

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 305 482 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

11.05.2005 Bulletin 2005/19

(21) Application number: **01945542.7**

(22) Date of filing: **06.07.2001**

(51) Int Cl.7: **E04B 1/94**, E04D 13/16

(86) International application number:
PCT/GB2001/003060

(87) International publication number:
WO 2002/010525 (07.02.2002 Gazette 2002/06)

(54) **FIRE RESISTANT SPACER**

FEUER BESTÄNDIGER ABSTANDHALTER

ENTRETOISE IGNIFUGE

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR**

(30) Priority: **29.07.2000 GB 0018590**

(43) Date of publication of application:
02.05.2003 Bulletin 2003/18

(73) Proprietor: **ENVIRONMENTAL SEALS LIMITED**
Nr. Dover, Kent CT15 7JG (GB)

(72) Inventor: **WARD, Derek, Alfred**
Dover, Kent CT15 5HR (GB)

(74) Representative: **Fry, Alan Valentine**
FRY HEATH & SPENCE LLP
The Gables
Massetts Road
Horley Surrey RH6 7DQ (GB)

(56) References cited:
GB-A- 2 189 827 **GB-A- 2 234 938**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 305 482 B1

Description

[0001] This invention relates to fire-resistant spacers and more especially to such spacers for separating tiled or slatted roof structures (hereinafter referred to as "tiled" roof structures) of adjoining buildings to prevent the spread of fire from one roof structure to an adjoining roof structure or structures.

[0002] Presently a fire in one building of a terrace quickly spreads to the adjoining buildings particularly through the neighbouring roof spaces. The present invention sets out to provide a fire-resistant spacer which operates to prevent the spread of fire between adjoining buildings or building sections for an enhanced period of time, especially a period in excess of one hour.

[0003] The Applicant's earlier application GB 2234938A discloses an intumescent fire barrier comprising a layer of wire mesh sandwiched between sheets of ceramic fibre.

[0004] GB 2189827A discloses a roof space fire stop comprising a non-combustible body member for location above a dividing wall between two roof volumes.

[0005] The present invention seeks to provide a spacer which operates to prevent the spread of fire between adjoining buildings or building sections for a greater period of time.

[0006] According to the present invention in one aspect, there is provided a fire-resistant spacer for separating tiled or slatted roof structures of adjoining buildings or building sections, the spacer comprising at least one sheet of intumescent material and at least one sheet of deformable material sealed within an envelope of flexible material, and a rib of flexible cellular fire-retardant foam or sponge in contact with an exposed surface of the envelope between opposed side edges thereof, the arrangement being such that in use the sides of the sealed envelope in which the intumescent material is present are capable of extending to positions at which they can be secured to neighbouring roof structures, such as joists, of adjoining buildings or building sections with the rib capable of extending between these neighbouring structures and to a height at least equal to the height of neighbouring tile battens of the neighbouring roof structures, the sealed envelope and rib being able to be subsequently covered by roof tiles.

[0007] The sheet of intumescent material may include or be coated with a mixture of particulate ceramic material, an intumescent substance and a binder. The intumescent material may comprise exfoliating graphite and/or sodium silicate in granular and/or powder form. The sheet containing the intumescent material may comprise a non-woven mat or sheet. The initial thickness of the sheet is preferably from 2 to 3mm and the sheet thickness when intumesced preferably exceeds 25mm.

[0008] The deformable sheet may comprise a wire mesh and the material of the envelope may comprise metallic foil or like material, reinforced foil paper, craft

paper, or a plastics sleeve.

[0009] The rib of flexible cellular fire-retardant foam or sponge may be secured to a surface of the envelope and may be coated on at least one of its surfaces with a primer solution including a sealant and a flowable coating of a fire-retardant material. In this embodiment, the primer solution operates to close the open pores of the coated surface of the rib and provides a bond to which the fire-retardant coating can adhere. The primer solution may comprise an aqueous solution of an acrylic copolymer, including ammonium polyphosphate. The fire-retardant coating may comprise a chlorinated vinyl copolymer system which includes a quantity of ammonium polyphosphate, zinc borate, or magnesium and calcium carbonates. The foam or sponge may comprise polyurethane or a silicone coated with a silane primer.

[0010] In another aspect, there is provided a felted, tiled or slatted roof structure comprising a plurality of spaced joists and tile or slat supporting battens, and a fire-resistant spacer positioned between one or more neighbouring pairs of joists, the spacer comprising at least one sheet of intumescent material and at least one sheet of deformable material sealed within an envelope of flexible material, and a rib of flexible cellular fire-retardant foam or sponge in contact with or secured to an exposed surface of the envelope between opposed side edges thereof, the envelope side edges being secured to each of the neighbouring joists and the height of the rib, before assembly, being greater than the height of neighbouring tile or slat battens whereby, in use, the ribs are urged into contact with the felted roof surface by the tiles or slats.

[0011] The invention will now be described by way of example only with reference to the accompanying diagrammatic drawings in which:-

Figure 1 is an isometric view of a fire-retardant spacer in accordance with the invention;

Figure 2 is a cross-section taken along line II-II of the fire-retardant spacer illustrated in Figure 1;

Figures 3 and 4 are end views of spacers in accordance with the invention positioned below tiles of a roofing structure; and

Figure 5 shows the illustrated spacer assembled between adjoining roof structures of neighbouring buildings.

[0012] The fire-retardant spacer illustrated in the drawings comprises a sheet of intumescent containing or coated material 1 and a sheet of deformable wire mesh 2 located within a sealed envelope 3 of metallic foil. The intumescent sheet may comprise a sheet marketed by the Applicants under their registered trade mark **Multigraf**. Alternatively, it may comprise other similar intumescent containing or coated sheet products

marketed by Applicants or others.

[0013] The thickness of the intumescent sheet used is preferably of the order of 2 to 3mm; when intumesced in the event of fire the thickness preferably increases to a minimum of 25mm. The wire mesh is typically produced from aluminium or steel with generally square or round openings of between 10 and 50mm. The envelope 3 may comprise reinforced foil paper; alternatively, the envelope may comprise a folded foiled sheet, a plastics sleeve or folded and sealed craft paper.

[0014] Adhered to one surface of the foil envelope is an elongate rib 4 of flexible cellular fire-retardant foam or sponge. In a preferred embodiment, the rib 4 comprises a length of impregnated fireproof sponge. Alternatively, it may comprise rockwool, glasswool, a ceramic material or a mixture of two or more of these substances. The rib 4 extends between opposed upper and lower edges of the sealed envelope and is positioned generally centrally between the envelope side edges. The height of the rib is at least equal to the height of conventional roof battens 5 to which roofing tiles 6 are secured. Preferably the height of the enveloped rib exceeds the height of the battens by a small amount whereby the rib is compressed by the overlying tile to eliminate any voids which may otherwise be present.

[0015] The illustrated sheet of intumescent material may comprise ceramic or like fibres mixed with exfoliating graphite and/or sodium silicate in granular, powder or chip form. Other intumescent compositions may be employed. The wire mesh is provided to enable the envelope to be shaped on site to conform to any particular required configuration.

[0016] The rib of polyurethane foam material is, in one embodiment, impregnated with an aqueous solution of a fire retardant material and is coated on some or all of its surfaces with a solution of a acrylic copolymer system which includes ammonium polyphosphate. At temperatures in excess of 250°C to 300°C the ammonium polyphosphate forms phosphoric acid which reacts with the fire-retardant coating of the rib. This primer coating has a viscosity similar to that of water and acts to seal the open cells of the polyurethane foam. The primer coating therefore seals the exposed surfaces of the polyurethane rib whilst retaining its flexibility characteristics. The primer coating also provides a bond to which the subsequently applied fire-retardant coating can adhere.

[0017] Referring now to Figures 3 and 4, it will be seen that the outwardly extending sides 5 of the spacer are positioned below the opposed ends of neighbouring battens 6 and spaced from the undersurfaces of these battens by conventional roofing felt 7. Tiles 8 are positioned over and above the spacers and, in the positions shown in Figure 4, compress the spacer to remove any voids which might otherwise be present.

[0018] As will be seen from Figure 5, in use the spacer is secured along the edges of its sides 5 to adjacent joists of adjoining roof structures with the rib 4 positioned

between the joists and below the sealed envelope. The height of the rib either equals or exceeds the height of the neighbouring battens to which the roof tiles are secured. Once in position the upper surface of the envelope is covered by roofing tiles in the normal way, the pressure of these urging the rib and the fire-retardant spacer into contact with the roofing felt which overlies the adjoining structures.

[0019] The enveloped spacers extend up to or overlie the ridge of the roof structure and are covered and compressed by ridge tiles 9.

[0020] In the event of fire the spacers intumesce to create an effective barrier to prevent the passage of fire from one roof structure section to an adjoining roof structure section.

[0021] It will be appreciated that the foregoing is merely exemplary of fire-resistant spacers in accordance with the invention and that modifications can readily be made thereto without departing from the true scope of the invention.

Claims

1. A fire-resistant spacer for separating tiled or slatted roof structures of adjoining buildings or building sections, the spacer comprising at least one sheet of intumescent material (1) and at least one sheet of deformable material (2) sealed within an envelope of flexible material (3), **characterised in that** the spacer further comprises a rib (4) of flexible cellular fire-retardant foam or sponge in contact with an exposed surface of the envelope (3) between opposed side edges thereof, the arrangement being such that in use the sides of the sealed envelope (3) in which the intumescent material (1) is present are capable of extending to positions at which they can be secured to neighbouring roof structures, such as joists, of adjoining buildings or building sections with the rib (4) capable of extending between these neighbouring structures and to a height at least equal to the height of neighbouring tile battens (6) of the neighbouring roof structures, the sealed envelope (3) and rib (4) being able to be subsequently covered by roof tiles (8).
2. A spacer as claimed in claim 1 wherein the sheet of intumescent material (1) includes or is coated with a mixture of particulate ceramic material, an intumescent substance and a binder.
3. A spacer as claimed in claim 2 wherein the intumescent material comprises exfoliating graphite and/or sodium silicate in granular and/or powder form.
4. A spacer as claimed in any one of the preceding claims wherein the sheet containing the intumescent material comprises a non-woven mat or sheet.

5. A spacer as claimed in any one of the preceding claims wherein the initial thickness of the sheet is from 2 to 3mm and the sheet thickness when intumesced exceeds 25mm.
6. A spacer as claimed in any one of the preceding claims wherein the deformable sheet (2) comprises a wire mesh.
7. A spacer as claimed in any one of claims 1 to 5 wherein the material of the envelope (3) comprises metallic foil, reinforced foil paper, craft paper, or a plastics sleeve.
8. A spacer as claimed in any one of the preceding claims wherein the rib (4) of flexible cellular fire-retardant foam or sponge is secured to a surface of the envelope (3) and is coated on at least one of its surfaces with a primer solution including a sealant and a flowable coating of a fire-retardant material.
9. A spacer as claimed in claim 8 wherein the primer solution comprises an aqueous solution of an acrylic copolymer, including ammonium polyphosphate.
10. A spacer as claimed in claim 8 or claim 9 wherein the fire-retardant coating comprises a chlorinated vinyl copolymer system which includes a quantity of ammonium polyphosphate, zinc borate, or magnesium and calcium carbonates.
11. A spacer as claimed in any one of the preceding claims wherein the foam or sponge comprises polyurethane or a silicone coated with a silane primer.
12. A felted, tiled or slatted roof structure comprising a plurality of spaced joists and tile or slat supporting battens, and a fire-resistant spacer positioned between one or more neighbouring pairs of joists, the spacer comprising at least one sheet of intumescent material (1) and at least one sheet of deformable material (2) sealed within an envelope of flexible material (3), and a rib (4) of flexible cellular fire-retardant foam or sponge in contact with or secured to an exposed surface of the envelope (3) between opposed side edges thereof, the envelope side edges being secured to each of the neighbouring joists and the height of the rib (4), before assembly, being greater than the height of neighbouring tile or slat battens (6) whereby, in use, the ribs (4) are urged into contact with the felted roof surface by the tiles or slats.

Patentansprüche

1. Feuerbeständiger Abstandshalter zum Abtrennen von Dachziegel- oder Dachschindel-Dachstruktu-

ren aneinanderstoßender Gebäude oder Gebäudeteile, wobei der Abstandshalter wenigstens eine Schicht aus aufblähbarem Material (1) und wenigstens eine Schicht aus deformierbarem Material (2) aufweist, die innerhalb einer geschlossenen Umhüllung (3) aus flexiblem Material angeordnet sind, **dadurch gekennzeichnet, dass** der Abstandshalter außerdem eine Rippe (4) aus einem flexiblen, zellenförmigen, feuerbeständigen Schaumstoff oder Schwamm in Berührung mit einer freiliegenden Oberfläche der Umhüllung (3) zwischen gegenüberliegenden Seitenrändern hiervon aufweist, wobei die Anordnung derart getroffen ist, dass im Gebrauch die Seiten der geschlossenen Umhüllung (3), in der das aufblähbare Material (1) vorhanden ist, in der Lage sind, sich in Positionen zu erstrecken, in denen sie an benachbarten Dachstrukturen, beispielsweise Dachbalken anstoßender Gebäude oder Gebäudeteile, befestigt werden können, wobei die Rippe (4) in der Lage ist, sich zwischen diesen benachbarten Strukturen und auf eine Höhe zu erstrecken, die wenigstens gleich der Höhe benachbarter Dachlatten (6) der benachbarten Dachstrukturen ist und wobei die geschlossene Umhüllung (3) und die Rippe (4) in der Lage sind, anschließend durch die Dachziegel (8) bedeckt zu werden.

2. Abstandshalter nach Anspruch 1, bei welchem die Lage aus aufblähbarem Material (1) eine Mischung aus partikelförmigem Keramikmaterial mit einer aufblähbaren Substanz und mit einem Binder aufweist oder hiermit überzogen ist.
3. Abstandshalter nach Anspruch 2, bei welchem das aufblähbare Material ein aufblähbares Graphit und/oder Natriumsilikat in granularer und/oder pulverförmiger Form ist.
4. Abstandshalter nach einem der vorhergehenden Ansprüche, bei welchem die das aufblähbare Material enthaltende Schicht eine nicht gewebte Matte oder eine nicht gewebte Schicht enthält.
5. Abstandshalter nach einem der vorhergehenden Ansprüche, bei welchem die ursprüngliche Schicht 2 bis 3 mm dick ist und die Schicht im aufgeblähten Zustand mehr als 25 mm dick ist.
6. Abstandshalter nach einem der vorhergehenden Ansprüche, bei welchem die deformierbare Schicht (2) ein Drahtgeflecht enthält.
7. Abstandshalter nach einem der Ansprüche 1 bis 5, bei welchem das Material der Umhüllung (3) eine Metallfolie, eine verstärkte Papierfolie, ein Hartpapier oder eine Plastikhülle ist.
8. Abstandshalter nach einem der vorhergehenden

Ansprüche, bei welchem die Rippe (4) aus flexiblem, zellenförmigem, feuerbeständigem Schaumstoff oder Schwamm an einer Oberfläche der Umhüllung (3) festgelegt und an wenigstens einer der Oberflächen mit einer Grundierlösung überzogen ist, die einen dichtenden und fließfähigen Überzug aus feuerbeständigem Material enthält.

9. Abstandshalter nach Anspruch 8, bei welchem die Grundierlösung aus einer wässrigen Lösung eines Acryl-Mischpolimerisats besteht, das Ammonium-Polyphosphat enthält.

10. Abstandshalter nach den Ansprüchen 8 oder 9, bei welchem der feuerbeständige Überzug ein chloriertes Vinyl-Mischpolimerisations-System aufweist, das eine Menge von Ammonium-Polyphosphat, Zinkborat oder Magnesium und Kalziumkarbonat enthält.

11. Abstandshalter nach einem der vorhergehenden Ansprüche, bei welchem der Schaumstoff oder Schwamm aus Polyurethan oder einem Silikon besteht, das mit einer Silangrundierung überzogen ist.

12. Dachpappen-, Ziegel- oder Schindel-Dachstruktur mit einer Mehrzahl von im Abstand angeordneten Dachbalken und Dachziegel-Trägerlatten und einem feuerbeständigen Abstandshalter zwischen einem oder mehreren benachbarten Paaren von Dachbalken, wobei der Abstandshalter wenigstens eine Schicht aus aufblähbarem Material (1) und wenigstens eine Schicht aus einem deformierbaren Material (2) enthält, das innerhalb einer geschlossenen Umhüllung aus flexiblem Material (3) angeordnet ist und eine Rippe (4) aus einem flexiblen, zellenförmigen, feuerbeständigen Schaumstoff oder Schwamm in Berührung mit einer freien Oberfläche der Umhüllung (3) zwischen benachbarten Rändern hiervon oder hieran befestigt ist, wobei die Seitenränder der Umhüllung an jedem der benachbarten Dachlatten festgelegt sind und die Höhe der Rippe (4) vor dem Zusammenbau größer ist als die Höhe benachbarter Dachlatten (6), wodurch im Gebrauch die Rippen (4) in Berührung mit der Dachpappen-Dachoberfläche durch die Ziegel oder Schindeln gedrückt werden.

Revendications

1. Pièce d'écartement résistant au feu pour séparer des structures de toits en tuiles ou en lattes de bâtiments adjacents ou de sections de bâtiments adjacents, la pièce d'écartement comprenant au moins une feuille constituée d'une matière intumescence (1) et au moins une feuille constituée d'une matière déformable (2) entourée d'une enveloppe

hermétique constituée d'une matière flexible (3), **caractérisée en ce que** la pièce d'écartement comprend en outre une nervure (4) constituée d'une éponge ou d'une mousse alvéolaire flexible ignifugée mise en contact avec une surface exposée de l'enveloppe (3) entre les bords latéraux opposés de cette dernière, l'arrangement étant tel qu'à l'état d'activité, les côtés de l'enveloppe hermétique (3) dans laquelle est présente la matière intumescence (1) sont capables de s'étendre pour prendre des positions auxquelles ils peuvent venir se fixer à des structures de toits adjacents, telles que des solives, de bâtiments adjacents ou de sections de bâtiments adjacents, la nervure (4) étant capable de s'étendre entre ces structures adjacents et jusqu'à une hauteur au moins égale à la hauteur de liteaux de tuiles adjacents (6) des structures de toits adjacents, l'enveloppe hermétique (3) et la nervure (4) étant à même d'être recouverts par la suite par des tuiles de toits (8).

2. Pièce d'écartement selon la revendication 1, dans laquelle la feuille constituée d'une matière intumescence (1) englobe un mélange d'une matière céramique particulaire, d'une substance intumescence et d'un liant ou bien est enduite avec ledit mélange.

3. Pièce d'écartement selon la revendication 2, dans laquelle la matière intumescence comprend du graphite apte au gonflement et/ou du silicate de sodium sous forme granuleuse et/ou sous forme pulvérulente.

4. Pièce d'écartement selon l'une quelconque des revendications précédentes, dans laquelle la feuille contenant la matière intumescence comprend un mat non tissé ou une feuille non tissée.

5. Pièce d'écartement selon l'une quelconque des revendications précédentes, dans laquelle l'épaisseur initiale de la feuille s'élève de 2 à 3 mm et l'épaisseur de la feuille, à l'état intumescent, dépasse 25 mm.

6. Pièce d'écartement selon l'une quelconque des revendications précédentes, dans laquelle la feuille déformable (2) comprend un grillage métallique.

7. Pièce d'écartement selon l'une quelconque des revendications 1 à 5, dans laquelle la matière de l'enveloppe (3) comprend une mince feuille métallique, du papier aluminium renforcé, du papier kraft ou une gaine en matière plastique.

8. Pièce d'écartement selon l'une quelconque des revendications précédentes, dans laquelle la nervure (4) constituée d'une éponge ou d'une mousse alvéolaire flexible ignifugée est fixée à une surface

de l'enveloppe (3) et est enduite, sur au moins une de ses surfaces, d'une solution de peinture primaire réactive englobant un produit d'étanchéité et une couche de type à écoulement libre, constituée d'une matière ignifuge.

5

9. Pièce d'écartement selon la revendication 8, dans laquelle la solution de peinture primaire réactive comprend une solution aqueuse d'un copolymère acrylique, y compris du polyphosphate d'ammonium. 10
10. Pièce d'écartement selon la revendication 8 ou 9, dans laquelle le revêtement ignifuge comprend un système de copolymère de chlorure de vinyle qui englobe une certaine quantité de polyphosphate d'ammonium, de borate de zinc ou encore de carbonate de magnésium et de calcium. 15
11. Pièce d'écartement selon l'une quelconque des revendications précédentes, dans laquelle l'éponge ou la mousse comprend du polyuréthane ou une silicone enduite d'une peinture primaire réactive à base de silane. 20
12. Structure de toit en feutre-toiture goudronné, en tuiles ou en lattes comprenant plusieurs solives espacées et plusieurs liteaux de support de tuiles ou de lattes, et une pièce d'écartement ignifugée disposée entre une ou plusieurs paires adjacentes de solives, la pièce d'écartement comprenant au moins une feuille constituée d'une matière intumescence (1) et au moins une feuille constituée d'une matière déformable (2) entourée d'une enveloppe hermétique constituée d'une matière flexible (3), et une nervure (4) constituée d'une éponge ou d'une mousse alvéolaire flexible ignifugée mise en contact avec une surface exposée de l'enveloppe (3) entre les bords latéraux opposés de cette dernière ou encore fixée à ladite surface, les côtés latéraux de l'enveloppe étant fixés à chacune des solives adjacentes et la hauteur de la nervure (4), avant l'assemblage, étant supérieure à la hauteur des liteaux adjacents (6) de support de tuiles ou de lattes, par laquelle, à l'état d'activité, les nervures (4) sont pressées en contact avec la surface de toit en feutre-toiture goudronné par les tuiles ou par les lattes. 25 30 35 40 45

50

55

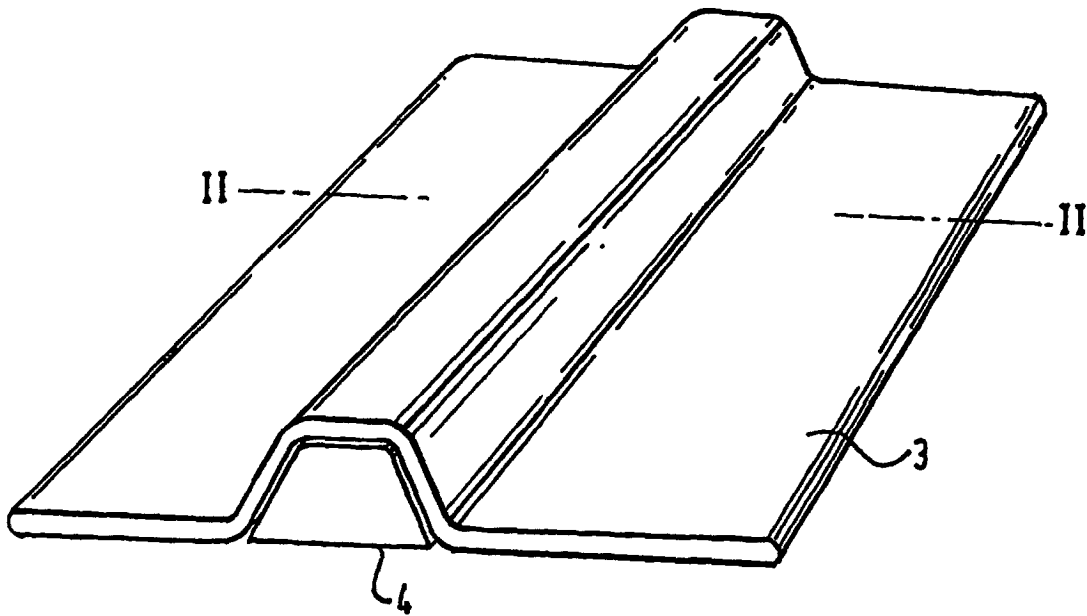


FIG.1.

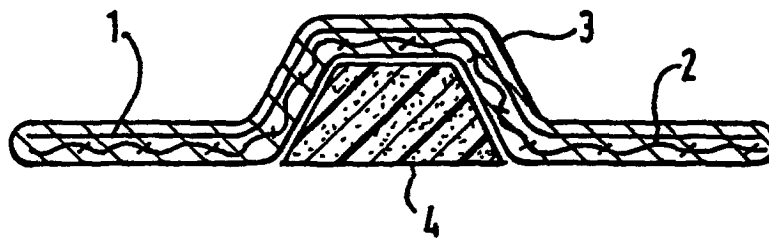
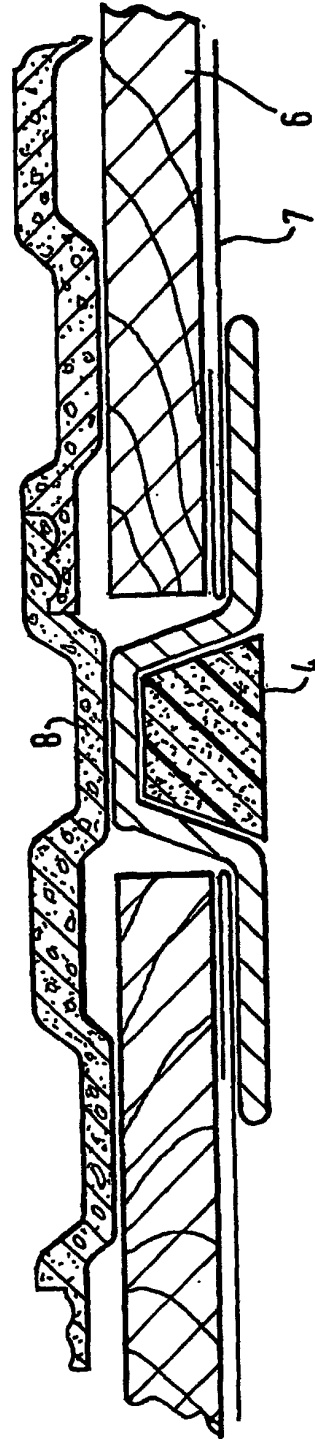
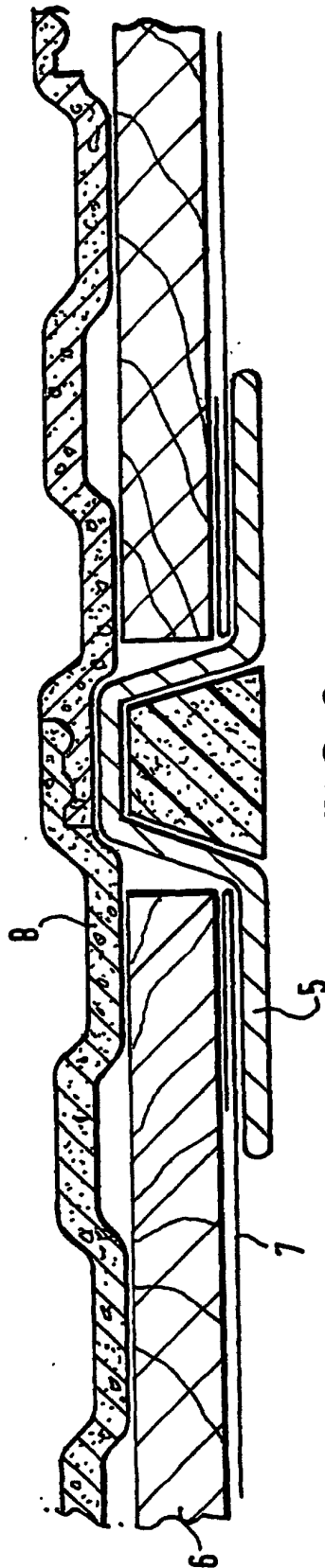


FIG.2.



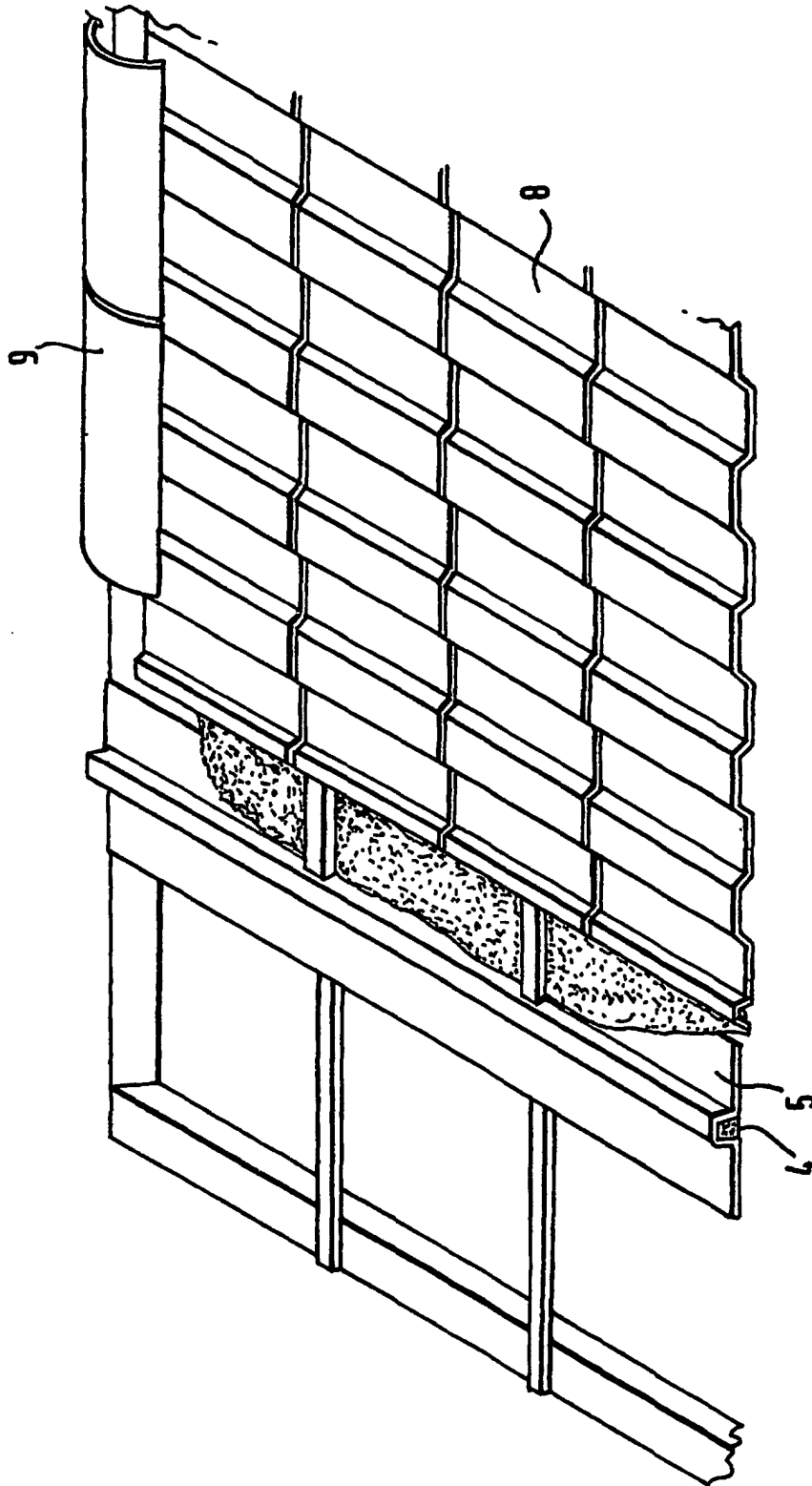


FIG. 5.