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(71) Ansøger:
VKR Holding A/S, Breeltevej 18, 2970 Hørsholm, Danmark

(72) Opfinder:
Jens-Ulrik Holst Henriksen, c/o VKR Holding A/S, Breeltevej 18, 2970 Hørsholm, Danmark
Martin Jensen, c/o VKR Holding A/S Breeltevej 18, 2970 Hørsholm, Danmark
Felix Thomas, c/o VKR Holding A/S Breeltevej 18, 2970 Hørsholm, Danmark

(74) Fuldmægtig:
AWA Denmark A/S, Strandgade 56, 1401 København K, Danmark

(54) Titel: **A method for packaging an underroof collar, a packed underroof collar, and a folding tool for folding an underroof collar**

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(57) Sammendrag:
A method for packaging an underroof collar for use in water-proofing a joint between a roof structure and a window frame is disclosed. It comprises folding the underroof collar along two or more folding lines extending substantially in parallel to the length of a first set of collar members using a folding tool comprising two or more elongate tool members. Each tool member has a length extending in parallel to the length of the collar members of the first set when in use. The folding is achieved by the underroof collar being lifted and/or displaced by the tool members, thereby moving a second set of collar members in relation to those of the first set, so that at least a part of centre sections of the collar members of the second set are arranged on top of at least one of the collar member of the first set.

Fortsættes...

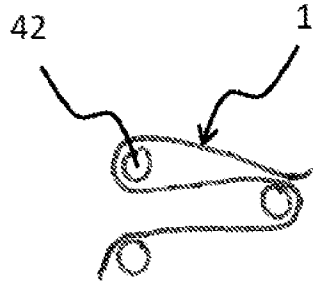

Fig. 15

Title of Invention

A method for packaging an underroof collar, a packed underroof collar, and a folding tool for folding an underroof collar

Technical Field

The present invention relates to a method for packaging an underroof collar for use in water-proofing a joint between a roof structure and a window frame, said underroof collar comprising a first set of collar members and a second set of collar members extending perpendicular to the first set of collar members, said collar members being configured for extending along frame members of a rectangular window frame in a mounted state, each collar member including an inner rim part and an outer skirt part intended for coming into engagement with the roof structure, and said inner rim parts together delimiting a collar opening, where each collar member has a length extending in parallel with the inner rim part, where each of said collar members comprises a centre section extending between the collar members of the other set of collar members along the collar opening, and where the underroof collar has an interior side adapted for facing the roof structure and window frame in a mounted state and an opposite exterior side adapted for facing away from the roof structure and the window frame in a mounted state, said method including the step of folding the underroof collar along two or more folding lines.

Background Art

Underroof collars of the kind mentioned above are known for example from EP0994992B1, EP2952646A1, and EP2284329A2, and since they are made from soft textile-like materials they can been packaged in many ways. Focus have primarily been on making the packed underroof collar as compact as possible in order to reduce the space needed for storage and transportation, but in later years focus has shifted towards making the installation of roof window related products, such as underroof collars, easier in order to avoid errors in mounting. One example is found in the applicants' own prior patent application WO2018/210937, where the underroof collar was provided with an

engagement zone adapted for engagement with a window frame or the like.

It, however, remains a problem that as underroof collars are relatively large and made from light and soft materials, they are difficult to handle during packaging.

Summary of Invention

With this background, it is an object of the invention to provide an improved method for packaging an underroof collar, a packed underroof collar, and a folding tool for folding an underroof collar.

This and further objects are achieved with a method as described above, where the underroof collar is folded along two or more primary folding lines extending substantially in parallel to the length of the collar members of the first set using a folding tool comprising two or more elongate tool members, each of said tool members having a length extending in parallel to the length of the collar members of the first set when in use and defining a length direction, and that the underroof collar is lifted and/or displaced by the tool members thereby moving the collar members of the second set in relation to the collar members of the first set, so that at least a part of the centre sections of the collar members of the second set are arranged on top of at least one of the collar member of the first set.

The elongate tool members act as carriers engaging with and moving the material of the underroof collar so that is folds over each tool member along a folding line extending in parallel to the length of the tool member. When the tool members are subsequently retracted from the underroof collar or the underroof collar taken off the folding tool, the folds will remain, leaving the underroof collar in a folded state. The length of tool members used is preferably longer than the length of the collar members of the first set so that one fold extending over the entire underroof collar is created by one tool member. It is, however, also possible to use tool members each engaging only with one of the collar members of the second set, i.e. using one set of tool members at one side of the underroof collar and another set of tool members at the other side of the underroof collar.

In addition to the pattern of movement of the tool members, the surface properties of the tool members may influence on the resulting configuration of the folded underroof collar. If the tool members have a smooth surface, the material of the underroof collar may slide over their surfaces, whereas a rough or profiled surface may result in friction against the material of the underroof, whereby it may be retained. All tool members do not have to be identical, and differences in surface properties may contribute to controlling the folding of the underroof collar. It is even possible to provide conveyors, such as belts, cables, or rollers, on the surface of one or more tool members. By activating such conveyors, the underroof collar may be forced to move in relation to the tool member in question. A similar effect may be achieved by rotating a tool member with rough or profiled surface about its length direction.

It is presently considered advantageous to release the underroof collar from the folding tool by arranging at least a part of the underroof collar so that it rests on a support surface and then retracting the tool members by moving them in their length directions, but it is also possible to for example pull the underroof collar off the folding tool, to change the angle of the tool members so that the underroof collar slides off the folding tool, or to use a combination of steps resulting in the underroof collar coming off the folding tool.

All tool members should preferably remain parallel to each other at all stages of the folding process to ensure that the folds are parallel, but a slight mutual angling of tool members may be advantageous when releasing the underroof collar from the folding tool to reduce friction between the tool members and the underroof collar.

In one embodiment the method for folding of the underroof collar further comprises the steps of:

A) fixating a collar member of the first set and allowing the collar member to hang from this collar member under the influence of gravity,

B) moving the tool members into contact with the underroof collar in directions, which are substantially perpendicular to their respective length directions, so that at least one a tool member engages the interior side of the underroof collar and at least one tool member engages the exterior side of the

underroof collar,

where the movement of the tool members is continued until the tool member engaging the interior side of the underroof collar has passed a plane defined by the exterior side in the hanging position in step A), and/or the tool member engaging the exterior side of the underroof collar has passed a plane defined by the interior side in the hanging position in step A).

In other words, the tool members move in on the hanging underroof collar from opposite sides and push the underroof collar in front of them so that each tool member creates a fold and the underroof collar is forced into a zig-zag configuration where sections of the underroof collar extend from one toll member to another. The angle of these sections of the underroof collar relative to each other and to the initial vertical orientation of the underroof collar will depend on the mutual distance between the tool members in the vertical direction and on how far across the tool members are moved. Another factor influencing on the resulting configuration of the underroof collar tool member is the cross-sectional shape and size of the tool members. It is presently considered advantageous that the tool members have a circular cross-section with a diameter of at least 10 mm so that the primary folds created on the underroof collar are not sharply defined and the underroof collar may slide over the tool members as they move across.

If the location of fixation of the fixated collar member of the first set is stationary, the distance between the free hanging collar member of the first set and the folding tool will gradually decrease as the tool members move across and sections of the underroof collar come to extend between them. It is also possible to move the location of fixation, the free hanging collar member, the folding tool, and/or individual tool members in relation to each other in the vertical direction to control the folding.

The fixation of the underroof collar may for example be achieved by clamping the underroof collar between two rail member of the folding tool, thus providing a linear support for the underroof collar, but it is also possible to use two or more local fixations, such as clips.

The folding method may further comprise the subsequent step C) of

moving at least one of the tool members in a direction, which is substantially parallel to the plane defined by the exterior side in the hanging position in step A) so that a mutual angle between two sections of the underroof collar located on different sides of a tool member following step B) becomes smaller, said sections of the underroof collar preferably becoming substantially parallel. In this way the underroof collar is moved further towards its intended folded state, thereby increasing the precision of the folding compared to methods where the underroof collar is released in position, where the tool members are further from each other.

Due to the fixation of the underroof collar, it is considered advantageous that the underroof collar slides over at least one of the tool members during at least a part of the steps B) and C). To facilitate this the tool members used in this embodiment of the invention preferably have a rounded and smooth surface as described above.

In another embodiment, the method, instead of steps A) and B), comprises the steps of:

D) arranging the underroof collar on a support surface, said support surface comprising openings or cavities configured for accommodating the tool members,

E) moving the tool members into contact with the underroof collar, thereby lifting it from the support surface, the tool members being moved in directions, which are substantially perpendicular to their respective length directions, and away from the support surface, and

F) moving the tool members in a direction along the support surface, thereby bringing at least two tool members closer to each other in a direction parallel to the support surface and shifting sections of the underroof collar in a direction parallel to the support surface.

As the initial position of the underroof collar, when it rests on the support surface, is now substantially horizontal there is no need for a fixation of the underroof collar. The continuous support provided by the support surface may also be advantageous if the skirt part of some of the collar members are made with a surplus of material, for example being pleated, as a surplus of

material may be more difficult to manage in a hanging position.

In this embodiment the members used preferably have a rough or profiled surface so that the tendency of the underroof collar to slide over the tool members due the folding steps is kept low as described above.

To move the underroof collar further towards its intended folded state, it is presently considered advantageous that step F) results in at least two tool members becoming arranged closely above each other when seen in a direction perpendicular to the support surface. As described above this will increase the precision of the folding compared to methods where the underroof collar is released in position, where the tool members are further from each other.

Regardless how the folding tool is embodied, the method may further comprise one or more of the following steps:

G) Folding the underroof collar along a secondary folding line extending substantially perpendicular to the primary folding lines so that the collar members of the second set are arranged on top of or underneath the collar members of the first set, and

H) Folding the underroof collar along a tertiary folding line extending substantially in parallel to the primary folding lines.

This will result in the folded or packed underroof collar becoming more compact, and potentially in that only a single collar member is exposed in the packed state. It is presently preferred that the underroof collar is folded along two secondary folding line, each coinciding substantially with the inner rim of a collar member of the second set. The folding along a tertiary folding can be performed before or after the folding along one or more secondary folding lines, or the underroof collar may be folded along two or more tertiary folding lines, possibly both before and after a folding one or more secondary folding lines. The folding along secondary and/or tertiary folding lines may be performed by hand or using a folding tool.

To facilitate the mounting of the underroof collar around a rectangular window frame mounted in an inclined roof structure the first set of collar members are top and bottom collar members configured for extending along

top and bottom frame member of the rectangular window frame, where the underroof collar is folded so that at least a part of the centre section of each side collar member is arranged on top of or underneath the top collar member, the bottom collar member, and/or a section of the side collar member located in continuation of the top collar member or the bottom collar member when seen in the length direction of said top collar member or bottom collar member, and so that the top collar member and the bottom collar member are arranged one on top of the other. This allows the packed underroof collar to be arranged at the top frame member of the window frame and to be then unfolded in the direction of the inclination of the roof so that the side collar members become arranged along the side member of the window frame and the bottom collar member is lastly arranged along the bottom frame member.

The inner rim parts of the underroof collar will typically be configured for abutting on outer sides of the top, bottom and side members of the window frame in the mounted state, said outer sides facing away from the opening defined by the frame and extending substantially perpendicular to the plane of the roof, i.e. being substantially vertical. This means that in the mounted state the inner rim parts will extend at an angle with respect to the skirt parts, which extend over the roof structure, away from the window frame. During the folding of the underroof collar, however, the inner rim parts are preferably arranged so that they lay flat in the same plane as the outer skirt parts. This makes it easier to fold the underroof collar.

The invention also relates to a packed underroof collar folded as described above.

The invention further relates to a folding tool for folding the underroof collar along two or more primary folding lines, said folding tool comprising two or more elongate tool members, each having a length extending defining a length direction, and an activation mechanism configured for moving the elongate tool members in relation to each other in directions, which are substantially perpendicular to the length directions of the tool members, where said tool members are configured for engaging the underroof collar and for lifting and/or displacing it into a folded state. The activation mechanism may for

example comprise pneumatic cylinders adapted for moving each tool member independently and may be controlled by a computer. As another example, a mechanical activation mechanism driven by a motor may be used.

The activation mechanism may also or alternatively be configured for rotating one or more tool members about its own length direction and/ or for activating one or more conveyors on the surface of one or more tool members.

In one embodiment the activation mechanism is also configured for moving the tool members in their length directions, which may facilitate removal of the underroof collar from the folding tool.

The folding tool may further comprise a fixation mechanism for fixation the underroof collar in a hanging position and/or a support surface for supporting the underroof collar in a substantially horizontal position and/or a release mechanism for facilitating the removal of the underroof collar from the tool members. The fixation mechanism may for example comprise a pair of rail members configured for clamping the underroof collar between them. The support surface may comprise a table and/or a belt conveyor on which the underroof collar may rest. The release mechanism may for example comprise clamps for holding on to the underroof collar during a retraction of the tool members and/or for pulling on the underroof collar.

Brief Description of Drawings

In the following description embodiments of the invention will be described with reference to the schematic drawings, in which

Fig. 1 is a perspective illustration of the mounting of an underroof collar around a window frame installed in an inclined roof structure,

Figs 2-5 are schematic illustrations of steps of a first method for folding an underroof collar,

Fig. 6 is a schematic illustration of an underroof collar folded by the method illustrated in Figs 2-5,

Fig. 7 is a schematic illustration of the folded underroof collar in Fig. 6 further folded along secondary folding lines,

Fig. 8 is a schematic illustration of the folded underroof collar in Fig. 6

further folded along a tertiary folding line,

Figs 9-11 are schematic illustrations of steps of a second method for folding an underroof collar, and

Figs 12-15 are schematic illustrations of steps of a third method for folding an underroof collar.

Description of Embodiments

Referring initially to Fig. 1, the mounting of an underroof collar 1 around a window frame 2 installed in an inclined roof structure 3 including an underroof 31 is shown. The packed underroof collar is arranged with a top collar member 11 at the top frame member 21 of the window frame and unfolded as shown by the arrows. In this way, side collar members 12 of the underroof collar come to extend alongside frame members 22 of the window frame and the bottom collar member 13 is eventually arranged along the bottom frame member 23. The top and bottom collar members 11, 13 here constitute a first set of collar members and the side collar members 12 constitute a second set of collar members extending perpendicular to the first set of collar members. Each collar member 11, 12, 13 includes an inner rim part 121, 131 and an outer skirt part 112, 122, 132. The inner parts delimit a collar opening 10 and are oriented so that they stand upright at an angle with respect to the skirt parts and will thus be parallel with and abut on the vertical exterior parts of the top, bottom and side members of the window frame 2 in the mounted state. An interior side of the outer skirt parts comes into engagement with the underroof 31 and laths 32 of the roof structure, while the exterior side 15, which is coloured grey, faces the exterior and diverts any precipitation, e.g. rain or snow, from the joint between a roof structure 3 and a window frame 2.

To facilitate mounting of the underroof collar 1, it is delivered in a packed state, where is it folded several times.

One method for folding an underroof collar in an automated manner is illustrated Figs 2-5.

In Fig. 2 the underroof collar 1 is hanging under the influence of gravity from a fixation mechanism 41 of a folding tool. The underroof collar is shown

simply as a line, as it is preferably arranged in a flattened state before being folded, but it will be understood that the presence of for example inner rim parts 121, 131, which are intended to project upwards along outer sides of the window frame in the mounted state as shown in Fig. 1, may result in some sections of the underroof collar appearing slight thicker than others. Likewise, the presences of pleating on the side collar members 12 may result in them being slightly thicker than the top and bottom collar members 11, 13. The invention is not limited to the folding of an underroof collar having the exact features shown in Fig. 1.

In this embodiment the fixation mechanism comprises two rail members, each having a triangular cross-sectional shape and extending into the plane of the drawing, and the underroof collar is fixated by a collar member of the first set being clamped between them, in this case the bottom collar member 13 as shown in Fig. 1. The fixation may, however, also be achieved in a different way as long as the underroof collar hangs safely.

Three tool members 42 are arranged below the fixation mechanism 41, one of one side of the underroof 1 collar and two on the opposite side. Each tool member is a rod, having a circular cross-sectional shape and extending into the plane of the drawing, and each is connected to an activation mechanism (not shown) of the folding tool configured for moving the tool member in directions substantially perpendicular to its length direction, i.e. in the plane of the drawing.

For initiating the folding of the underroof collar 1, the tool members 42 are moved as indicated by the arrows in Fig. 2 into contact with the underroof collar. In this case one tool member engages the interior side 14 of the underroof collar and two tool members engage the exterior side 15 of the underroof collar. As may be seen, the tool member 42 engaging the interior side 14 is located approximately at the centre of the underroof collar, i.e. at the centre sections of side collar members 12 extending between the top and bottom collar members 11, 13 along the collar opening 10 as shown in Fig. 1. To be able to engage with both side collar members 12 it is preferred that the tool members 42 have a length in the direction extending into the drawing in

Fig. 1, which is longer than the length of the top and bottom collar members 11, 13, i.e. the collar members of the first set. It is, however, also possible to use two sets of tool members each engaging one of the collar members of the second set, i.e. the side collar members in this embodiment.

Turning now to Fig. 3, it is seen that the movement of the tool members 42 continues until the tool member engaging the interior side 14 of the underroof collar 1 has passed a plane defined by the exterior side 15 in the hanging position in Fig. 2, and the tool members engaging the exterior side 15 have passed a plane defined by the interior side 14 in the hanging position. In this way the underroof collar is displaced by the tool members and brought into a zig-zag configuration with a soft fold at each tool member, the tool members thus defining three primary folding lines extending substantially in parallel to the length of the collar members of the first set. As may be seen, the distances between the tool members 42 is larger in Fig. 3 than in Fig. 2. This means that the underroof collar 1 is forced to slide over the tool members during their movement and that the free hanging section 16 of the underroof collar hanging below the lowermost tool member is thus shortened.

The tool members 42 are then moved upwards in a direction, which is substantially parallel to the plane defined by the exterior side 15 in the hanging position in Fig. 2 as illustrated by the arrows in Fig. 3 to the position illustrated in Fig. 4. This results in that the mutual angles between the sections of the underroof collar 1 located on different sides of a tool member becomes smaller and in that the free hanging section becomes slightly longer again due to the underroof collar sliding over the tool members. It is, however, also possible to initially arrange the tool members closer to each other in the direction parallel to the plane defined by the exterior side 15 in the hanging position, thereby eliminating the need for the movements illustrated by the arrows in Fig. 3.

The distance covered by the tool members 42 during their movement may depend on the size of the underroof collar 1. A longer movement will allow the folding of a longer underroof collar. It is also possible to increase the number of tool members, for example adding one or more additional tool members below those shown in Figs 2 and 3, and to use some of them only for

the folding of underroof collars, which are longer than the one shown. Such additional tool members (not shown) may be kept idle when folding shorter underroof collars or simply move without engaging the shorter underroof collar.

The tool members 42 are then moved downwards and sideways as illustrated by the arrows in the Fig. 4 to the positions in Fig. 5. By this movement the free hanging section 16 of the underroof collar comes into contact with a support surface 43 and is pulled to the side by the friction between material of the underroof collar and the support surface. It is, however, also possible to apply a simpler pattern of movement, for example only moving the tool member 42 straight downwards towards the support surface.

At the same time or thereafter the fixation mechanism releases its grip so that the section 17 of the underroof collar previously extending between the uppermost tool member and the fixation mechanism 41 falls down over the neighbouring section extending between the two uppermost tool members. In Fig. 5 all four sections of the underroof collar are shown as extending substantially in parallel, but it is to be understood that the previously fixated section 17 will usually be resting on the neighbouring section underneath it. It is also to be understood that if applying more tool members, the number of folds and hence the number of sections arranged on top of each other will be higher.

While the method has here been described with reference to an embodiment where the tool members 42 are moved in relation to the support surface 43 it is to be understood that the it may also be the other way around. What is important, is the mutual movement of the two, and similar considerations apply to the other movements of tool members described, also with reference to the other embodiments of the invention.

The underroof collar 1 is now folded along three primary folding lines and the folding tool can be retracted either in a direction into or out of the plane of the drawing, or the underroof collar can be pulled off the tool members. The underroof collar is thereby left in the state shown in Fig. 6, where the primary folding lines I-I are indicated by the dash-dotted lines, and where the top collar member 11 and the bottom collar 13 member are arranged one on top of the

other.

The actual folds on the underroof collar 1 are not exactly linear due to the soft nature of the material typically used for underroof collars and the relatively large diameter of the tool members 42. If sharper folds are needed or desired, tool members with a smaller diameter may be used and/or both ends of the underroof collar may be fixated so that the underroof collar may be pressed against the tool members. A fixation of the section 16 hanging free in Fig. 2-4 may replace the support surface 43 in Fig. 5, but it is presently considered advantageous that at least a part of the underroof collar 1 rests on a support surface during the release from the tool members 42, as this provides a good control of the relatively soft folded material.

To make the packed underroof collar more compact it may be folded further along secondary and/or tertiary folding lines, which are indicated by the broken lines II-II and III-III and shown by the arrows a and b, respectively, in Fig. 6.

If folded only along the primary folding lines and the secondary folding lines, which extend substantially perpendicular to the primary folding lines and along the inner rim parts of the side collar members 12, i.e. the second set of collar members, the underroof collar 1 get into the configuration in Fig. 7. Here, the corner sections of the underroof collar 1, where the side collar members 12 meet the top and bottom collar members, are arranged on top of the bottom collar member 13. In some embodiments of the underroof collar the top and bottom collar members extend over the entire width of the underroof collar, in other embodiments the side collar members extend over the entire height of the underroof collar, and in still further embodiments the collar members are interconnected in bevelled joints. In the embodiment in Fig. 1 the top collar member 11 extend over the entire width of the underroof collar, while the side and bottom collar members 12, 13 are interconnected in bevelled joints, but other combinations of different joint types are also possible.

If the underroof collar is folded only along the primary folding lines and the tertiary folding line, which extends substantially in parallel to the primary folding lines, the underroof collar 1 get into the configuration in Fig. 8. Here, the

centre sections of the side collar members 12 are arranged on top of the bottom collar member 13.

It is also within the scope of the invention to fold the corner sections or side collar members onto the top collar member 11 and/or to fold along all of the primary, secondary, and tertiary folding lines. Likewise, the underroof collar 1 may be folded along further folding lines, which will particularly be advantageous when packaging large underroof collars intended for large roof windows or like roof penetrating structures.

While the secondary and tertiary folding lines II, III are shown as extending along edges of collar members it is to be understood that they may be located differently, depending for example on the overall size of the underroof collar 1 and the desired shape of the packed underroof collar.

Another method for folding an underroof collar 1 is shown in Figs 9-11. In this embodiment the underroof collar is arranged on a support surface 43 in a substantially horizontal orientation and tool members 42 corresponding to those described above with reference to Figs. 2-5 are arranged in grooves 44 in the support surface. When the tool members are moved upwards as indicated by the arrows in Fig. 9, the underroof collar 1 is lifted to the position shown in Fig. 10. As the soft underroof collar is now hanging from the tool members 42, a primary folding line is created above each tool member and a third, but less well-defined primary folding line extends at the position marked c.

The tool members 42 are then moved sideways and downwards as indicated by the arrows in Fig. 10 to the positions in Fig. 11. As described with reference to the free hanging section 16 in Figs 2-5, the right-hand end-section 18 is kept back by friction when coming into contact with the support surface 43 and thus comes to lie underneath the other sections of the underroof collar.

In this embodiment is may be advantageous that the tool members 42 are less smooth than in the embodiment in Figs 2-5, as the underroof collar 1 only needs to slide over them when it is taken off the folding tool, either by retraction of the tool members, by pulling on the underroof collar or by a combination of the two.

The size distribution of the four sections of the underroof collar 1 in Fig 11 is slightly more equal than in Fig. 5, but this is only intended to illustrate the possibility for variation. The size distribution may be changed by changing the initial distance between the tool members 42 or by changing the pattern of movement of the tool members, and the surface properties of the tool members, which define the friction against the underroof collar, will also play a role.

A still further method for folding an underroof collar is shown in Figs 12-15. In this embodiment the underroof collar 1 is initially arranged in a horizontal position on a conveyor 45, here illustrated as a roller conveyor, and then passes over the edge of the conveyor at the right-hand side in Fig. 12. By this movement the underroof collar passes between two tool members 42, which are moved sideways as shown by the arrows in substantially the same way as described with reference to Fig 2. In this case, however, the third and lowermost tool member engages later than the first two as shown in Fig. 13, waiting until the free hanging end of the underroof collar has reached down to it. Finally, the trailing end of the underroof collar 1 comes off the conveyor as shown in Fig. 14 and falls down onto the neighbouring section of the underroof collar as shown by the arrow, thereby ending up in the final position shown in Fig. 15, where the underroof collar is ready for being released from the folding tool. In this embodiment there are only two primary folding lines, but a third may be added by adding an additional tool member or by engaging a support surface as described above.

The forward movement of the underroof collar 1 is here described as being driven by the conveyor 45, but it is also possible to use one or more of the tool members as drive members. This may for example be done by making them rotatable and having a high coefficient of friction in contact with the underroof collar or by making a belt conveyor pass over them. In this way the tool members may pull the underroof collar off the conveyor, which may then be passive or only active during an initial phase of the folding process. The conveyor may then also be replaced with an entirely passive support surface as described with reference to Figs 9-11.

The observations presented with respect to the folding along secondary and tertiary folding lines presented with reference to Figs. 6-8 and the folding method illustrated in Figs 2-5 also apply to the folding methods in Figs. 9-15 even though the mutual positioning of the collar members is not necessarily the same.

List of reference numerals

1	Underroof collar
10	Collar opening
11	Top collar member
111	Inner rim part
112	Outer skirt part
12	Side collar member
121	Inner rim part
122	Outer skirt part
13	Bottom collar member
131	Inner rim part
132	Outer skirt part
14	Interior side
15	Exterior side
16	Free hanging section
17	Fixated section
18	End section
2	Roof window frame
21	Top frame member
22	Side frame member
23	Bottom frame member
3	Roof structure
31	Underroof
32	Lath
41	Fixation mechanism
42	Tool member
43	Support surface
44	Groove
45	Conveyor
I	Primary folding line
II	Secondary folding line
III	Tertiary folding line

Claims

1. A method for packaging an underroof collar for use in water-proofing a joint between a roof structure and a window frame, said underroof collar comprising a first set of collar members and a second set of collar members extending perpendicular to the first set of collar members, said collar members being configured for extending along frame members of a rectangular window frame in a mounted state, each collar member including an inner rim part and an outer skirt part intended for coming into engagement with the roof structure, and said inner rim parts together delimiting a collar opening, where each collar member has a length extending in parallel with the inner rim part, where each collar member comprises a centre section extending between the collar members of the other set of collar members along the collar opening, where the underroof collar has an interior side adapted for facing the roof structure and window frame in a mounted state and an opposite exterior side adapted for facing away from the roof structure and the window frame in a mounted state, said method including the step of folding the underroof collar along two or more folding lines, **characterised in that** the underroof collar is folded along two or more primary folding lines extending substantially in parallel to the length of the collar members of the first set using a folding tool comprising two or more elongate tool members, each of said tool members having a length extending in parallel to the length of the collar members of the first set when in use and defining a length direction, and that the underroof collar is lifted and/or displaced by the tool members thereby moving the collar members of the second set in relation to the collar members of the first set, so that at least a part of the centre sections of the collar members of the second set are arranged on top of at least one of the collar member of the first set.

2. A method according to claim 1, where the length of tool members used is longer than the length of the collar members of the first set.

3. A method according to claim 1 or 2, further including the steps of arranging at least a part of the underroof collar so that it rests on a support surface and then retracting the tool members by moving them in their length directions.

4. A method according to one or more of the preceding claims, further comprising the steps of:

A) fixating a collar member of the first set and allowing the collar member to hang from this collar member under the influence of gravity,

B) moving the tool members into contact with the underroof collar in directions, which are substantially perpendicular to their respective length directions, so that at least one tool member engages the interior side of the underroof collar and at least one tool member engages the exterior side of the underroof collar,

where the movement of the tool members is continued until the tool member engaging the interior side of the underroof collar has passed a plane defined by the exterior side in the hanging position in step A), and/or the tool member engaging the exterior side of the underroof collar has passed a plane defined by the interior side in the hanging position in step A).

5. A method according to claim 4, further comprising the subsequent step C) of moving at least one of the tool members in a direction, which is substantially parallel to the plane defined by the exterior side in the hanging position in step A) so that a mutual angle between two sections of the underroof collar located on different sides of a tool member following step B) becomes smaller, said sections of the underroof collar preferably becoming substantially parallel.

6. A method according to claim 4 or 5, where the underroof collar slides over the tool members during at least a part of the steps B) and C).

7. A method according to one or more of claims 1-3, further comprising the steps of:

D) arranging the underroof collar on a support surface, said support surface comprising openings or cavities configured for accommodating the tool members,

E) moving the tool members into contact with the underroof collar, thereby lifting it from the support surface, the tool members being moved in directions, which are substantially perpendicular to their respective length directions, and away from the support surface, and

F) moving the tool members in a direction along the support surface, thereby bringing at least two tool members closer to each other in a direction parallel to the support surface and shifting sections of the underroof collar in a direction parallel to the support surface.

8. A method according to claim 7, where step F) results in at least two tool members becoming arranged closely above each other when seen in a direction perpendicular to the support surface.

9. A method according to one or more of the preceding claims, further comprising one or more of the following steps:

G) Folding the underroof collar along a secondary folding line extending substantially perpendicular to the primary folding lines so that the collar members of the second set are arranged on top of or underneath the collar members of the first set, and

H) Folding the underroof collar along a tertiary folding line extending substantially in parallel to the primary folding lines.

10. A method according to one or more of the preceding claims, where the first set of collar members are top and bottom collar members configured for extending along top and bottom frame member of a rectangular window frame, and where the underroof collar is folded so that at least a part of the centre section of each side collar member is arranged on top of or underneath the top collar member, the bottom collar member, and/or a section of the side collar member located in continuation of the top collar member or the bottom collar member when seen in the length direction of said top collar member or bottom collar member, and so that the top collar member and the bottom collar member are arranged one on top of the other.

11. A packed underroof collar for use in water-proofing the joint between a roof structure and a window frame folded by the method according to one or more of claims 1-10.

12. A folding tool for folding an underroof collar along two or more primary folding lines, said folding tool comprising two or more elongate tool members, each having a length extending defining a length direction, and an activation mechanism configured for moving the elongate tool members in

relation to each other in directions, which are substantially perpendicular to the length directions of the tool members, where said tool members are configured for engaging the underroof collar and for lifting and/or displacing it into a folded state.

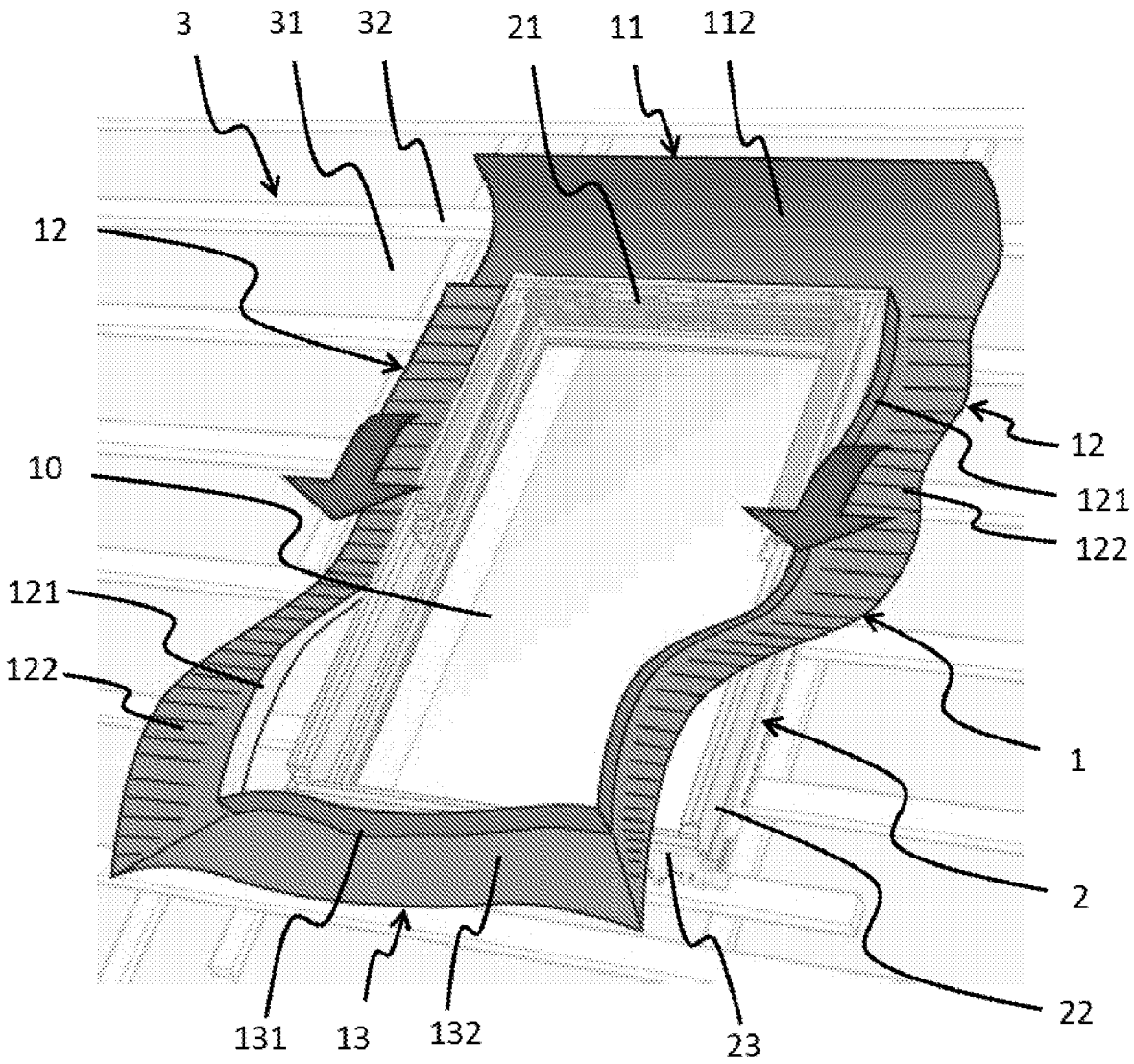

Fig. 1

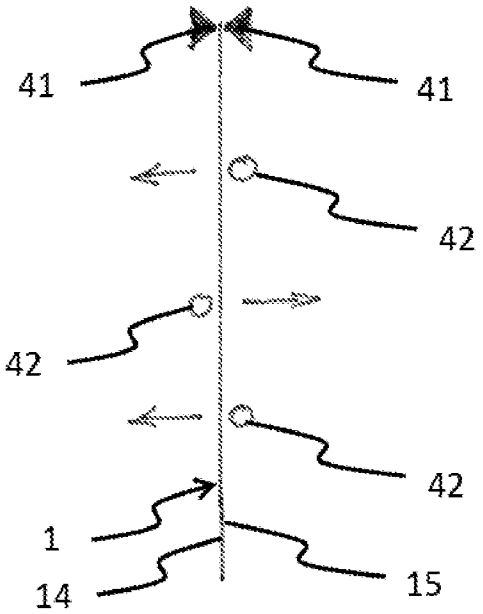

Fig. 2

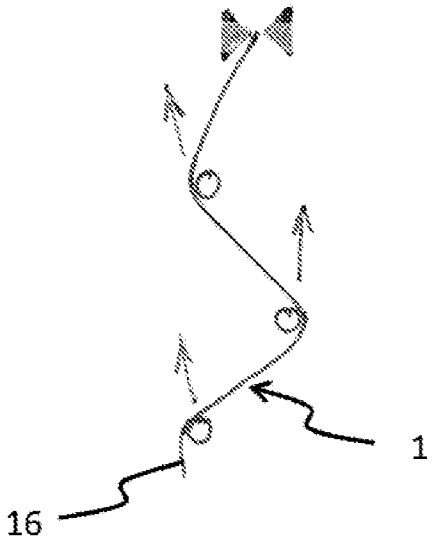

Fig. 3

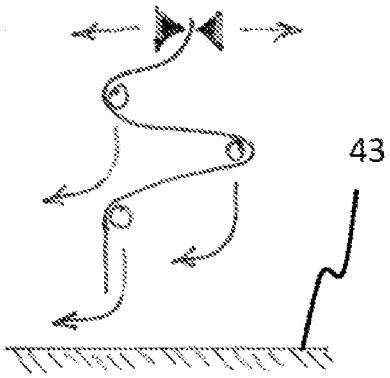

Fig. 4

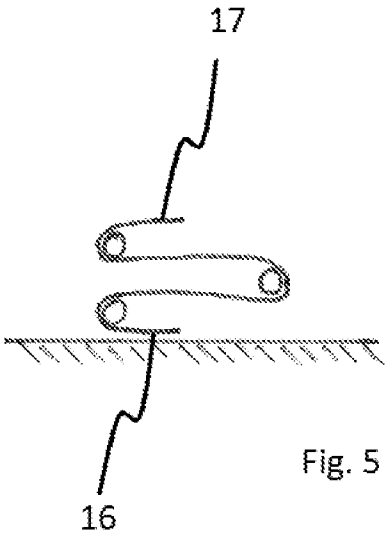

Fig. 5

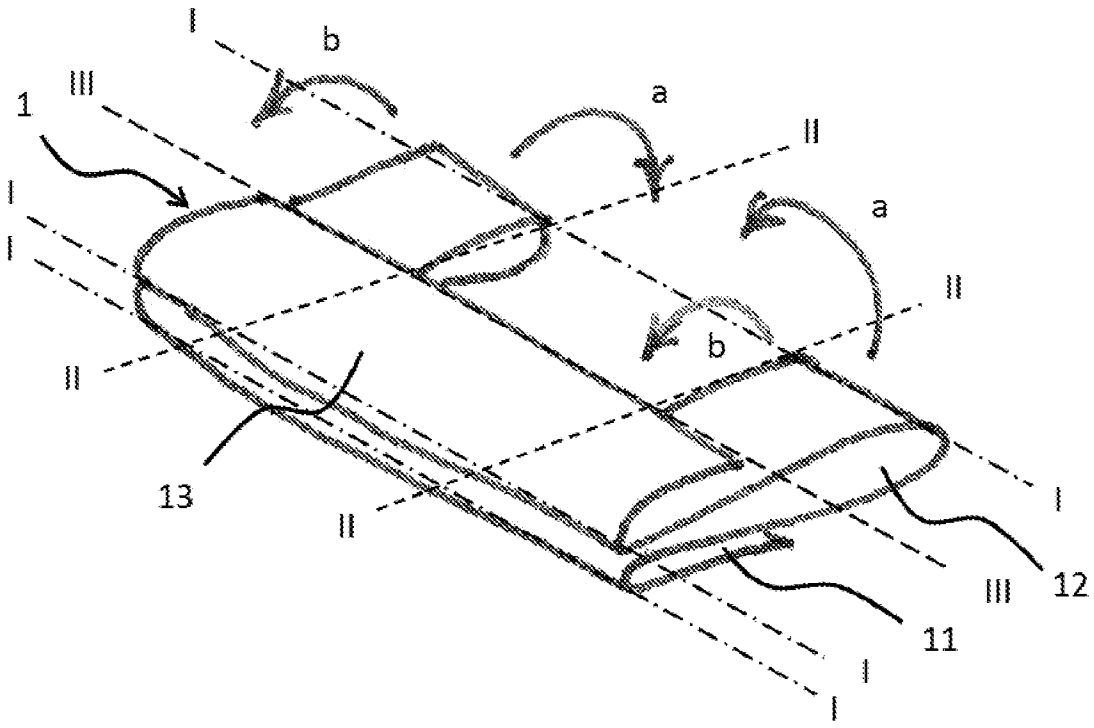

Fig. 6

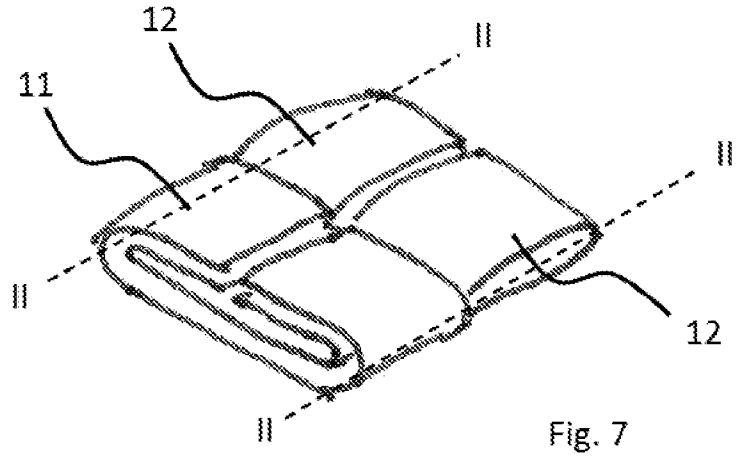

Fig. 7

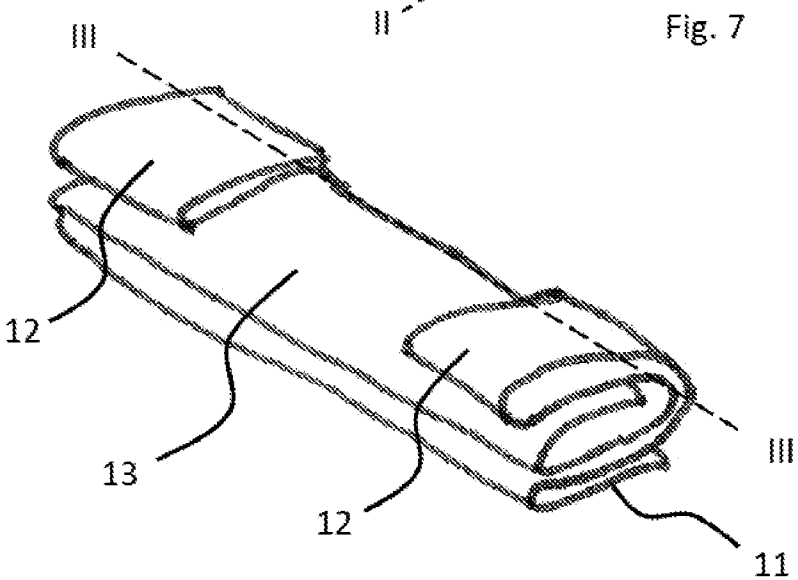

Fig. 8

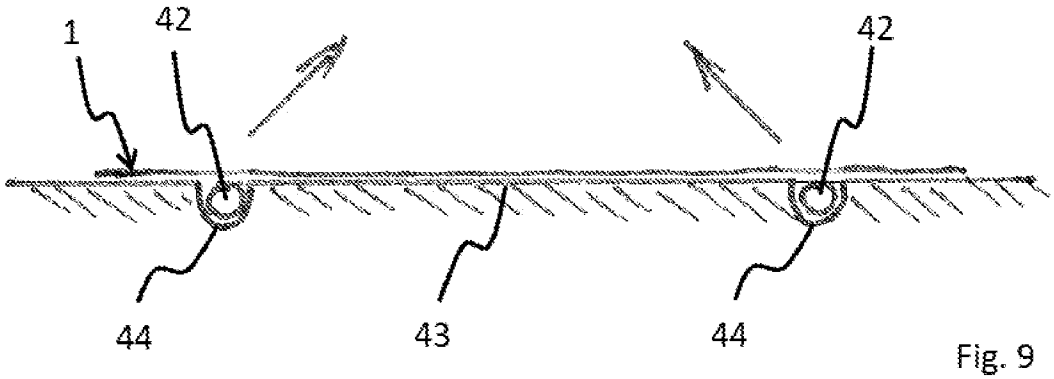

Fig. 9

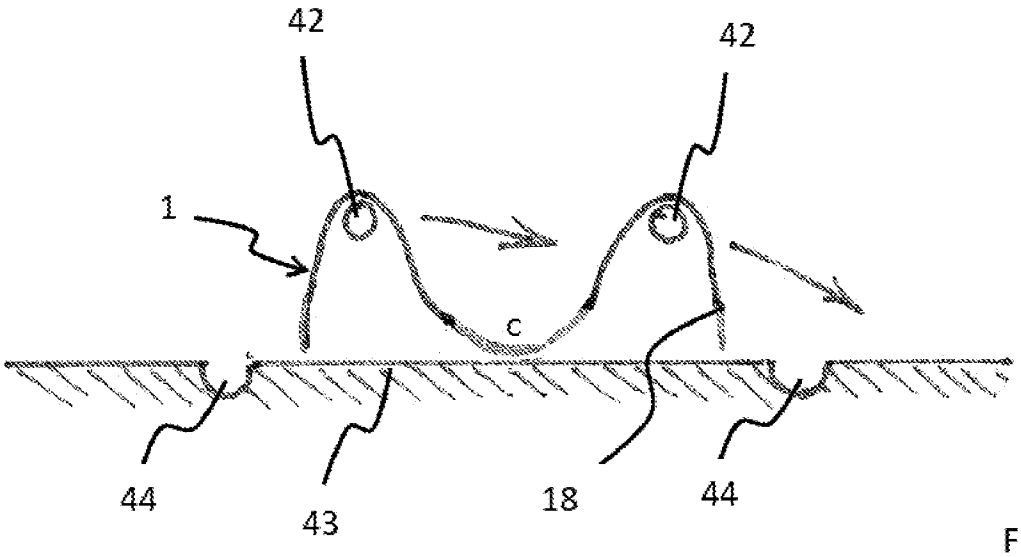

Fig. 10

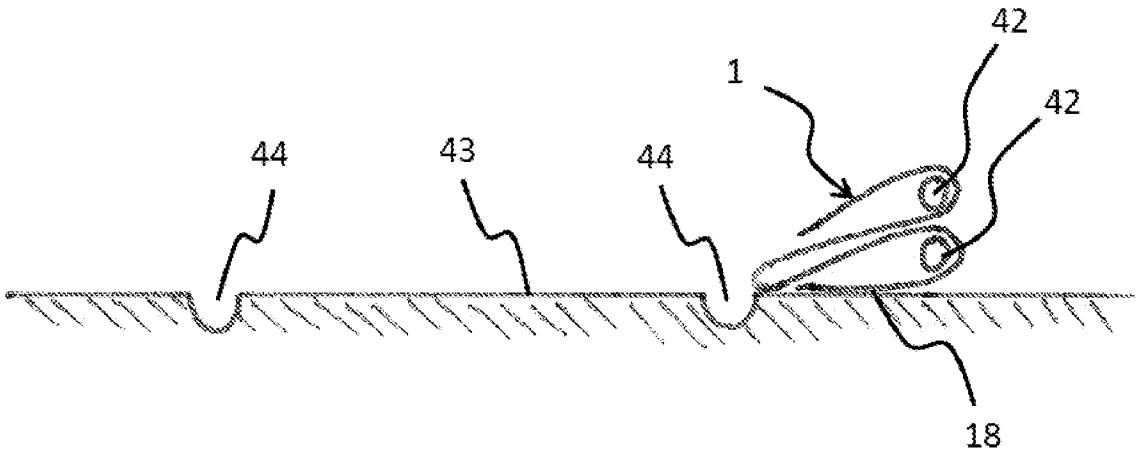

Fig. 11

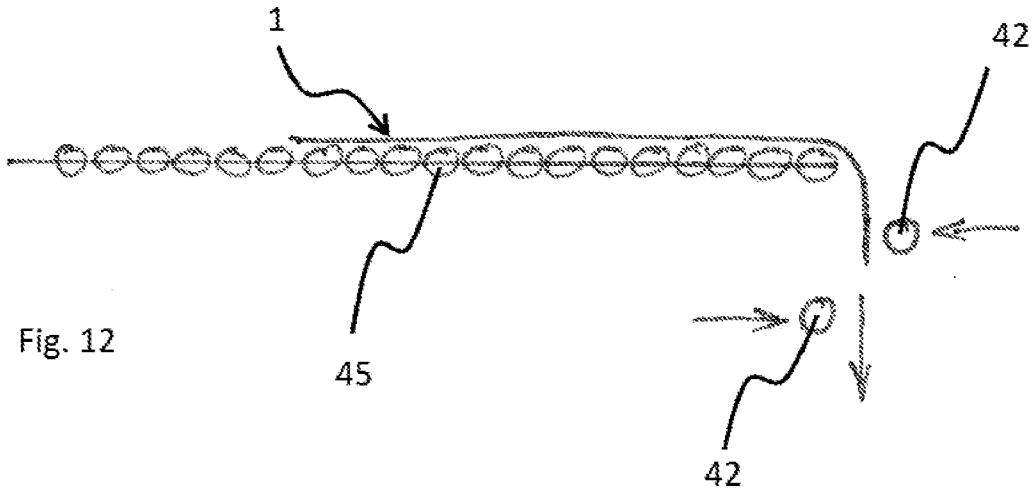

Fig. 12

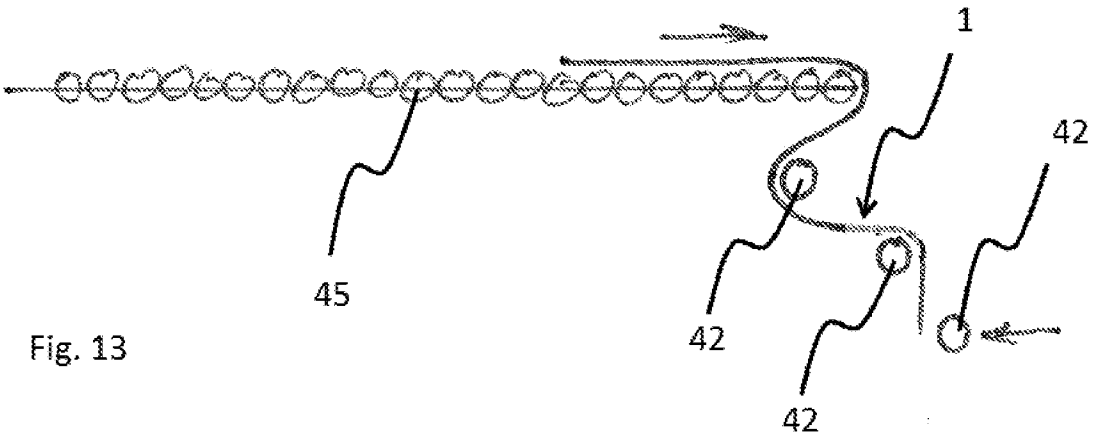

Fig. 13

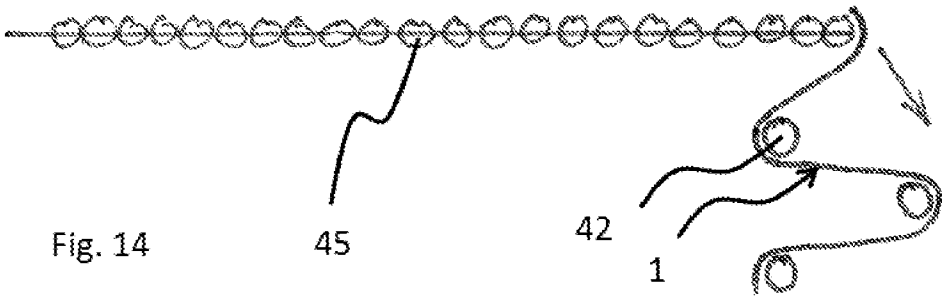

Fig. 14

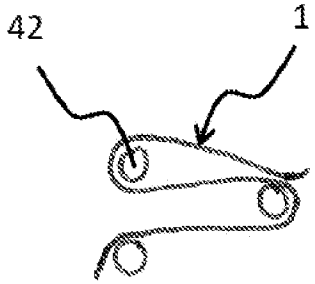

Fig. 15

DANISH PATENT AND TRADEMARK OFFICE

SEARCH REPORT - PATENT	Application No. PA 2021 70003

1. ☐ Certain claims were found unsearchable (See Box No. I).

2. ☐ Unity of invention is lacking prior to search (See Box No. II).

A. CLASSIFICATION OF SUBJECT MATTER

E04D 13/03 (2006.01), B65B 63/04 (2006.01), B65H 45/107 (2006.01)

According to International Patent Classification (IPC)

B. FIELDS SEARCHED

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

IPC&CPC: E04D, B65B, B65H

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

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

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

EPODOC, WPI, Full-text: English

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.
X; A	EP 3393918 A1 (SAFEDON LTD) 2018.10.31 See in particular par. 0055-0058, 0097-0105 and Fig. 27-34.	12; 1-11
DA	WO 2018/210937 A1 (VKR HOLDING AS) 2018.11.22 See entire document.	1-12
DA	EP 0994992 A1 (VKR HOLDING AS) 2000.04.26 See entire document.	1-12
DA	EP 2952646 A1 (VKR HOLDING AS) 2015.12.09 See entire document.	1-12
DA	EP 2284329 A2 (FAKRO PP SPOLKA ZOO) 2011.02.16 See entire document.	1-12

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

* Special categories of cited documents:

"A" Document defining the general state of the art which is not considered to be of particular relevance.

"D" Document cited in the application.

"E" Earlier application or patent but published on or after the filing date.

"L" Document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified).

"O" Document referring to an oral disclosure, use, exhibition or other means.

"P" Document published prior to the filing date but later than the priority date claimed.

"T" Document not in conflict with the application but cited to understand the principle or theory underlying the invention.

"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.

"Y" Document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" Document member of the same patent family.

Danish Patent and Trademark Office
Helgeshøj Allé 81
DK-2630 Taastrup
Denmark

Telephone No. +45 4350 8000
Facsimile No. +45 4350 8001

Date of completion of the search report
01 July 2021

Authorized officer
Nis Madsen
Telephone No. +45 43 50 84 93

SEARCH REPORT - PATENT		Application No. PA 2021 70003
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant for claim No.

SEARCH REPORT - PATENT	Application No. PA 2021 70003

Box No. I Observations where certain claims were found unsearchable

This search report has not been established in respect of certain claims for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched, namely:

2. ☐ Claims Nos.:
because they relate to parts of the patent application that do not comply with the prescribed requirements to such an extent that no meaningful search can be carried out, specifically:

3. ☐ Claims Nos.:
because of other matters.

Box No. II Observations where unity of invention is lacking prior to the search

The Danish Patent and Trademark Office found multiple inventions in this patent application, as follows:

SEARCH REPORT - PATENT	Application No. PA 2021 70003

SUPPLEMENTAL BOX

Continuation of Box [.]