the lower surface is even more pronounced and in addition also the upper surface of the hinge comprises a sharply bend edge 224.

Fig. 7 shows in cross-section (taken perpendicular to the longitudinal direction of the rail) a schematic representation of a flashing member according to a second aspect of the present invention in which a rail or sheet member 303 having a first lower edge 313 and a second opposed upper edge 314 as well as a skirt having a first upper edge 323 and a second lower edge 324. The skirt is attached to the rail or sheet member along the first edges thereof. However, in contrast to the flashing member shown in Fig. 2 this embodiment comprises a separate hinge element 301 arranged between the skirt 302 and the rail 303, the hinge allowing the skirt to be pivoted substantially freely between a first "initial/final" position (shown in full line) and a second bend-back position (shown in dotted line) in which the skirt is pivoted along the hinge arranged there between. In Fig. 7 the hinge is represented symbolically. Preferred types of hinges included pin-type hinges, e.g. piano hinge.

As described above, it is important that the skirt in the Fig. 7 embodiment can be locked relative to the rail member. This can be done in any convenient way, either by locking the hinge itself or by locking the skirt relative to the rail member. Indeed, when the hinge is arranged between two portions of the skirt, the locking means should be placed correspondingly. When locking the hinge itself, this may be done by, for example, pivotal or sliding clamping

means. When locking the skirt relative to the rail, the locking means can be provided on either the skirt member or the rail, or both.

Indeed, although the embossed hinges are adapted to be "self-locking" the flashings provided with such hinges may also be provided with locking or clamping means for further assuring a close contact between the skirt and the upper surface of the roof.

In the above described embodiments, only a single hinge arranged in the vicinity of the rail member has been described, however, it is within the scope of the present invention to provide a single hinge at any desired location between the upper and lower edges of the skirt or to provide a number of hinges. For example, a second hinge could be arranged in the vicinity of the lower edge or in the middle of the skirt relative to the upper and lower edges. Fig. 8 illustrates such an embodiment comprising a first 401 and a second hinge 402. It is clear that for a flashing member with more than one hinge, the properties of each hinge can be chosen independently of each other, the above disclosure relating to such individual hinges.

In all the illustrated embodiments, the dimensions of the hinges are shown exaggerated. In preferred embodiments the depth of the embossed groove is between 2 and 20 mm.

According to a preferred embodiment of the invention, a sheet flashing kit for a roof window is provided comprising flashing members as described above with reference to Figs. 1 to 8.

In a further preferred embodiment a sheet flashing kit for a roof window is provided comprising two identical side flashing members, an upper flashing member as well as a lower flashing members as described above with reference to Figs. 1 to 8. Preferably corner segments for providing a seal between

the side members and the upper/lower members are supplied or integrated with either the side or upper/lower flashing members.

P A T E N T C L A I M S

1. A flashing member comprising:

- a rail member (101,203,303) of a sheet material and comprising first and second opposed portions;
- a skirt member (102,202,302) of another sheet material and comprising first and second opposed portions;
- the first portion (104) of the skirt being connected to the first portion (110) of the rail, by a joint running in a longitudinal direction of the flashing member, the second portion (107) of the skirt having a free edge (103),

c h a r a c t e r i z e d by

- hinge means (201,301,401,402) allowing at least a portion of the skirt member to bend or pivot relative to the rest of the flashing member, and
- locking means associated with the hinge means for preventing unintended lifting of said portion of the skirt member after the flashing has been fitted.

2. A flashing member as defined in claim 1, wherein the skirt member comprises a longitudinal embossed indentation (201,401,402) serving as self-locking hinge means.

3. A flashing member as defined in claim 2, wherein the skirt member or a part thereof comprising the embossed indentation is made of a strain hardening material.

4. A flashing member as defined in claim 2 or 3, wherein the skirt comprises upper and lower surfaces and the hinge means comprises corresponding upper and lower curved surfaces, at least one of the curved surfaces comprising a relatively sharply bend ridge (223,224) arranged in the longitudinal direction of the hinge means.

5. A flashing member as defined in claim 1, wherein the hinge means comprise a hinge element (301).

6. A flashing member as defined in claim 5, wherein the hinge element (301) is a piano hinge.

7. A flashing member as defined in any of claims 1-6, wherein the hinge means (201,301,401,402) is arranged substantially parallel to the longitudinal direction of the flashing element.

8. A flashing member as defined in any of the claims 1-7, wherein the skirt member and the rail member are interconnected by a hinge element (301).

9. A flashing member as defined in any of claims 1-8, comprising at least one further hinge (402) arranged between portions of the skirt member, the hinges (401,402) preferably being arranged in parallel.

10. A flashing member as defined in any of claims 1-9, wherein the skirt member is of a sandwich construction comprising a stress damping and stabilizing core layer (210) of ductile material covered on at least one side by a foil sheeting (211,212).

11. A flashing member as defined in claim 10, wherein the core (210) comprises a polymeric material or bitumen product, and wherein the foil (211,212) comprises a thin metal foil, preferably an aluminium foil.

12. A sheet flashing kit comprising at least two sheet flashing members being adapted for use as side flashing members for a roof window, and at least one flashing member as defined in any of claims 1-11, said one flashing member being adapted for use as a lower flashing member for a roof window.

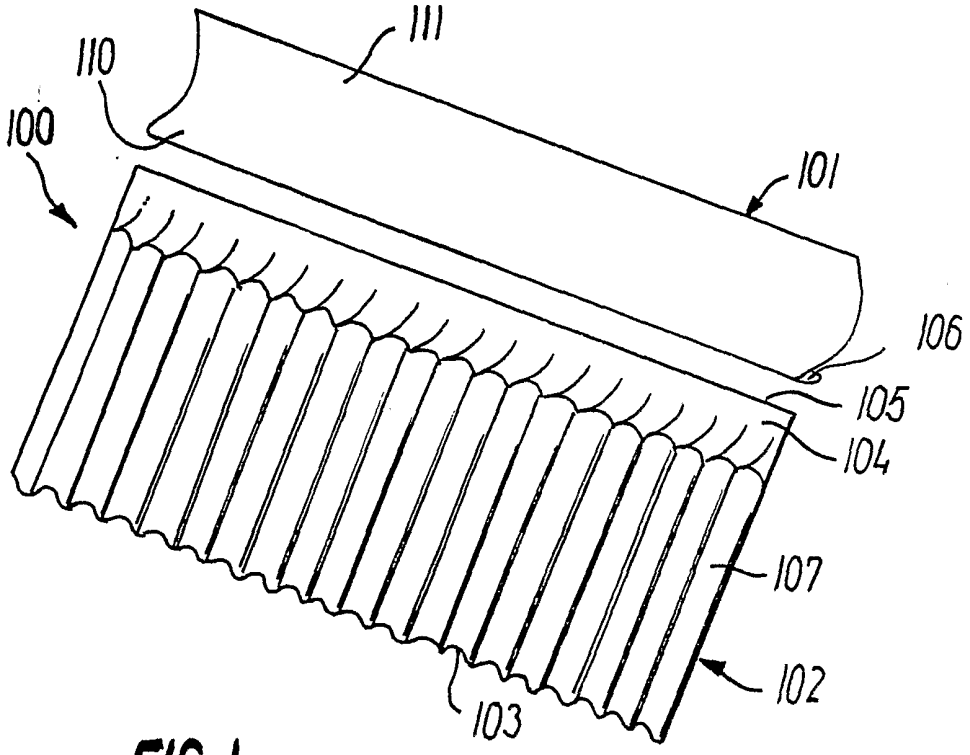

FIG. 1

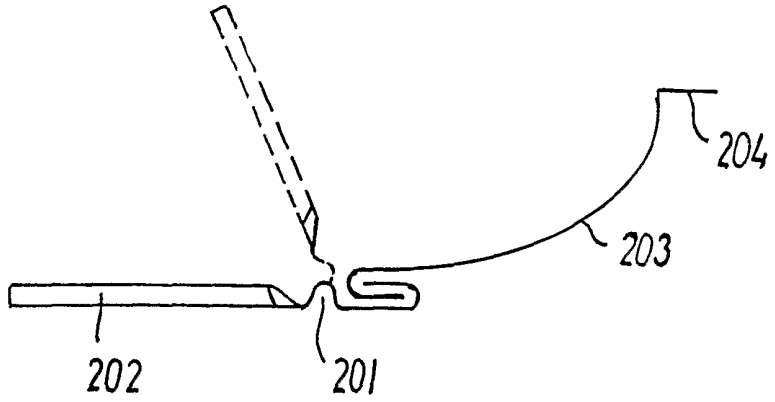

FIG. 2

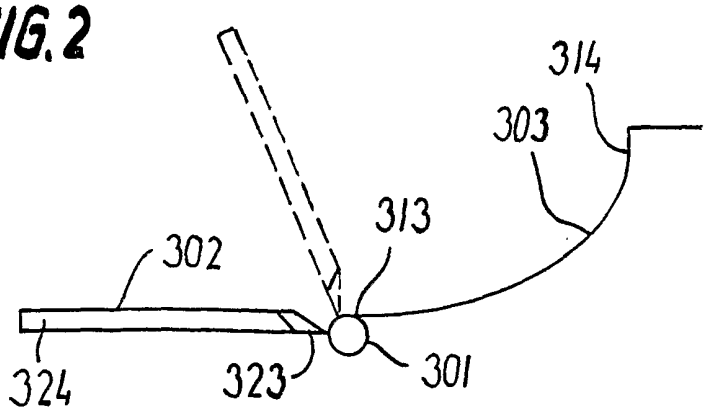

FIG. 7

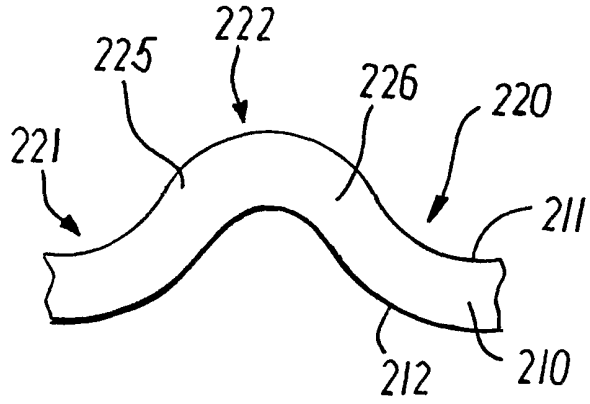

FIG.3

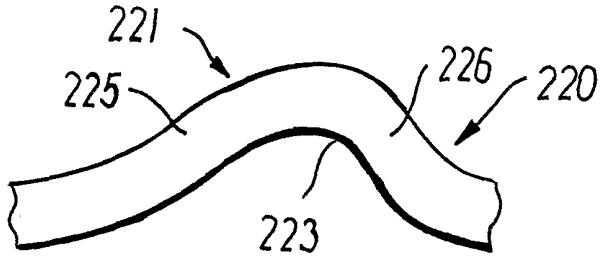

FIG.4

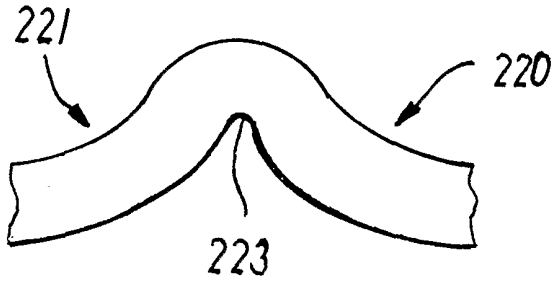

FIG.5

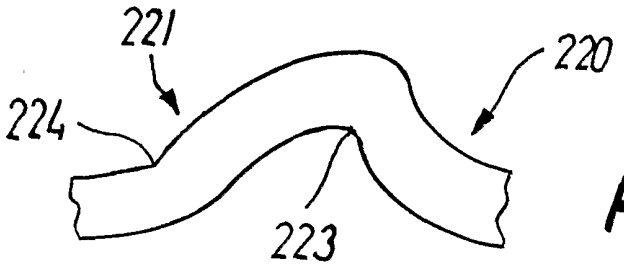

FIG.6

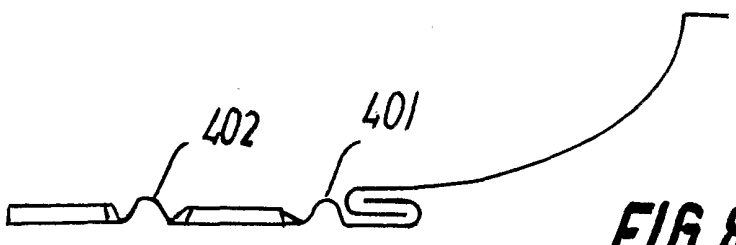

FIG.8

INTERNATIONAL SEARCH REPORT

Int ›nal Application No
PCT/DK 01/00552

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 E04D13/14 E04D13/147 E04D13/02 E04D13/03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 E04D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 196 831 A (RASMUSSEN KANN IND AS) 8 October 1986 (1986-10-08) page 1, line 24 -page 3, line 5	1,5-9,12
Y		10,11

X	WO 99 13181 A (VELUX IND AS (DK)) 18 March 1999 (1999-03-18) page 1, line 3 - line 27 page 2, line 6 - line 24 abstract	1,5-9,12
Y		10,11

X	WO 99 13180 A (VELUX IND AS) 18 March 1999 (1999-03-18) page 4, line 5 - line 24; figures 4,5	1,5-12

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
16 November 2001	16. 01. 2002

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 37106 84 A (MONIER LTD) 4 July 1985 (1985-07-04) the whole document	1,5-9,12
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INTERNATIONAL SEARCH REPORT

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