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54 **Tile covering with tile fixing means, and suitable tile fixing means therefor.**

57 Tile covering in which tile feet 7 of connecting, removably fitted tiles 6 in the absence of a hydraulically set composition are fixed in a casing 11 designed as a tile carrier 2 and having a bottom 3 and raised edges 5 which mate with the tile feet 7.

The raised edges 5 slope outwards, while the tile feet are therefore provided with the same bevel.

When a casing 11 with bottom 3 is used, it is provided with drainage holes 21.

If the raised edges 5 are not connected to a bottom 3, the edges 5 form a fixing frame.

The bottom side of the casing 11, preferably made of a thermoplastic material, can be supported by a bearing element 22 of elastic material which itself rests on a roof surface 23.

The bottom 3 of the casing 11 can be provided with an adhesive layer 1, in particular containing soundproofing material, and said adhesive layer can be fixed by projections 13 from the bottom 3 which can engage in recesses 14 of the adhesive layer.

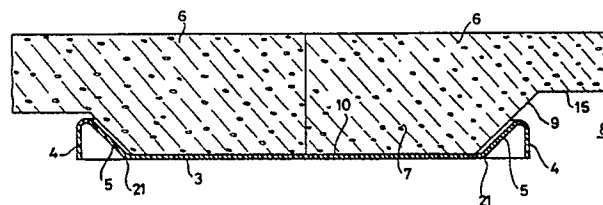


FIG. 2.

Tile covering with tile fixing means, and suitable tile fixing means therefor.

The invention relates to a tile covering in which tile feet of connecting, removably fitted tiles mate with a tile fixing means.

Such a tile covering in which tile feet of connecting, removably fitted tiles are supported by a tile carrier of rubber material is known.

However, in such a tile covering the disadvantage is that if tiles supported by the tile carriers are not properly enclosed on one or more sides by boundary ribs, the tiles can still easily slip, and can even come off the tile carrier, with the result that the desired effect of a tile covering is lost and there is a great risk of damage to the roof covering below it. This disadvantage is found particularly in the case of tile coverings of balconies and roofs which have to absorb shearing forces, such as in the case of roofs which are, for example, driven on with smaller or larger vehicles.

The object of the invention is now to eliminate the above-mentioned disadvantages and to provide a tile covering in which the connecting tiles have no chance of coming loose through sliding of the tiles.

This object is achieved according to the invention in that the tile fixing means comprises a fixing frame provided with raised strip-type tile fixing elements which fixes the tiles in the absence of a hydraulically set compound.

In this way one obtains a durable, close-fitting surface of linked tiles which is easy to lay by less skilled personnel, and which can undergo a thermal or dynamic expansion or shrinkage.

In addition, in such a tile covering horizontal forces are distributed over a large number of tiles.

The invention also has the great advantage that the tiles can be fixed quickly in a simple manner and so that they are frost-resistant, without the use of reinforcing materials, and without making use of a hydraulically set compound, in particular a mortar, which is often used for the fixing of tiles. Such a mortar has, however, the disadvantage that the tiles cannot be fixed so that they are easily removable and are therefore not easy to replace if damaged, while due to the expansion of the tiles as a result of temperature fluctuations which occur, hot during the day, cold at night, the hydraulically set mortar compound cracks easily and thus loses its fixing action.

Finally, such hydraulically set compounds in the form of mortars are very sensitive to climate conditions.

The strip-type tile fixing elements advantageously consist of raised edge parts of a tile carrier. This gives the advantage that a tile carrier, which can very easily be provided with the desired

tile fixing means, can also be used as a tile fixing means.

In a particularly advantageous embodiment the raised edge parts together with a bottom form a casing which acts as a tile carrier. This casing can then accommodate the tile feet of neighbouring tiles essentially fitting closely together, so that the tiles are fixed in the horizontal direction. The casing holding the tile feet can, however, be moved freely over a roof covering without damaging it.

In order to fix the tiles in the optimum manner, the tiles are provided in the corners with free-standing tile feet which merge expediently bevelled off into the inside of a tile bottom, while the raised edge parts of the tile fixing means have bevelled inside raised edges with virtually the same bevel as the bevel with which the tile feet merge into a tile bottom inside, so that the tile feet can mate virtually in a close fit with the raised edge parts, and the tile feet are confined in the space bounded by the raised edge parts.

It is recommended that the tile fixing means with strip-type tile fixing elements should be made of a plastic, in particular a thermoplastic, more particularly polyvinyl chloride. Such a fixing means is cheap to produce, through its low weight is easy to use, and has a certain elasticity, together with a certain deformability.

Irrespective of the tiles to be used, expedient use can be made of a simple bearing element to increase the bearing surface of a tile fixing means designed as a tile carrier, depending on the resistance to pressure of the under layer which is determined by the insulation materials used for the roofing.

The invention also relates to a tile fixing means suitable for a tile covering according to the invention, with which tile feet of connecting, removably fitted tiles can mate, characterized in that the tile fixing means comprises a tile fixing frame provided with raised strip-type tile fixing elements.

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

Fig. 1 shows a top view of a tile covering according to the invention;

Fig. 2 shows a cross section of a part of such a tile covering;

Fig. 3 shows a cross section of a variant of a part of a tile covering in which use is made of a tile fixing means designed as a tile carrier, with a bearing element placed below it;

Fig. 4 shows a cross section of another variant of a tile covering according to the invention, in which an additional adhesive layer is placed in a tile fixing means designed as a tile carrier;

Fig. 5 shows a tile to be used in a tile covering according to the invention, in perspective; and

Fig. 6 shows the same tile as that of Fig. 5, viewed from the bottom side.

Fig. 1 shows a tile covering according to the invention comprising connecting removably fitted tiles 6 with tile feet 7. The tile feet 7 of four successive, connecting tiles 6 are placed on a tile fixing means designed as a tile carrier 2 and shown by dotted lines. This tile carrier 2 is advantageously made of a polyvinyl chloride casing, comprising a bottom 3 which rests on a roof covering 23 and is connected with raised edge parts 5 which together with the bottom 3 form the casing 11. The bevelled inside raised edge 5 of the casing merges at its top side into a continuous raised outside edge 4.

It will be clear that the raised edge parts 5 can form a fixing frame without bottom 3.

A suitable material for the formation of such a casing 11 is, for example, polyvinyl chloride, but other thermoplastic materials such as polyethylene or polypropylene are also suitable for forming such a casing.

A suitable tile 6 of the type used in a tile covering according to the invention, which is shown in greater detail in Figs. 5 and 6, has in the corner points free-standing tile feet 7 extending downwards relative to the inside 15 of the tile bottom, forming a continuous bottom tile recess 8. In the centre the tile is provided with a central part 15, the bottom face 17 of which is flush with the bottom side 10 of the tile feet 7 which are supported by the bottom 3 of the tile carrier 2 designed as a casing 11. The bottom side 10 of the tile feet 7 merges via a bevelled transition face 9 into a tile bottom inside 15.

Matching the bevel of the transition face 9 with the bevel of the inside raised edge 5 of the casing 11 ensures simple positioning of the tile feet 7 in the casing 11, and it can be ensured that only very slight play exists between the transition face 9 and the opposite inside raised edge 5, so that the tiles 6 are fixed. Although the drawing also shows a space between edge part 4 and transition face 9, this space is preferably as small as possible in order to confine the tile feet 7 in a casing 11.

As can be seen in Fig. 5, on two sides standing at right angles to each other the concrete tile 6 is provided with projecting portions 18 and 19, while the side faces are indicated by 20. The presence of the projecting portions 18, 19 means that when two tiles 6 are placed against each other a groove

24 will always be produced, with the result that water falling on the top side of the tile covering can easily be drained away via the space under the tiles 6, so that non-porous material such as concrete can be used for the tiles.

In order to prevent water from lying in a tile carrier 2 designed as a casing 11, in particular made of plastic, one or more drainage holes 21 are advantageously provided in or near the bottom 3.

Fig. 3 shows part of a tile covering according to the invention, in which an additional bearing element 22 is disposed under the bottom 3 of the casing 11, in the form of an elastic disc, for example a bearing element made of recycled rubber particles, which greatly reduces noise nuisance when people are walking, riding or driving on the tile covering.

This design of the tile covering is particularly suitable for use on a roof which has less resistance to pressure, due to the insulation materials used, and which therefore is less able to withstand great vertical loads. Such a design also promotes the independent horizontal and vertical movement of the whole tile covering, while maintaining a close-fitting tile covering.

It can be advantageous for the bearing element 22 to be enclosed essentially in tight-fitting fashion by an outside edge 4 of the casing 11. This outside edge 4 can be disposed at a substantial distance from the edge parts 5, so that a bearing element 22 can be placed under the casing 11 to increase the bearing surface for the tiles. Of course, the outside wall 4 can connect vertically to the top edge of the edge parts 5.

Fig. 4 shows yet another embodiment, in which an adhesive layer 1 of adhesive material is applied to the bottom 3 of the casing 11. This prevents vertical movement of the tiles, since they stick to the top face 12 of the adhesive layer, while said adhesive layer 1 itself sticks to the bottom 3 of the casing 11.

Through the adhesive effect of the adhesive layer 1, the tiles are additionally linked to each other.

The adhesive layer 1 preferably consists of a plastic non-woven material impregnated with a previously applied bitumen emulsion and/or with a liquid bitumen and/or plastic of another composition. A cloth or non-woven fabric impregnated with a liquid bitumen and provided with felt, foamed plastic or another soundproofing material on the underside is also very suitable for reducing noise nuisance when people walk, ride or drive on the tile covering.

The adhesive layer 1 can already be provided in a casing 11 in the factory.

The casing 11 can expediently be provided on the bottom 3 with one or more projections being

able to engage with a corresponding recess 14 in the adhesive layer.

It is clear that one can also, of course, use a casing 11 having an adhesive layer 1 on one side and resting on a bearing element 22 on the other.

It goes without saying that it is also possible to use round or other shapes of casings 11, instead of the square casings as shown.

Tiles of a different shape from those described can also be used for the tile covering. Instead of tiles (6) with the above-described tile feet 7, it is, for example, also possible to use tile feet 7 with transition faces 9 extending vertically, in which the raised walls 5 of the casing, of course, also run vertically.

The tile 6 can also be designed with a central part 15, the bottom face 17 of which is not flush with the bottom side 10 of the tile feet 7.

Claims

1. Tile covering in which tile feet (7) of connecting, removably fitted tiles (6) mate with a tile fixing means, characterized in that the tile fixing means comprises a fixing frame provided with raised strip-type tile fixing elements (5) which fixes the tiles (6) in the absence of a hydraulically set compound.

2. Tile covering according to Claim 1, characterized in that the tile fixing elements consist of raised edge parts (5) of a tile carrier (2).

3. Tile covering according to Claim 1 or 2, characterized in that the raised edge parts (5) together with a bottom (3) form a casing (11) acting as a tile carrier (2), and preferably provided with drainage holes (21).

4. Tile covering according to one or more of the preceding claims, characterized in that the tile feet (7) mate essentially in close-fitting fashion with the tile fixing elements (5).

5. Tile covering according to one or more of the preceding claims, characterized in that the raised tile fixing elements have a bevelled inside raised edge (5).

6. Tile covering according to one or more of the preceding claims, characterized in that the tile feet (7) merge essentially with the same bevel as the bevelled inside raised edges (5) into a tile bottom inside (15).

7. Tile covering according to one or more of the preceding claims, characterized in that the tile fixing means (2) is made of a plastic, in particular a thermoplastic material.

8. Tile covering according to one or more of the preceding claims, characterized in that the bottom (3) of the casing (11) mates with a bearing element (22) of elastic material which at the other side mates with a roof surface (23).

9. Tile covering according to one or more of the preceding claims, characterized in that an adhesive layer (1) is provided on the bottom (3) of the casing (11), preferably an adhesive layer of sound-proofing material.

10. Tile covering according to one or more of the preceding claims, characterized in that for fixing of the adhesive layer (1) on the bottom (3) of casing (11) the casing is provided on its inside with one or more projections (13) which can mate with a corresponding recess (14) in the said adhesive layer.

11. Tile fixing means suitable for use in a tile covering according to one or more of the preceding claims, with which tile feet (7) of connecting, removably fitted tiles (6) can mate, characterized in that the tile fixing means comprises a fixing frame provided with raised strip-type tile fixing elements (5).

12. Tile fixing means according to Claim 11, characterized in that it comprises a casing (11) having a bottom with raised edge parts (5), and preferably provided with one or more drainage holes (21).

13. Tile fixing means according to Claim 11 or 12, characterized in that the top side of the bottom (3) of a casing (11) bears an adhesive layer (1).

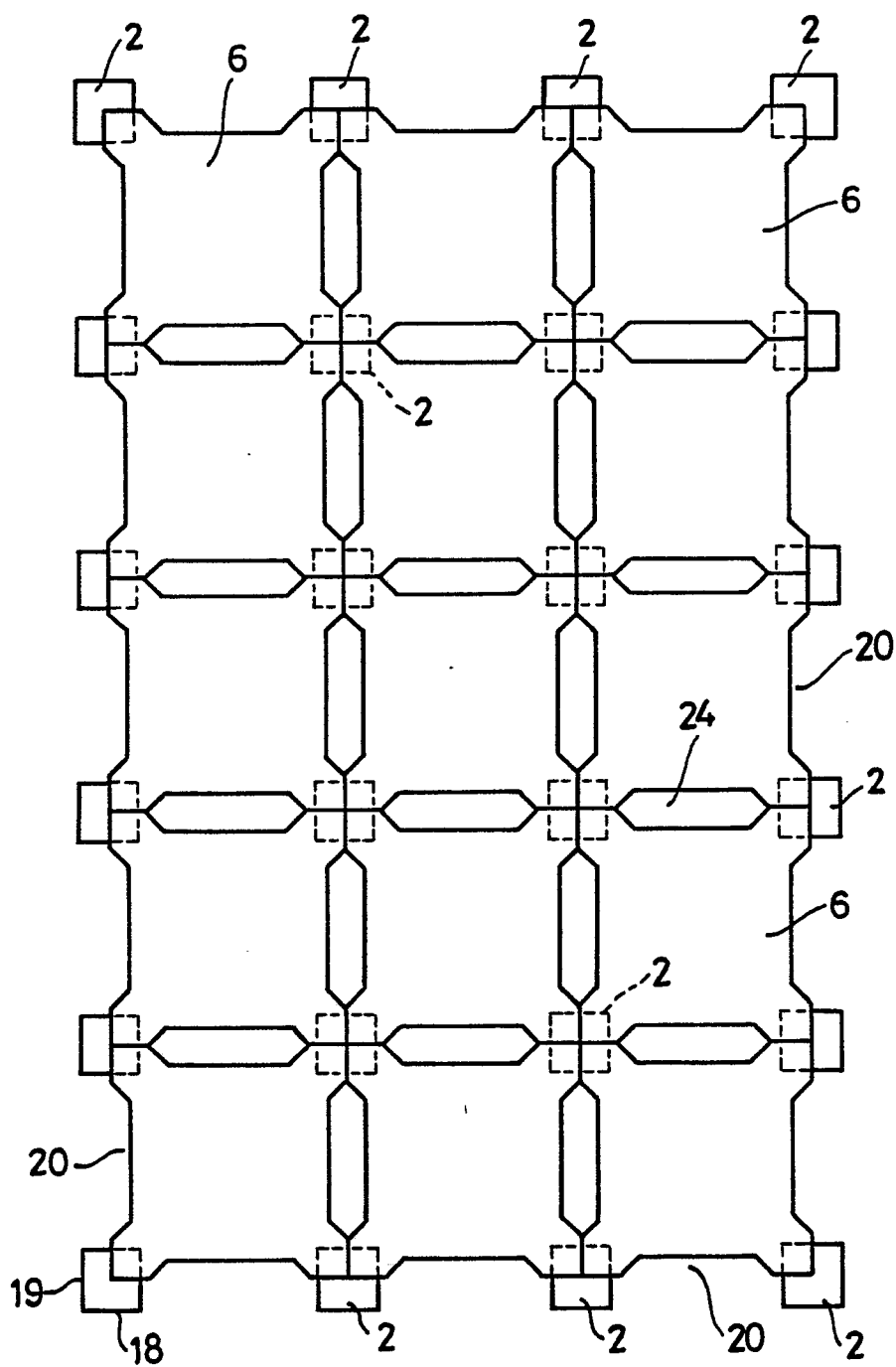
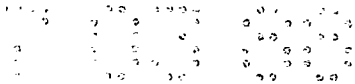


FIG. 1.

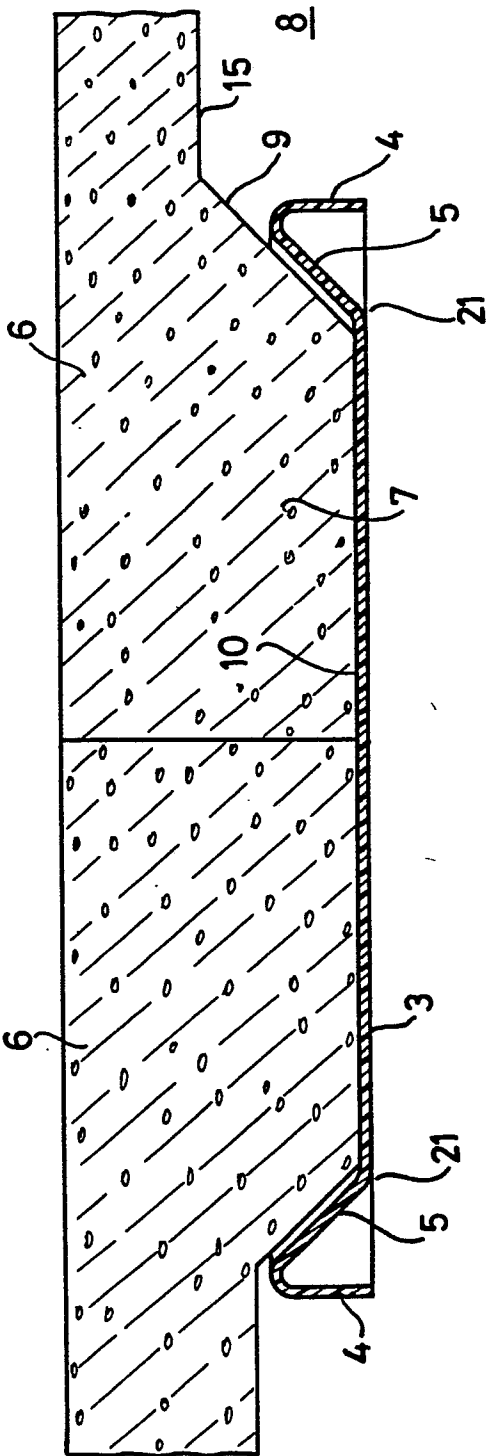
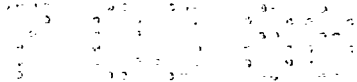


Fig. 2.

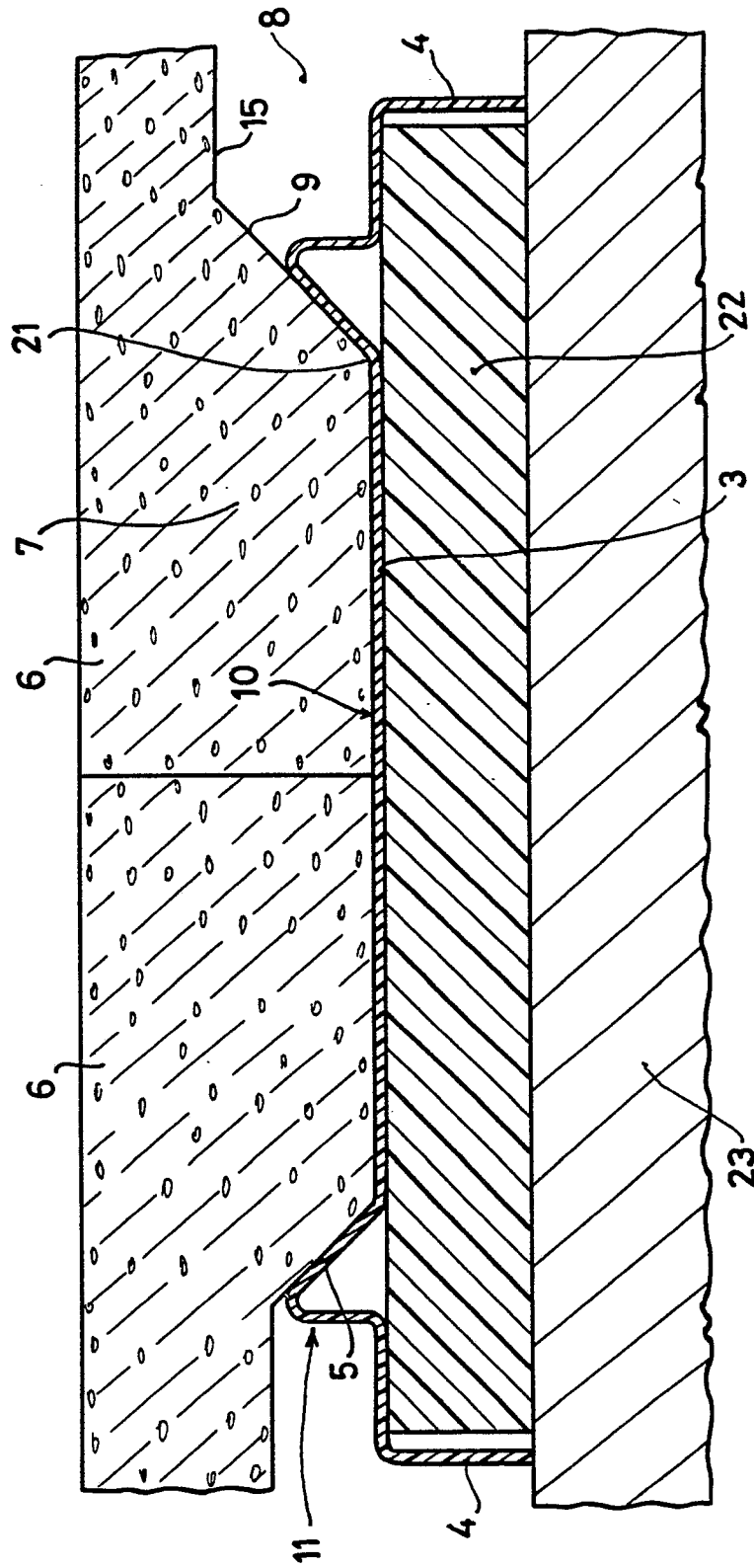


Fig. 3.

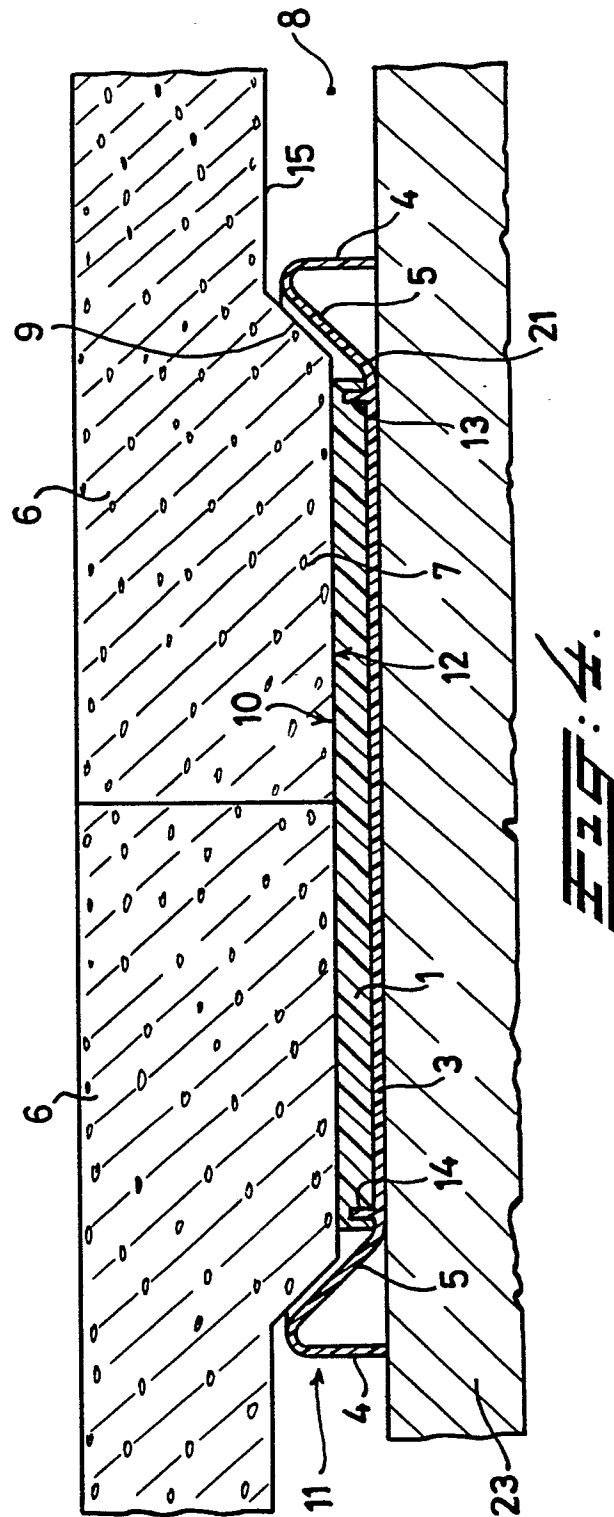


Fig. 4.

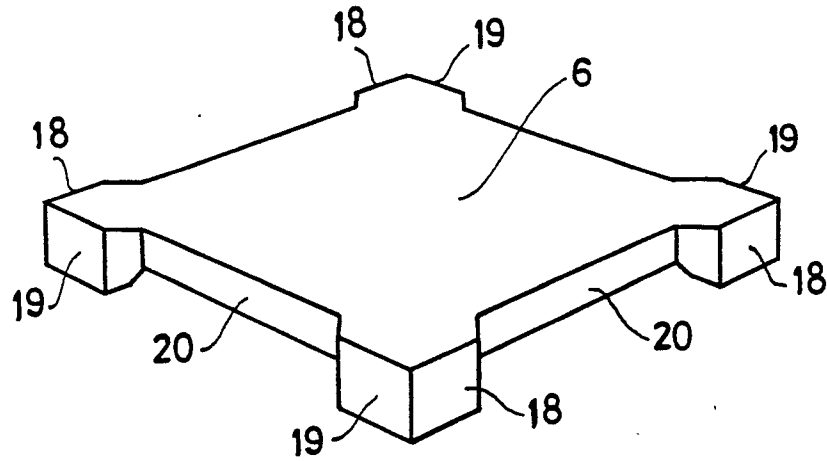


FIG. 5.

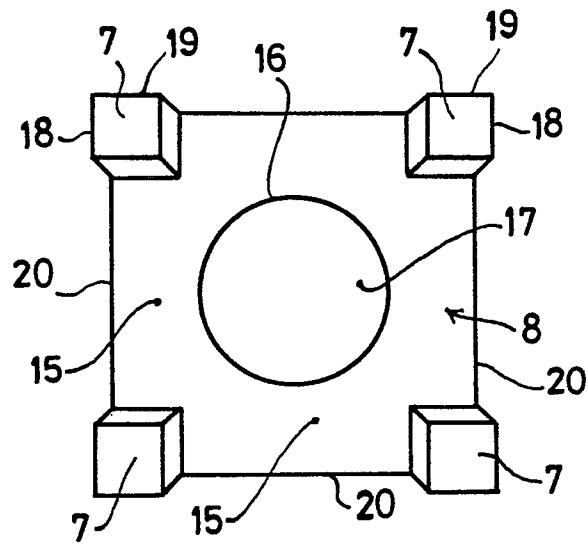


FIG. 6.



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. 4)
Y	FR-A-2 109 896 (BAUTYPEN AG) * Page 2, line 20 - page 3, lines 15,29 - page 5, line 32; figures 1-4 * ----	1-7,9, 11,13	E 04 F 15/08 E 04 F 15/02 E 04 D 11/00
Y	FR-A-2 517 714 (HARNOIS) * Page 4, line 16 - page 7, line 11; figures 1,2 * ----	1-7,9, 11,13	
A	CH-A- 496 867 (FIRMA CARL FREUDENBERG) * Column 1, line 31 - column 2, line 37; figures 1,2 * ----	1-7,11	
A	DE-A-2 558 967 (STEINKOPFF) * Page 8, line 5 - page 9, line 16; figures 1-4 * ----	1,4	
A	FR-A-1 134 770 (LE GALL) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4) E 04 F E 04 D
Place of search THE HAGUE		Date of completion of the search 17-10-1988	Examiner AYITER J.
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			