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(51) **International Patent Classification (Int. Cl.):** B28B 3/00, B28B 3/04

(54) **Title:** BUILDING BLOCK AND METHOD OF MANUFACTURE THEREOF

(57) **Abstract:**

A building block, a method of manufacture thereof and a method of constructing a building, are disclosed. The building block has a pair of opposed long side surfaces, a pair of opposed short side surfaces, and a pair of opposed upper and lower surfaces, the upper and lower surfaces having complementary shapes such that one is male and the other female, the male of the upper and lower surfaces being provided with a longitudinally extending first ridge located intermediate the pair of opposed long side surfaces and at least two transversely extending second ridges located intermediate the pair of opposed short side surfaces, and the female of the upper and lower surfaces being provided with a channel corresponding to each ridge of the male of the upper and lower surfaces.

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(56) **Documents cited:** GB - 2030918

DE-OS 3917500

FIELD OF THE INVENTION

This invention relates to building and construction. More particularly, the invention relates to a building block, to a method of manufacture thereof, and to a method of constructing a building using a building block in accordance with the invention.

BACKGROUND TO THE INVENTION

The applicant is aware of a plethora of interlocking building blocks of various shapes and sizes, which are used in the construction of buildings.

In the field of sub-economic housing, the inventor is also aware of a variety of dry stacking building blocks which have been used with varying degrees of success and economics.

A problem generally associated with conventional dry stacking blocks, is that those which interlock sufficiently, generally have relatively intricate shapes which means that they are difficult to manufacture and that they can easily be damaged when they have to be handled or transported. On the other hand, those conventional blocks which have simpler shapes usually do not interlock sufficiently, and can only be safely stacked up to a limited height.

South African Patent No 91/9250 discloses a building block of which the upper and lower surfaces have profiles which, when viewed in a direction normal to the end faces, has an outer semi-channel and an inner full channel alternating with an inner full projection and an outer semi-projection, the semi-channel and the semi-projection being half the width of the full channel and the full projection, and the channels and projections extending longitudinally between the opposed end faces of the block, the opposed lower and upper surfaces of the block being symmetrical about an imaginary axis which extends transversely between opposed side faces to divide the lower and upper face into two equal halves, each half having a profile, when viewed normal to the major side faces, comprising a semi-projection and a full projection alternating with the full channel and a semi-channel, which extend transversely between opposed side faces and which are complementary with the channels and projections on the opposed respective upper or lower face.

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This block, however, suffers from the disadvantages that its profile is intricate and that it can easily be damaged during transportation and handling.

There accordingly exists a need for a stackable building block which is capable, when being placed upon a similar building block, of being easily locatable thereon.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, there is provided a building block having a pair of opposed long side surfaces, a pair of opposed short side surfaces, and a pair of opposed upper and lower surfaces, the upper and lower surfaces having complementary shapes such that one is male and the other female, the male of the upper and lower surfaces being provided with a longitudinally extending first ridge located intermediate the pair of opposed long side surfaces, and at least two transversely extending second ridges located intermediate the pair of opposed short side surfaces; and the female of the upper and lower surfaces being provided with a channel corresponding to each ridge of the male of the upper and lower surfaces.

In order to reduce the mass of the building block in accordance with the invention, and also to reduce the requirements for materials in the manufacture thereof, and, furthermore, to facilitate the construction of a building from a plurality of building blocks in accordance with the invention, the building block may be provided with at least one passage extending from the upper surface to the lower surface.

In a preferred embodiment of the invention, the building block is divisible into two halves, by a plane extending from the upper surface along a first imaginary line located midway between the pair of opposed short side surfaces, to the lower surface along a second imaginary line located midway between the pair of opposed short side surfaces, each half being provided with a passage extending from the upper surface to the lower surface.

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Conveniently, the passage of each half is located substantially centrally in that half. Each of the passages may be cylindrical or may be rectangular in cross-section.

The dimensions of the block may be selected such that the length of the long side surfaces is approximately equal to twice the length of the short side surfaces. The height of the building block may be selected such that a desired number of whole blocks is required to reach the height of, for instance, a standard door frame, so as to simplify construction of a dwelling. We have found that a width varying from about 150 mm to about 180 mm, a length of from about 298 mm to about 358 mm, and a height of from about 120 mm to about 170 mm, are convenient dimensions in the construction of low cost houses. Using commonly available materials for the construction of the building block in accordance with the invention, and bearing in the mind the aforementioned ranges of dimensions, the mass of the building block in accordance with the invention should preferably be selected so as to optimise the handling thereof in view of the fact that smaller blocks are easier to handle but take a longer time to stack, whilst larger blocks, although heavier, take a shorter time to stack.

In accordance with another aspect of the invention, there is provided a method of manufacturing a building block as hereinbefore disclosed, the method including the steps of:

- providing a substantially rectangular pallet comprising a longitudinally extending ridge located intermediate the long sides of the pallet, and at least two transversely extending ridges located intermediate the short sides of the pallet;

- placing a substantially rectangular mould box over the pallet, the mould box having a pair of opposed long sides of which the ends are interconnected by a pair of opposed short sides, the mould adapted to define the pair of opposed long side surfaces and the pair of opposed short side surfaces of the building block, the lengths of the sides of the mould box being substantially equal to the lengths of the corresponding sides of the pallet;
- introducing a suitable settable material into the mould box;
- lowering a substantially rectangular tamper plate onto the settable material, the tamper plate having a pair of opposed long sides slightly shorter than the pair of opposed long sides of the mould box and a pair of opposed short sides which are slightly shorter than the short sides of the mould box, the tamper plate also being provided with a longitudinally extending ridge located intermediate the pair of long side surfaces and with at least two transversely extending ridges located intermediate the pair of opposed short sides; and
- compacting the settable material in the mould box.

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The method according to the invention may also include the further steps of removing, in an upward direction, the mould box together with the tamper plate, and allowing the settable material to cure. The settable material may conveniently be a mixture of sand and cement.

We have found that, when a sand and cement mixture is used as the settable material, it cures to a sufficient strength after about 24 hours, so that the building block can be removed from the pallet and stacked. In a stacked condition, the building block is preferably allowed to cure for another three weeks before it is ready to be used.

The invention also extends to a method of constructing a building, including the steps of:

- (a) providing suitable foundations;
- (b) laying a plinth wall on the foundations, using building blocks in accordance with the invention, until floor level is reached;
- (c) filling the passages of the bricks with concrete;
- (d) allowing the concrete to cure to a suitable strength;
- (e) filling in the area defined by the plinth wall;
- (f) casting a floor on the filled in material, up to the level defined by the plinth wall;
- (g) laying damp course on the plinth wall;
- (h) building the walls of the building up to door height, using building blocks in accordance with the invention, including doors and windows;
- (i) filling in the passages of the building blocks in accordance with the invention which are located on the corners of the building, those adjacent the doors and the windows, as well as those located in between the doors, windows and corners at distances from one another of between 500 mm and 1500 mm;
- (j) laying a layer of damp course on the top layer of building blocks in accordance with the invention. at door height;

- (k) laying a further two to three layers of building blocks in accordance with the invention up to ceiling height;
- (l) casting concrete in all the passages of the top two to three layers;
- (m) inserting roof anchors into the concrete, immediately after casting thereof. cast into the passages of the top two to three layers; and
- (n) allowing the concrete to cure.

The purpose of the damp course of Step (j), is to prevent concrete from dropping through the passages of layers below the top two to three layers. In this way, a ring beam is created by the top two to three layers, imparting rigidity and strength to the building.

The method of constructing a building in accordance with the invention may conveniently include the provision of services in the passages of overlying layers of building blocks. As an alternative, service pipes and conduits can be chased into the walls after completion of the walls.

As a further step, the method of constructing a building in accordance with the invention may include the waterproofing of the building on at least one of the interior and exterior thereof. Waterproofing may include the application of a waterproof plaster such as Cemcrete or the like.

The invention will now be described, by way of example, with reference to the accompanying drawings, in which:

- FIGURE 1 is an isometric view of a building block in accordance with the invention;

- **FIGURE 2** is a side elevational view of the building block of Figure 1;
- **FIGURE 3** is a plan view of the building blocks of Figures 1 and 2; and
- **FIGURE 4** is a section along line IV-IV in Figure 1.

Referring to the drawings, reference numeral 10 generally indicates a building block in accordance with the invention.

The block 10 has a pair of opposed long side surfaces 12, 14, a pair of opposed short side surfaces 16, 18, and a pair of opposed upper and lower surfaces 20,22.

The upper surface 20 and the lower surface 22 have complementary shapes such that the upper surface 20 is male and the lower surface 22 is female. The male or upper surface 20 is provided with a longitudinally extending first ridge 24 located intermediate the pair of opposed long side surfaces 12, 14. It is also provided with two transversely extending second ridges 26, 28 located intermediate the pair of opposed short side surfaces 16, 18. The female or lower surface 22 is provided with a channel (not shown) corresponding to the first ridge 18 of the male or upper surface 20. The female or lower surface 22 is also provided with two second channels 30, 32 corresponding to the two second ridges 26, 28 of the upper or male surface 20.

The building block is divisible into two equal halves, by a plane extending from the upper surface 20 along a first imaginary line (not shown) located midway between the pair of opposed short side surfaces 16, 18, to the lower surface, along a second imaginary line (not shown) located midway between the pair of opposed short side surfaces 16, 18.

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In order to reduce the mass of the building block 10, and also to reduce the requirements for materials in the manufacture thereof, and furthermore, to facilitate the construction of a building from a plurality of building blocks 10, the building block 10 is provided with two passages 34, 36 extending from the upper surface 20 to the lower surface 22, one passage 30 being located in one half of the building block 10 and the other passage 30 being located in the other half of the building block 10.

The passages 34, 36 of each half are located substantially centrally in that half. Each of the passages 34, 36 is rectangular in cross-section.

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CLAIMS

1. A building block having a pair of opposed long side surfaces, a pair of opposed short side surfaces and a pair of opposed upper and lower surfaces, the upper and lower surfaces having complementary shapes such that one is male and the other female, the male of the upper and lower surfaces being provided with a longitudinally extending first ridge located substantially centrally between the pair of opposed long side surfaces and at least two transversely extending second ridges located intermediate the pair of opposed short side surfaces; and the female of the upper and lower surfaces being provided with a channel corresponding to each ridge of the male of the upper and lower surfaces.
2. A building block as claimed in claim 1, having at least one passage extending from the upper surface to the lower surface.
3. A building block as claimed in claim 1 or claim 2, which is divisible into two halves, by a cleft on a plane extending from the upper surface along a first imaginary line located midway between the pair of short side surfaces, to the lower surface along a second imaginary line located midway between the pair of opposed short side surfaces, each half being provided with a passage extending from the upper surface to the lower surface.
4. A building block as claimed in claim 3, wherein the passage of each half is located centrally in that half.
5. A building block as claimed in claim 4, wherein each of the passages is cylindrical.
6. A building block as claimed in claim 4, wherein each of the passages is rectangular in cross-section.

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7. A building block as claimed in any one of the preceding claims, wherein the dimensions of the block are selected such that the length of the long side surfaces is approximately equal to twice the length of the short side surfaces.
8. A building block as claimed in any one of the preceding claims, wherein the height of the block is selected such that a desired number of whole blocks is required to reach the height of a standard door frame.
9. A building block as claimed in any one of the preceding claims, having a width falling within the range of 90 mm to 230 mm, a length falling within the range of 290 mm to 360 mm, and a height falling within the range of 100 mm to 200 mm.
10. A building block as claimed in claim 9, in which the width range is 150 mm to 180 mm, the length range from 298 mm to 358 mm and the height range from 120 mm to 170 mm.

11. A method of manufacturing a building block as claimed in any one of claims 1 to 10 including the steps of :

- providing a substantially rectangular pallet comprising a longitudinally extending ridge located intermediate the long sides of the pallet, and at least two transversely extending ridges located intermediate the short sides of the pallet;

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- placing a substantially rectangular mould box over the pallet, the mould box having a pair of opposed long sides of which the ends are interconnected by a pair of opposed short sides, the mould box adapted to define the pair of opposed long side surfaces and the pair of opposed short side surfaces of the building block, the lengths of the sides of the mould box being substantially equal to the lengths of the corresponding sides of the pallet;
- introducing a suitable settable material into the mould box;
- lowering a substantially rectangular tamper plate onto the settable material, the tamper plate having a pair of opposed long sides slightly shorter than the pair of opposed long sides of the mould box, and a pair of opposed short sides which are slightly shorter than the short sides of the mould box, the tamper plate also being provided with a longitudinally extending ridge located intermediate the pair of long side surfaces and with at least two transversely extending ridges located intermediate the pair of opposed short sides; and
- compacting the settable material in the mould box.

12. A method of constructing a building, including the steps of:

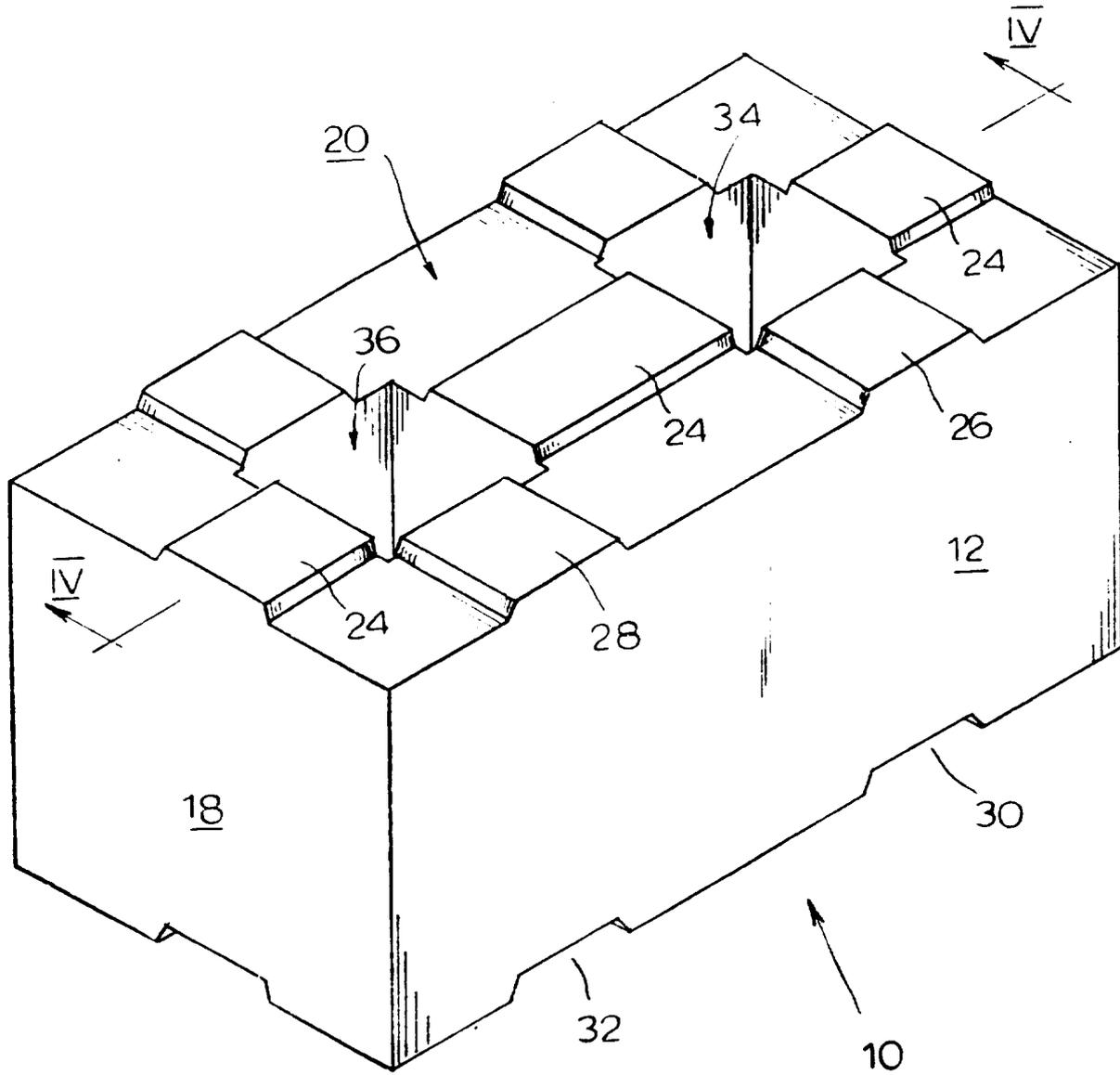
- (a) providing suitable foundations;
- (b) laying a plinth wall on the foundations, using building blocks in accordance with the invention, until floor level is reached;

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- (c) filling the passages of the bricks with concrete;
- (d) allowing the concrete to cure to a suitable strength;
- (e) filling in the area defined by the plinth wall;
- (f) casting a floor on the filled in material, up to the level defined by the plinth wall;
- (g) laying damp course on the plinth wall;
- (h) building the walls of the building up to door height, using building blocks in accordance with the invention, including doors and windows;
- (i) filling in the passages of the building blocks in accordance with the invention which are located on the corners of the building, those adjacent the doors and the windows;
- (j) closing the passages of the building blocks near the top layer of building blocks in accordance with the invention, at door height;
- (k) laying a further two to four layers of building blocks in accordance with the invention up to ceiling height;
- (l) casting concrete in all the passages of the top two to four layers;
- (m) inserting roof anchors into the concrete, immediately after casting thereof, cast into the passages of the top two to four layers; and
- (n) allowing the concrete to cure.

- 13.** A method as claimed in claim **12**, in which the passages of the building blocks located in between the doors, windows and corners at distances from one another of between 500 mm and 1500 mm are also filled in.
- 14.** A method as claimed in either one of claims **12** or **13**, in which the passages of the building blocks near the top layer are closed by a layer of damp course.
- 15.** A method as claimed in either one of claims **12** or **13**, in which the passages of the building blocks near the top layer are closed by a plurality of cups, cones or wedges inserted into the passages.

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FIG 1



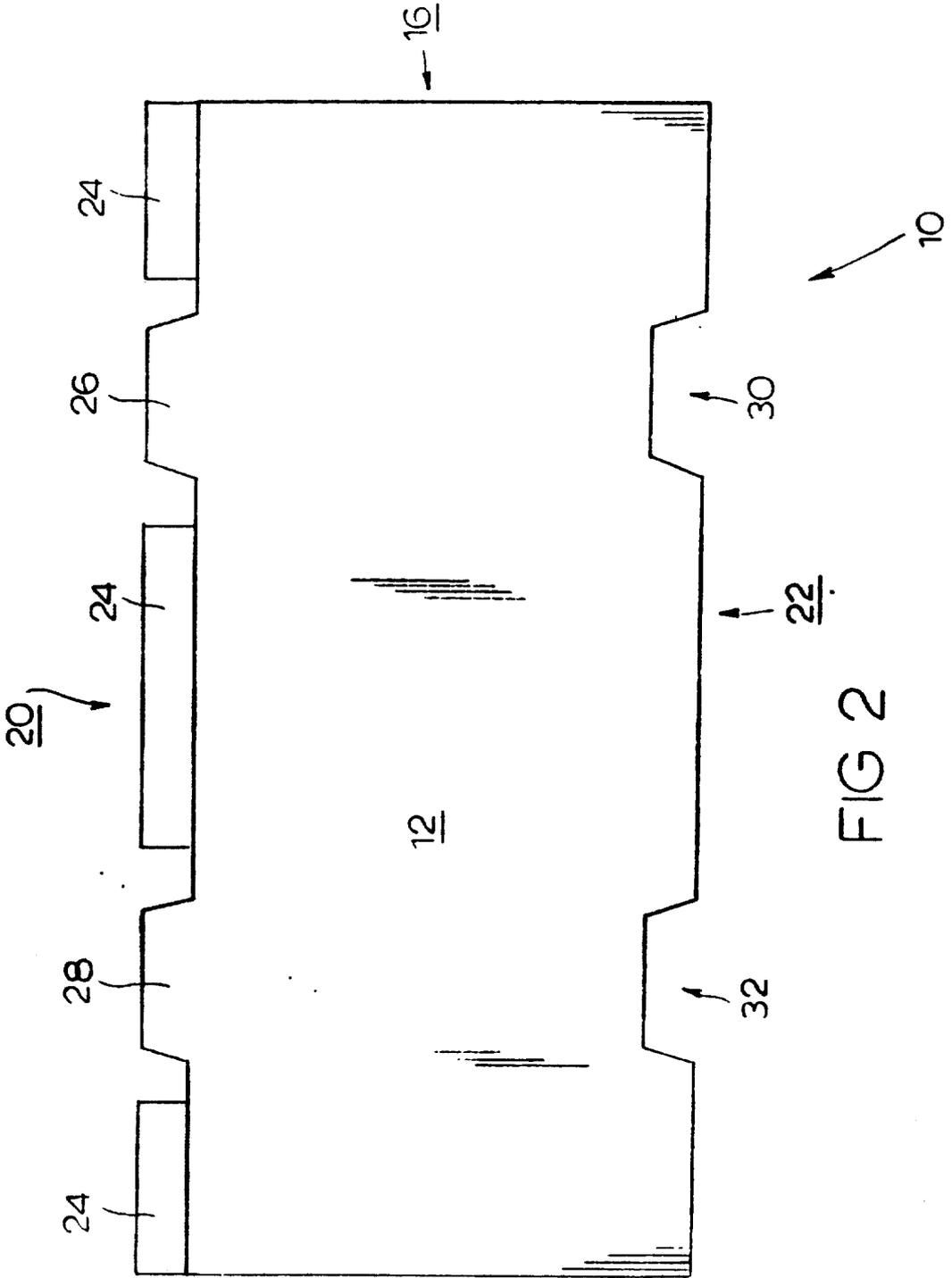


FIG 2

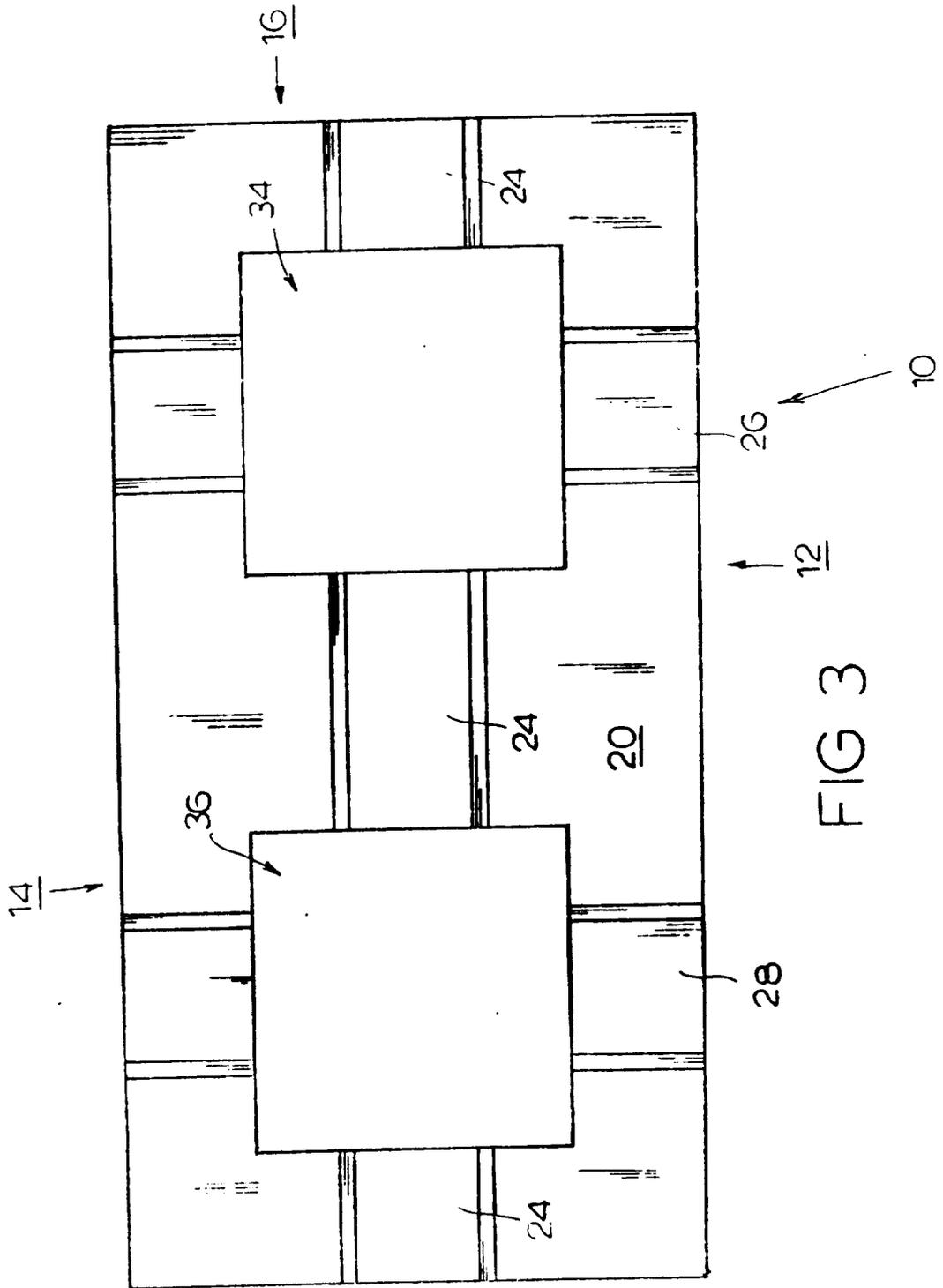
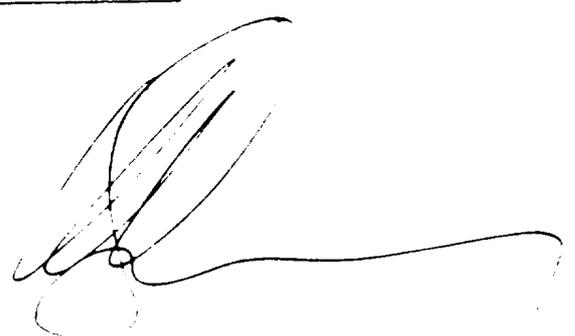


FIG 3



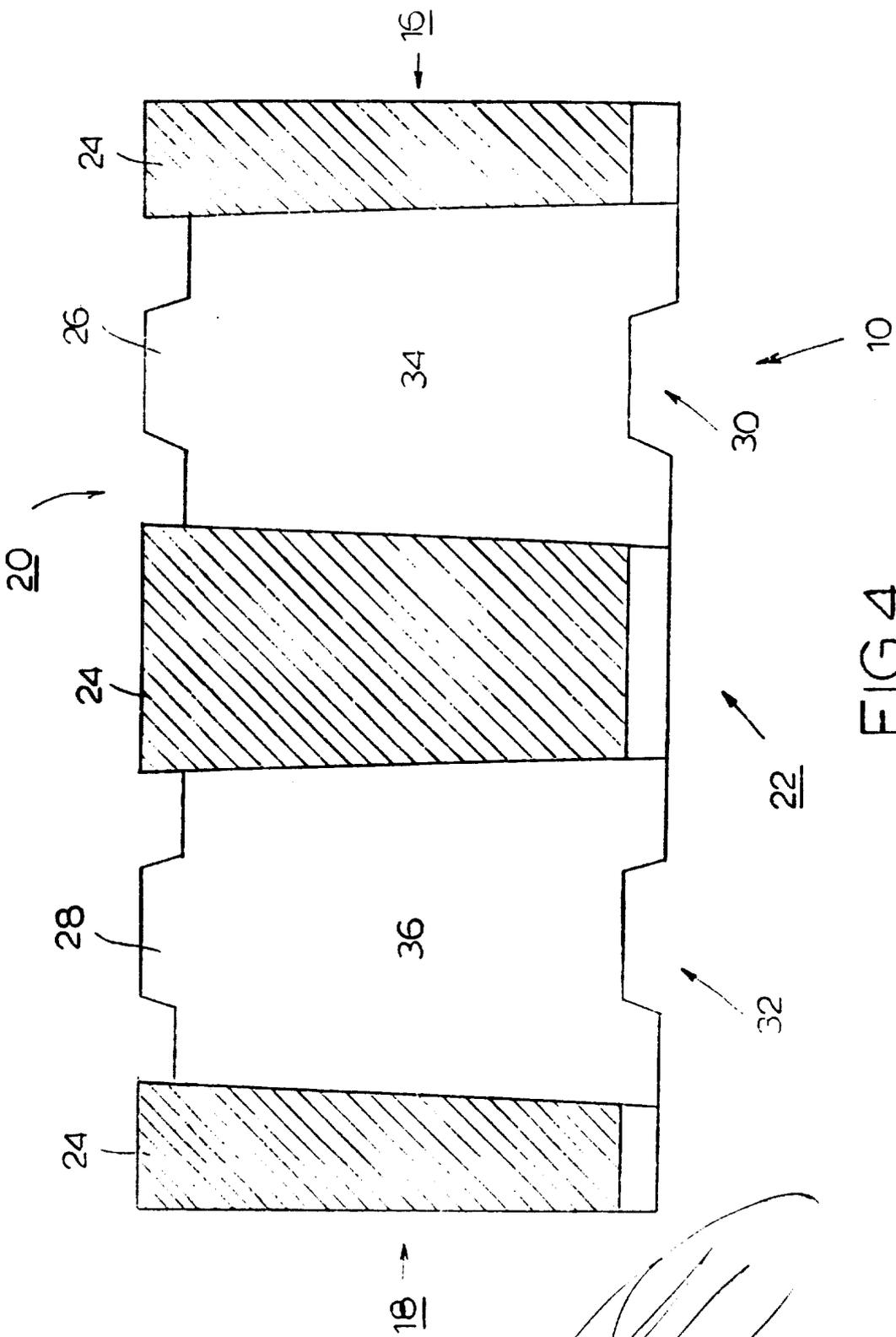


FIG 4

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