

(19)



(11)

EP 2 811 085 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
10.12.2014 Bulletin 2014/50

(51) Int Cl.:
E04D 5/14 (2006.01)

(21) Application number: **14171401.4**

(22) Date of filing: **05.06.2014**

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

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(30) Priority: **05.06.2013 NL 2010923**

(54) **Roof covering for substantially horizontal roofs and method for arranging such a roof covering**

(57) The invention relates to a substantially rectangular, elongate piece of roof covering, comprising at least one layer of material which is water-impermeable and to some extent flexible and fastening means arranged on the underside of the layer for the purpose of connecting the piece of roof covering to a substantially horizontally extending roof which is to be covered watertightly and which is provided with a structure engaging on the fas-

tening means, wherein the fastening means comprise at least one strip of fastening material which extends in the lengthwise direction of the piece of roof covering and the width of the at least one strip is less than 75% of the width of the piece of roof covering. Since the strip of fastening material extends over only a part of the surface, the remaining pieces of roof covering can be easily fastened watertightly to the underlying surface.

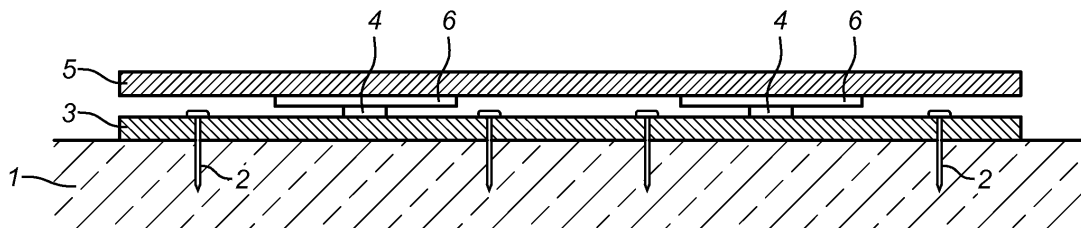


Fig. 1

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Description

[0001] The invention relates to a roof covering for substantially horizontal roofs, as well as to a piece of roofing material which is provided on its upper side with fastening means for at least temporarily connecting the piece of roofing material to pieces of roof covering to be arranged thereon. The invention relates particularly to a piece of roof covering comprising at least one layer of material which is to some extent flexible and water-impermeable, and fastening means arranged on the underside of the layer for the purpose of connecting the piece of roof covering to a substantially horizontally extending roof which is to be covered watertightly and which is provided with a structure engaging on the fastening means, wherein the strip has a substantially rectangular, elongate form.

[0002] Such pieces of roof covering are known from the European patent application EP-A-2 308 688. In these prior art roof coverings the fastening material extends over a large part of the piece of roof covering and only a narrow strip is available for overlap with and fastening to an adjacent piece of roof covering. Since the overlap usually involves two folds in opposite directions in the piece of roof covering which take up a part of the width of the narrow strip, the remaining width of the strip is extremely limited, and the holding force and the watertightness of the connection are not guaranteed.

[0003] The object of the invention is to provide such a piece of roof covering wherein more options are available for making a watertight and strong connection between the overlapping pieces of roof covering.

[0004] This object is achieved in that the fastening means comprise at least one strip of fastening material which extends in the lengthwise direction of the piece of roof covering and the width of the at least one strip is less than 75% of the width of the piece of roof covering. Since the strip of fastening material extends over only a part of the surface, there remains - taking into account the space for the folds - a strip of a sufficiently large width for the purpose of making a watertight and strong connection, either by melting meltable material or by applying glue.

[0005] It is also noted here that the measures according to the invention make it possible to leave a wide strip clear on either side so that a strip can be arranged on both sides on an adjacent strip and can be fastened on both sides. Another effect of the wide layer is to make a watertight connection between the piece of roof covering and the roof surface, for instance at the end of the working day. Possible rain during the night cannot then get between the already arranged pieces of roof covering and the roof surface. Such a connection can also function as separation between compartments in the roof covering, which will later simplify a search for possible leakages.

[0006] The invention likewise relates to a method for arranging on a substantially horizontally extending roof surface a piece of roof covering which is provided with a layer of material which is to some extent flexible and at least one strip of fastening material arranged on the un-

derside of the layer, wherein on the roof surface a number of pieces of fastening material are initially fastened to the roof and the piece of roof covering is then arranged, wherein the strips of fastening material arranged on the underside of the piece of roof covering are brought into engagement with the pieces of fastening material arranged on the roof, wherein a sealing connection is subsequently formed between a part of the roof covering not covered by the fastening material and the underlying layer.

[0007] The at least one strip of fastening material is preferably formed by a strip of fastening material engaging on Velcro. It is after all hereby possible to make a connection to the Velcro pieces arranged on the roof surface.

[0008] Tests have shown that two separate strips of fastening material are sufficient for a good attachment between the piece of roof covering and the roof surface. It is therefore attractive for the piece of roof covering to be provided with at least two strips of fastening material.

[0009] According to another embodiment, the width of the strips of fastening material together is less than 50% of the width of the piece of roof covering. This measure saves fastening material while a good attachment is nevertheless obtained. Mention is made here of the effect that, in the unlikely event wind were to penetrate the space between the roof covering and the roof surface, the roof covering would bulge outward, thereby creating a shear force on the connection between the strips of fastening material and the pieces of fastening material arranged on the roof. Hook and loop or Velcro connections can withstand a shear force which is several times greater than the maximum allowable peeling force, so that greater forces can thus be absorbed. It is however assumed here that the pieces of fastening material arranged on the roof are only connected to the roof surface at a distance from their edges so that the thus resulting flaps of fastening material will bend along with the roof covering.

[0010] According to an alternative embodiment, the at least one strip of fastening material is only connected to the piece of roof covering over at least two fastening tracks, each extending parallel to the strip of fastening material and mutually separated by a separate band. Only a single strip need hereby be arranged on the roof covering, this being attractive from a production engineering viewpoint.

[0011] In order to save material it is recommended that the width of the fastening tracks is less than 50% of the width of the piece of roof covering.

[0012] A good distribution of forces occurs in the roof covering when the width of the fastening tracks is the same and the width of the separate band lies between 50% and 150% of the width of a fastening track. The strips of fastening material are preferably arranged symmetrically of the central axis of the piece of roof covering. The strip can hereby be used in both directions.

[0013] In order to obtain a uniform distance between

the strips of fastening material when the pieces of roof covering are arranged adjacently of each other, it is recommended that the sum of the distance between the outer strip of fastening material and the closest edge of the piece of roof covering is equal to the distance between adjacent strips of fastening material.

[0014] The layer of roof covering preferably comprises on its underside a layer meltable at high temperatures. This meltable layer can be formed by bitumen, for instance when the piece of roof covering is formed in its entirety from bitumen. Not precluded however is that the meltable layer is formed by a plastic with properties similar to those of bitumen. This layer can extend over a large part of the thickness of the piece of roof covering, but the layer can also be formed by a specially arranged fastening layer.

[0015] This invention also provides a method of the above stated type wherein the piece of roof covering is placed in rolled-up form with its underside facing outward on the edge of a part of the roof to be covered by the piece of roof covering, the roll is subsequently unrolled onto the part of the roof to be covered, wherein during the unrolling a fastening strip arranged on the underside of the roof covering is brought into overlap with a fastening strip arranged on the roof, wherein, after the piece of roof covering has been arranged, the piece of roof covering is fastened to the roof by supplying heat locally.

[0016] Preferably arranged on the underside of the piece of roof covering is a foil extending at least partially over the whole width of the piece of roof covering. This provides advantages during production, but also makes it possible to initially position the piece of roof covering and subsequently realize the connection to the roof surface. It is noted that the foil can extend as one whole over the whole width of the piece of roof covering. In order to obtain a good connection to the roof surface the foil must then be removed prior to bringing the fastening layer into contact with the Velcro. Not precluded however is that the foil is arranged only on those parts not covered by the layer or layers of fastening material. All that is important in such a situation is to remove the foil when the layer lying directly thereabove has to be connected to the roof surface.

[0017] According to a further embodiment, the foil protrudes on at least one of the sides of the piece of roof covering. After the piece of roof covering has been arranged it is hereby possible to see whether the foil is still present. It will be apparent that the foil has to be removed in order to obtain a good connection between the piece of roof covering and the roof surface.

[0018] This embodiment therefore also relates to a method of the above stated type wherein the piece of roof covering is provided with a foil and wherein the piece of roof covering is initially placed and positioned on the roof surface, the foil is subsequently removed and the strips of fastening material arranged on the underside of the piece of roof covering are brought into engagement with the pieces of fastening material arranged on the roof.

[0019] The invention also relates to a combination of a piece of roof covering according to any of the foregoing claims and pieces of fastening material for arranging on a substantially horizontally extending roof surface which are configured to engage on the strips of fastening material arranged on the underside of the piece of roof covering and which are arranged on a strip of roofing material which is configured for connection to the roof surface.

[0020] The at least one strip of fastening material is preferably formed by a strip of fastening material provided with hooks, also known as Velcro. The Velcro is much more expensive than the material provided with loops which engages thereon. The above measure makes it possible to use as little Velcro as possible. In the case of a combination of a piece of roof covering and a piece of roofing material the width of the fastening strips on the at least one piece of roof covering is preferably smaller than the width of the fastening strips on the at least one piece of roofing material.

[0021] The piece of roof covering is preferably provided with at least one strip of fastening material only connected to the piece of roof covering over at least two fastening tracks, each extending parallel to the strip of fastening material and mutually separated by a separate band and, during attachment of an end edge of the piece of roof covering, a piece of the separate band of fastening material adjacent to the end edge is initially removed and the piece of roof covering thus left clear is subsequently connected to the roof by being melted. The end edges of the piece of roof covering can hereby be connected watertightly to the substrate. The meltable material is heated here to a temperature above the melting temperature. The presence of the fastening material prevents to significant extent adhesion of the melted material to the roof surface or to the underlying layer of roof covering. Because the fastening material extends over only a small part of the edge length, the fastening material impedes to lesser extent the adhesion of the melted material to the underlying layer.

[0022] The piece of the separate band of fastening material adjacent to the end edge is preferably removed by cutting through the strip of fastening material between the separate band and the fastening tracks, and the thus created flap is folded back on itself. An easy way of removing the fastening material is hereby obtained. It is also possible to cut off the flap in its entirety.

[0023] The present invention will be elucidated hereinbelow with reference to the accompanying figures, in which:

Figure 1 shows a cross-sectional view of a first embodiment;

Figure 2 shows a cross-sectional view of a second embodiment;

Figure 3 is a schematic perspective view of a piece of roofing material according to a third embodiment;

Figure 4 is a schematic perspective view of a roll of rolled-up roof covering material, in the core of which

a roll of roofing material is arranged;
 Figure 5 shows a cross-sectional view of a fourth embodiment;
 Figure 6 shows a cross-sectional view of the fourth embodiment in a processed situation;
 Figure 7 shows a cross-sectional view of the fourth embodiment in a further processed situation; and
 Figure 8 shows a cross-sectional view of a fifth embodiment.

[0024] Figure 1 shows a substrate 1 of a roof. This substrate is for instance of wood, although the substrate can also be formed by a layer of insulation material. Fixed to the substrate by means of nails or screws 2 is a layer of roofing material 3, manufactured from for instance non-woven material. The roofing material is provided with two strips 4, extending parallel to each other, of fastening material with hooks. In this embodiment strips 4 have a width of about 5 cm, while the width of the piece of roofing material 3 amounts to about 100 cm. The distance between strips 4 amounts to about 45 cm, while the distance between strips 4 and the closest edge of the piece of roofing material 3 is about 22 cm. A regular spacing between strips 4 is hereby obtained when the pieces of roofing material 3 are placed abutting each other.

[0025] An elongate piece of roof covering 5 is placed on the above elucidated construction. The width of this piece of roof covering amounts to 100 cm. Two strips 6 of fastening material provided with loops are arranged on the underside of this piece of roof covering 5, for instance by co-extrusion during the extrusion of the piece of roof covering 5. These strips 6 have a width of about 20 cm and both extend about 15 cm away from the edge of the piece of roofing material 3, wherein the strips are separated by 30 cm from each other. When the piece of roof covering 5 is arranged on the roofing material the strips of Velcro 4 and 6 come into engagement with each other and the layer of roof covering is fixed. Parts of the piece of roof covering 5 can then be brought into sealing connection with the substrate by being heated locally.

[0026] The embodiment shown in figure 2 largely corresponds to the embodiment shown in figure 1, with the proviso that both the piece of roofing material 3 and the piece of roof covering 5 are each provided with three strips of fastening material 4 and 6 respectively. These strips 4, 6 are also distributed as uniformly as possible over the width of the associated pieces 3, 5. It will be apparent that it is likewise possible to make use of other numbers of strips, such as one, four or five, also depending on the width of pieces 3, 5.

[0027] The embodiment shown in figure 2 also differs in the greater width of the piece of roofing material 3, this such that more than one strip of roof covering 5 extends over the piece of roofing material 3. The width of the piece of roofing material 3 can thus be about one and a half times or twice as great as that of the piece of roof covering 5.

[0028] Finally, the width of the piece of roof covering

5 is slightly greater than the above elucidated size of 100 cm; the piece of roof covering 5 shown in this figure has a width of about 108 cm, whereby, with an overlap of 8 cm, a working width of 100 cm is likewise obtained. This is in contrast to the embodiment of figure 1, wherein the pieces of roof covering 5 are placed abutting each other. As in the foregoing embodiment, the strips in this embodiment can be placed symmetrically, for instance with a spacing of 19 cm between the edges and the fastening strips, a width of the fastening strips of 20 cm and a space between the fastening strips of 30 cm wide. It is however also possible to apply an asymmetrical placing of the fastening strips.

[0029] Figure 3 shows a piece of roofing material 13 likewise manufactured from for instance a textile or non-woven carrier sheet. Arranged on the piece of roofing material 13 are two strips 14 of fastening material which are connected by means of glueing, but preferably by means of stitched seams 15, to the piece of roofing material 13. Strips of plastic 16 are also arranged on the strips of fastening material 14 in order to prevent premature attachment of fastening material 14 to the fastening material. It is attractive to arrange these plastic strips 16 by means of the same stitched seam 15 since this simplifies arrangement. Since plastic strips 16 tear easily, they can be easily removed before the pieces of roof covering 5 are arranged. Plastic strips 16 are preferably somewhat wider than the strips of fastening material 14. It is otherwise also possible to arrange the plastic strips by means of adhesion.

[0030] Marking lines 17 extending in the lengthwise direction of the strips of roofing material are arranged every 25 cm for easy cutting into the pieces of roofing material 13. Marking lines 18 are also arranged every 30 cm for the same purpose. These marking lines can also be provided cm transversely of these marking lines separated in the lengthwise direction respectively every 25 and 30 cm. Both these types of marking line 17, 18 can also be used to facilitate cutting into the strips of roofing material 13 when it is necessary to work around obstacles, while marking lines 17, 18 are also useful when positioning the strips 5 of roof covering material. Figure 3 also shows transverse lines 19 which extend in the transverse direction of the pieces of roofing material and which can likewise be used to facilitate marking out and positioning. These transverse lines 19 are preferably also arranged at a mutual distance of 25 cm and 30 cm. The lines extending in the length as well as the transverse lines can be arranged in different colours, for instance the lines arranged every 25 cm in white and the lines arranged every 30 cm in yellow.

[0031] Figure 4 further shows an axial view of a combined roll 20 of a rolled-up strip of roof covering material 21 and a piece of roofing material 22. It is attractive for logistical reasons to market such combined rolls 20 since the total volume taken up by a roll of only roof covering material is the same as that of a combined roll 20. It is after all not possible to roll up the roof covering material

smaller than with a minimal curvature radius without damaging the roof covering material. Bearing this in mind, a free space is created inside the roll of roof covering material which can be easily taken up by a roll of roofing material which can be rolled up to a smaller diameter without damage.

[0032] Figure 5 shows an elongate piece of roof covering material 25 which, just as the above described pieces of roof covering material 5, is formed from a water-impermeable material which is to some extent flexible. The material applied in this embodiment is meltable to enable watertight attachment thereof to the roof surface, which need not necessarily be the case with the above described embodiments. The piece 25 has a width of 110 cm, so resulting in a working width of 100 cm with an overlap of 10 cm. It will be apparent that these dimensions can differ, for instance in order to obtain a manageable roll at a given length of the piece. When overlap is for instance not required and the seam between adjacent pieces of roof covering material 25 is sealed by separate sealing strips, it is possible to apply narrower pieces, for instance with a width of 100 cm. A single strip 26 of fastening material provided with loops is arranged on the underside of piece 25. This strip 26 is arranged symmetrically and has a width of 70 cm so that a free space of 20 cm remains on both sides of the strip. When a piece of roof covering material 25 with a width of 100 cm is applied with a strip of fastening material of 70 cm, a free space of 15 cm remains on both sides of strip 26. The strip of fastening material 26 is connected over the width of the two fastening strips 27 to the piece of roof covering material 25 by a glue surface 28. These fastening strips 27 each have a width of 20 cm and a strip 29 is left clear between these fastening strips 27 where the strip of fastening material 26 is not connected to the piece of roof covering material 25. It will be apparent that other dimensions can be applied; it is thus possible in the case of a piece of material with a width of 70 cm to apply fastening strips with a width of 15 cm having a free space 29 with a width of 40 cm.

[0033] Figure 6 shows how the strip of fastening material 26 is cut through with a cut 30 of a limited length on lines 30 between fastening strips 27 and the free strip 29 from the edge on the end surface 33 of the piece of roof covering 85. A loose piece of fastening material 31 hereby results which, as shown in figure 6, is folded downward. A piece of roof covering material 31 is thus released between fastening strips 27.

[0034] Figure 7 shows how the thus preprocessed piece of roof covering 25 is fastened to a roof surface 32. It is noted that figure 7 shows a section along a plane in which layer 26 is not connected to the piece of roof covering 25. This figure shows clearly that the part 31 cut from the free strip 27 is folded back on itself. A part 32 connecting to end surface 33 of the piece of roof covering material 25 is hereby left clear so that it can be attached by means of heating to the roof surface, where a fastening surface 34 thus results.

[0035] Figure 8 shows an embodiment of a piece of roof covering 25 wherein a foil 36 is arranged on the underside of the piece of roof covering material. In this embodiment foil 36 extends over both the strips of fastening material 27 of the piece of roof covering 25 and the pieces not covered by the strips of fastening material 27 of the piece of roof covering. Foil 36 is also slightly wider than the piece of roof covering 25 so that it protrudes on both sides. It will be apparent that it is likewise possible to apply a piece of foil with the same width as the piece of roof covering. It is likewise possible to provide with a foil only those parts of the piece of roof covering not covered by the fastening layer. The foil can then also protrude outside the piece of roof covering, although it is likewise possible to make use of foil which does not protrude outside the piece of roof covering.

Claims

1. Substantially rectangular, elongate piece of roof covering, comprising at least one layer of material which is water-impermeable and to some extent flexible and fastening means arranged on the underside of the layer for the purpose of connecting the piece of roof covering to a substantially horizontally extending roof which is to be covered watertightly and which is provided with a structure engaging on the fastening means, **characterized in that the** fastening means comprise at least one strip of fastening material which extends in the lengthwise direction of the piece of roof covering and the width of the at least one strip is less than 75% of the width of the piece of roof covering.
2. Piece of roof covering as claimed in claim 1, **characterized in that** the at least one strip of fastening material is formed by a strip of fastening material provided with loops.
3. Piece of roof covering as claimed in claim 1 or 2, **characterized in that** the piece of roof covering is provided with at least two strips of fastening material which extend parallel to each other.
4. Piece of roof covering as claimed in claim 3, **characterized in that** the width of the strips together is less than 50% of the width of the piece of roof covering.
5. Piece of roof covering as claimed in claim 1 or 2, **characterized in that** the at least one strip of fastening material is only connected to the piece of roof covering over at least two fastening tracks, each extending parallel to the strip of fastening material and mutually separated by a separate band.
6. Piece of roof covering as claimed in claim 5, **char-**

acterized in that the width of the fastening tracks is less than 50% of the width of the piece of roof covering.

7. Piece of roof covering as claimed in claim 4, **characterized in that** the sum of the distances between the outer strips of fastening material and the closest edge of the piece of roof covering is equal to the distance between adjacent strips of fastening material. 5
8. Piece of roof covering as claimed in any of the foregoing claims, **characterized in that** the layer of roof covering comprises on its underside a layer meltable at high temperatures. 10
9. Piece of roof covering as claimed in claim 8, **characterized in that** a foil extending at least partially over the whole width of the piece of roof covering is arranged on the underside of the piece of roof covering. 15
10. Piece of roof covering as claimed in claim 9, **characterized in that** the foil protrudes on at least one of the sides of the piece of roof covering. 20
11. Combination of a piece of roof covering as claimed in any of the foregoing claims and pieces of fastening material for arranging on a substantially horizontally extending roof surface which are configured to engage on the strips of fastening material arranged on the underside of the piece of roof covering and which are arranged on a strip of roofing material which is configured for connection to the roof surface. 25
12. Method for arranging on a substantially horizontally extending roof surface a piece of roof covering which is provided with a layer of material which is to some extent flexible and at least one strip of fastening material arranged on the underside of the layer, wherein on the roof surface a number of pieces of fastening material are initially fastened to the roof and the piece of roof covering is then arranged, wherein the strips of fastening material arranged on the underside of the piece of roof covering are brought into engagement with the pieces of fastening material arranged on the roof, **characterized in that** a sealing connection is subsequently formed between a part of the roof covering not covered by the fastening material and the underlying layer. 30
13. Method as claimed in claim 12, **characterized in that** the piece of roof covering is provided with a foil and that the piece of roof covering is initially placed and positioned on the roof surface, the foil is subsequently removed and the strips of fastening material arranged on the underside of the piece of roof covering are brought into engagement with the pieces 35

of fastening material arranged on the roof.

14. Method as claimed in claim 12, **characterized in that** the piece of roof covering is provided with at least one strip of fastening material only connected to the piece of roof covering over at least two fastening tracks, each extending parallel to the strip of fastening material and mutually separated by a separate band and that, during attachment of an end edge of the piece of roof covering, a piece of the separate band of fastening material adjacent to the end edge is initially removed and the piece of roof covering thus left clear is subsequently connected to the roof by being melted. 40
15. Method as claimed in claim 14, **characterized in that** the piece of the separate band of fastening material adjacent to the end edge is removed by cutting through the band of fastening material between the separate band and the fastening tracks, and that the thus created flap is folded back on itself. 45

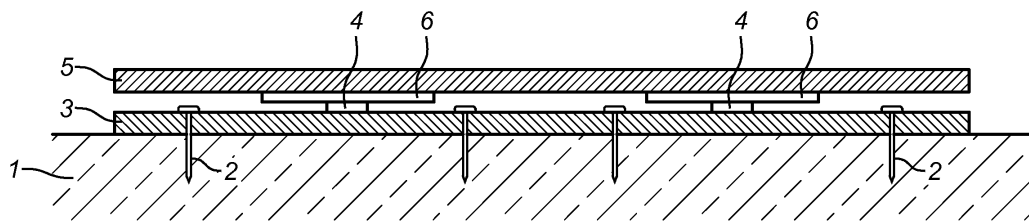


Fig. 1

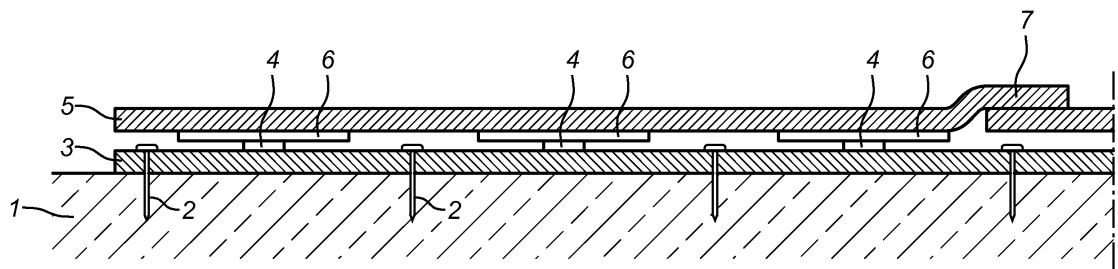


Fig. 2

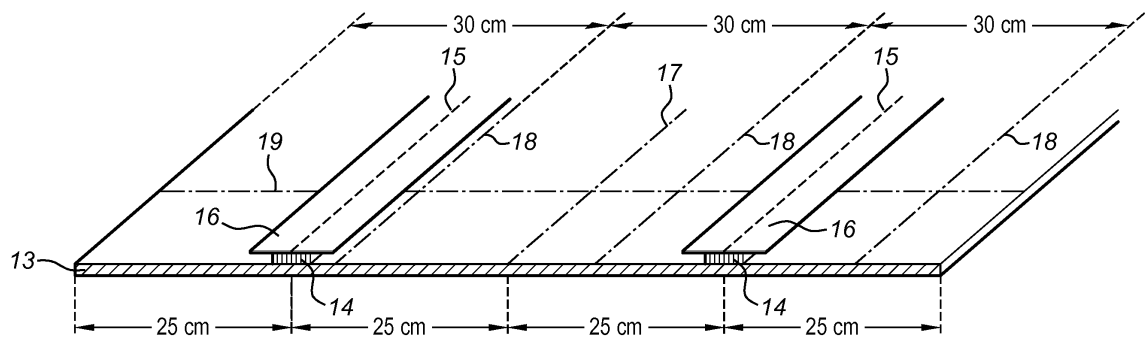


Fig. 3

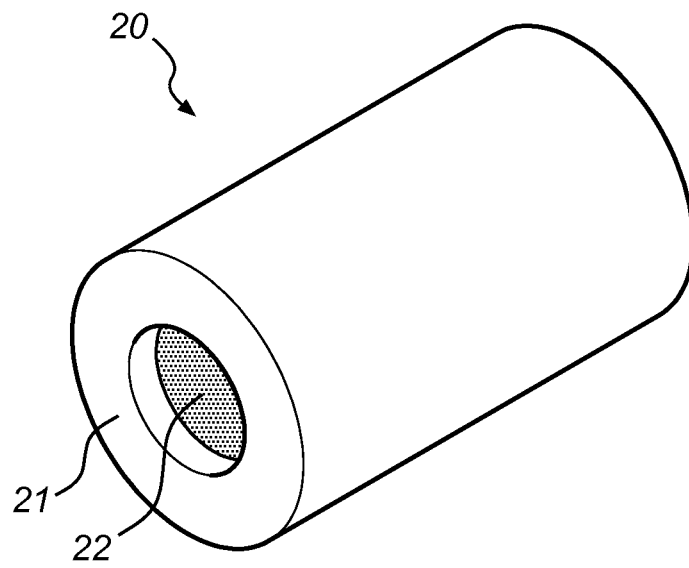


Fig. 4

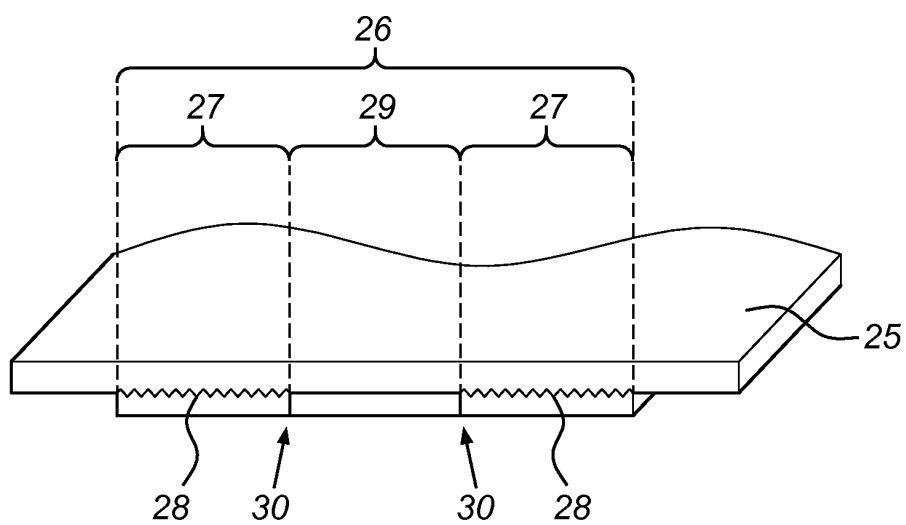


Fig. 5

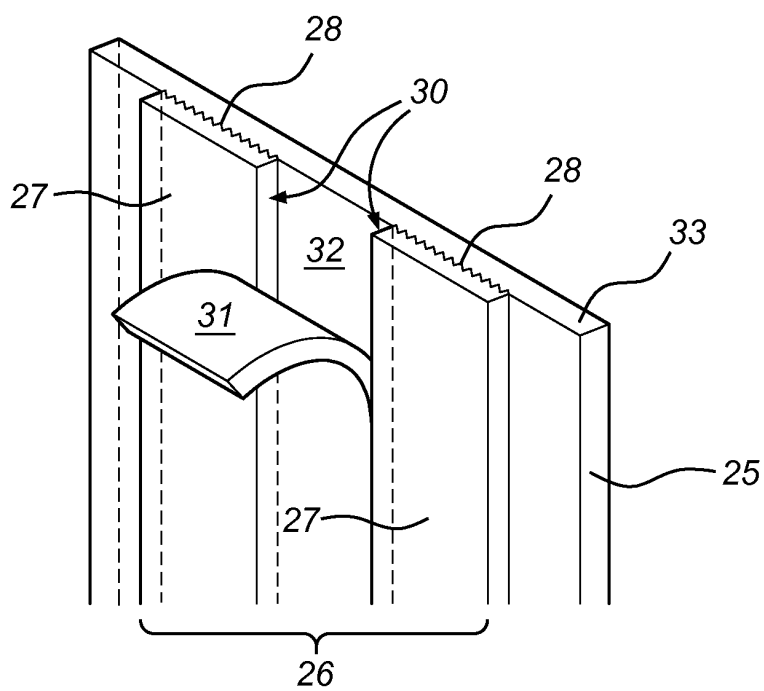


Fig. 6

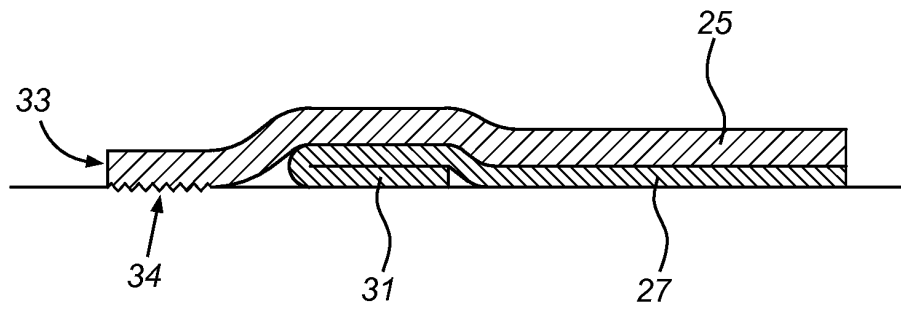


Fig. 7

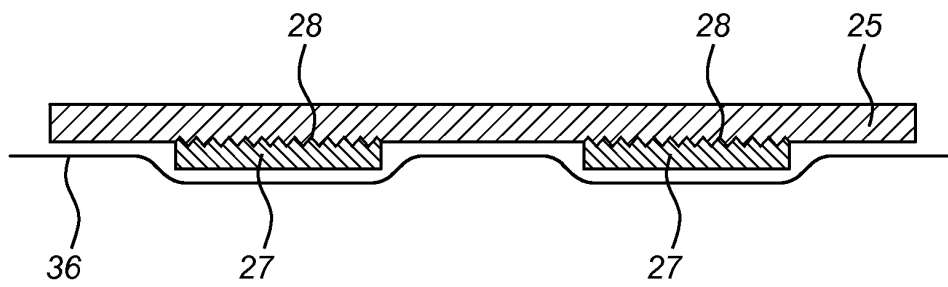


Fig. 8



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 Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 October 2014	Examiner Tran, Kim Lien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EUROPEAN SEARCH REPORT

Application Number
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Place of search The Hague		Date of completion of the search 15 October 2014	Examiner Tran, Kim Lien
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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The members are as contained in the European Patent Office EDP file on
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