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(54) Flexible crack spread preventing, separable web-type joining material for joining a bearing face of a structure to a covering layer to be provided thereon, method for use of and covering layer construction formed with this material.

(57) Flexible crack spread preventing, separable web-type joining material for joining a bearing face of a structure to a covering layer to be provided thereon, method for use of and covering layer construction formed with this material.

Crack spread preventing web (1) for joining a bearing face (2) of a structure to a rigid covering (3) to be provided thereon.

The web comprises a lower fixing layer (5) of a fibrous web and an upper stretchable fixing layer (6) of a woven fabric or fibrous web separated by a thin flexible non adhering separating plastic foil layer (4). The upper (6) and lower layer (5) are joined to each other by breakable bridges (7) formed by needle punching extending through separating foil layer (4).

The breaking strength between upper (6) and lower (5) layer is controlled by the number of bridges (7).

In and for forming a covering layer construction the web (1) is placed on the bearing surface (2) and connected thereto by an adhesive penetrating into lower layer (5), the covering layer (3) is connected to the web (1) through an adhesive penetrating into the upper layer (6), said adhesives do not adhere to separating layer (4).

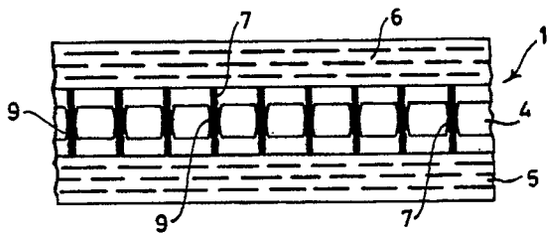

Fig. 1.

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FLEXIBLE CRACK SPREAD PREVENTING, SEPARABLE WEB-TYPE JOINING MATERIAL FOR JOINING A BEARING FACE OF A STRUCTURE TO A COVERING LAYER TO BE PROVIDED THEREON, METHOD FOR USE OF AND COVERING LAYER CONSTRUCTION FORMED WITH THIS MATERIAL.

The invention relates to a flexible crack spread preventing, separable web-type joining material for joining a bearing face of a structure to a rigid covering layer to be provided thereon.

In building structures where a rigid covering layer, such as an ornamental layer or tile surface, is provided on a bearing face of a building, pool, stock container or bridge, there is a risk that on the occurrence of cracks in a bearing face of, for example, concrete the covering layer will also crack.

In order to eliminate this problem, it is known to make use of, for example, elastified resin systems combined with a fibrous web.

When the bearing face cracks the elastified resin must then be capable of bridging the crack, but the crack-bridging action here depends on the quality which happens to exist in the adhesion to the bearing face. With good adhesion the crack-bridging action will generally be limited to less than 1 mm, depending on the thickness of the elastic covering layer. Only if the adhesion is poor good crack bridging can be obtained, since the fibrous web above the crack can only stretch with it if it is not adhering to the underlying bearing face.

Through the use of, for example, elastified polyester resins in these systems, one is, however, tied to a particular type of resin which limits the potential uses through its specific mechanical and chemical properties. There is also the problem that, due to high shrinkage, approximately 5%, and low alkali resistance, they can cause adhesion problems, as a result of which the covering can come away completely from the bearing face and loses its mechanical strength.

Such a known fixing of a bearing face with a rigid covering layer also produces many problems when one wishes to remove a fitted covering layer, since the known fixing is difficult to break.

The object of the invention is now to provide a web-type joining material which prevents cracks which occur in a bearing face of, for example, concrete, masonry or wood, such as a roof, floor or wall of a building structure, such as a building, bridge or pool, from spreading into a rigid covering layer provided thereon and joined thereto, while in addition a covering layer once fitted can be removed more or less easily.

This object is achieved according to the invention through the fact that the joining material comprises at least a lower fixing layer separated by a thin, flexible, essentially non-adhering separating layer, from an upper stretchable fixing layer, while on either side of the separating layer and extending through it breakable bridges join together the lower and upper fixing layer.

A non-adhering separating layer in this case is understood to mean a layer which does not adhere to the adhesive agents used for bonding the lower fixing layer to the bearing face and the upper fixing layer to the covering layer.

The breaking strength between the lower fixing layer, which is preferably in the form of a fibrous web layer, and the upper fixing layer is expediently regulated by the number of breakable bridges between these layers. In this way, a covering layer once fitted can easily be removed with the use of a small number of breakable bridges, while this is much more difficult with a large number of bridges.

The bridges extending on either side of the separating layer are expediently formed by needle punching from the lower to the upper fixing layer through the separating layer.

With the use of the flexible crack spread preventing, web-type joining material according to the invention it is possible to join a bearing face well to a rigid covering layer through the fact that the lower fixing layer, preferably a fibrous web layer, is bonded with a synthetic resin to the bearing face, while at the other side the covering layer, for example a tile surface or a covering layer made from synthetic resin and filler particles, is placed on the upper fixing layer, and crack formation in the bearing face still does not spread into the covering layer.

The filler particles can be, for example, powder particles, such as quartz powder particles, or granular particles or granulate particles, such as gravel particles.

The thickness of the lower fibrous web is expediently as low as possible, in order to reduce the consumption of resin for the bonding of this fibrous web layer to the bearing face.

Instead of being a fibrous web, the upper fixing layer can also be a woven fabric or a glass mat, as a result of which a greater tensile strength is obtained, and in particular a higher modulus, so that the covering layer itself is subjected to less stress.

In general, a synthetic resin is selected for bonding the lower fibrous web layer to the bearing face and the upper fixing layer to the rigid covering layer, and this resin can be selected freely depending on the further use requirements.

Suitable bonding agents are unsaturated polyester resins, polyurethanes, polymethyl methacrylates or epoxy resins, or formulations

based on such resins. However, formulations of other plastics and cement and/or plastic mortars are also suitable.

Shearing stresses occur in the breakable bridges joining the lower fibrous web layer to the upper fixing layer when cracks occur in, for example, bearing faces made of concrete, as a result of which the fibrous web layer cracks, which at the same time leads to a tensile stress in the upper fixing layer.

A number of bridges will give way under the influence of the shearing stress, so that a local delamination takes place. Consequently, the then free part of the upper fixing layer can stretch over the delaminated area and can thus absorb the crack width in the bearing face. The extent of delamination can be regulated by suitable regulation of the number of breakable bridges, the tensile strength of the upper fixing layer, and the elasticity thereof.

In the case of a small number of breakable fibrous bridges, delamination will easily be obtained, which is particularly desirable with the use of the joining material according to the invention for strippable floor or wall systems.

With a larger number of fibrous bridges, the mechanical strength of the system will, however, increase considerably.

The invention also relates to a covering layer construction on a bearing face of a structure with a rigid covering layer provided thereon and a web-type separable joining material placed between them, which is characterized in that a joining material is present between covering layer and bearing face, said joining material comprising at least a lower fixing layer separated by a thin, flexible, essentially non-adhering separating layer, from a stretchable upper fixing layer, while on either side of the separating layer and extending through it breakable bridges join together the lower and upper fixing layers, and lower and upper fixing layer are joined to the bearing face or the covering layer.

Such a covering layer construction is particularly suitable for providing, for example, a covering layer of filler particles bound by synthetic resin as a protective and/or decorative layer on floors, roofs and walls of a building.

Finally, the invention relates to a method for providing a rigid covering layer on a bearing face of a structure using a separable web-type material fitted between them, which is characterized in that a joining material is placed on the bearing face, said joining material comprising at least a lower fixing layer separated by a thin, flexible, essentially non-adhering separating layer, from a stretchable upper fixing layer, while on either side of the thin separating layer and extending through it breakable bridges join together the lower and upper fixing layer, and one of the layers of the fixing layer is bonded with a bonding agent to the bearing face, and the other layer is bonded also with a bonding agent to a rigid covering layer provided thereon.

The invention will now be explained with reference to an example of an embodiment shown in the drawing, in which:

Fig. 1 shows a cross-section of a web-type joining material according to the invention; and

Fig. 2 shows a covering layer construction on a floor of a building and a rigid protective covering layer of filler particles, such as quartz powder, bonded together by epoxy resin provided thereon.

Fig. 1 shows a flexible crack spread preventing, separable web-type joining material 1, comprising a lower fixing layer, in the form of a fibrous web layer 5, and a upper fixing layer 6, separated from each other by a thin, flexible, non-porous separating layer 4, in the form of a polythene plastic film. This plastic film does not adhere to thermosetting resins.

In the present case the upper fixing layer 6 is also a fibrous web made of plastic fibres.

Through needle punching breakable fibrous bridges 7 are formed between lower fibrous web layer 5 and upper fixing layer 6, which fibrous bridges 7 extend through holes 9 in the plastic film.

It is expedient to work with 5 to 50 needle punches per cm^2 for forming the breakable fibrous bridges.

With the use of 10 needle punches per cm^2 a readily usable product is obtained, but the ventilation of the lower fibrous web 5 can then sometimes be difficult during the impregnation with certain synthetic resins.

With the use of 20 - 50 needle punches per cm^2 a very good ventilation of the lower fibrous web layer 5 is obtained during the bonding to a bearing face 2. However, the adhesion strength between the different layers 5 and 6 increases greatly in that case.

The fibrous web layer 5 is expediently made of plastic fibres weighing about 50 g/m^2, while the fibrous web layer 6 weighs about 50 - 250 g/cm^2.

The fibrous web layer 6 is expediently approximately 2 mm thick, while the thickness of fibrous web layer 5 is selected as low as possible. These values are, however, given only by way of illustration. Fig. 2 shows what effects occur with crack formation in a floor 2 of a building on which the joining material 1 is fixed by means of a synthetic resin which has penetrated into the lower fibrous web layer 5. At the other side, a covering layer 3 of filler particles such as quartz powder particles bound by epoxy resin is bonded to the upper fixing layer 6, which is also a fibrous web.

The number of needle punches forming fibrous

bridges in the joining material was 20/cm^2.

When a crack 8 forms in the concrete floor 2, the lower fibrous web layer 5 cracks, with the result that fibrous bridges 7a in the vicinity of the crack 8 which has occurred are also broken.

Through the breaking of the fibrous bridges 7a, the upper stretchable fixing layer 6 has come away from the lower fibrous web layer 5 through delamination and can itself stretch in order to prevent the crack 8 which has formed from spreading into the rigid covering layer 3.

If one wishes to be able to remove the covering layer 3 of filler particles bonded by epoxy resin easily after a period of time, use can be made of a joining material with fibrous bridges formed by 5 - 10, preferably 5, needle punches per cm^2.

Claims

1. Flexible crack spread preventing, separable web-type joining material (1) for joining a bearing face (2) of a structure to a rigid covering layer (3) to be provided thereon, characterized in that the joining material (1) comprises at least a lower fixing layer (5) separated by a thin, flexible, essentially non-adhering separating layer (4), from an upper stretchable fixing layer (6), while on either side of the separating layer (4) and extending through it breakable bridges (7) join together the lower fixing layer (5) and the upper fixing layer (6).

2. Flexible crack spread preventing joining material (1) according to claim 1, characterized in that the breaking strength between the lower fixing layer (5) and the stretchable upper fixing layer (6) is controlled by the number of breakable fibrous bridges between these layers.

3. Flexible crack spread preventing joining material (1) according to claim 1 or 2, characterized in that the lower fixing layer (5) is made of a fibrous web and the upper, stretchable fixing layer (6) is a woven fabric or fibrous web made of organic or inorganic material.

4. Flexible crack spread preventing web-type joining material (1) according to one or more of the preceding claims, characterized in that the breakable bridges are fibrous bridges (7) formed by needle punches from a fibrous web layer through the thin separating layer (4).

5. Covering layer construction on a bearing face (2) of a structure with a rigid covering layer (3) provided thereon and a separable web-type joining material (1) provided between them, characterized in that a joining material (1) according to anyone of claims 1-4 is present between covering layer (3) and bearing face (2) and lower (5) and upper fixing layer (6) are joined to the bearing face (2) or the covering layer (3).

6. Covering layer construction according to claim 5, characterized in that the lower fixing layer in the form of a fibrous web (5) is joined to the bearing face (2) by adhesive penetrating into said layer and preferably the stretchable upper fixing layer (6) is joined to the covering layer (3) by an adhesive penetrating into said layer.

7. Method for providing a rigid covering layer (3) on a bearing face (2) of a structure using a separable webtype joining material (1) fitted between them, characterized in that a joining material (1) is placed on the bearing face, said joining material comprising at least a lower fixing layer (5) separated by a thin, flexible, essentially non-adhering separating layer (4), from a stretchable upper fixing layer (6), while on either side of the thin separating layer (4) and extending through it breakable bridges (7) join together the lower and upper fixing layer, and one of the layers of the separating material is bonded with a bonding agent to the bearing face, while the other layer is bonded also with a bonding agent to a rigid covering layer (3) provided thereon.

8. Method according to claim 7, characterized in that the lower fixing layer in the form of a fibrous web (5) is joined to the bearing face (2) by adhesive penetrating into said layer and/or the stretchable upper fixing layer (6) is bonded to the covering layer (3) by an adhesive penetrating into said layer.

9. Method according to one or more of claims 7 or 8, characterized in that the breaking strength between the upper fixing layer (5) and the lower fixing layer (6) is controlled by the number of breakable bridges, preferably fibrous bridges formed from the lower fibrous web layer (5) by needle punches.

10. Method according to one or more of claims 7 -9, characterized in that the lower fixing layer (5) is made of a fibrous web, and the upper fixing layer (6) is a fibrous web or woven fabric made of organic or inorganic material.

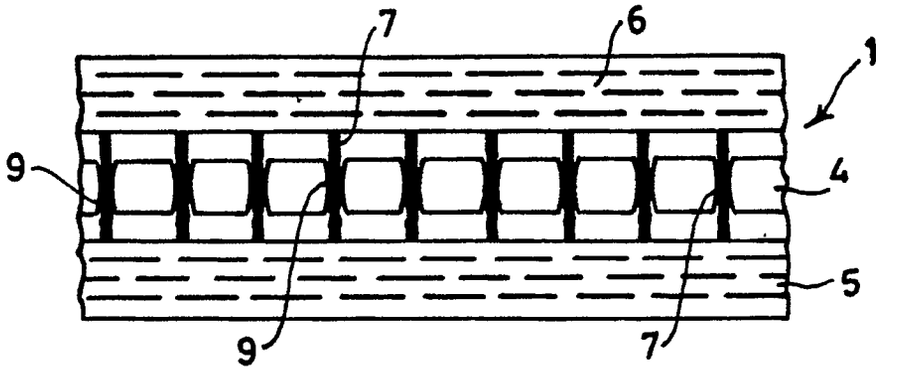

Fig: 1.

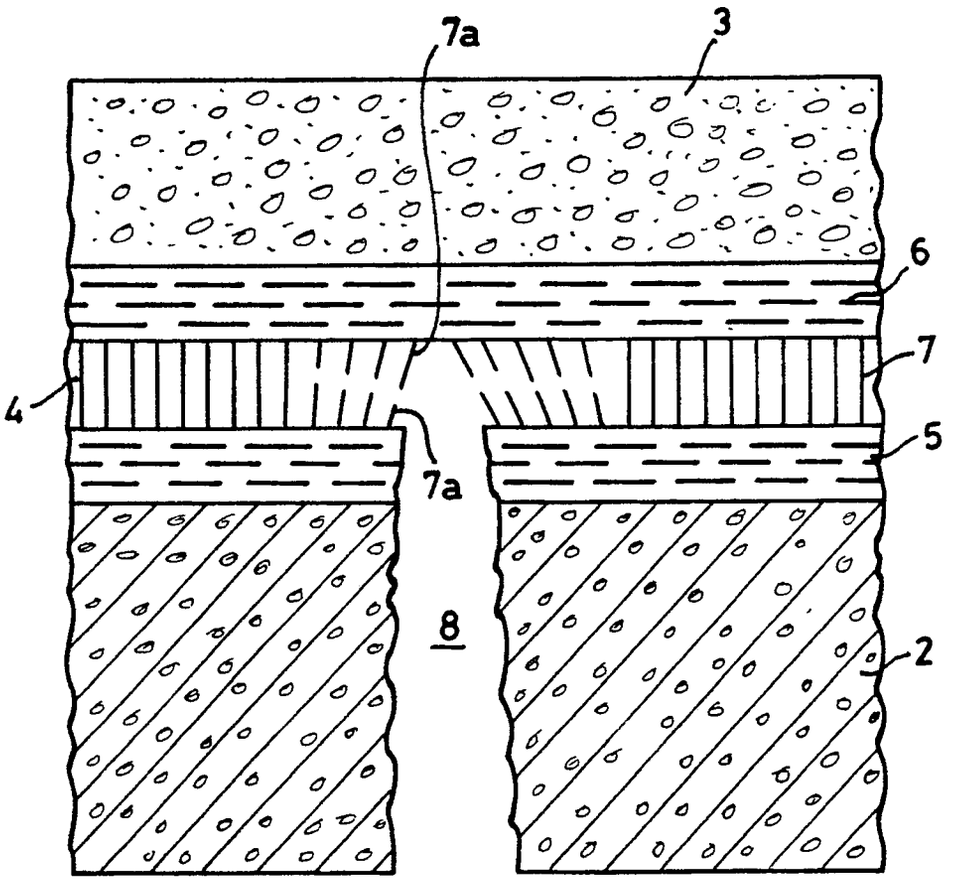

Fig: 2.

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EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2894

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-7 866 14 (STATOFIX TRANSCONTINENTAL CORPORATION S.A.) * page 1, line 54 - page 2, line 130; figures 1-5 *	1,4,5,10	E 04 F 15/22 E 04 F 15/18 E 04 F 13/04 E 01 C 7/14
A	US-A-4 393 634 (MC DERMOTT ET AL.) * column 3, line 32 - column 6, line 42; figures 1-4 *	1,3-10	
A	NL-A-6 703 573 (ASPHALTGESELLSCHAFT GEISSLER U.PEHR) * page 1, line 1 - page 3, line 35; figures 1, 2 *	1,3,5,7	
A	GB-A-1 418 493 (AKTIESELSKABET JENS VILLADSENS FABRIKER) * page 1, line 51 - page 2, line 128 * * page 3, line 56 - page 4, line 103 *	1,3,5-8, 10	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 04 F
E 04 D
E 01 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	25 January 91	AYITER J.

CATEGORY OF CITED DOCUMENTS

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