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(54) **A PLASTICALLY DEFORMABLE FLASHING MATERIAL, IN PARTICULAR FOR ROOF FLASHING PURPOSES AND A METHOD OF MANUFACTURING SUCH A MATERIAL**

PLASTISCH-VERFORMBARES DICHTUNGSMATERIAL, SPEZIELL FÜR DACHABDICHTUNGEN UND VERFAHREN ZUM HERSTELLEN DIESES MATERIALS

MATERIAU PLASTIQUEMENT DEFORMABLE POUR LA REALISATION D'UNE BANDE D'ETANCHEITE, EN PARTICULIER D'UNE BANDE D'ETANCHEITE DE TOITURE, ET SON PROCEDE DE FABRICATION

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Description

[0001] The invention relates to a plastically deformable flashing material, in particular for roof flashing purposes in connection with roof windows and similar roof penetrating building structures, consisting of a sheet-, web- or strip-shaped expanded-metal grid covered on both sides by an elastomeric layer of thermoplastic material.

[0002] Such deformable sheet materials are frequently used to provide water- and snowproof sealings between roof penetrating building structures, especially roof windows, and the surrounding roofing which may consist of tiles or other forms of corrugated covering materials.

[0003] In order to permit an adaptation of such flashing materials to the form of the surrounding roof covering by a purely manual deformation, the use of corrugated roofing materials made from lead or other forms of deformable metal foils as disclosed in, inter alia, DE utility model G 82 00 019.0, has in course of time also been proposed to replace the flat lead skirts with a thickness of 1-2 mm and originally used for this purpose.

[0004] Concurrently with increasing concern of the environment, it has further been suggested to use a number of different sandwich or composite materials including those disclosed in EP-A-038222, EP-A-0123141 and GB-A-2184685, in order to avoid the pollution problems related to the use of lead.

[0005] However, such sandwich materials have as a rule been considerably more expensive than pure lead flashings. Furthermore, both per se and as a consequence of their incorporation in a sandwich material together with partly elastomeric materials, the used metal foils have not always had the required lasting deformation properties because of a certain remaining elastic resilience.

[0006] By the flashing material known from GB-A-2184685, an attempt to avoid this problem has been made by using a plastically formable metal insert in the form of an expanded-metal grid, which has an extensibility of 50 to 150% in the longitudinal direction of the sheet-, web- or strip-shaped material whereas the extensibility in the cross direction orthogonal thereto is less or equal to 20%, which insert is surrounded by an elastomeric layer in the form of a non-adhesive polyisobutylene mass with an extensibility of more than 50%.

[0007] As this material is shaped in plane sheet-form, the deformability depends solely on the extensibility of the grid insert and the elastomeric layer, respectively, which results in large demands on the properties of the elastomeric layer when using the material in connection with heavily corrugated roof coverings with great level differences in order to avoid that the expanded-metal grid breaks through one or both elastomeric layers whereby their weather-resistant effect is lost.

[0008] Based on flashing materials of the type disclosed in above GB-A-2184685, it is the object of the invention to procure a new design of such a flashing material which can be produced at a relatively low price and has deformation properties fully up to the standard of those of the best sandwich materials at the same time as the weather-resistant effect is maintained to the full extent.

[0009] To this end, a flashing material of the above type according to the invention is characteristic in that the expanded-metal grid is pretreated to essentially the same extensibility in two directions substantially orthogonal to each other and corresponding to the longitudinal and cross direction of the sheet-, web- or strip-form, and that the sandwich material formed by the expanded-metal grid and the elastomeric layers is corrugated in a waveform parallel to one of said two directions substantially orthogonal to each other.

[0010] The waveform of the flashing material according to the invention entails that the area of the plastically deformable material per unit area of the finished flashing material is considerably increased. Thereby is obtained a light manual deformability merely by stretching the crests and valleys of the waveform with an appreciable reduction in the need for stretching or butting the expanded-metal insert of the flashing material.

[0011] It has thus appeared that it was possible to obtain extremely good lasting deformation properties, practically without resilience, and at the same time an improved strength, rigidity and weatherproofness.

[0012] Furthermore, the invention relates to a method of manufacturing a plastically deformable flashing material as indicated above, which method according to the invention is characteristic in that a metal sheet suitable for manufacture of expanded metal is pretreated for production of a expanded-metal grid with substantially the same extensibility in two directions substantially orthogonal to each other, and in that other cousing the expanded-metal grid on both sides with an elastomeric layer of thermoplastic material in a subsequent processing step by advancing the grid in a direction parallel to one of said orthogonal directions the coated expanded-metal grid is corrugated in continuous waveform by a rolling process by advancing it in a direction parallel to one of said orthogonal directions.

[0013] In the following the invention will be explained in more detail with reference to the schematic drawing where

Fig. 1 shows a section of an embodiment of a flashing material according to the invention, and
Figs. 2 and 3 are sectional views along the lines II-II and III-III in Fig. 1.

[0014] The flashing material as shown in Fig. 1 may be formed in a sheet-, web- or strip-shape, eg. as an elongated strip with a width of eg. 15-30 cm for connection with the main frame bottom piece of a roof window. The flashing material comprises a metal insert in the form of a expanded-metal grid 1, which may be manu-

factured eg. on the basis of a soft aluminium sheet or foil with a thickness of 0.5-1.0 mm.

[0015] The expanded-metal grid 1 is on both sides covered by an elastomeric layer 2 of a thermoplastic material which in Fig. 1 is partially removed in order to show the form of the expanded-metal grid. An appropriate material is eg. the thermoplastic rubber mainly consisting of polypropylene and EPDM rubber manufactured by Monsanto Polymer Products Company, Ohio, the USA and marketed under the registered trade mark SANTOPRENE.

[0016] Especially in designs in the range of 40 to 80 Shore A hardness, this material has a good elastic deformability and is weatherproof in a considerable temperature range from about -40 to about 100°C.

[0017] As an important feature of the invention, the sandwich material consisting of the expanded-metal grid 1 and the elastomeric layers 2, as it is clearly seen in the sectional view in Fig. 3, is thus corrugated in a continuous waveform, eg. sine waveform.

[0018] The expanded-metal grid 1 may be manufactured by stretching a slit perforated aluminium sheet or foil in one direction by means of prior art technology so that the slit perforations open and form grid meshes 3 as shown in Fig. 1. This pretreatment is carried out according to the invention in such a way that the expanded-metal grid 1 is provided with substantially the same extensibility in two directions substantially orthogonal to each other and corresponding to the diagonals in the meshes 3. The expanded-metal grid is thus manufactured with substantially square meshes 3.

[0019] As known per se from afore-said DK patent no. 165.014, a high degree of plastic deformability with a very low resilient recovery capacity, typically less than 5%, is obtained.

[0020] In order to remove the cold setting typically occuring during this pretreatment, there may be performed an annealing of the thus manufactured expanded-metal grid.

[0021] As there is further a pronounced tendency for the material in the aluminium sheet or foil to raise when stretched, it is expedient to remove the thus created sharp edges by a slight smooth-rolling before the further pretreatment in order to avoid that the elastomeric layers 2 in the finished flashing are damaged by such edges.

[0022] From a thus manufactured expanded-metal grid the metal insert is cut out for the finished sheet, web- or strip-shaped flashing material according to the invention with the longitudinal and cross directions orthogonal to each other of the sheet-, web- or strip-form being parallel to diagonals of the meshes 3 in Fig. 1.

[0023] When advancing parallel to one of these mutually orthogonal directions, the expanded-metal grid 1 is subsequently covered on both sides with the elastomeric layers 2 by a coating where the expanded-metal grid 1 is lead through the nozzle on an extruder.

[0024] The waveform, which is essential for the invention, of the finished flashing material is obtained in the way that the sandwich material composed of expanded-metal grid 1 and the elastomeric layers 2 is by a subsequent section rolling lead through one or more rolling stations in a advancing direction parallel to one of said directions orthogonal to each other, preferably corresponding to the cross direction of the strip-shaped flashing material.

[0025] By the above choice of material for the elastomeric layers 2, it has appeared to be possible to carry through this section rolling without elongation or butting of the elastomeric layers.

Claims

1. A plastically deformable flashing material, in particular for roof flashing purposes in connection with roof windows and similar roof penetrating building structures, consisting of a sheet-, web- or strip-shaped expanded-metal grid (1) covered on both sides by an elastomeric layer (2) of thermoplastic material, characterized in that the expanded-metal grid (1) is pretreated to essentially the same extensibility in two directions substantially orthogonal to each other and corresponding to the longitudinal and cross direction of the sheet-, web- or strip-form, and that the sandwich material formed by the expanded-metal grid (1) and the elastomeric layers (2) is corrugated in a waveform parallel to one of said two directions substantially orthogonal to each other.

2. A method of manufacturing a flashing material according to claim 1, characterized in that a metal sheet suitable for manufacture of expanded metal is pretreated for production of an expanded-metal grid (1) with substantially the same extensibility in two directions substantially orthogonal to each other, and in that after covering the expanded-metal grid on both sides with an elastomeric layer (2) of thermoplastic material in a subsequent processing step by advancing the grid in a direction parallel to one of said orthogonal directions, the covered expanded-metal grid (1) is corrugated in a continuous waveform by a rolling process by advancing it in a direction parallel to one of said orthogonal directions.

3. A method according to claim 2, characterized in that prior to said subsequent process step, the expanded-metal grid (1) is annealed for removal of a possible cold setting.

4. A method according to claim 2 or 3, characterized in that prior to said subsequent process step, the expanded-metal grid (1) is smooth-rolled for removal of sharp edges originating from said pretreat-

ment.

Patentansprüche

1. Plastisch verformbares Eindeckungsmaterial, speziell für Dacheindeckungen in Verbindung mit Dachflächenfenstern und ähnlichen dachdurchbrechenden Baukonstruktionen, bestehend aus einem bogen-, bahn- oder streifenförmigen Streckmetallgitter (1), das auf beiden Seiten von einer Elastomerschicht (2) von thermoplastischem Material gedeckt ist, dadurch **gekennzeichnet,** daß das Streckmetallgitter (1) zu im wesentlichen derselben Dehnbarkeit in zwei zueinander im wesentlichen orthogonalen und den Längs- und Querrichtungen der Bogen-, Bahn- oder Streifenform entsprechenden Richtungen vorbehandelt ist, und daß das von dem Streckmetallgitter (1) und den Elastomerschichten (2) gebildete Sandwichmaterial parallel mit einer der erwähnten zwei zueinander im wesentlichen orthogonalen Richtungen wellenförmig ausgestaltet ist.

2. Verfahren zum Herstellen eines Eindeckungsmaterials gemäß Anspruch 1, dadurch **gekennzeichnet,** daß eine zum Herstellen eines Streckmetalls geeignete Metallplatte zur Herstellung eines Streckmetallgitters (1) mit im wesentlichen derselben Dehnbahrkeit in zwei zueinander im wesentlichen orthogonalen Richtungen vorbehandelt wird, und daß das gedeckte Streckmetallgitter (1) nach der Dekkung des Streckmetallgitters auf beiden Seiten mit einer Elastomerschicht (2) von thermoplastischem Material in einem nachfolgenden Vorgang durch Vorschub des Gitters in einer zu einer der erwähnten orthogonalen Richtungen parallelen Richtung mittels eines Walzvorganges während Vorschub in einer zu einer der erwähnten orthogonalen Richtungen parallelen Richtung fortlaufend wellenförmig ausgestaltet wird.

3. Verfahren nach Anspruch 2, dadurch **gekennzeichnet,** daß das Streckmetallgitter (1) vor dem erwähnten nachfolgenden Vorgang zur Entfernung eines etwaigen Kalthärtens ausgeglüht wird.

4. Verfahren nach Anspruch 2 oder 3, dadurch **gekennzeichnet,** daß das Streckmetallgitter (1) vor dem erwähnten nachfolgenden Vorgang zur Entfernung scharfer, von erwähnter Vorbehandlung herrühren Ecken glättgewalzt wird.

Revendications

1. Matériau plastiquement déformable, en particulier pour le raccordement de toiture en relation avec des fenêtres de toit et des constructions pénétrant de toiture similaires, composé d'un treillis en métal déployé (1) dans la forme d'une feuille, d'un tissu ou d'une lame couvert sur les deux côtés par une couche d'élastomère (2) d'un matériau thermoplastique, **caractérisé** en ce que le treillis en métal déployé (1) est traité préparatoirement à essentiellement la même extensibilité dans deux directions essentiellement orthogonales l'une à l'autre et correspondant aux sens longitudinal et transversal de la forme de feuille, de tissu ou de lame, et que le matériau sandwich formé par le treillis en métal déployé (1) et les couches d'élastomère (2) est pourvu d'une forme ondulée parallèle à l'une des deux dites directions essentiellement orthogonales l'une à l'autre.

2. Procédé de fabrication d'un matériau de raccordement selon la revendication 1, **caractérisé** en ce qu'une feuille en métal apte à la fabrication de métal déployé est traitée préparatoirement pour produire un treillis en métal déployé (1) ayant essentiellement la même extensibilité dans deux directions essentiellement orthogonales l'une à l'autre, et qu'après avoir été couverte aux deux côtés d'une couche d'élastomère (2) d'un matériau thermoplastique dans un stade de fabrication suivant par avancement du treillis dans une direction parallèle à l'une desdites directions orthogonales, le treillis en métal déployé couvert (1) est pourvue d'une forme ondulée continue par une opération de laminage par avancement dans une direction parallèle à l'une desdites directions orthogonales.

3. Procédé selon la revendication 2, **caractérisé** en ce qu'avant ledit stade de fabrication suivant, le treillis en métal déployé (1) est recuit pour éliminer un durcissement à froid éventuel.

4. Procédé selon la revendication 2 ou 3, **caractérisé** en ce qu'avant ledit stade de fabrication suivant, le treillis en métal déployé (1) est lissé par laminage pour éliminer des arêtes vives résultant dudit traitement préparatoire.

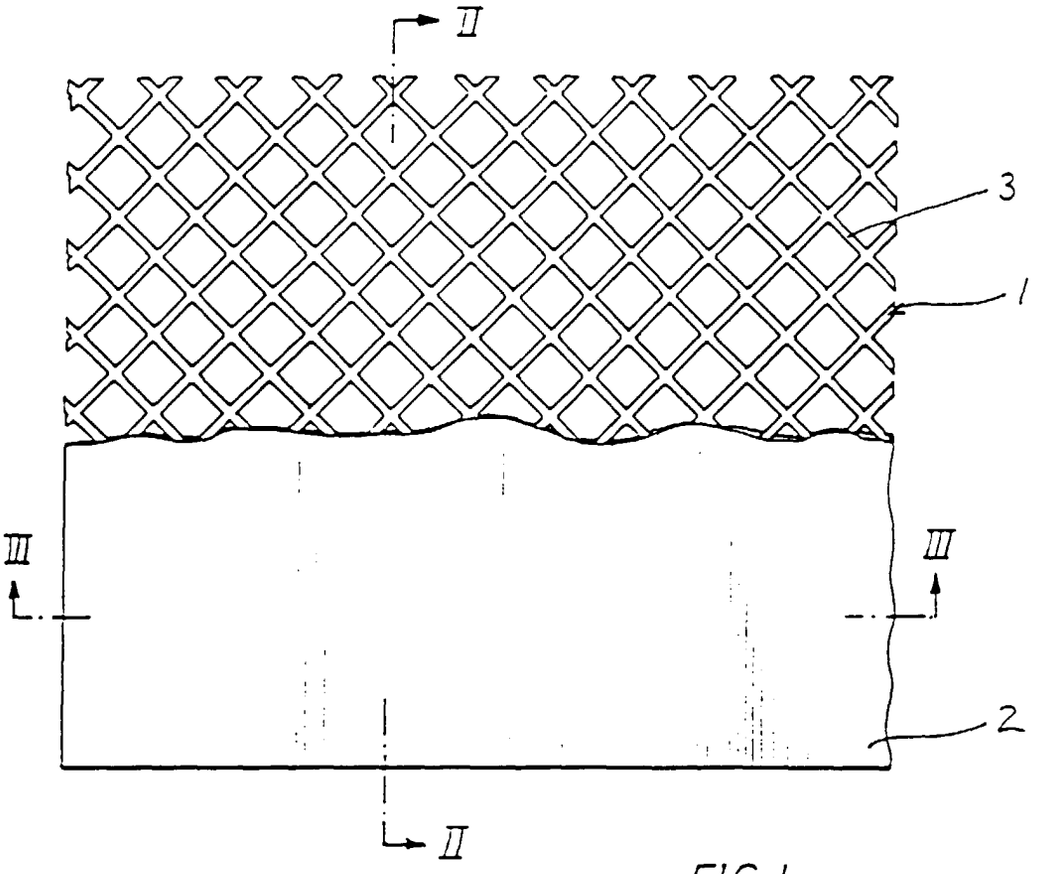

FIG. 1

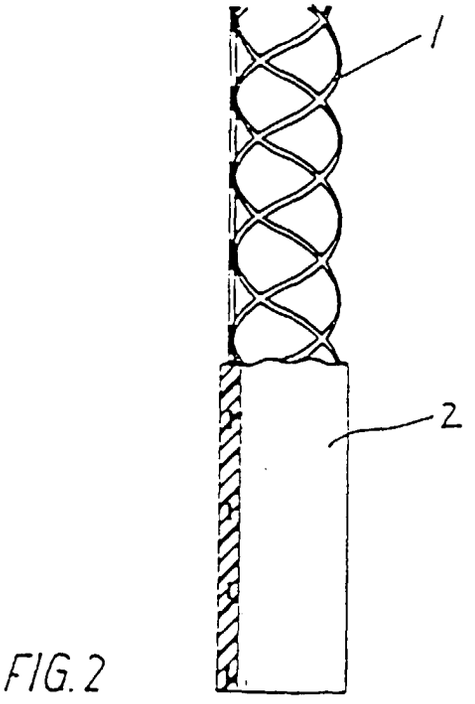

FIG. 2

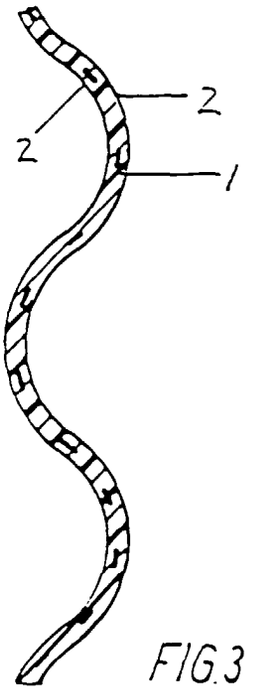

FIG. 3