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(54) Improvements in or relating to building blocks.

(57) The building block is of uniform assymmetric transverse section and has two vertical end faces, a front face 13 and a rear face 14 and upper and lower surfaces each having a bearing surface 20, 24 of equal width. The upper bearing surface has an extension thereof 19 extending to the front face 13 of the block and the lower bearing surface has an extension 23 thereof extending to the rear face 14 of the block. One block can be placed upon another block in like disposition so that the front extension 19 of the lower block extends beyond the front face 13 of the upper block or in a disposition at 180° to each other in which the front face 13 of one block is vertically alligned with the rear face 14 of the other block, and the width of each bearing surface 20 or 24 and its extension 19 or 23 is equal to the width of the other bearing surface and extension. The upper bearing surface 20 has a centrally located projection 21 with a vertical axis of symmetry 22, and the lower bearing surface 24 has a centrally located recess 25 of complementary shape to the projection 21 on the upper face. The recess 25 has a vertical axis of symmetry 26 which is displaced from that 22 of the projection 21 by the width of the narrow edge strip 19/23. The building block can be used to build a free standing vertical wall or a retaining wall.

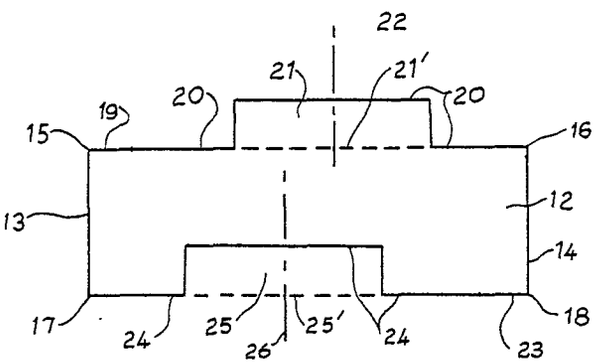

FIG. 1

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IMPROVEMENTS IN AND RELATING TO BUILDING BLOCKS

This invention concerns improvements in and relating to building blocks.

An object of the present invention is to provide a building block which permits, without the use of a bonding agent between courses, the construction of free-standing walls which offer full or partial screening and the construction of retaining walls which have a stepped exposed face.

Economy in the construction of mass gravity and crib retaining walls results when the walls are stepped or battered back against the material to be retained to such an extent that the resultant compressive stress over any transverse section of a wall is uniform. A fully screened free-standing wall can be constructed by building concrete blocks or the like in courses with each block abutting. By providing gaps between blocks and/or by providing blocks with throughgoing orifices between exposed faces such a wall may become more decorative and less resistant to wind forces but offers less screening. Precast concrete blocks of various forms are currently used to construct retaining walls and screen walls and although cement mortar is commonly used to provide a bond between adjacent courses of blocks, other forms of block exist which are provided with suitably formed nibs and recesses so that a mechanical interlock is achieved between blocks. Hitherto more than one form of block has been required to construct dry bound free-standing screen walls and retaining walls.

Building blocks are known from U.K. Patent 2000830B wherein the upper side of the block has a bearing surface which constitutes a peaked roof shape and a lower bearing surface which constitutes a recess complementary to said peaked roof and in which the upper side is wider than the lower side so that the upper side of one block projects beyond the respective lower side of another of said blocks resting thereon. Such blocks however are limited to the construction of stepped retaining walls.

The building block, according to one aspect of the present invention is characterised in that the upper and lower surfaces each have a bearing surface of equal width, the upper bearing surface having an extension thereof extending to the front face of the block and the lower bearing surface having an extension thereof extending to the rear face of the block whereby one block can be placed upon another block in like disposition so that the front extension of the lower block extends beyond the upper block or in a disposition at 180° to each other in which the front face of one block is vertically alligned with the rear face of the other block, and the width of each bearing surface and its extension is equal to that of the other bearing surface and extension.

The building block according to another aspect of the invention is characterised in that the front face and the rear face each have a horizontal upper edge vertically disposed to a lower edge, the upper surface is sub-divided into a narrow edge strip extending horizontally from or inclined to the upper edge of the block and a wide bearing surface extending therefrom to the upper edge of the rear face and which surface is provided with a centrally located projection with a vertical axis of symmetry, the lower surface is correspondingly sub-divided into a narrow edge strip extending horizontally from or similarly inclined to the lower edge of the rear face of the block and a wide bearing surface extending therefrom to the lower edge of the front face and provided with a centrally located recess of complementary shape to the projection on the upper face, and which recess has a vertical axis of symmetry which is displaced from that of the projection by the width of the narrow edge strip.

The invention also comprises a free-standing vertical wall structure constructed using a plurality of such blocks in an alternating course sequence consisting of a course of blocks each laid with its front face exposed, superimposed on a course of blocks each laid with its rear face exposed or vice versa when viewed from either side of the structure.

The invention further provides a retaining wall structure constructed using a plurality of such blocks in a course sequence consisting either of a course of blocks each laid with its front face exposed, superimposed on a like course of blocks or on an odd number of courses in which every odd course consists of blocks each with its front face exposed and every even course consists of blocks each with its rear face exposed.

The accompanying drawings show by way of example various forms of block and types of wall structure which can be constructed using blocks in accordance with the invention and wherein:-

Figures 1 and 2 are elevations on one end and Figures 3 and 4 are elevations on the other end of four alternative shapes of a block according to the invention;

Figures 5 and 6 are perspective views of a block of shape as in Fig. 1 in upright and in inverted orientation respectively;

Figures 7 and 8 are perspective views of three blocks of shape as in Fig. 1 built to form a vertical sided column by reversing the orientation of alternate blocks and built to form a stepped structure using units of like orientation respectively;

Figures 9, 10, 11 and 12 correspond to Figs. 5, 6 7 and 8 respectively but relate to a block of shape as in Fig. 3;

Figure 13 is a perspective view of part of a free-standing wall built using blocks of shape as in Fig.3 and which wall is of open or partially screened form in the upper courses and is of closed form in the lower courses; and

Figure 14 is a perspective view of part of a retaining wall built using blocks of shape as in Fig. 3.

Referring to the drawings in general, the blocks may be moulded using concrete or any such mouldable material and may also be produced by extrusion using semi-dry mix concrete, asphalt, or the like.

The block is of uniform transverse section and has opposed vertical end faces 11 and 12 of reflected form. The front face 13 and the rear face 14 may be vertical, concave, convex, ribbed or otherwise shaped but the upper edge 15 of front face 13 and the upper edge 16 of rear face 14 are horizontal and are vertically disposed to their corresponding lower edges 17 and 18 respectively.

Referring now to Figs. 1 to 4, the upper surface of the block is divided into a narrow edge strip 19 and a wide bearing surface 20 each extending over the length of the block. The wide bearing surface 20 extends horizontally from the upper edge 16 of the rear face 14 and occupies at least two thirds of the overall width of the block. The narrow

edge strip 19 extends either horizontally Figs. 1, 2 and 4 from or is inclined (Fig. 3) to the upper edge 15 of the front face 13 and respectively connects to or intersects with the wide bearing surface 20 and occupies not more than one third of the overall width of the block. The width of the narrow edge strip 19 is related to the depth of the front face 13 and determines the slope of the exposed face of a retaining wall constructed using a plurality of the blocks. The wide bearing surface 20 is provided with a projection 21 which may occupy all (Fig. 3) or only part of the width (Figs. 1, 2 and 4) of the bearing surface 20. The projection 21 is of any regular cross-sectional shape which has horizontal base, an imaginary 21' and a vertical axis of symmetry 22 such as a rectangle (Fig. 1), an isosceles triangle (Figs. 2 and 3), or a right circular arc (Fig.4).

The lower surface of the block is correspondingly shaped to that of the upper surface rotated horizontally through one half of one revolution and consists of a narrow edge strip 23 and a wide bearing surface 24 each extending over the length of the block. The narrow edge strip 23 has similar dimensions to those of the upper surface edge strip 19 and extends either horizontally from the lower edge 18 of the rear face 14 or is inclined to the vertical plane containing the upper edge 16 and the lower edge 18 of the rear face 14 or is inclined to the vertical plane containing the upper edge 16 and the lower edge 18 of the rear face 14 at the same angle as the upper edge strip 19 is inclined to the vertical plane containing the upper edge 15 and the lower edge 17 of the front face 13. The wide bearing surface 24 is the same width as the upper surface wide bearing surface 20 and extends from the lower edge 17 of the front face 13 and respectively connects to or intersects with the horizontal or inclined narrow edge strip 23. The wide bearing surface 24 is provided with a recess 25 of dimensions which correspond to those of the upper surface projection 21 and which recess has an imaginary base 25' and a vertical axis of symmetry 26 horizontally displaced from the vertical axis of symmetry 22 of the projection by a distance equal to the plan width of the narrow edge strip 19 in the upper surface. This is also the plan width of the narrow edge strip 23 in the lower surface.

Referring in particular to Fig. 3 there is shown a block in which the upper surface 20 comprises two substantially planar bearingsurfaces 20A, 20B disposed at an angle to each other to constitute a peaked roof shape 21 with a vertical axis of symmetry 22 and an extention 19 extending from the bearing surface 20B to the front face 13 of the block. The lower bearing surface 24 similarly comprises two substantially planar bearing surfaces 24A, 24B, disposed at an angle to each other to form a recess 25 complementary to the peaked roof shape 21 with a vertical axis of symmetry 26 and an extension 23 extending from the bearing surface 24B to the rear face 14. The axis of symmetry 22 and 26 are displaced laterally to each other by the width of the extension 19/23 and equally from the central longitudinal axis of the block.

The upper planar surface 20A is equal in length to the lower planar surface 24A and the length of the upper planar surface 20B and its extension 19 is equal to the length of the lower planar surface 24B and its extension 23. The depth of the rear end face 14 is greater than that of the front face.

Referring now to Figs. 5 to 12, when a block is superimposed on a corresponding block in reversed orientation then the lower surface of the upper block bears fully on the upper surface of the lower block and is such that the projection 21 of the lower block nests into the recess 25 in the upper block and the upper surface narrow edge strip 19 of the lower block is in full contact with the lower surface narrow edge strip 23 of the upper block. This is illustrated in Figs. 7 and 11 wherein three blocks alternating in orientation and each with a transverse section as shown respectively in Figs. 1 and 3, are built one on top of another thus to form a column with vertical sides.

When a block is superimposed on a corresponding block of like orientation as shown in Figs. 8 and 12 then the wide bearing surface 24 on the lower surface of the upper block bears directly on the wide bearing surface 20 of the lower block such that the recess 25 in the lower surface of the upper block provides a snug fit for the projection 21 on the upper surface of the lower block. The upper block is thus laterally displaced relative to the lower block and causes the narrow edge strip 19 of the upper surface of the lower block to be exposed.

Fig. 13 shows a free-standing wall structure constructed using blocks with a transverse section as shown in Fig. 3. Blocks in successive courses of the wall alternate in orientation thus providing a wall with vertical sides. In the lower four courses of the wall the blocks in any course abut to give a closed face appearance whereas in the next five courses, blocks in any course are set less than a block length apart so that blocks in the next course span the gaps thus formed giving an open face appearance. In the top course of the wall each block abutts the adjacent block thus to form a continuous cope.

Fig. 14 shows a part-sectional perspective view of a retaining wall structure constructed using blocks with a transverse section as shown in Fig. 3. The lowest or foundation course of blocks consists of blocks laid contiguously to permit a relatively even transfer of load to the subsoil or to an in-situ concrete foundation. The top course or coping course of blocks likewise has blocks laid contiguously as this is preferable both aesthetically and for protection of the wall interior from the affect of weather. As a measure of protection against the removal of blocks in the coping course of such a wall by vandals, the backfill material 27 can usefully be placed to cover over the rearward portion of a block up to the level of the upper surface projection 21. Blocks in each of the intermediate courses of the retaining wall are either laid contiguously or may be spaced apart depending on the weight of wall required to counteract the pressure from the retained material 28. In a retaining wall of varying height blocks in any course may require to be closely spaced or abutting for high sections and spaced relatively further apart over low sections thus providing more economical use of blocks. After laying each course of blocks in a retaining wall the void behind the blocks is infilled with suitable material fill 27 up to the level of the upper edge of the rear face of the blocks and the fill material spills over the exposed upper surfaces of blocks in the superimposed course at least as far as the top of each block projection 21 thus giving additional weight to the wall structure.

By laying two or more courses of blocks in like orientation side by side such that the rear faces 14 of blocks in one course abut with the front faces 13 of blocks in an adjacent course, walls can be constructed of increased width to cater for locations requiring higher walls and for walls with increased resistance against overturning and sideways displacement. To ensure that a wall of multiple block width acts as a composite wall and to inhibit differential vertical displacement of adjacent courses of units, a flexible synthetic sheeting material 29 can be placed between adjacent courses of units to reinforce the vertical joints.

By choosing block dimensions such that the height of the projection 21 is equal to or greater than the mean height of the front face 13 and the rear face 14 then even an 'open' faced wall built with such blocks will provide full visual screening although permitting passage of wind.

Blocks can usefully be provided with an extending orifice in order to locate steel bars, rope, cable or the like which can be used to reinforce courses of blocks, assist handling of the blocks and to 'lock' adjacent blocks together as is preferable in a wall cope.

Although blocks according to the invention are normally used in upright orientation they may be oriented in any manner suitable for the purpose in hand. Indeed inverted blocks of transverse section as shown in Fig. 3 can be used to form surface water drainage channels and cascades.

Construction blocks according to the invention are extremely versatile and unskilled labour can be used in any application thereof. Any structure built using the blocks may require blocks of different lengths to form vertical ends to the structure consistant with the provision of staggered vertical joints between adjacent courses.

Claims

1. A building block of uniform asymmetric transverse section comprising two vertical end faces, a front face and a rear face and upper and lower surfaces characterised in that the upper and lower surfaces each have a bearing surface 20, 24 of equal width, the upper bearing surface having an extension thereof 19 extending to the front face 13 of the block and the lower bearing surface having an extension 23 thereof extending to the rear face 14 of the block whereby one block can be placed upon another block in like disposition so that the front extension 19 of the lower block extends beyond the upper block or in a disposition at 180° to each other in which the front face 13 of one block is vertically alligned with the rear face 14 of the other block, and the width of each bearing surface 20 or 24 and its extension 19 or 23 is equal to that of the other bearing surface and extension.

2. A building block of uniform asymmetric transverse section comprising two vertical end faces, a front face and a rear face and upper and lower surfaces, characterised in that the front face 13 and the rear face 14 each have a horizontal upper edge 15 and 16 vertically disposed to a lower edge 17 and 18, the upper surface is subdivided into a narrow edge strip 19 extending horizontally from the inclined to the upper edge 15 of the block and a wide bearing surface 20 extending therefrom to the upper edge 16 of the rear face 14 and which surface 20 is provided with a centrally located projection 21 with a vertical axis of symmetry 22, the lower surface is correspondingly subdivided into a narrow edge strip 23 extending horizontally from or similarly inclined to the lower edge 18 of the rear face 14 of the block and a wide bearing surface 24 extending therefrom to the lower edge 17 of the front face 13 and provided with a centrally located recess 25 of complementary shape to the projection 21 on the upper face, and which recess 25 has a vertical axis of symmetry 26 which is displaced from that 22 of the projection 21 by the width of the narrow edge strip 19/23.

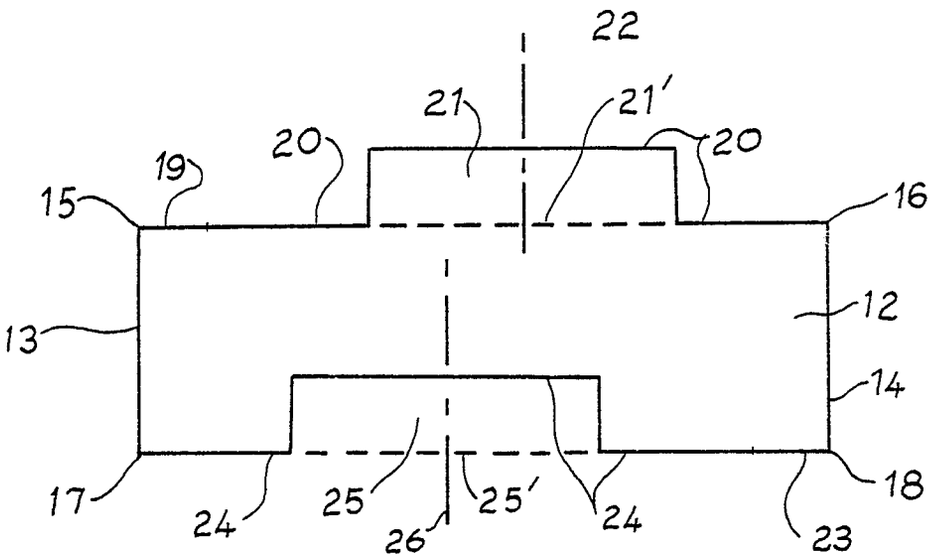
3. A building block according to claim 1 or 2 characterised in that the upper bearing surface 20 comprises two substantially planar bearing surfaces 20A, 20B disposed at an angle to each other to constitute a peaked roof shape 21 with a vertical axis of symmetry 22 and an extension 19 extending from the bearing surface 20B to the front face 13 of the block, and the lower bearing surface 24 comprises two substantially planar bearing surfaces 24A, 24B disposed at an angle to each other to form a recess 25 complementary to said peaked roof surface with a vertical axis of symmetry 26 and an extension 23 extending from the bearing surface 24B to the rear face 14, the axes of symmetry 22, 26 being displaced laterally by the width of the extension 19/23 and equally from the central longitudinal axis of the block.

4. A building block according to claim 3 characterised in that the length of the upper planar surface 20A extending from the rear face is equal to the length of the lower planar surface 24A extending from the front face and the length of the other upper planar 4 surface 20B and extension 19 is equal to the length of the other lower planar surface 24B and extension 23.

5. A free standing vertical wall structure constructed using a plurality of block characterised in that the wall structure is constructed using a plurality of blocks as claimed in any one of the preceding claims, laid in an alternating course sequence in which a course of blocks each laid with its front face 13 exposed is superimposed on a course of blocks each laid with its rear face 14 exposed or vice verse when viewed from either side of the wall structure.

6. A retaining wall structure constructed using a plurality of blocks characterised in that the wall structure is constructed using a plurality of blocks as claimed in any one of claims 1 to 4 laid in a course sequence in which a course of blocks is each laid with its front face 13 exposed superimposed on a like course of blocks.

7. A retaining wall structure constructed using a plurality of blocks, characterised in that the wall structure is constructed using a plurality of blocks as claimed in any one of claims 1 to 4, laid in a course sequence in which a course of blocks is each laid with its front face 13 exposed superimposed on an odd number of courses in which each odd course consists of blocks each with its front face 13 exposed and each even course consists of blocks each with its rear face 14 exposed.


22
21
21'
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19
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16
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12
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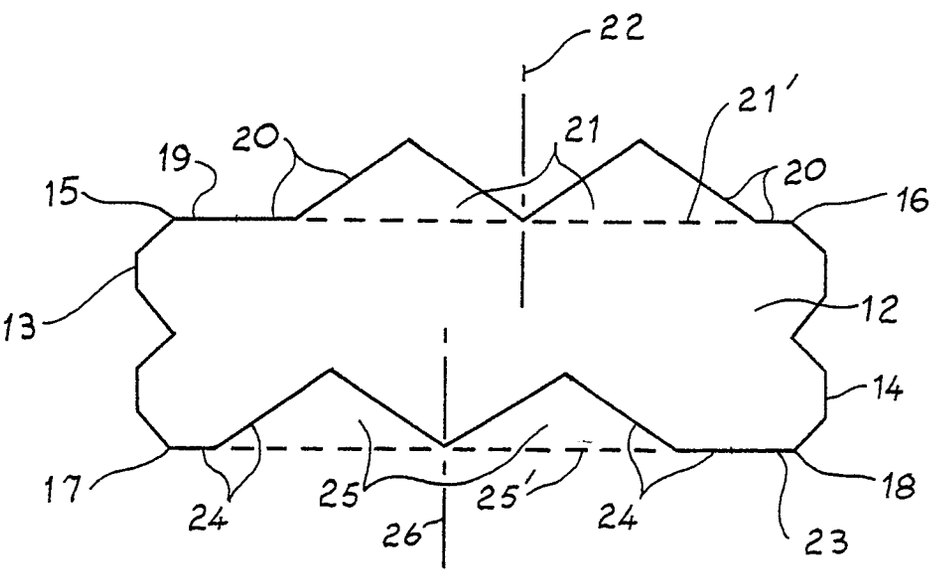
17
24
25
26
25'
24
18
23

FIG. 1


22
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25
26
25'
24
18
23

FIG. 2

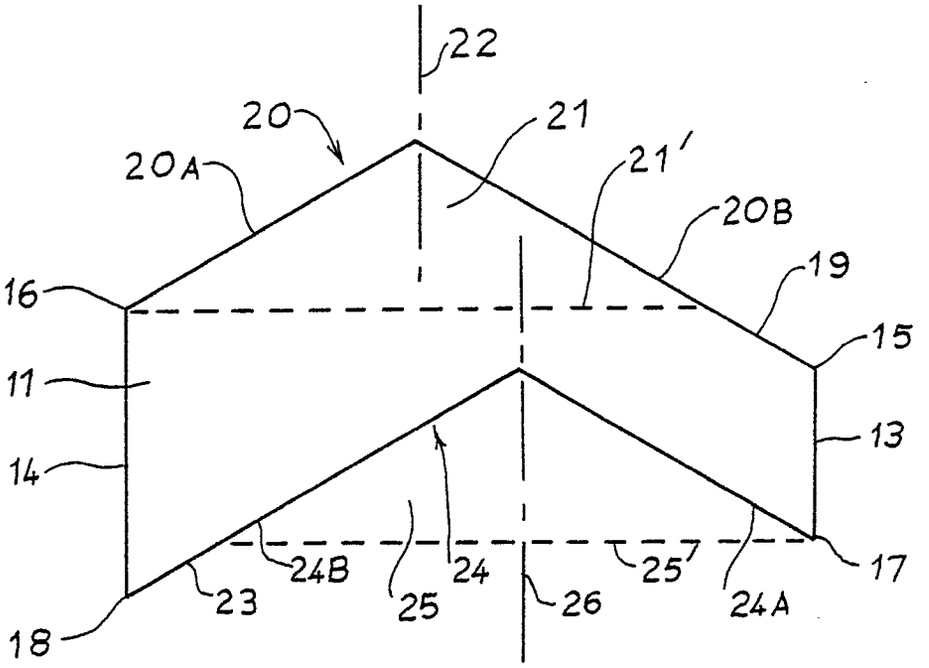
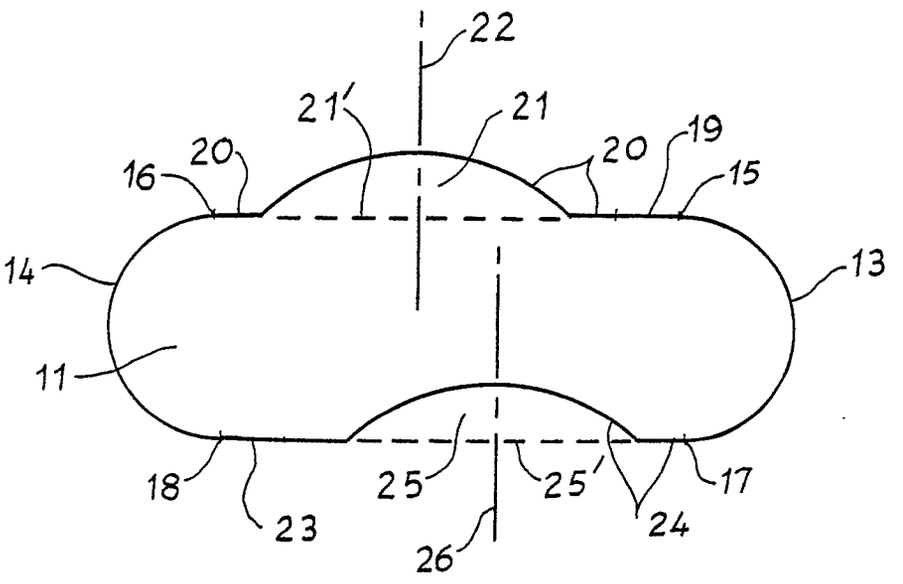

22
20
21
21'
20A
20B
19
16
15
11
13
14
24B
24
25'
17
23
25
26
24A
18

FIG. 3


22
21'
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19
16
15
14
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11
18
25
25'
17
23
24
26

FIG. 4

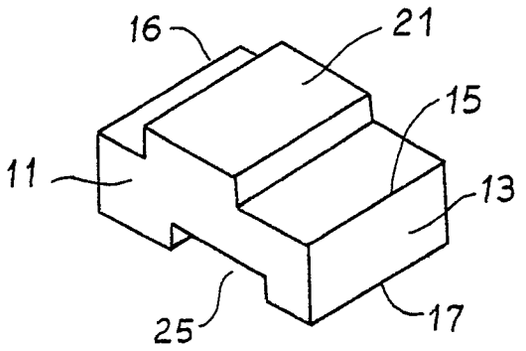

FIG. 5

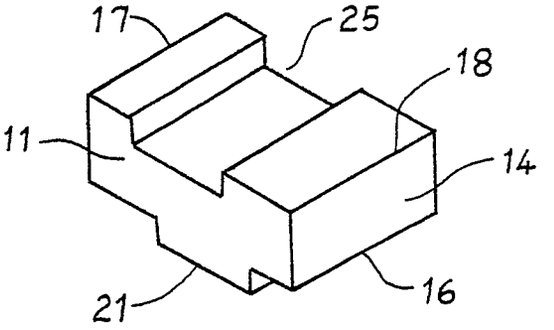

FIG. 6

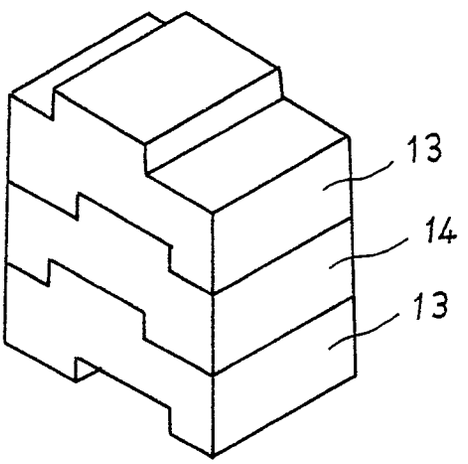

FIG. 7

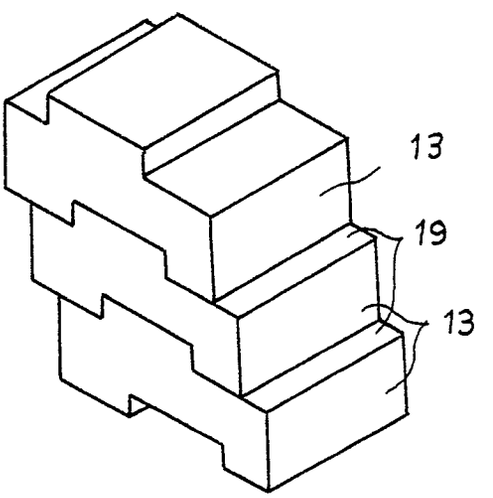

FIG. 8

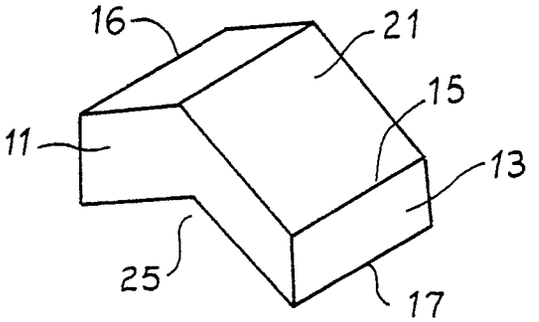

FIG. 9

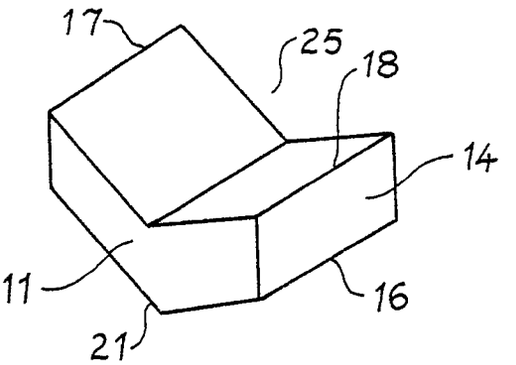

FIG. 10

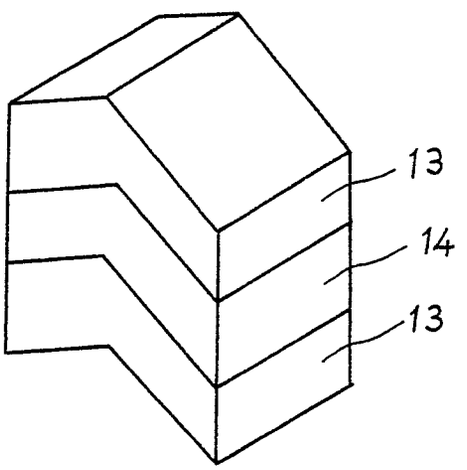

FIG. 11

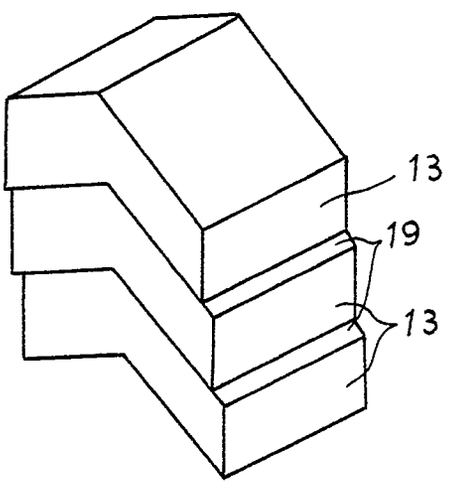

FIG. 12

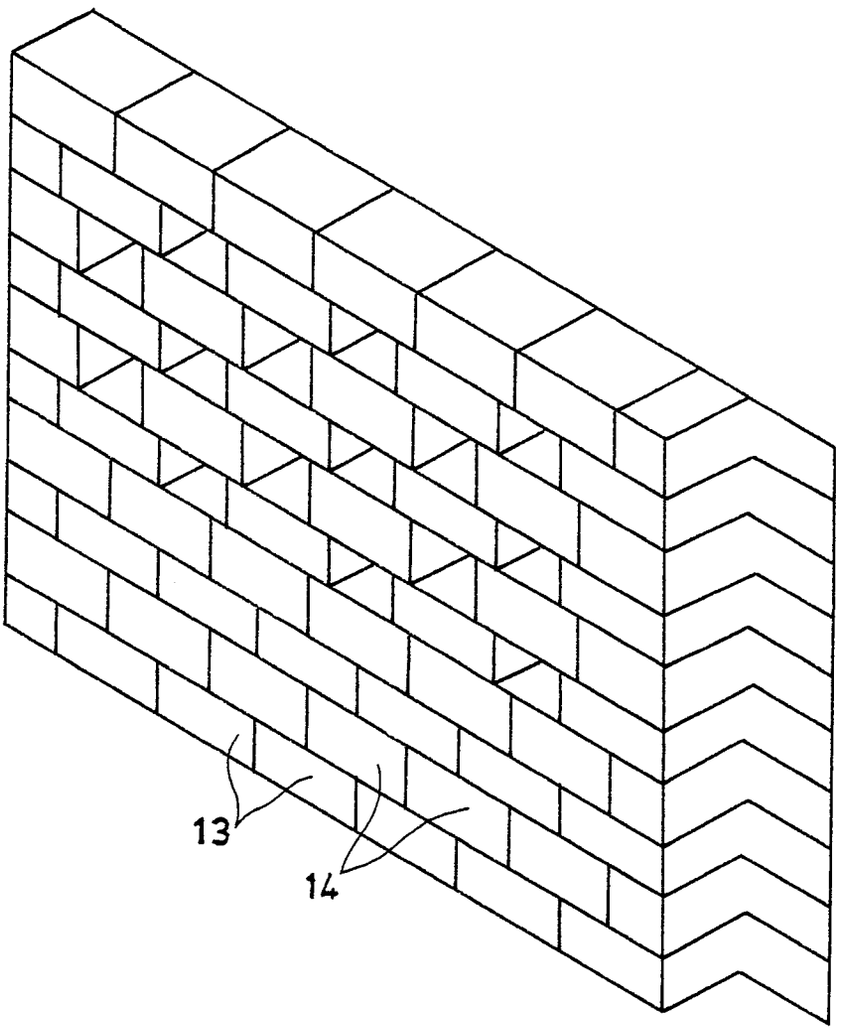

FIG.13

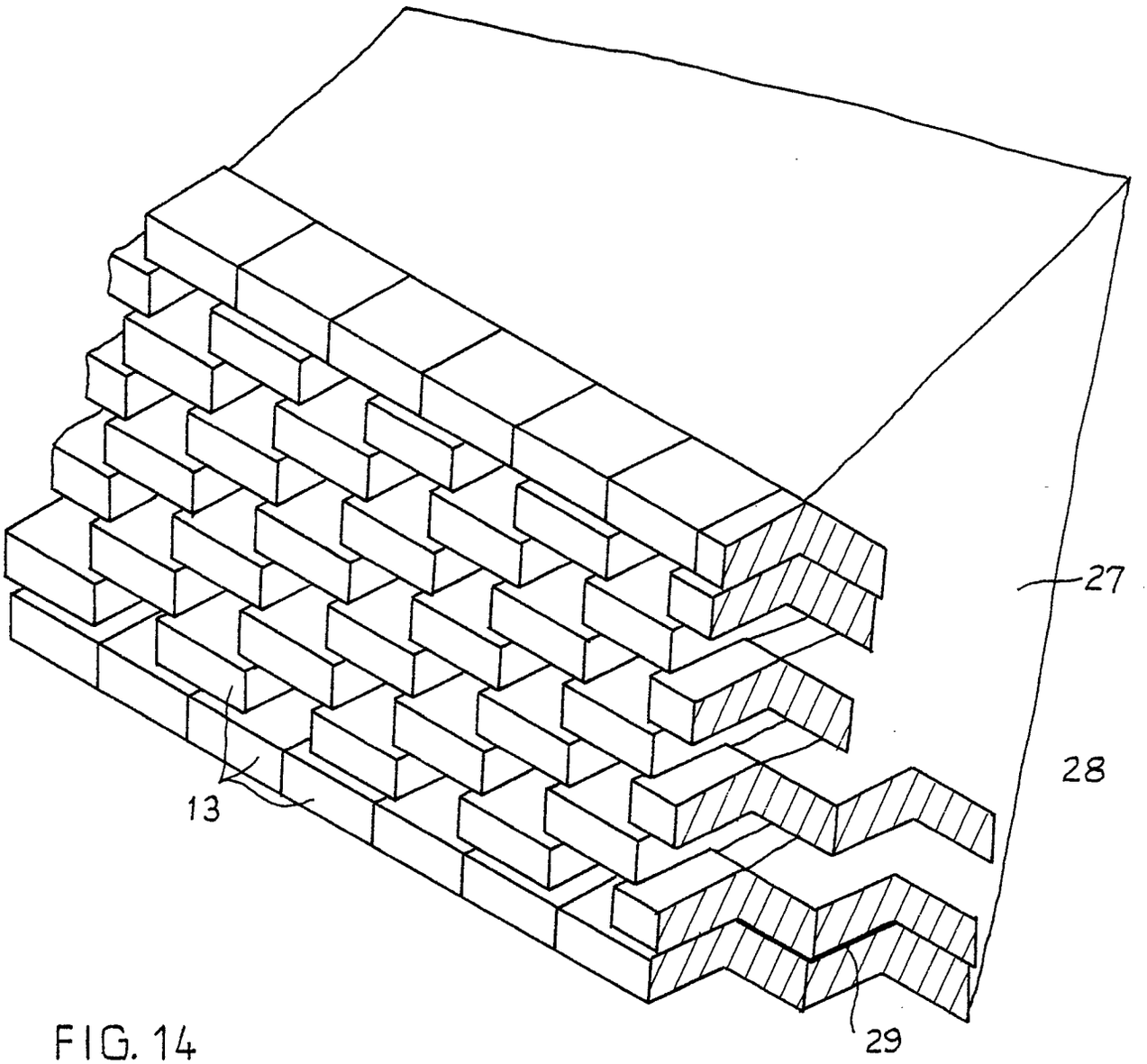

FIG. 14