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(54) **Support structure for a door's threshold**

(57) Support structure (1) for a door's threshold (3) which consists of at least two plates (6, 6a, 7, 7a), where the upper plate (7, 7a) is provided on its lower surface with a locking element corresponding with a locking element located on the upper surface of the plates (7, 7a)

placed beneath the upper plate (7, 7a) placed plate (6,6a), wherein between the lower surface of the upper plate (7, 7a) and the upper surface of the lower plate (6, 6a) a water insulation (11, 11a) is placed, and on the top of the upper surface of the upper plate (7, 7a) a threshold connection (4) is placed.

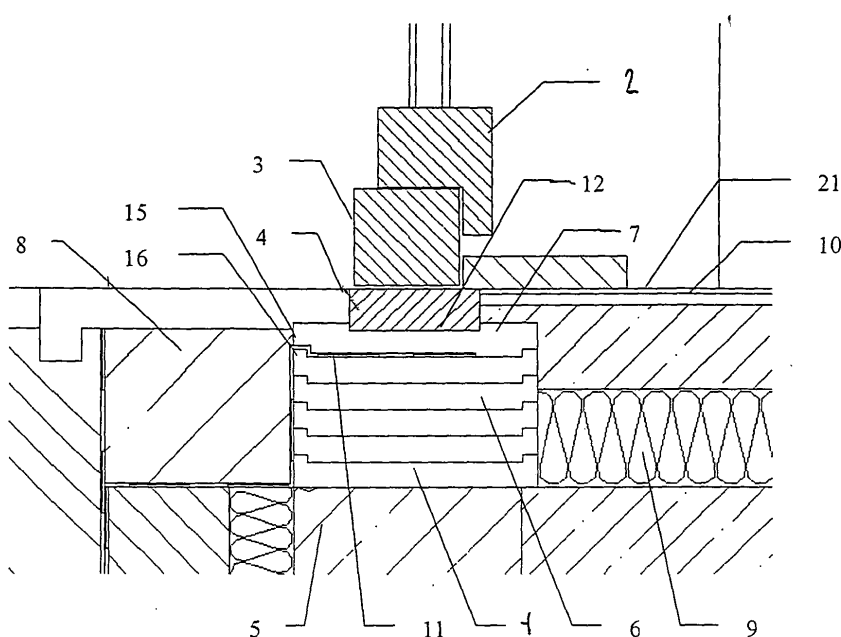


Fig.1

Description

Background of the Invention

[0001] The invention concerns the support structure for a threshold of the door. Its aim is to remove the thermal bridge under the door construction and create suitable conditions for the optimal function of the door.

State of the art

[0002] The present trend of building energy-efficient and passive houses has led to innovations in the characteristics of the materials used, and new technologies have been developed. A large portion of these serve to attenuate thermal bridges with a great attention to the application of various insulating elements. The problem concerns to the door's thresholds where the limiting factor is their thickness due to ease entry into the rooms.

[0003] At the present time, the thermal bridge under the door's thresholds is broken by insertion of a rubber strip. The supporting element used is most commonly extruded polystyrene, or foam glass.

[0004] In the first case, there is an insufficiently compression strength of this material as a consequence of the cutting of the original material into thin pieces. Under the threshold there is a dynamic compression stress and its transmission into the supporting structure. The problem is the insulation layer of the waterproof material, usually made of asphalt or sheets of other material which cannot come into contact with polystyrene.

[0005] The second example concerns the use of foam glass. Its availability on the market in terms of sizes and shapes does not realistically conform to its common uses, and during the construction process it becomes necessary to modify the components to their required dimensions. This results in diminished insulating properties as well as resistance to pressure because the material's structural integrity has been affected. Dimensional adaptations damage the insulating surface pores which may necessitate their rather cumbersome reinforcement using molten asphalt. When this is done, water in the form of steam or liquid gets trapped in these damaged pores, thereby damaging the material's heat insulating and other technical characteristics. It also becomes less pressure-resistant. Such a component becomes unsuitable for anchoring through the opening when connecting to an existing adjacent structure. Drilling through it may damage the foam glass thermal insulation thereby leading to a gradual loss of insulating capacity, as well as resistance to dynamic stressing.

[0006] In each of these situations the main problem always consists in that how to terminate properly the waterproof barrier sheets. It is either not sufficiently overlapped and folded underneath the lower edge of the built-in component; or, its outer edge is simply covered over with a skirting board and thus negatively affects the esthetic or technical qualities of the work, or limits acces-

sibility.

Feature of the Invention

[0007] The above mentioned disadvantages are considerably eliminated by the use of the support structure for a door's threshold according to the invention, which it consists of at least two plates, where the upper plate is provided on its lower surface with a locking element corresponding with a locking element located on the upper surface of the plates placed beneath the upper plate placed plate, wherein between the lower surface of the upper plate and the upper surface of the lower plate a water insulation is placed, and on the top of the upper surface of the upper plate a threshold connection is placed. The support structure is laid into the floor structure.

[0008] In an advantageous embodiment the upper surface of the upper plate is provided with a fixation groove for seating the threshold connection. This helps to fix the position the door's frame.

[0009] In an advantageous embodiment the locking element on the lower surface of the upper plate is shaped as a half-groove and the locking element on the upper surface of the lower plate is shaped as a protrusion corresponding in shape to the half-groove. The plates are shaped in such a way as to be stackable having either a molded or flat surface, thereby simplifying the application of that technology. These plates can be easily adapted by cutting to the exact size required.

[0010] In another advantageous embodiment the locking element on the lower surface of the upper plate is shaped as an angled protrusion and the locking element on the upper surface of the lower plate is shaped as an angled edge of a shape corresponding to the angled protrusion. The plate construction as well as its material characteristics will thereby distribute dynamic loads incurred during use onto the lower supporting layers.

[0011] The plates are non-absorbable and diffusively closed.

[0012] In another advantageous embodiment the plates, the threshold connection and the frame of the door are connected with an anchor. Connecting the plates is accomplished by gluing, welding, or screwing them together.

[0013] In another advantageous embodiment the plates are made of recycled HDPE plastics or some of its modifications.

Description of the Drawings

[0014] The invention will be further explained using drawings, in which Fig. 1 presents a vertical cross section of the door's threshold area with the support structure underneath the door threshold connection in its first embodiment; Fig. 2 is a detail of the support structure with a feasible arrangement of plates according to the embodiment of the Fig. 1; Fig. 3 presents a vertical cross section of the door's threshold area with the support structure

underneath the door threshold connection in its second embodiment; Fig. 4 is a detail of the support structure with a feasible arrangement of plates according to the embodiment of the Fig. 3 and Fig. 5 shows various variants of mutual fixation of the plates of the support structure.

Preferred Embodiments of the Invention

[0015] Fig. 1 is a vertical cross section of the threshold area of the door 2, and the support structure 1 beneath the threshold connection 4. By the term the threshold connection 4 is meant a supporting structure under the door, more exactly under the frame 3 of the door 2. The material for the threshold connection 4 is usually the same as the material of the frame 3. From the side into the interior, this threshold connection 4 fits tight to the floor 21, which is laid onto a load distribution layer 10.

[0016] Between the threshold connection 4 and the foundation 5 or the outer wall, if the door is in a higher floor, is placed the support structure 1. This structure consists of more plates 6 arranged above one another and fitting into each other in such a way as to ensure a stable arrangement. The upper plate 7 of the arrangement may be fitted on its upper surface with a fixation groove 12 for a better positioning on the threshold connection 4. This is especially important in the first embodiment, because there is no fixation element holding between the assembly of plates 6 and the threshold connection 4.

[0017] From the side, the masonry 8 fits tight to the plates 6 and from the other side there is the thermal floor insulation 9 and the load dispersing floor layer 10. Between the masonry 8 and the side of the plate's assembly 6 a water repellent insulation 11 is arranged. This insulation layer 11 is by one of its ends clamped between the upper plate 7 and the plate 6 arranged beneath. The embodiment shown in Fig. 1 is especially suited for sheet-form water insulation 11 for reasons of perpendicular and therefore relatively sharp transitions between individual components of the system. The water barrier is pulled over the second-to-last plate 6 and under the upper plate 7. By its enclosure between two plates a connection that resists the encroachment of moisture into the structure is made.

[0018] Fig. 2 shows a detail of the plates 6, 7 for clamping of the sheet-type water barrier insulation 11. The upper plate 7 has a fixation groove 12 for the anchoring and stabilization of the threshold connection 4 or fixation of the frame 3 of the door. The threshold connection 4 is inserted into the fixation groove 12 and is then anchored. Any air gaps can be filled in with polyurethane foam.

[0019] As can be clearly seen in the detail, there is a shaped connection, or interlock, between the plates 6 and 7 which consists of the locking element on the upper plate 7 and the corresponding locking element on the lower plate 6. The locking element on the lower surface of the upper plate 7 is shaped as a half-groove 15 and the locking element on the lower plate 6 is shaped as a protrusion 16 corresponding in shape to the half-groove

15. Above the water insulation 11 there are the support mounts 19 on top of which the flooring covering 17 is placed (see Fig. 3). Under the water insulation 11 there is a non-porous thermal insulation 20. In front of the door there is shown an outer wall 22 of e.g. a balcony in cross-section. As mentioned above, this arrangement is especially suited for terraces, balconies, and other similar architectural structures.

[0020] Fig. 3 shows the second embodiment of the support structure 1 using water insulation 11 made of asphalt sheets which is easy breakable. By inclining the edges of the plates 6 at an angle of about 45° the insulation 11 will not crack. The last upper plate 7a has its edge facing downward by an outward protrusion 13 and the second-to-last plate 6a has its edges facing a corresponding angled edge 14. By subsequent connection of the plates a tight connection between the plates 6a, 7a and the water insulation 11a is created. The plates 6a, 7a will be glued, screwed, or welded together and will be additionally held in its mutual position by a plastics anchor 18 placed into pre-drilled openings. The anchor 18 can be shortened as needed based on the actual thickness of the resulting plate's assembly and common arrangement of all elements. The anchor 18 shall be of a constant diameter.

[0021] Fig. 4 shows in detail the plates 6a, 7a to illustrate the transition from the vertical position of the water insulation 11a to the horizontal position. This embodiment is suitable for balconies, terraces, etc. The upper plate 7a is shaped with a downward protrusion 13, the lower plate 6a is corresponding angled edge 14 for optimal placement of the asphalt strip of the water insulation 11a in between. Under the upper plate 7a the other plates 6a can be arranged according to the need to achieve the height required to properly secure the water insulation. As can be seen in Fig. 3 and 4, the last plate, from its the water insulation 11a leaves the plate's assembly, should be angled in such a manner as to ensure a smooth form transition to the plane insulation portion.

[0022] It is obvious that each of the embodiments can be carried out with the fixing groove 12 or without it by use of the anchor 18.

[0023] Fig. 5 shows various possibilities for the mutual fixation of the plates 7, 6 or 6a, 7a creating a plate's assembly of the support structure 1. Each pair of the plates is creating mutually corresponding plates with a variant of an interlocking system to connect the upper plates 7, 7a with the plates 6, 6a beneath. In the first variant A, the connection is made as described detailed in the first embodiment according to the Figs. 1 and 2 but without the fixation groove 12. As it can be seen, the locking element on the lower surface of the upper plate 7 is shaped as a half-groove 15 and the locking element on the plate 6 beneath is shaped as a protrusion 16 corresponding to the half-groove 15.

[0024] In the second variant B, the connection is made as described detailed in the second embodiment in Figs. 3 and 4 without the groove 12. Again, as it can be seen,

the locking element on the lower surface of the upper plate 7a is shaped as an angled protrusion 13 and the locking element on the plate 6a beneath is shaped as an angled edge 14 corresponding in shape to the angled protrusion 13.

[0025] In the third variant C, the connection is made as detailed described in the first embodiment in Figs. 1 and 2 but with the fixation groove 12. In the fourth variant D, the connection is made as detailed described in the second embodiment in Figs. 3 and 4 but also with the fixation groove 12.

[0026] The problem of properly termination of the water insulation 11 is solved by pulling of the insulation 11 underneath the upper plate 7 and by covering of upper surface of the second-to-last plate 6. By mutual connection these plates 6, 7 a firm and impervious termination of the water insulation 11 is achieved. The water insulation 11 can be anchored at any height. By use of the angled edges 14 on the plates 6 it is possible to create smoothly transition from a vertical position of the insulation to a horizontal one, or vice versa.

[0027] The mutual anchoring of the plates can be achieved by use of many methods. One of these is to anchor the lowest plate and to glue, weld, or screw the other plates onto it. Another method is to anchor all of them mutually through their entire thickness and into the support structure. The plates can be secured from deviation using a plastic wedge.

[0028] The illustrated embodiments of this invention are not limited to just door constructions, but can be generally used for any openings in a building structure, such as windows, gates, display windows, etc.

Claims

1. Support structure for a door's threshold **characterized in that** it consists of at least two plates (6, 6a, 7, 7a), where the upper plate (7, 7a) is provided on its lower surface with a locking element corresponding with a locking element located on the upper surface of the plates (7, 7a) placed beneath the upper plate (7, 7a) placed plate (6, 6a), wherein between the lower surface of the upper plate (7, 7a) and the upper surface of the lower plate (6, 6a) a water insulation (11, 11 a) is placed, and on the top of the upper surface of the upper plate (7, 7a) a threshold connection (4) is placed.
2. Support structure according to the claim 1, **characterized in that** the upper surface of the upper plate (7) is provided with a fixation groove (12) for seating the threshold connection (4).
3. Support structure according to the claim 1, **characterized in that** the locking element on the lower surface of the upper plate (7) is shaped as a half-groove (15) and the locking element on the upper surface

of the lower plate (6) is shaped as a protrusion (16) corresponding in shape to the half-groove (15).

4. Support structure according to the claim 1, **characterized in that** the locking element on the lower surface of the upper plate (7a) is shaped as an angled protrusion (13) and the locking element on the upper surface of the lower plate (6a) is shaped as an angled edge (14) of a shape corresponding to the angled protrusion (13).
5. Support structure according to the claim 1, **characterized in that** the plates (6a, 7a), the threshold connection (4) and the frame (3) of the door (2) are connected with an anchor (18).
6. Support structure according to the claim 5, **characterized in that** the plates are made of recycled HDPE plastics or one of its modifications.

Amended claims in accordance with Rule 137(2) EPC.

1. Support structure for a door's threshold which consists of at least two support elements provided by locking elements, wherein between the elements a hydro-insulation is laid and the support elements and the threshold can be connected by an anchor and the upper surface of the upper plate is provided with a fixation groove for seating the threshold connection **characterized in that** the support elements are created as full plates (6, 6a, 7, 7a), wherein the upper plate (7, 7a) on its upper surface provided by a locking elements made to enable the simply laying down from above on the corresponding locking elements provided on the upper surface of the lower plate (6, 6a) for assembling of the plates (6, 6a, 7, 7a) on each other with a non-disrupted sheet of the hydro-insulation wherein on the upper face of the most upper plate a threshold connection is placed.

2. Support structure according to the claim 1, **characterized in that** the locking element on the lower surface of the upper plate (7) is shaped as a half-groove (15) and the locking element on the upper surface of the lower plate (6) is shaped as a protrusion (16) corresponding in shape to the half-groove (15).

3. Support structure according to the claim 1, **characterized in that** the locking element on the lower surface of the upper plate (7a) is shaped as an angled protrusion (13) and the locking element on the upper surface of the lower plate (6a) is shaped as an angled edge (14) of a shape corresponding to the angled protrusion (13).

4. Support structure according to the claim 5,
characterized in that the plates are made of recycled HDPE plastics or one of its modifications.

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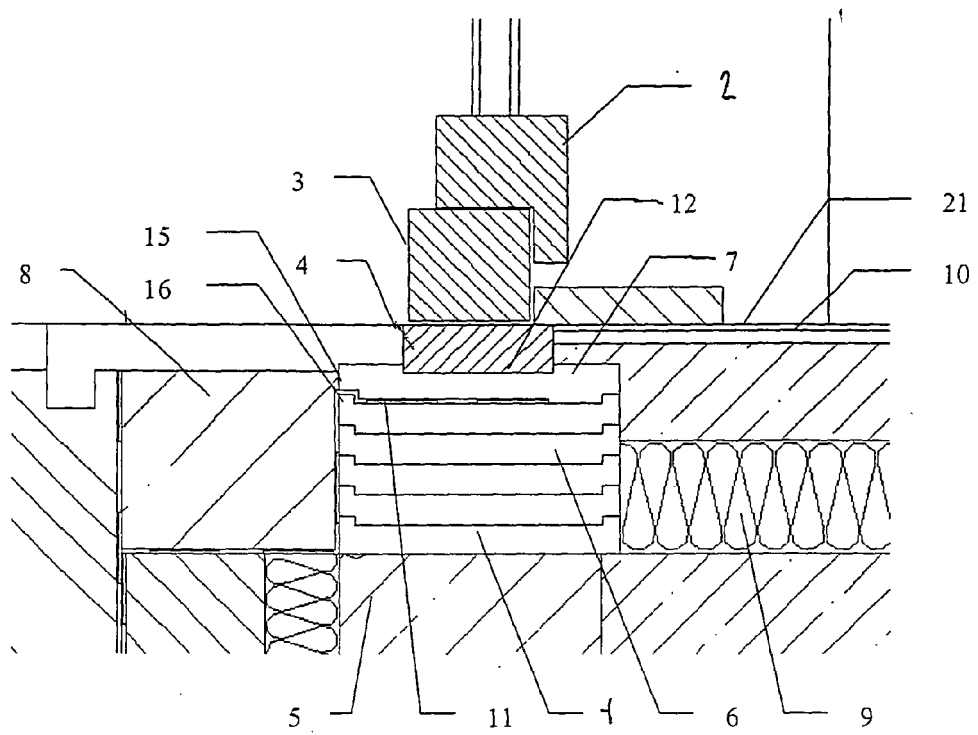


Fig.1

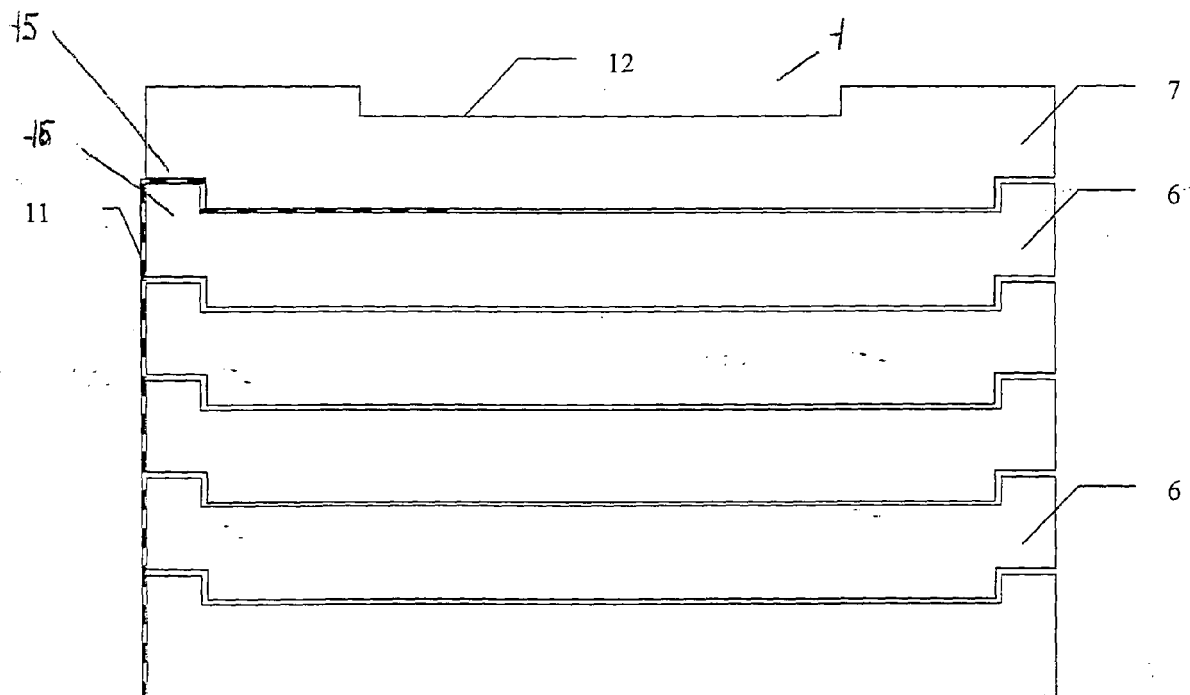


Fig.2

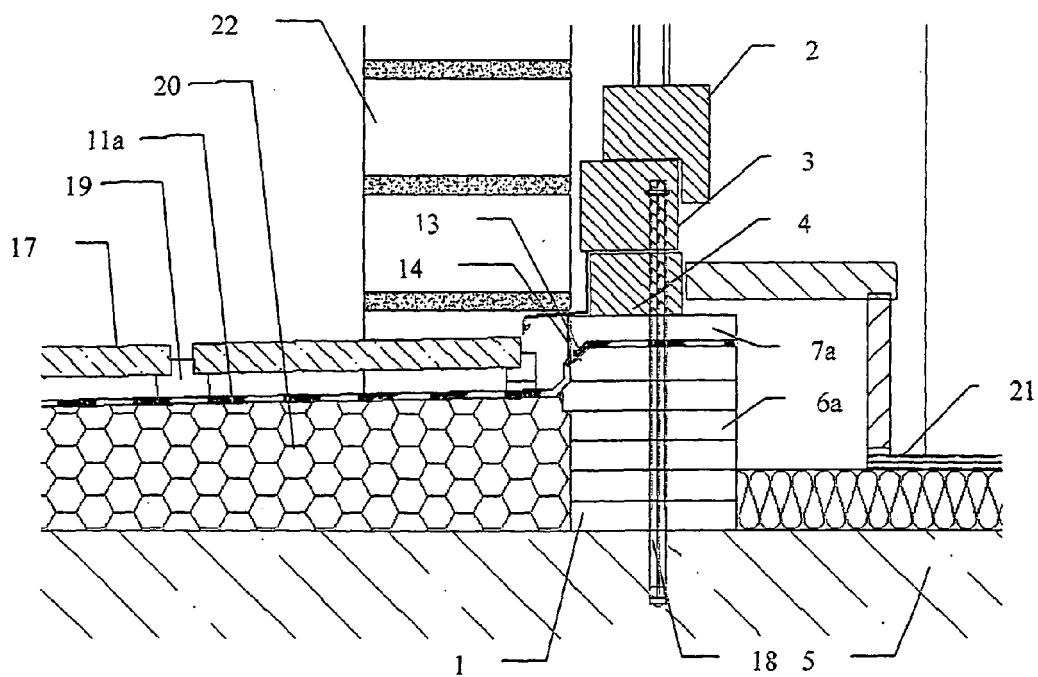


Fig.3

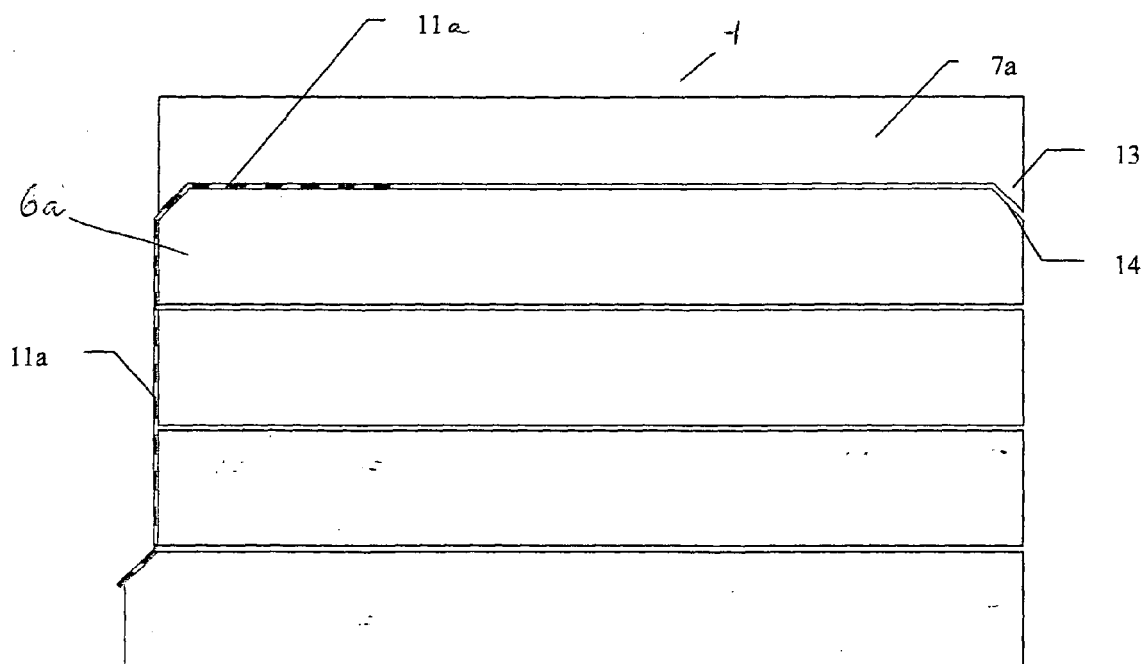


Fig.4

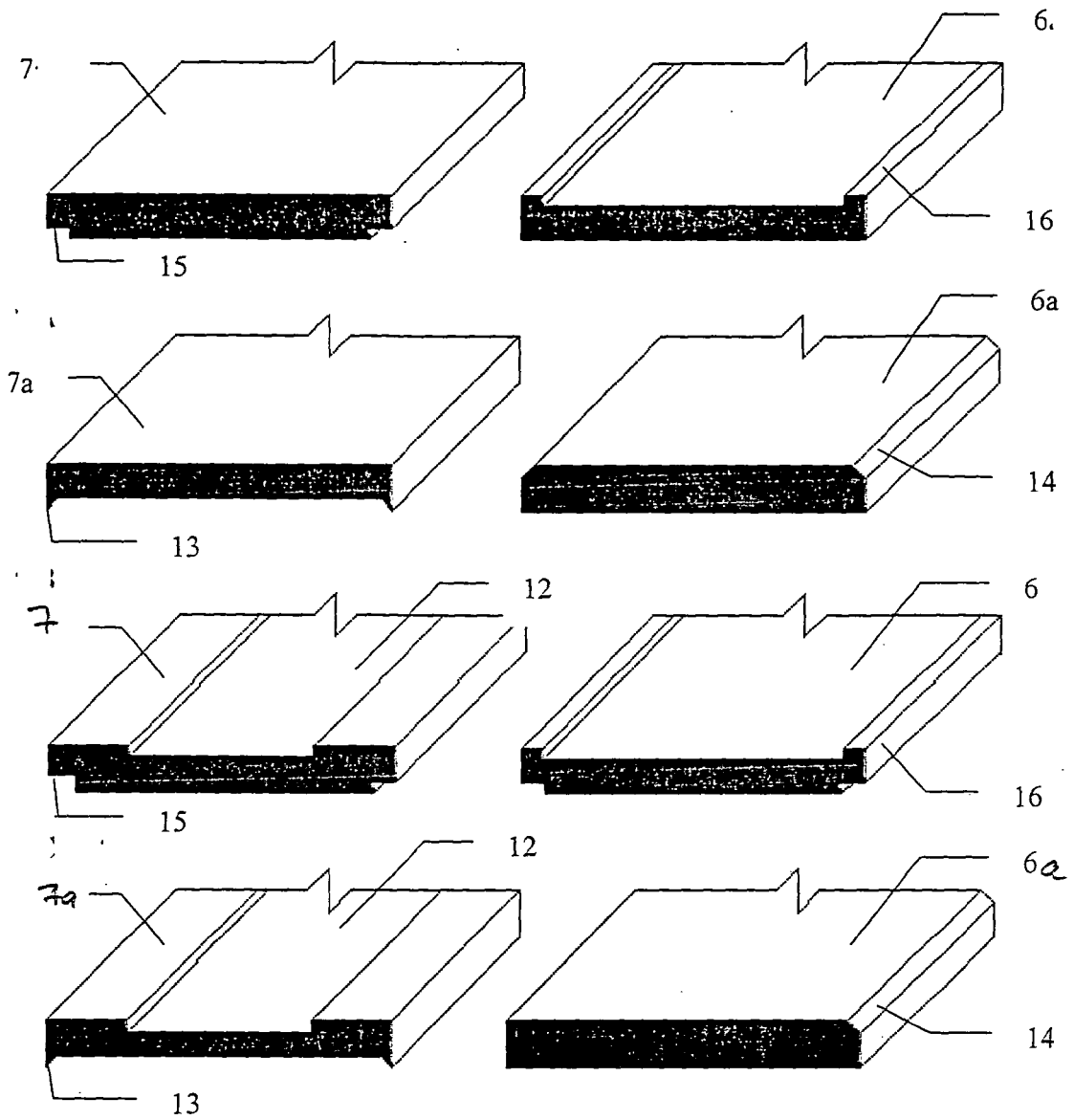


Fig.5



EUROPEAN SEARCH REPORT

Application Number
EP 08 01 8771

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	DE 28 06 285 A1 (MUEHLE MANFRED) 16 August 1979 (1979-08-16) * figure 2 *	5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) E06B E04D
Place of search		Date of completion of the search	Examiner
The Hague		13 March 2009	Julich, Saskia
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			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 08 01 8771

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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13-03-2009

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