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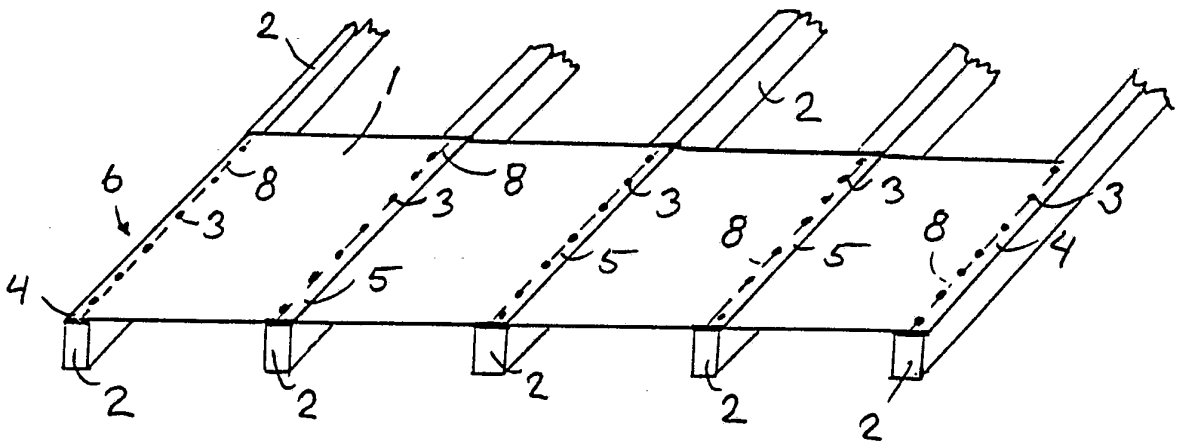
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(54) Title: A ROOF COVERING AND A METHOD OF MANUFACTURING THE SAME



(57) Abstract

The present invention refers to a roof covering comprising a reinforced roofing sheet (1) which is provided with a kraft liner board and is extendable over the supporting frames (2) of a building, said sheet (1) is attachable to said supporting frames (2) by aid of fastening means (3). The reinforced roofing sheet (1) comprises transverse double folds (4, 5) along its entire length in predetermined intervals corresponding to the interval between said roof frames (2), said double folds in the mounted state of the sheet (1) extend over the width of each roof frame (2) and along the length of each roof frame (2) in order to form a reinforced area on said sheet (1) by which the sheet (1) is intended to be fastened to said roof frames (2) by aid of suitable formed nail, screw or clip means (3). The sheet (1) is double folded by aid of former means (10, 11) in a transverse direction at predetermined intervals along the longitudinal direction of the sheet (1) in providing said double folds (4, 5).

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A roof covering and a method of manufacturing the same

The present invention relates to a roof covering of a building, said roof covering comprises a reinforced roofing sheet which is provided with a kraft liner board and can be extended over the supporting frames, said sheet can be fixed to said supporting frames by aid of fastening means.

Today roof sheets are usually used as roof covering between the supporting frames of a building. In order to achieve a roof covering as cheap as possible attempts have also been made to use reinforced plastic as roof covering. In this connection it has appeared that the plastic has not been sufficiently strong at its fixing areas against the supporting frames, but during surface pressure towards the plastic between the supporting frames by a body weight of a human being the plastic has been torn apart along the fixing points of the nails or clamps used for the attachment of the plastic against the supporting frames with step right through as a result. To solve this problem it has been necessary to place even three layers of reinforced plastic over the supporting frames to achieve a sufficient strong roof covering, which has appeared to be too expensive and also too tight, since this kind of roof covering does not permit steam diffusion. That is why attempts have been started again to use only one layer of reinforced plastic, at the same time as one has started to use a new, special fixing method of the plastic against the supporting frames. This fixing method consists in that special clamping laths are placed over the reinforced plastic where it contacts the supporting frames, whereby after nailing of these laths the plastic is fixed against the supporting frames. This method has however appeared to be relatively time consuming having long mounting times of the roof covering as a result.

The object of the present invention is to achieve a roof covering and a method of manufacturing the same of the kind mentioned above, by which the drawbacks mentioned above are eliminated. The distinguishing features of the present in-

vention are apparent from the accompanying claims.

Thanks to the invention it has now been achieved a roof covering which in an excellent way fulfils its purposes in the same time as it is also cheap and easy to manufacture. The double folds over the fixing portions against the supporting frames have such a big strength that step through between the supporting frames cannot occur, by the reason that the sheet is securely fixed and remains intact around the nail, screw or clip means even during loads onto the sheet between the supporting frames which extends the weight of the body of a human being. By that only one layer reinforced sheet is needed between the supporting frames the price of the roof covering be kept low, at the same time as the roof covering has a strength which is as big as that of a normal roof covering having three layers of reinforced sheet.

The invention will now be described in more detail below with reference to the accompanying drawing, in which

- Fig. 1 schematically illustrates a perspective view of a roof covering according to the invention during the mounting procedure,
- Fig. 2 illustrates a partial perspective view in a scale enlarged of the roof covering according to the invention and
- Fig. 3 schematically illustrates how the manufacturing of a roof covering according the present invention is carried out.

In Fig. 1 is illustrated how a roof covering consisting of a reinforced roofing sheet 1 according to a first embodiment of the present invention is placed and fixed to the supporting frames 2 of a building. The attachment in position of the reinforced roofing sheet 1 against the supporting frames 2 can be done by suitably formed nail, screw or clip means 3. The sheet 1 can be made of a reinforced non-woven having

a weight of gram of between 50-300 g/m and preferably of about 100 g/m. At predetermined intervals along the longitudinal direction of the sheet 1, said intervals correspond to the centre distance being between the supporting frames 2, the sheet 1 is provided with transverse double folds 4,5. In Fig. 2 it is illustrated in a scale enlarged how the double folds 4,5 look like. The double folds in the end portions 6 of the sheet comprise of one single double fold 4, while the double folds between these end portions 6 consist of at least one Z-fold 5. These double folds 4,5 have a width which mainly corresponds to the width of each supporting frame 2 and a length which is equal to the length of the sheet 1. The predetermined intervals of the double folds 4,5 can be 60, 90 or 120 cm, said measure of intervals are the most common centre intervals between supporting frames. The different layers of the double folds 4,5 are kept together by melting adhesive strings 7. In order to facilitate the mounting and nailing of the sheet 1 against the supporting frames 2 a colour marking 8 or other kind of marking can extend over each double fold 4,5. A kraft liner board is glued against the sheet 1 and said board is intended to prevent water penetration into the building.

In Fig. 3 is schematically illustrated an arrangement for manufacturing a roof covering in the form of a reinforced roofing sheet 1 according to the invention. The sheet is at first fed from a storage roll 15 of reinforced roofing sheet and past an assembly station 9 comprising an upper 12 and lower adhesive nozzle 13, at said station 9 transverse adhesive strings 7 are applied to the end portions 6 of the sheet 1 on one side of the same and between the end portions 6 of the sheet 1 on both sides at an interval, viewed in the feeding direction of the sheet, which is a bit less than the width of one double fold 4,5. These adhesive strings 7 are applied to the sheet 1 at least over those areas of the sheet which after the double folding will be along the open edge portion 17 of the double fold. During the double folding itself the sheet 1 is folded along its total length by aid of transverse former means 10 and 11 at predetermined intervals corresponding to the interval between the support-

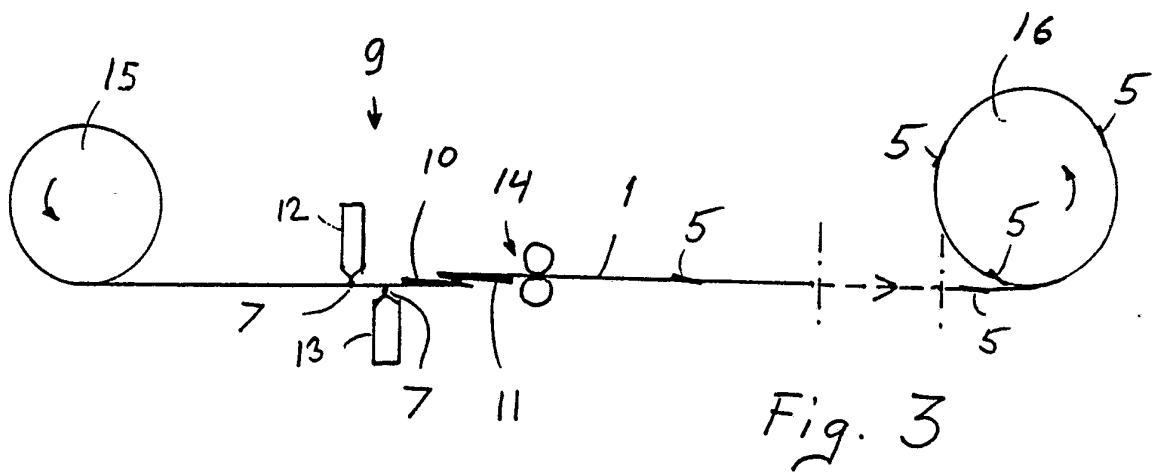
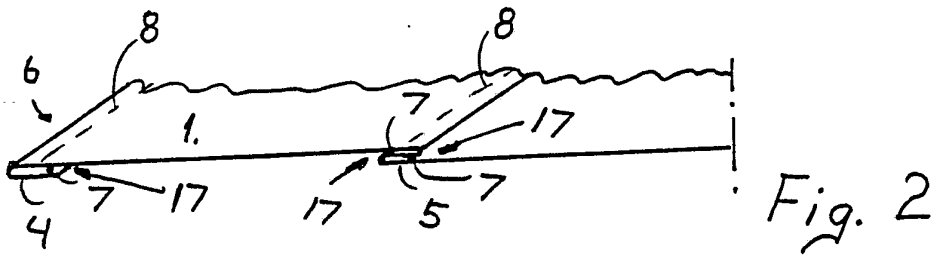
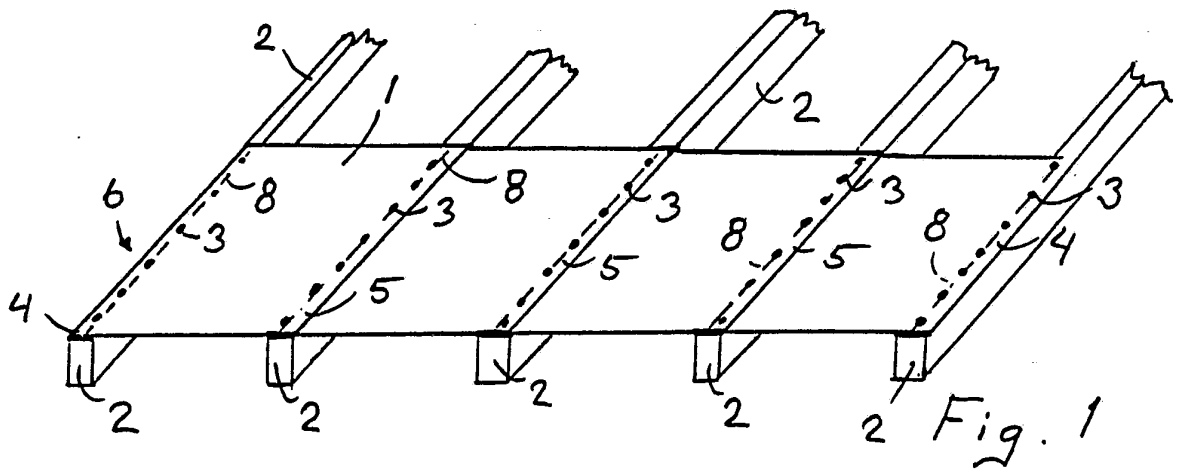
ing frames along the whole width of the sheet 1 in a transverse direction in relation to the longitudinal direction of the sheet 1. The two former means 10,11 are carrying out the double folding itself and by that they are placed a distance above each other they can be displaced in a direction towards and past each other so that the double fold is formed. The former means 10,11 are then retracted in a transverse direction from the sheet 1 and leave the adhesive strings 7 intact, whereupon the double folds are fed into and pressed together in a roll nip 14. Then the colour marking 8 is carried out over and along each double fold 4,5 in order to indicate where the double folds 4,5 are located along the sheet 1, said markings 8 facilitate the mounting and fixing in position of the sheet 1 against the supporting frames 2. After that the ready roofing sheet 1 is winded up on a roll 16, which after rolling up of a predetermined length of reinforced roofing sheet 1 can be delivered. Before the rolling up onto the roll 16 a kraft liner board is glued to one of the sides the sheet 1. A total covering adhesive is applied to the sheet during this gluing procedure, said adhesive has the quality to crack in a dry condition and thus permit steam diffusion through the ready material surface, while during water wetting, e.g. rain leakage, the adhesive is softening up and the cracking splits are contracted and prevent water penetration into the building.

Claims

1. A roof covering of a building and comprising a reinforced roofing sheet (1) which is provided with a kraft liner board and can be extended over the supporting frames, said sheet (1) can be fixed to said supporting frames (2) by aid of fastening means (3), **characterized in** that said reinforced roofing sheet (1) comprises transverse double folds (4,5) along its entire length at predetermined intervals corresponding to the interval between said roof frames (2), said double folds in the mounted state of the sheet (1) extend over the width of each roof frame (2) and along the length of each roof frame (2) in order to form a reinforced area on said sheet (1) by which the sheet (1) is intended to be fastened to said roof frames (2) by aid of suitable formed nail, screw or clip means (3).
2. A roof covering according to claim 1, **characterized in** that said double folds (4,5) in the end portions (6) of said sheet (1), intended to be fastened to the outermost roof frames (2), consist of at least one double fold (4) and that the double folds (4,5) between these end portions (6) consist of at least one Z-fold (5).
3. A roof covering according to claim 1, **characterized in** that different layers of said double folds (4,5) are kept together by melting adhesive strings (7).
4. A roof covering according to claim 1, **characterized in** that the kraft liner board on said sheet (1) is applied by aid of a covering adhesive having the quality to crack in a dry condition and thus permit steam diffusion through the roof covering, while during water wetting, the water softening up the adhesive and the cracking splits are contracted in preventing of water penetration into the building.
5. A method of manufacturing a roof covering of a building and said roof covering comprising a reinforced roofing sheet which is provided with a kraft liner board and

extendable over the supporting frames (2), **characterized** in that the sheet (1) along its entire length being double folded in predetermined intervals corresponding to the interval between said supporting frames (2) by aid of former means (10,11) along the entire width of the sheet (1) in a transverse direction in relation to the longitudinal direction of the sheet (1) a distance mainly corresponding to the width of each supporting frame (2) and that adhesive strings (7) before the double folding are applied to the sheet (1) at least over the areas of the sheet (1) which after the double folding will be along the open edge region (17) of said double fold (4,5).

6. A method according to claim 5, **characterized** in that a colour marking (8) is applied to the sheet (1) over each double fold (4,5) in indicating the position of the double folds (4,5) along the sheet (1) and in order to facilitate the mounting and fixing of the sheet (1) against the supporting frames (2).



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 91/00594

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: E 04 D 12/00 // E 04 D 5/14		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
IPC5	E 04 D; E 04 B	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched ⁸		
SE,DK,FI,NO classes as above		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	SE, B, 430267 (PACSAC AB) 31 October 1983, see figure 3 --	
A	US, A, 800320 (T.F. ODELL) 26 September 1905, see figure 3, detail 3 --	
A	US, A, 1661562 (G.E. CONWAY) 6 March 1928, see figure 12 --	
A	US, A, 1844655 (Y. HIKASA) 9 February 1932, see figure 2, details 1, 2 and 3 --	
A	US, A, 4373315 (H.H. FARRANT) 15 February 1983, see figure 3 --	
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IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
18th March 1992		1992-03-30
International Searching Authority		Signature of Authorized Officer
SWEDISH PATENT OFFICE		<i>Vilho Juvonen</i> Vilho Juvonen

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
E	SE, A, 9001342 (ZANDA TRADING AB) 12 October 1991, see the whole document -----	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/SE 91/00594**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on **28/02/92**. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 430267	83-10-31	SE-A- 8200961	83-08-18
US-A- 800320	05-09-26	NONE	
US-A- 1661562	28-03-06	NONE	
US-A- 1844655	32-02-09	NONE	
US-A- 4373315	83-02-15	AU-B- 535568 AU-D- 5637580	84-03-29 80-09-18
SE-A- 9001342	91-10-12	NONE	