(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 862 597 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
05.12.2007 Bulletin 2007/49

(51) Int Cl.:
E02D 29/02 *(2006.01)*

(21) Application number: **07075353.8**

(22) Date of filing: **07.05.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **18.05.2006 CA 2547415**

(71) Applicants:
- **Risi, Angelo**
  Richmond Hill, ON L4S 1K6 (CA)
- **Matys, Tyler**
  Aurora ON L4G 7Y1 (CA)

(72) Inventors:
- **Risi, Angelo**
  Richmond Hill, ON L4S 1K6 (CA)
- **Matys, Tyler**
  Aurora ON L4G 7Y1 (CA)

(74) Representative: **Donné, Eddy**
Bureau M.F.J. Bockstael nv
Arenbergstraat 13
2000 Antwerpen (BE)

(54) "Combination of a structural block and a facing element attached thereto".

(57) Disclosed is the combination of a structural block with a facing element. The facing element is hung to the structural block for at least partially covering its longitudinal face by means of a hanger affixed to the facing element. The hanger has a tab extending from the facing element for engaging the structural block. The tab and the block are engaged by means of at least one substantially vertical post and at least one aperture for receiving the at least one substantially vertical post. The at least one substantially vertical post is part of either the tab or the structural block, while the at least one aperture is part of the other.

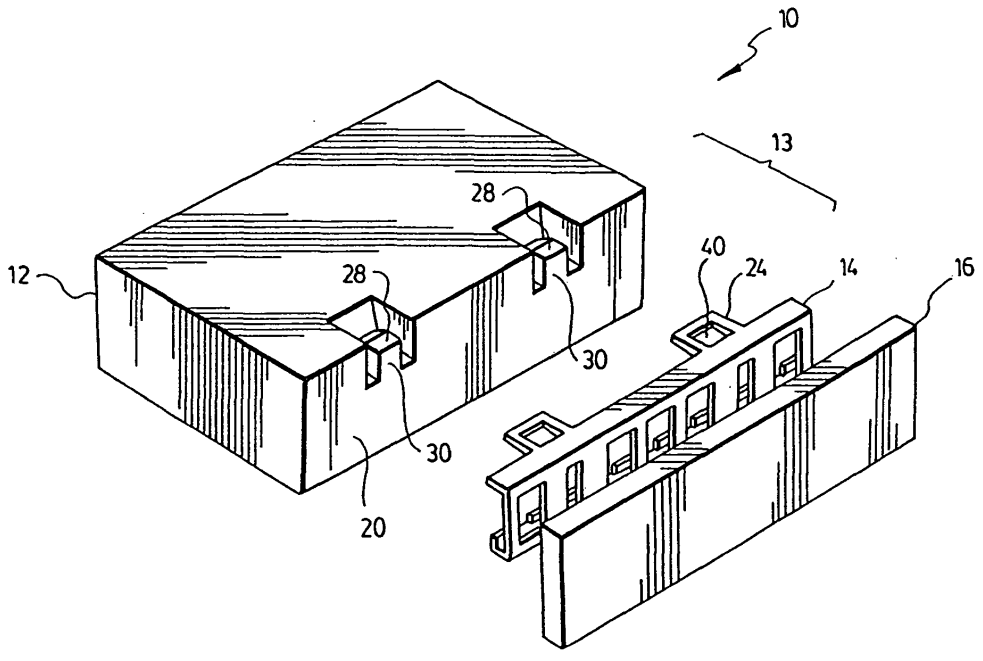

FIG. 1

EP 1 862 597 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to the combination of a structural block and a facing element attached thereto by means of a hanger.

BACKGROUND OF THE INVENTION

[0002] Facing elements can be added to the exterior of a structure for any number of reasons. For example, a facing element may be chosen for its aesthetic attributes, or alternatively, it could be chosen based on the resilience, sound dampening ability, or reflective properties of its material.

[0003] The structures discussed herein can include buildings, steel reinforced concrete block retaining walls and parapets, segmental retaining walls, and fences or acoustical barriers. The facing element can include any architectural or building material the designer wishes to incorporate into the aesthetic or physical properties of the structure. Examples include pre-cast concrete, marble, glass, steel, granite and other natural stone, plastics, or fabrics.

[0004] Structures can be broadly classified as either rigid or flexible structures. Rigid structures are those which are not designed to allow significant deflection or movement during or following construction. Deflections larger than those within a very narrow limit constitute a failure of the structure. Examples of such structures include most buildings, bridges, reinforced concrete block retaining walls, and pre-cast concrete culverts. Flexible structures are those structures which, despite undergoing movements, deflections, or settlements beyond the allowable limits of a rigid structure, continue to perform their intended structural function and are not considered to have failed. Examples of this type of structure are conventional and geogrid-reinforced segmental retaining walls. In this type of structure, blocks are dry-stacked (no mortar or adhesive is used) and the integrity of the structure is maintained by the structure's own weight in order to resist soil pressure and other loads applied through the earth they are retaining. The joints in a segmental retaining wall allow the units to move relative to one another within a much greater range without affecting the structural stability of the wall as a whole. An advantage of this type of system is that it does not require the foundation of the wall be buried below the frost line, or can be constructed on foundation soils where settlement is anticipated.

[0005] Currently, facings and building veneers are secured to the underlying structure in a number of ways. However, facing elements are not generally incorporated into flexible structures (i.e. segmental retaining walls) due to the limitations in existing techniques. Elements such as brick and stone are mortared and/or tied mechanically to the underlying structure. Coating elements such as stucco can be applied directly to the underlying structure with the addition of a supporting layer such as metal lath. Panels, such as those composed of reinforced pre-cast concrete, granite or marble, are generally fastened to the underlying structure with structural fasteners such as steel dowels and bolts, but can also be chemically bonded. In order to ensure a strong bond, it is however usually preferred to perform the bonding in a controlled environment rather than in the field where chemical agents are more prone to contamination.

[0006] In general, the facing material is meant to be more aesthetically pleasing than the structural block it is covering, and is therefore generally more expensive. The use of a façade or veneer to create the desired outward look of the structure is significantly more economical than attempting to use the facing material as the entire structural element.

[0007] However, the use of mortar, steel lathing, and other adhesive compounds to apply a facing material to a structure requires skilled labour, is dependent on the craftsmanship of the installer, is dependent on climatic and moisture conditions, and long term adherence is subject to degradation (mortar under freeze thaw cycles). All of these elements add variability to the installation and may increase costs, installation time, and adversely effect long term performance (reliance on contractor for good workmanship and proper application of bonding/adhesive materials).

[0008] In addition, the use of coating elements such as stucco or other compounds that are applied directly on to the structure are known for poor long term performance under severe weather conditions (spalling of stucco or mortar due to freeze thaw cycles in Canada). The bond of mortar to concrete or brick, and the use of other adhesives, is vulnerable to environmental conditions such as temperature, moisture, pollutants, etc.

[0009] Another common problem associated with segmental retaining walls is the staining cause by efflorescence. Efflorescence is a phenomenon wherein water passing through the earth behind a retaining wall, enters the concrete block, dissolves the natural salts therein and evaporates from the outer surface of the retaining wall leaving behind the dissolved salts. These salts cause the white/grey/black staining commonly seen on masonry products, which has been a major problem for precast concrete manufacturers as the look of their walls is significantly diminished by the staining. Various concrete admixtures, face treatments and other techniques have been employed to help control the negative effects of efflorescence. However, most have little effect and are costly.

[0010] Furthermore, the practice of securing facings to flexible structures, such as segmental retaining walls, is not commonplace. Generally, structures such as segmental retaining walls are constructed of pre-cast concrete blocks, which allow the manufacturer to create various finishes on the face of the actual structural block (split rock, smooth with chamfers, exposed aggregate,

etc). Architects are becoming more and more demanding with respect to the appearance of such structures, ultimately wanting these exterior landscape walls and structural retaining walls to better compliment and blend into the surrounding natural and built environment. As such, the addition of a more attractive facing element would provide the manufacturer a competitive advantage in the marketplace.

[0011] Canadian Patent 2,244,348, titled Block Retaining Wall with Attached Facing Panels provides a segmental retaining wall block with a vertical slot in the face to be used in conjunction with a matching facing panel for securing the facing panel to the segmental retaining wall block. The vertical slot in the face of this segmental retaining wall block accepts a vertical tongue protruding from the back of the facing panel. To secure the facing panel to the structural block, the facing panel is slid vertically into the groove on the face of the block, and rests on the unit below, thereby supporting the panel vertically. As the facing element itself is resting on the facing element below, no space is provided between panels for movement or expansion. Contact between panels that are subject to movement or settlement, as with a flexible segmental retaining wall, creates stress on the panels as they attempt to move relative to each other. Furthermore, panels that rest on each other must be load bearing, as they take the load of all the other panels above. This greatly restricts the type of material that may be used as a facing.

[0012] This design requires that the panel be slid into the opening at the top of the block and pushed down to rest on the block underneath it. In order to install a facing panel on a block, the top of the block must be unobstructed. This can only be accomplished in one of two ways: either each course of blocks must be setback considerably to expose the entrance to the slot on the top of the block or, alternatively, the facing panels must be installed as the wall is being built, with each row of panels being secured prior to the stacking the successive course or blocks. Both these scenarios present serious drawbacks to a designer.

[0013] Given that most rigid reinforced concrete block walls are essentially vertical, and that flexible segmental retaining walls are constructed either vertical or near vertical (batter on most segmental retaining walls varies between 0° and 12°), the first of the above-mentioned scenarios is clearly impractical.

[0014] The second scenario, in which the facing panels are installed as the structural portion of the wall is being constructed, greatly increases the potential for damage to the facing panels since they are being placed during a time of "heavy construction". Large machines, bigger crews, and more activity in general cause a greater exposure to potentially damaging circumstances. In addition, the risk of theft or vandalism further increase with the length of time left on site.

[0015] Additionally, the placement of the panels during construction may slow progress on the actual structure, which may be under a specific timeline in many cases the completion of one structure is required to support other related structural elements. Furthermore, the necessity of adding the facing panels during construction limits the designer's flexibility to change or modify the facing at later stages in construction or try different facings on the finished structure prior to choosing the final one.

[0016] Furthermore, installing the facing panels as the structure is being constructed means installing the facing panels before the structure has settled, a situation particularly important for flexible structures. With specific reference to the wall structure disclosed in CA 2,244,348, the facing units bear directly on each other, or on the structural unit below. If these panels are subject to movements or settlements, as they are in direct contact with each other and/or the structural block, they will be vulnerable to additional stresses and loads caused by differential movement. This may result in fractures or breakage of the facing panels due to expansion forces or differential settling of the structure.

[0017] As such, there exists a need for a system for attaching a facing element to a structural block which overcomes some of the afore-mentioned problems found in the prior art.

SUMMARY OF THE INVENTION

[0018] The object of the present invention is to provide a system for attaching a facing element to a structural block which apparatus overcomes the above-identified deficiencies found in existing techniques.

[0019] More specifically, the invention is directed to the combination of a structural block with a facing element hung thereto for at least partially covering a longitudinal face of the structural block,

- wherein the facing element is hung to the structural block by means of a hanger affixed to the facing element, the hanger comprising a tab extending from the facing element for engaging the structural block; and
- wherein the tab and the block are engaged by engagement means comprising:

- at least one substantially vertical post; and
- at least one aperture for receiving the at least one substantially vertical post;
- the at least one substantially vertical post being part of either the tab or the structural block, while the at least one aperture is part of the other.

[0020] Preferably, the structural block comprises the at least one substantially vertical post and the tab comprises the at least one aperture.

[0021] Preferably also, the combination comprises two of substantially vertical posts and two apertures, the two substantially vertical posts being aligned with the two ap-

ertures.

[0022] With architects, designers, and consumers constantly looking for new and more appealing textures, colours, and aesthetic elements to incorporate into and enhance the built environment, the integration of a wide variety of materials is becoming increasingly popular. The present invention provides a means through which attractive facing materials can be incorporated into both rigid and flexible structures with better economics, better performance, and greater ease than existing methods and systems. The present invention further provides a means of controlling the negative effects of efflorescence.

[0023] The invention will be better understood upon reading the following non-restrictive description of preferred embodiments thereof, made with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Figures 1 and 2 are exploded perspective views of a system for attaching a facing element to a structural block according to a first preferred embodiment of the invention.

Figure 3 is an unexploded perspective view of the system for attaching a facing element to a structural block shown in Figures 1 and 2.

Figure 4 is a side view of the embodiment shown in Figures 1 to 3 with portions of the hanger being shown in phantom lines.

Figure 5 is a perspective view of the structural block according to the first preferred embodiment of the present invention.

Figure 6 is a side view of the structural block according to the first preferred embodiment of the present invention with portions of the hanger being shown in phantom lines.

Figures 7 and 8 are perspective views of the hanger according to the first preferred embodiment of the present invention.

Figures 9 and 10 are top and side views, respectively, of the hanger according to the first preferred embodiment of the present invention.

Figures 11 to 16 are side views illustrating the steps to be carried out for applying facing elements to two vertically disposed structural blocks, with portions of the hanger being shown in phantom lines.

Figures 17 to 22 are perspective views illustrating the steps to be carried out for applying facing elements to a retaining wall in accordance with the present invention.

Figures 23 is a partially exploded plan view of a system for attaching a facing element to a structural block according to a second preferred embodiment of the present invention.

Figure 24 is a side view of the partially exploded system shown in Figure 23.

Figure 25 is a perspective view of the partially exploded system shown in Figures 23 and 24.

Figures 26, 27 and 28 are top, perspective and side views of a hanger insert according to the second preferred embodiment of the present invention.

Figures 29 and 30 are perspective views of a hanger according to the second preferred embodiment of the present invention.

Figure 31 is a side view of stacked structural blocks and facing elements of varying sizes according to the second preferred embodiment of the present invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0025] Figures 1 to 4 illustrate a combination 10 comprising a structural block 12, a facing hanger 14 and a facing element 16 according to a first preferred embodiment of the invention.

[0026] Generally, structural blocks or units such as structural block 12 are designed to bear the load of the structure (compression, shear, etc) either on their own or by being combined with other structural materials. Such structural materials include, but are not limited to, reinforcing steel, geosynthetic reinforcements, mortar/grout, and concrete. Examples of such structural blocks, which have been in use for many years, include typical masonry building blocks, concrete, clay bricks, and segmental retaining wall units.

[0027] Blocks may range is size considerably. Typically masonry building blocks are manufactured in dimensions that allow a bricklayer or mason to place them by hand (i.e. weighing less than 20 kg) with typical dimensions of 190 mm (h) x 390 mm (l) x 100 mm (w). Such manually placed blocks often have hollow cores to decrease their weight and allow for the placement of grout and/or steel reinforcement.

[0028] For the construction of segmental retaining walls, the blocks may either be hand-placed pre-cast blocks (weighing less than 35 kg) with typical dimensions of 150 mm (h) x 200 mm (l) x 300 mm (w), or machine-placed pre-cast blocks (weighing up to and including 750

kg) with typical dimensions of 300 mm (h) x 1830 mm (l) x 610 mm (w). Such blocks can also have hollow cores to decrease their weight and allow for the placement of grout and/or steel reinforcement.

[0029] Hanger 14 serves to hang facing element 16 from block 12, which provides a façade for an exposed, longitudinal face 20 of block 12. Hanger 14 can be machined from metal stock or fabricated from bent sheet metal, but is preferably a moulded plastic.

[0030] Facing element 16 is composed of a material or materials that have a preferred physical property or attribute, but are, for example, more expensive or less structurally sound than the material of structural block 12. The physical property can be an electrical, chemical or mechanical. Facing element 16 may be chosen for aesthetic reasons, or alternatively, facing element 16 could be chosen, for example, based on its resilience, sound dampening ability, or reflective properties. Facing element 16 could be made of pre-cast concrete, steel, marble, granite or other cut stone, glass, or wood panels.

[0031] Hanger 14 can be secured to facing element 16 mechanically, chemically, or, preferably, by placing it into a mould and allowing it to set into the facing material while the facing material is in a non-solid form, such as pouring wet concrete or plastic into a mould with the hanger 14 already inserted, thereby enveloping a portion of the hanger 14 within the facing material, as seen in Figures 4 and 11 to 16.

[0032] Preferably, facing element 16 is attached or integrated with hanger 14 at the place of manufacture. In the case of using a cast concrete facing panel, which is usually manufactured using a wet-cast mould with shapes/textures resembling natural stone or brick, the body 22 of hanger 14 is set into the facing element mould prior to pouring the concrete. Tabs 24 and a lower bumper portion 26 and are left out of the mould, allowing the wet concrete to surround and/or bond to the majority of the hanger body, covering it in the process. It is to be noted that presence of a bumper portion, like bumper 26, is not essential to the functioning of the present invention. A hanger 14 which is stabilised and aligned only by the engagement of tab, or tabs, 24 and structural block 12 is within the scope of the invention.

[0033] In the case where a marble facing element 16 is preferred, hanger 14 is preferably glued to the marble element 16. For yet other types of facings 16, it may be preferable to otherwise mechanically or chemically bond hanger 14 to facing element 16.

[0034] Block 12 and tabs 24 are engagable by engagement means 13 including a post and an aperture located on one or the other of block 12 and tabs 24.

[0035] In the illustrated embodiment, block 12 is provided with at least one inset mounting post 28, incorporated into the top of block 12 and from which facing element 16 is hung along longitudinal side 20 of block 12. Posts 28 can be manufactured as part of the block mould, in the case of a block 12 made of concrete, or can be added later through machining. Posts 28 can further be manufactured separately and attached to block 12 thereafter.

[0036] In the present example, which is to be considered in no way limiting, block 12 comprises two mounting posts 28. It is to be noted, however, that the numbers of posts 28 can vary according to the wide variety of applications of the present invention. Additional mounting posts 28 could be located on the opposite side of block 12 for use in a structure that has two exposed faces and requires a facing on both the front and back of the structure. For larger blocks, there may be a larger number of mounting posts 28, so as ensure an even hanging and ensure that the allowable spanning distance of the panel is not exceeded.

[0037] Preferably, a post 28 is formed entirely within the walls of block 12, i.e. no part of post 28 extends beyond the six sides of block 12. In this way, each post 28 comprises five exposed surfaces: a front longitudinal surface 30 which is co-planar with front surface 20, lateral surfaces 32 which are parallel to the lateral surfaces of block 12, a back surface which tapers downward away from longitudinal faces 20 and 30, and a top surface 34 which is parallel to upper face 36 of block 12.

[0038] As seen in the Figures, the block 12 is cut-out around in order to form post 28, leaving a horseshoe-shaped groove 33 with the longitudinal surface 30 being flush with the exposed face 20 of block 12. In a first embodiment, top surface 34 of post 28 is lower than upper face 36, creating a space 38 therebetween. This space 38 allows the hanger 14 to be inserted horizontally into the top of block 12, without being obstructed by the next course of blocks 12 stacked above it. As such, facing elements 16 can be placed after the wall/structure is built, regardless of whether the structure is vertically aligned or is battered back.

[0039] In an alternate embodiment, top surface 34 and upper face 36 are co-planar. In order to allow the placement of a facing element 16 on a post 28, an additional cut out is provided along the lower face of block 12 (and therefore any corresponding blocks 12 positioned above) in line with post 28, in order to allow create an equivalent space 38, this time above the lower block 12 in the bottom side of the block 12 above it and provide access to post 28.

[0040] As discussed above, hanger 14 comprises tabs 24 and a bumper 26 that protrude from facing element 16. In addition, each tab 24 comprises an aperture 40 which is slightly larger in size than a post 28. Hanger 14 slips over the mounting posts 28, ultimately resting in the horseshoe-shaped groove 33 set in the top of the block 12. Body 22 or hanger 14 is slightly smaller than facing panel 16 and longitudinal face 20. Tabs 24 extend from the top of the hanger 14 at a 90 degree angle to a distance roughly equivalent with the depth of groove(s) 33 inset into the top of block 12. Hanger 14 also comprises gussets 42 extending between tab 24 and body 22. The vertical thickness of tab 24 is slightly less than the vertical space 30 between top surface 42 of post 28 and top face

44 of block 12. This ensures that tab 24 can be inserted horizontally into the face of block 12, and, once inside, be slipped down over mounting post 28. As such, facing element 16 can be placed after the wall or structure is built, even if the block 12 is positioned below another block 12.

[0041] In yet another alternate embodiment, the locations of post 28 and aperture 40 are reversed within engagement means 13. In this embodiment, tab (or tabs) 24 of hanger comprises a downwardly extending vertical post at its outer edge. A corresponding aperture is then provided in block 12 to receive the downward facing post. The functionality of this alternative is maintained by similarly providing space 38 below the upper 36 face of block 12 in which tab 24 is inserted horizontally without being obstructed by the next course of blocks stacked above it. The aperture in block 12 should be about the same size as the downwardly extending vertical post, or could be part of a much larger void, as in a hollow block. In either case, hanger 14 allows facing element 16 to be hung from block 12.

[0042] With reference now to Figures 11 to 22, the method of installing facing panels 16 to a wall 50 of blocks 12 will be described. The following method can also be applied to any of the above-mentioned alternate embodiments.

[0043] Retaining wall 50 which is illustrated comprises four courses of structural blocks 12a, 12b, 12c and 12d stacked alternatingly one atop the other. A first facing element 16a is aligned with a first block 12a from the bottommost course, so that tab 24 is aligned with space 38. Hanger 14 is then inserted, in direction 52, into the space between post 28 and the bottom face of the block above of course 12b. When bumper 26 engages the longitudinal face 20 of block 12a, facing element 16 is lowered in direction 54. Once lowered, tab 24 fully surrounds post 28, and the bottom side of tab 24 rests on the bottom of the horseshoe-shaped groove 33, including gusset 42.

[0044] This process is then repeated for each block 12a in the bottom most course, and then similarly for the blocks 12b in the course above that, and so on until each block 12 is has a facing element affixed thereto, as seen in Figure 21.

[0045] Note that it is important to start from the bottommost course and work upwards because, as seen most clearly in figure 16, first facing element 12a cannot be raised enough to withdraw it from block 12 if a second facing element 12b is positioned above.

[0046] Lastly, finishing blocks 56 are fixed on top of each block 12 whose upper face 36 is exposed, thereby preventing the top course of finishing elements 16d from being removed.

[0047] As such, the structural elements of wall 50 can be erected, allowing the remainder of the construction to continue, while allowing the facing panels to be installed at a later date.

[0048] Figures 23 to 31, illustrate another preferred embodiment of the invention.

[0049] This other combination 100 comprises a structural block 112, a hanger 114, a facing element 116 and at least one hanger insert 118. In this embodiment, hanger inserts 118 are inserted into block 112 via vertical a vertical slots 120. The slots 120 have a larger cavity set back from the face of block 112.

[0050] As pictured, a pair of hanger inserts 118 fit into vertical slots 120 in block 112, which extend from upper face 122 to lower face 124 of block 112 and have a complementary shape to that of insert 118. The larger backside of insert 118 and slot 120 prevents insert 118 from any frontward or backward movement. Once insert 118 is placed inside block 112 and the following course of blocks 112 are laid thereabove, insert 118 is locked in place.

[0051] With specific reference to Figures 26 to 28, each insert 118 comprises a shaft 126 and a substantially vertical post 128 extending outwards and upwards from shaft 126. Shaft 126 comprises straight section 130 and flanges 132 extending laterally outwards from therefrom, the combination of which creates a tapered cross-section which is of substantially constant over the length of shaft 126. Opposite to flanges 132, post 128 projects from straight section 130 and forms a groove 134 therebetween comprising vertical surface 138, bottom surface 140 and outer surface 142 of straight section 130. Angled surface 136 is further provided to ease placing of hanger 114 within groove 134, which is equivalent to above-mentioned groove 33.

[0052] The complementary shape of each slot 120 takes the form of shaft 126 (i.e. straight section 130 and flanges 132), but of slightly greater dimensions so as to allow movement of insert 118 within slot 120 and forms an opening down the longitudinal face of block 112 the width of straight section 130. In this way, shaft 126 can slide freely in a vertical direction within slot 120 with post 128 outside slot 120. Furthermore, because the widths of flanges 132 and post 128 are greater than that of straight section 130, insert 118 is constrained to move in the vertical direction only.

[0053] The height of insert 118 is less than the height of block 112, i.e. the distance between upper face 122 and lower face 124.

[0054] The embodiment illustrated in the preceding Figures describes a block 112 with two slots 120 and a corresponding two inserts 118, however it is to be noted that embodiments involving a single slot 120 and corresponding insert 118, as well as more than two of each, are within the scope of the present invention.

[0055] A shown in Figures 29 to 31, tabs 144 of hanger 114 comprise rails 144 projecting from body 146. Each rail 144 comprises one or more apertures 148 dimensioned to receive a post 128 of insert 118 and rest in groove 134. As pictured, the two rails 144 are identical and either one is capable of engage posts 128, while the remaining rail functions as a bumper stabilising hanger 114 and ensuring that facing element 116 is properly aligned with the longitudinal face of block 112. This ver-

satility advantageously enables the installation of each facing element 116 in one of two distinct orientations, effectively doubling the options available to an architect or designer. Furthermore, apertures 148 are considerably wider than posts 128, enabling a user to slide the facing back and forth a certain distance.

[0056] As with the above-described hanger 16, hanger 116 is preferably attached or integrated with hanger 114 at the place of manufacture. In the case of a cast facing panel, body 146 is set in the facing panel mould material prior to setting. Rails 144 are left outside the mould, while the wet concrete material is allowed to flow around body 146, through casting apertures 150 and around the C-shape created by outer rails 152, thereby securing the facing material to hanger 114 when hardened.

[0057] Figure 31 shows four structural blocks 112a, 112b, 112c and 112d stacked on top of each other. Facing element 116a is hung from insert 118a which is vertically supported by the upper face of block 112b. It is important to note that, in this case, blocks 112a, 112b, 112c and 112d are stacked such that respective slots 120a, 120b, 120c and 120d (not shown) are not in alignment. Were this the case, each insert 118 could fall into the lower block's slot 120 as each insert 118 is shorter than each corresponding slot 120.

[0058] Alternatively, a slot 120 could be provided which does not extend completely through block 112, but rather from upper face 122 to somewhere above lower face 124, thereby creating a surface to vertically support insert 118. Alternatively again, a small plate of greater dimension than the cross-section of slot 120 could be inserted between two vertically stacked blocks 112, and positioned so as to prevent an insert 118 from falling into the slot 120 of a lower block.

[0059] Facing element 116a is dimensionally smaller than corresponding block 112a, which leaves an opening 154 between facing element 112a and any adjacent facing elements. This opening 154 is particularly important in situations where some movement or settling is expected from the structure. An opening 154 between facing element 116a and a laterally adjacent facing element 116 (not shown) allows for small adjustments of the position of element 116a relative to block 112a.

[0060] Providing a facing system which "floats", rather than being rigidly fixed or resting on a lower block, allows the use of facing panels that can extend over one and a half, or two courses of structural blocks. As further seen in Figure 31, facing element 116b, hung from insert 118b, and facing element 116d, hung from insert 118d, can combine to provide facing to block 116c. This feature is advantageous in that it visually interrupts up the unnatural horizontal lines in the face of the wall. This interruption of horizontal lines reduces the look of a manufactured "dimensional" facing, and creates a a more natural, aesthetically pleasing look as the eye does not pick up the horizontal joints as easily. Furthermore, this system has the ability to hide slight variances in the horizontal alignment of the wall, which are often caused by differential settlement or an uneven base. The less continuous the lines are, the more difficulty the eye has in picking up these variances.

[0061] Combinations 10 and 100 are simple and do not require skilled labour as would the use of mortar, steel lathing, and other adhesive compounds. Thus, combinations 10 and 100 are not subject to expensive labour costs or the craftsmanship and/or knowledge of the installer. As well, combinations 10 and 100 require no mortar or other chemical adhesives to secure them, removing any vulnerability to non-ideal weather conditions or long term degradation.

[0062] Similarly, combinations 10 and 100 do not require chemical bonds to secure them, and therefore are not subject to the spalling or degradation often found with stucco and other coatings in extreme weather environments. When a marble facing element 16 or 116 is favoured, and it remains necessary to glue the marble facing element to hanger 14 or 114, such gluing can be performed off-site and at any time prior to final installation. This represents a major improvement over prior art systems which would otherwise necessitate non-ideal fabrication conditions and be at the mercy of varying weather conditions and work schedules.

[0063] Combinations 10 and 100 are "floating systems", allowing the facing to hang from the structural block with no part off the facing contacting or bearing on any other facing element. This structural independency allows for the settlement or movement between adjacent units and expansion or contraction of the various elements relative to one another. Being structurally independent ensures each individual facing panel 16 will not rely on or be effected by other surrounding panels. This also allows for replacement of damaged panels without having to remove all of the surrounding panels 16.

[0064] In addition, the use of the "floating panel" system described herein provides a space between body 22 or 146 of hangar 14 or 144, respectively, and structural block 12 or 112, ensuring that water does not continue through to the facing and essentially severing the efflorescence process. This is a clear advantage over existing facing panel systems which place facing elements flush with the face of the structural block to which they're attached.

[0065] Lastly, by allowing the user to place the facing elements at any time after construction, the more expensive, delicate facing can be store off-site and installed at a time when the "heavy construction" is not taking place, thereby significantly lowering exposure potentially damaging conditions, and reducing the risk of theft or vandalism.

[0066] The above description of a preferred embodiment of the present invention should not be read in a limitative manner as refinements and variations are possible without departing from the spirit of the invention. The scope of the invention is defined in the appended claims and their equivalents.

Claims

1. The combination of a structural block with a facing element hung thereto for at least partially covering a longitudinal face of said structural block,

   - wherein said facing element is hung to said structural block by means of a hanger affixed to said facing element, said hanger comprising a tab extending from said facing element for engaging said structural block; and
   - wherein said tab and said block are engaged by engagement means comprising:

     - at least one substantially vertical post; and
     - at least one aperture for receiving said at least one substantially vertical post;
     - said at least one substantially vertical post being part of either said tab or said structural block, while said at least one aperture is part of the other.

2. The combination of claim 1 wherein the structural block comprises said at least one substantially vertical post and the tab comprises said at least one aperture.

3. The combination of claim 2 wherein the structural block comprises at least one opening in its longitudinal face for horizontally receiving said tab and enabling engagement of said at least one aperture on the corresponding at least one substantially vertical post.

4. The combination of claim 3 wherein said at least one substantially vertical post is inset in said structural block and creates a groove in an upper face of said structural block surrounding said at least one substantially vertical post and said opening in said longitudinal face.

5. The combination of claim 4 wherein said at least one substantially vertical post has an upper surface lower than the upper face of said structural block.

6. The combination of any one of claims 2 to 5 wherein said at least one substantially vertical post further comprises a longitudinal surface which is flush with the longitudinal surface of said structural block whereby said groove extends to said longitudinal face.

7. The combination of claim 2 wherein said structural block further comprises a substantially vertical slot opening along said longitudinal face of said structural block and a complementary insert comprising a shaft portion for engagement with said substantially vertical slot, said complementary insert comprising said at least one substantially vertical post.

8. The combination of claim 7 wherein said slot portion comprises a generally tapered cross-section tapering outwardly from said longitudinal face and said complementary insert has a corresponding generally tapered cross-section.

9. The combination of claim 8 wherein said generally tapered cross-section comprises a straight section and a flange, said straight section being proximate to said at least one opening along said longitudinal face.

10. The combination of claim 9 wherein said substantially vertical post extends outwards from said straight section.

11. The combination of any one of claims 7 to 10 wherein said substantially vertical slot extends from an upper face of said structural block to a lower face of said structural block.

12. The combination of claim 11 wherein said insert is shorter in length that the distance between said upper and lower faces of the structural block.

13. The combination of claim 1 wherein said structural block comprises said at least one aperture and said tab comprises said at least one substantially vertical post.

14. The combination of claim 13 wherein said at least one substantially vertical post extends downward from said tab and said at least one aperture comprises a downwardly extending void area in said structural block.

15. The combination of claim 14 wherein said structural block comprises an opening in said longitudinal face for horizontally receiving said tab and said at least one substantially vertical post, and for enabling engagement of said at least one aperture into at least one substantially vertical post.

16. The combination of any one of claims 1 to 15 wherein said hanger comprises a body portion extending along, and substantially parallel to, said longitudinal face of said structural block and wherein said tab extends substantially perpendicularly from said body portion.

17. The combination of claim 16 wherein said hanger is affixed to said facing element by moulding said facing element around said body portion.

18. The combination of claim 16 or 17 wherein said hanger further comprises a bumper portion extending

from said body portion in the same direction as said tab so as to abut said longitudinal face of said structural block.

19. The combination of claim 18 wherein said tab and said bumper portion are both in the form of rails that extend longitudinally across said body portion and are interchangeable.

20. The combination of any one of claims 1 to 19 wherein said facing element is made of a pre-cast concrete.

21. The combination of any one of claims 1 to 20 wherein said structural block has a lower face and the said upper and lower faces of said structural block comprise complementary shapes for allowing said structural block to be stacked upon another structural block.

22. The combination of any one of claims 1 to 21, comprising two of said at least one substantially vertical post and two of said at least one aperture, said two substantially vertical posts being aligned with said at least two apertures, respectively.

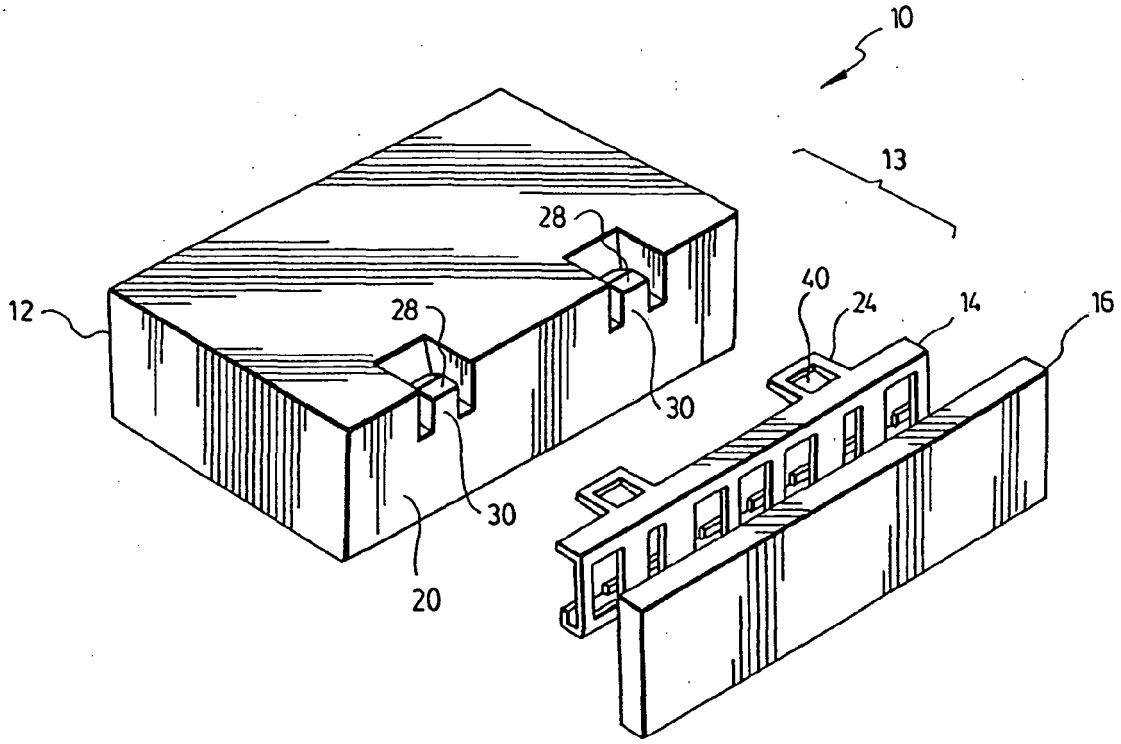

FIG. 1

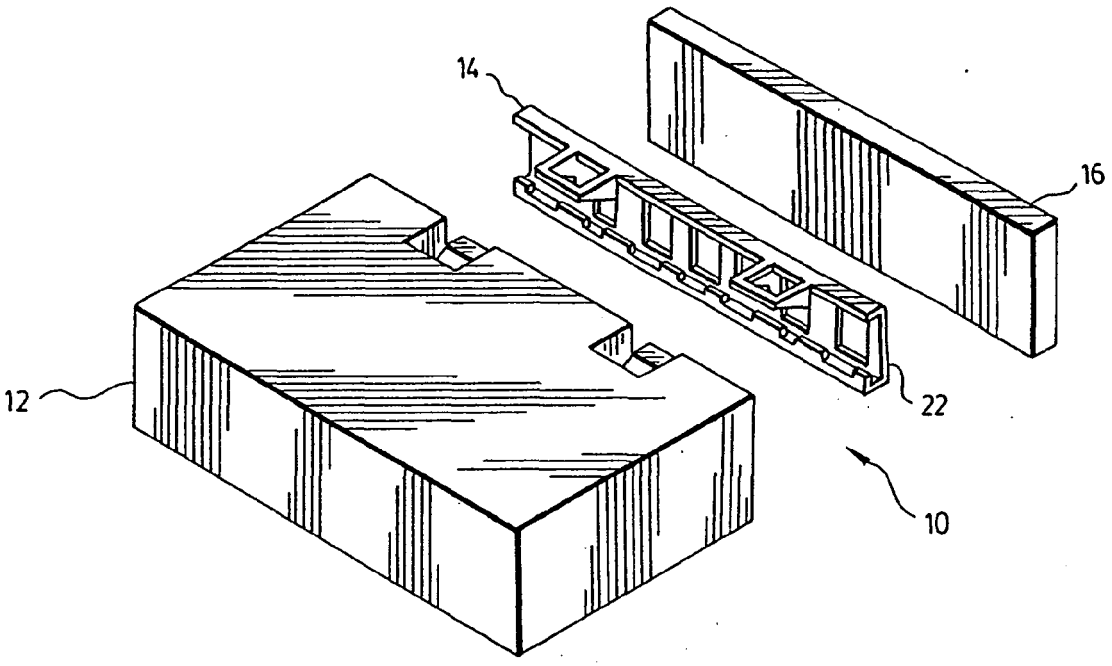

FIG. 2

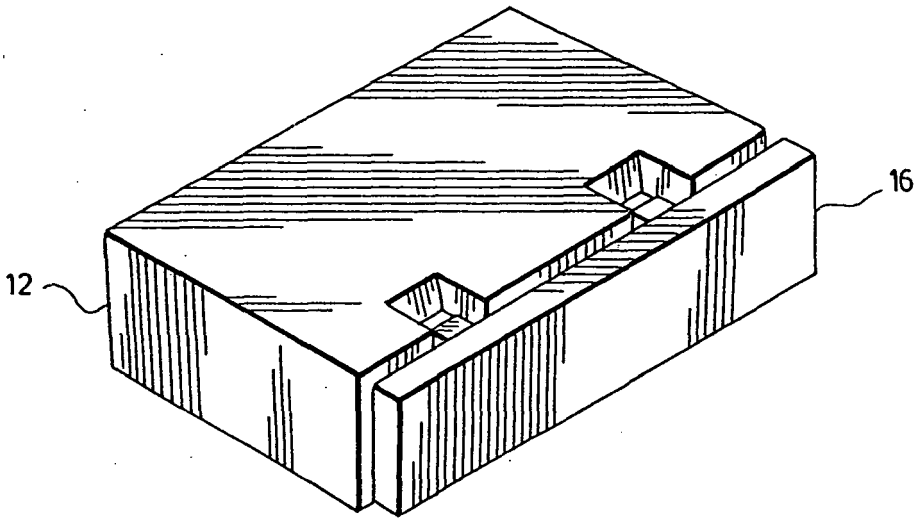

FIG. 3

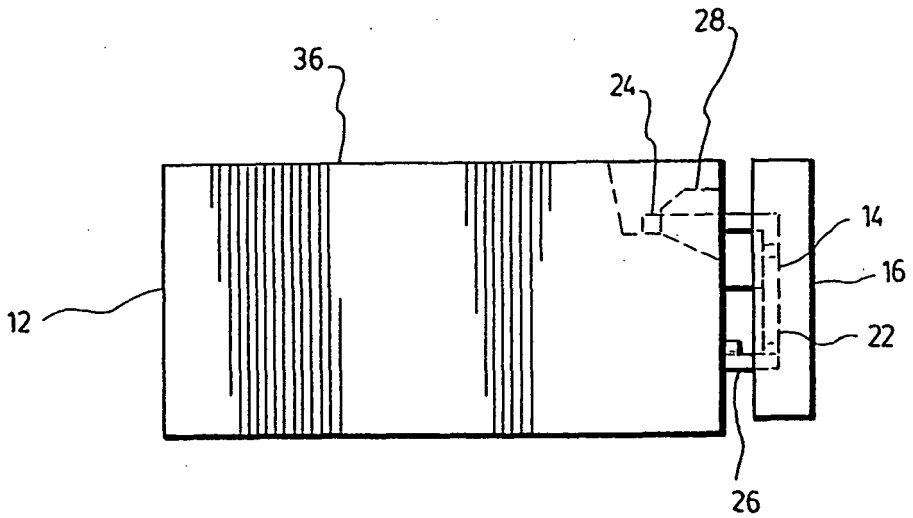

FIG. 4

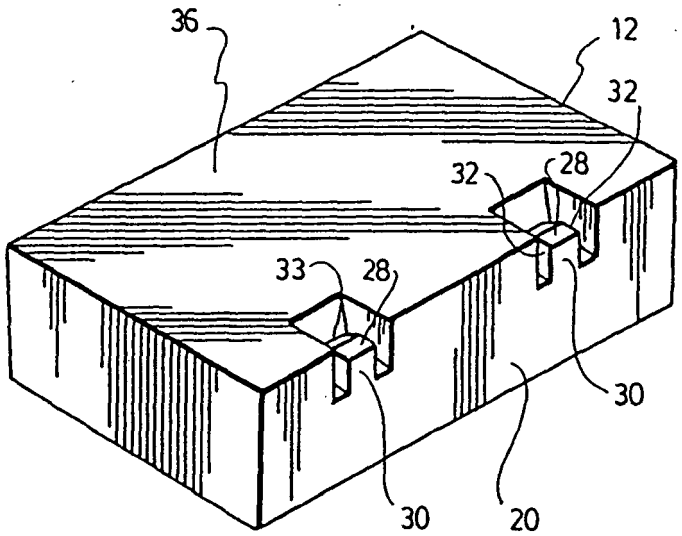

FIG. 5

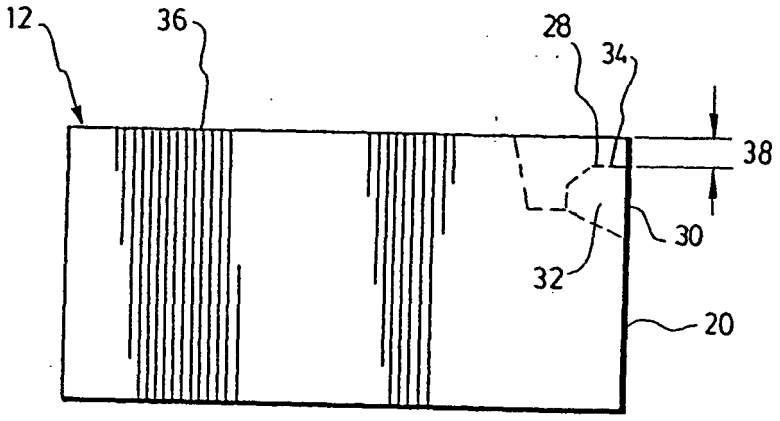

FIG. 6

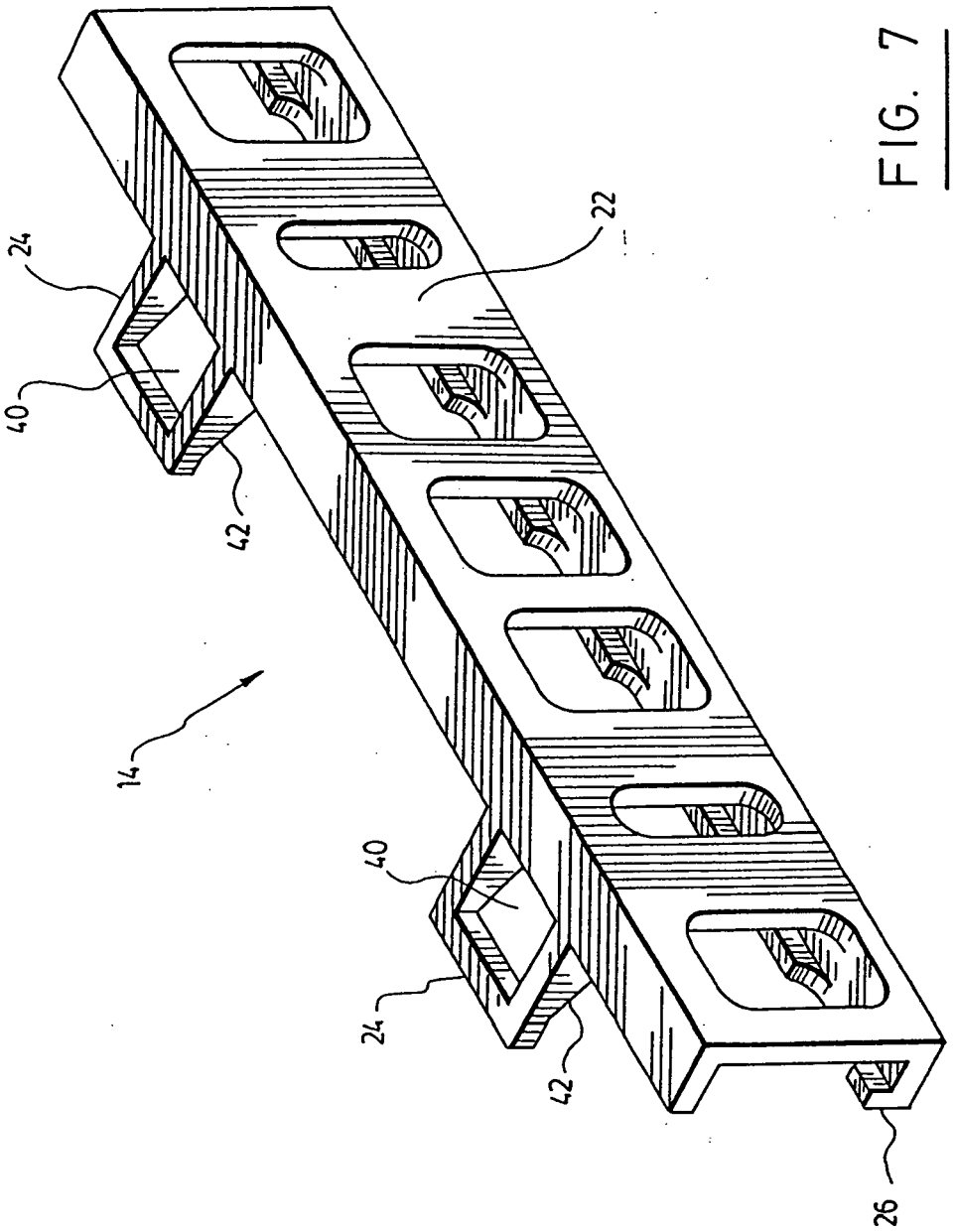

FIG. 7

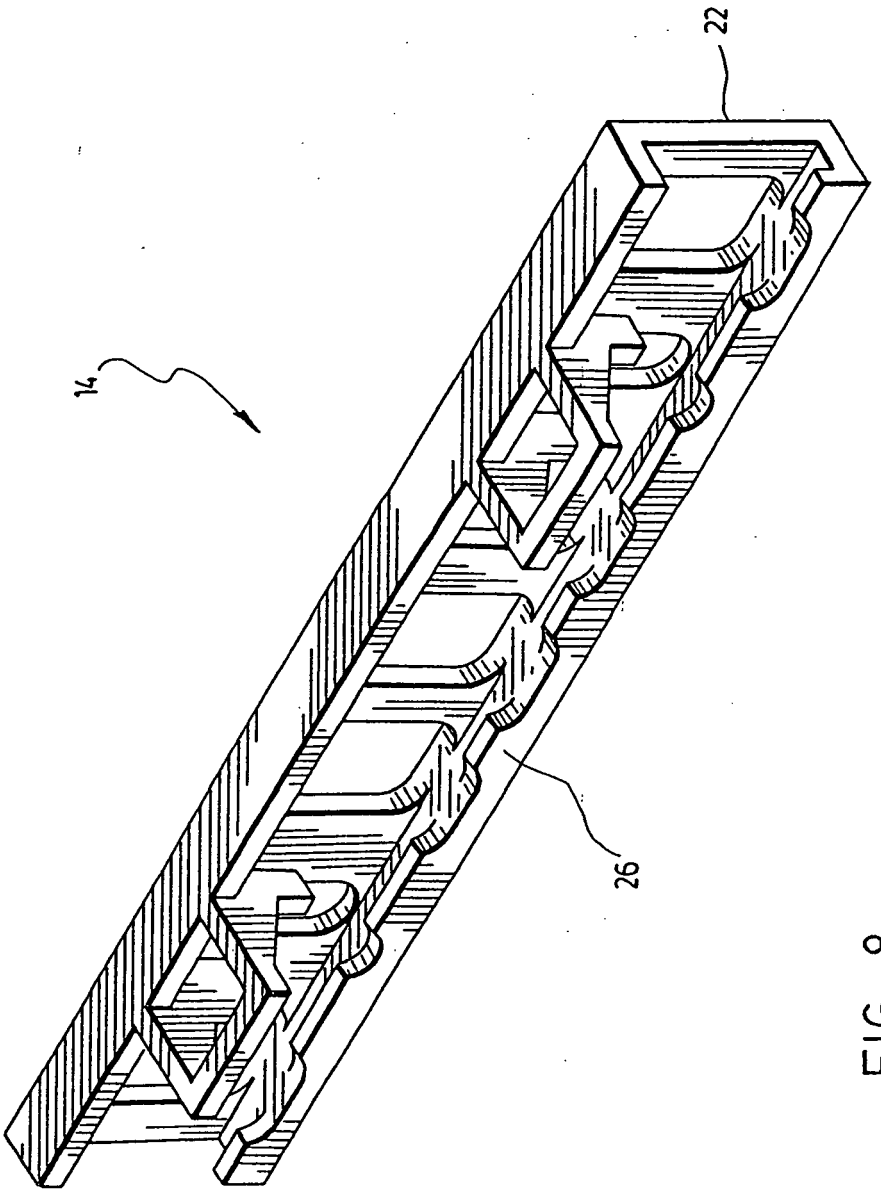

FIG. 8

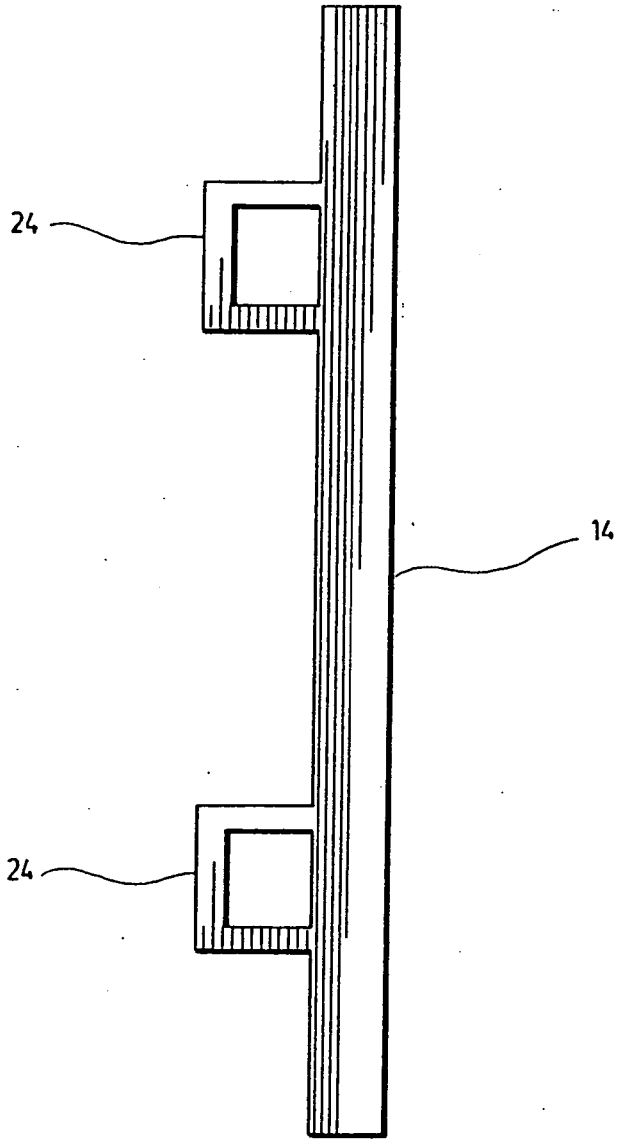

FIG. 9

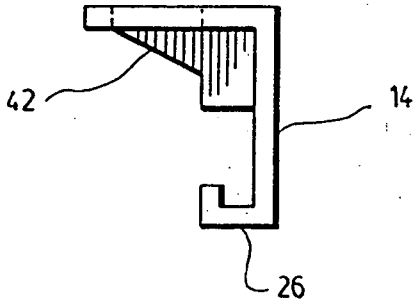

FIG. 10

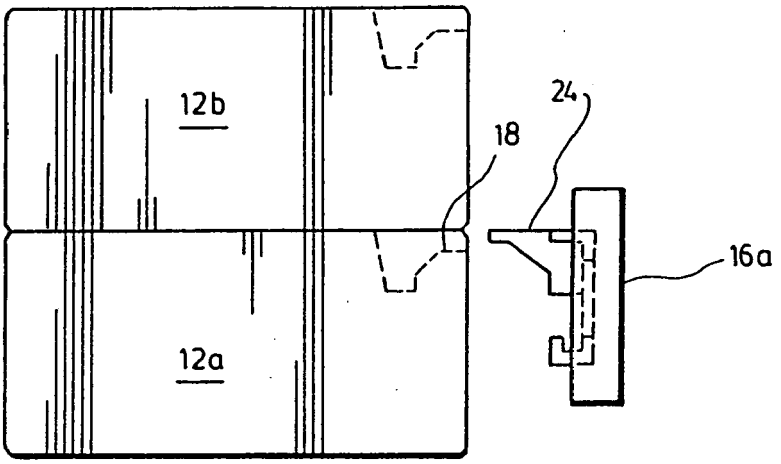

FIG. 11

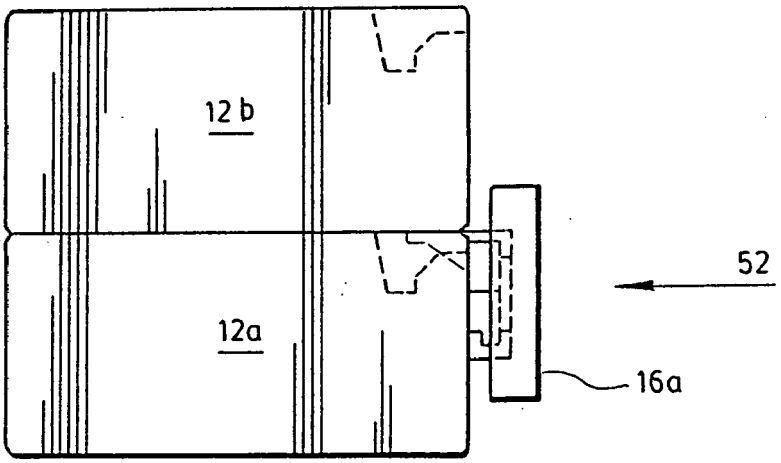

FIG. 12

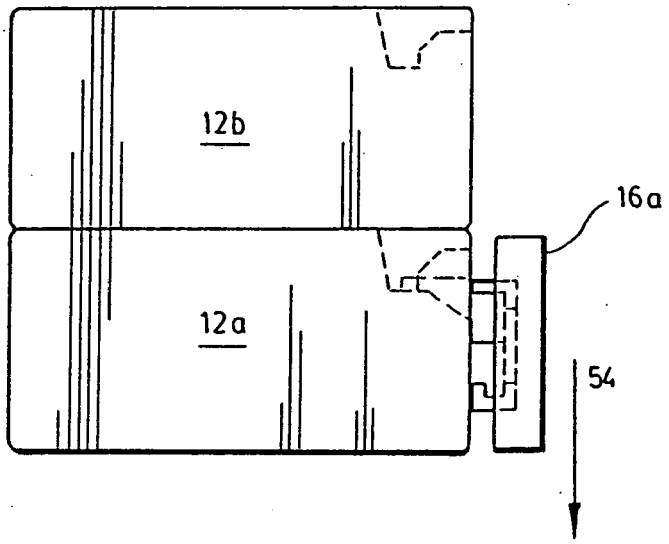

FIG. 13

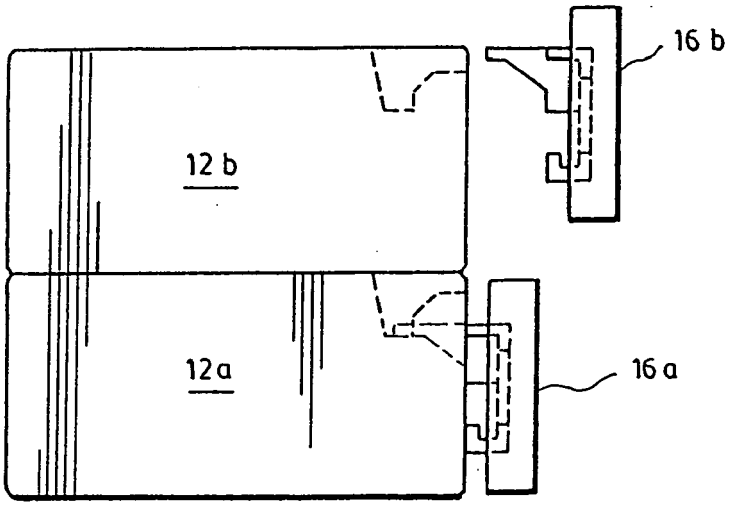

FIG. 14

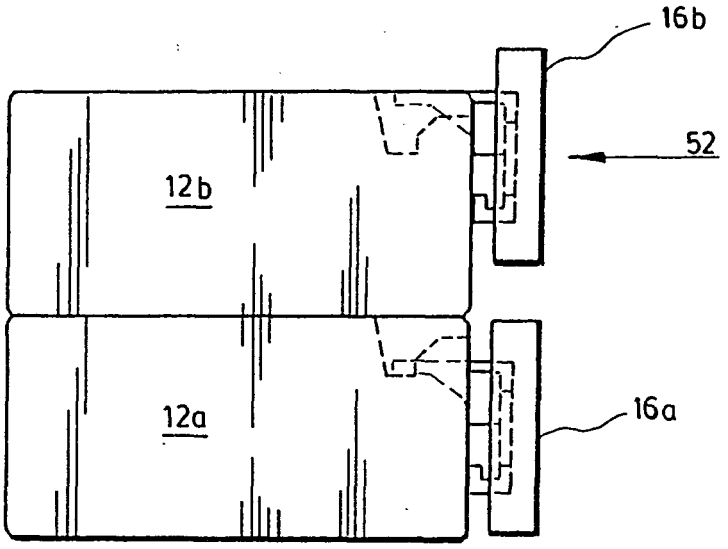

FIG. 15

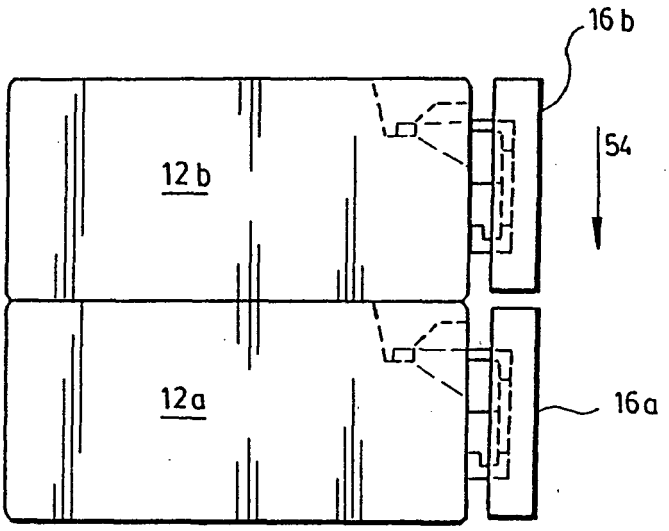

FIG. 16

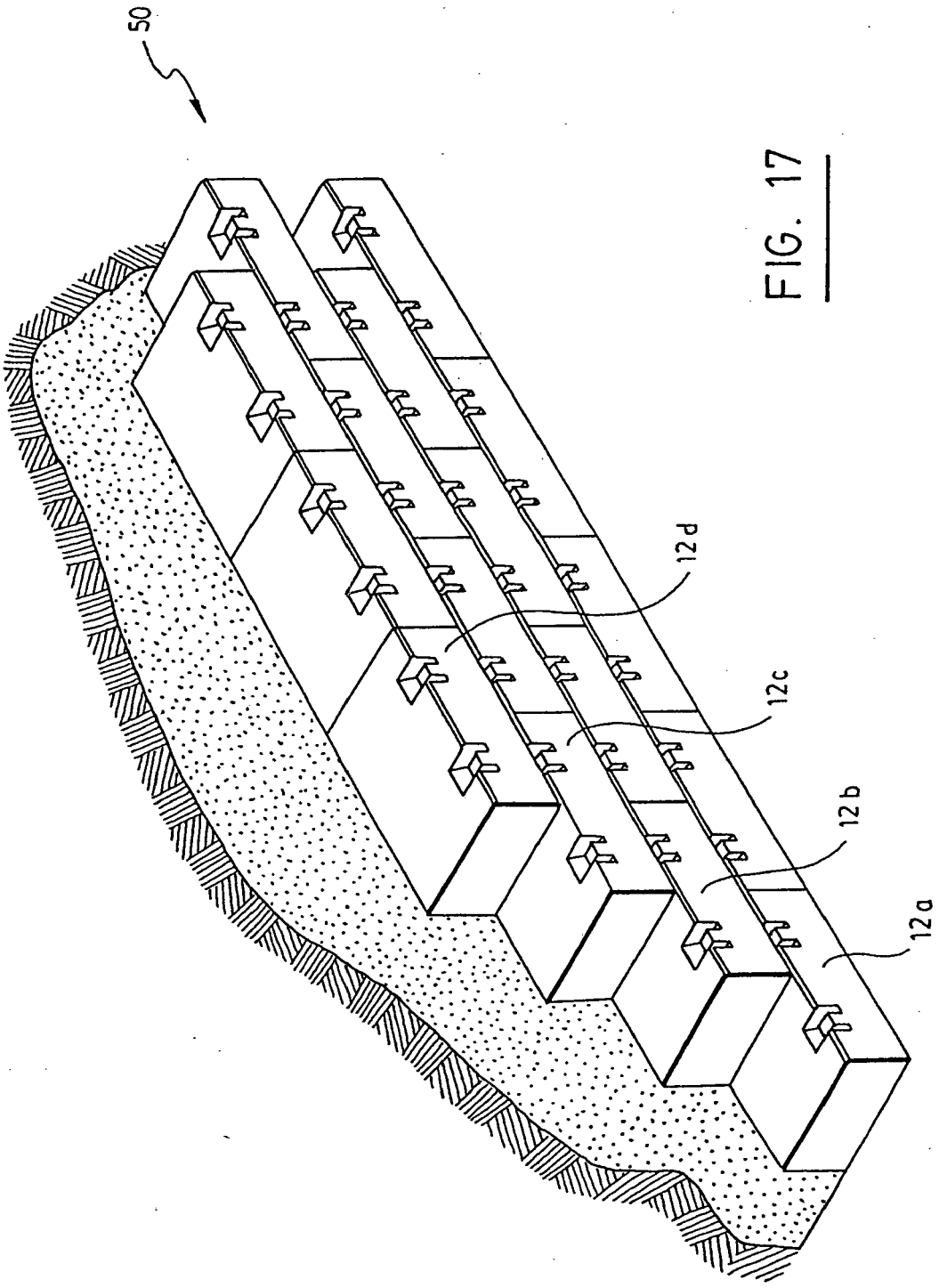

FIG. 17

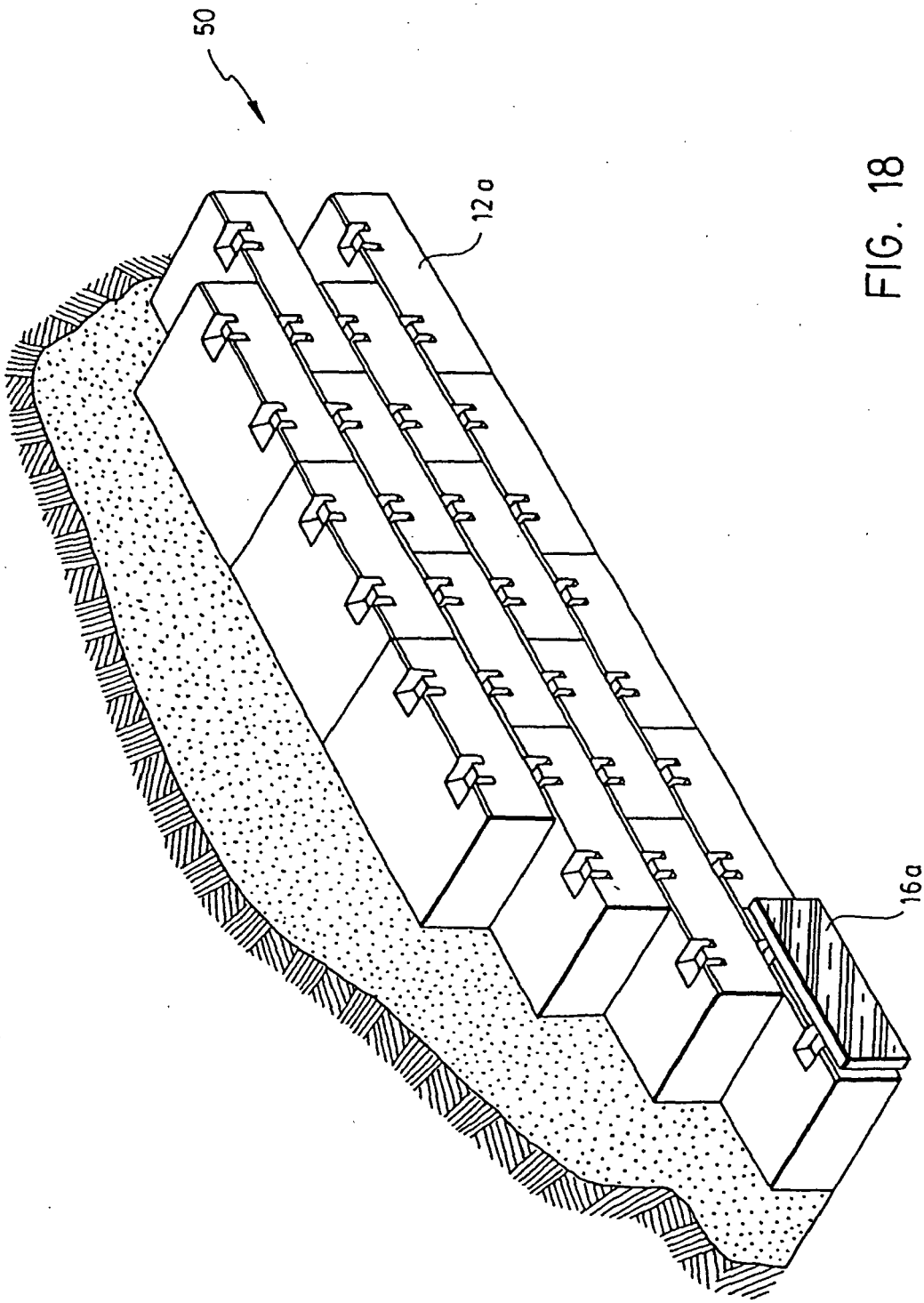

FIG. 18

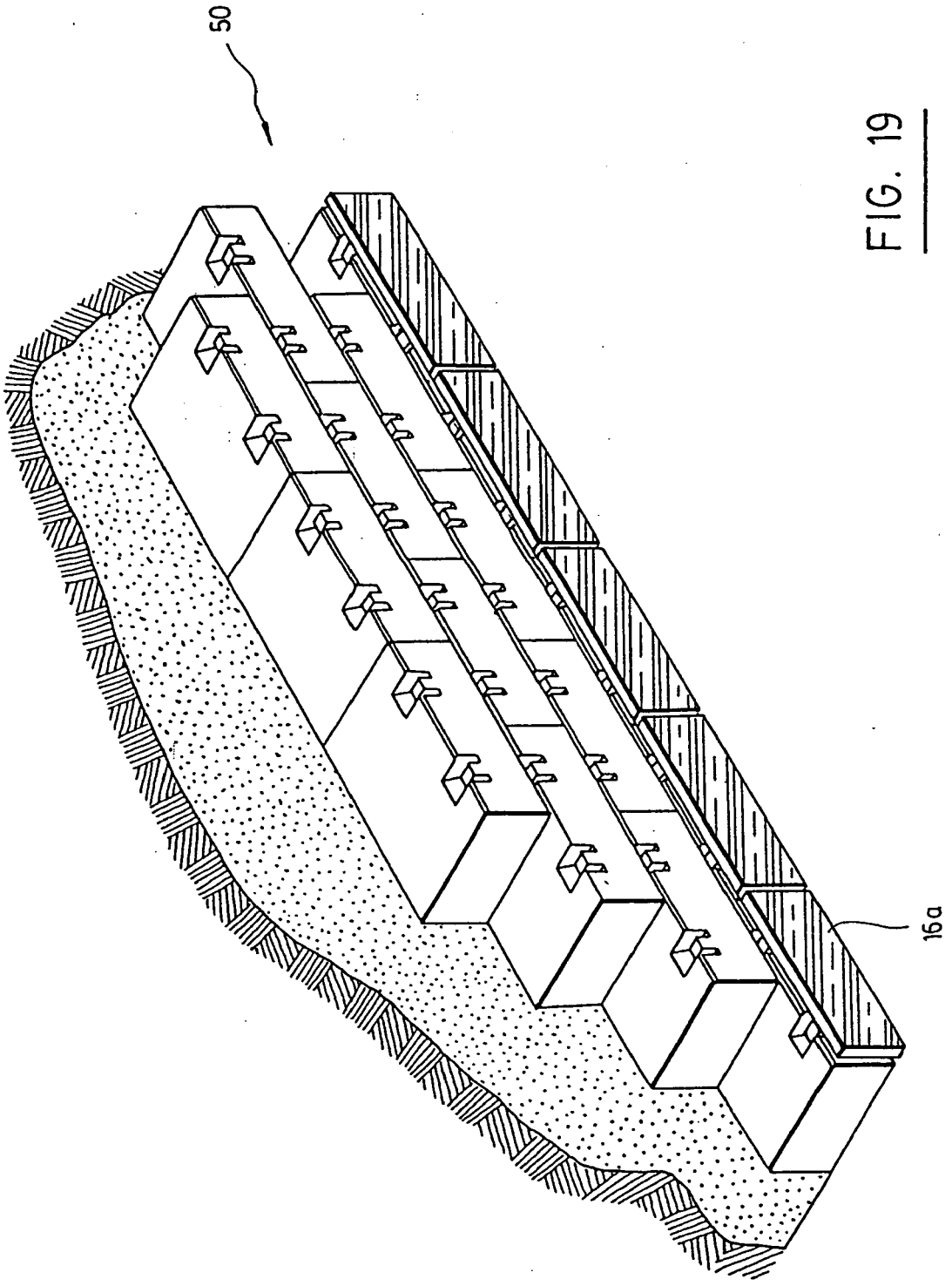

FIG. 19

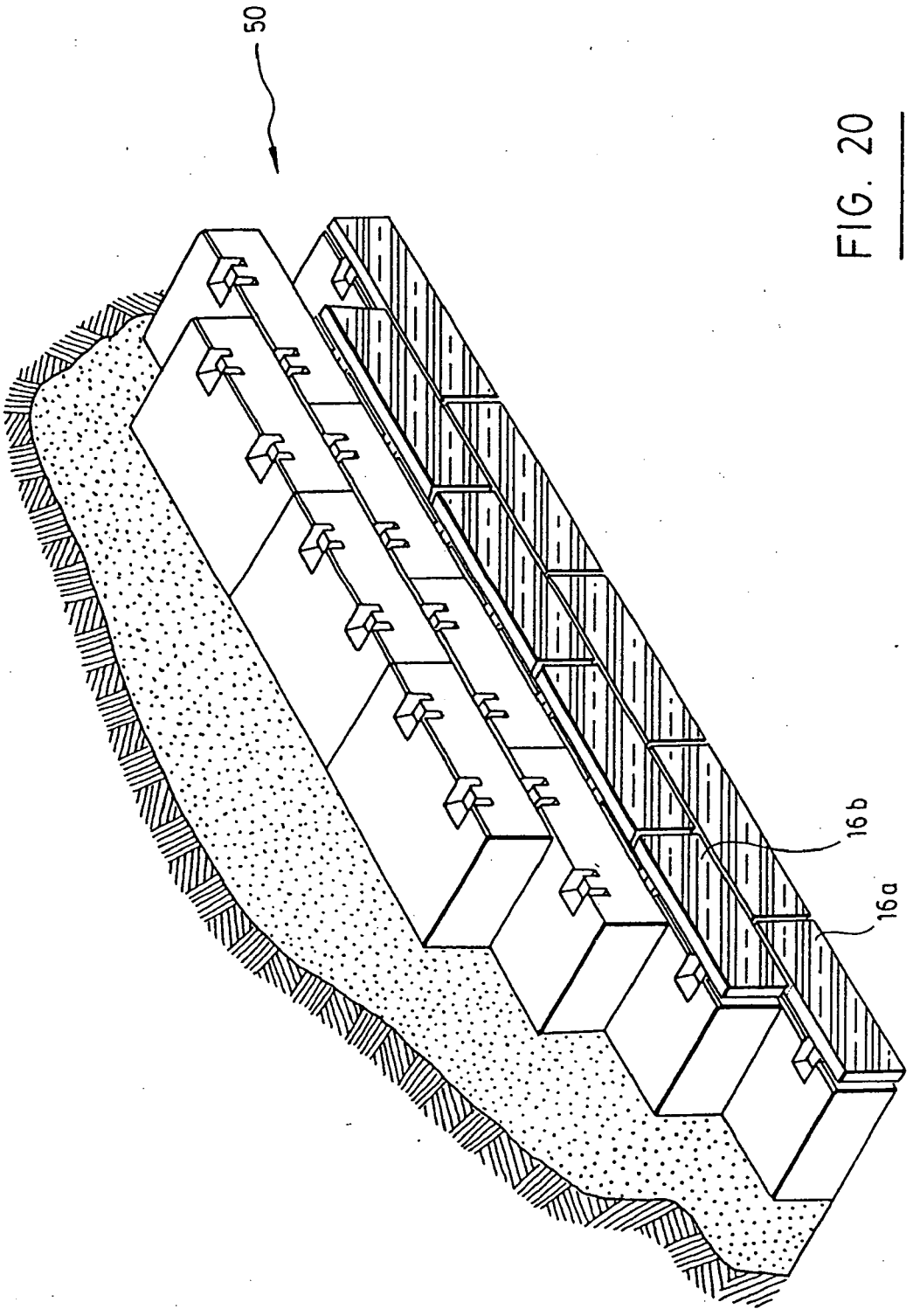

FIG. 20

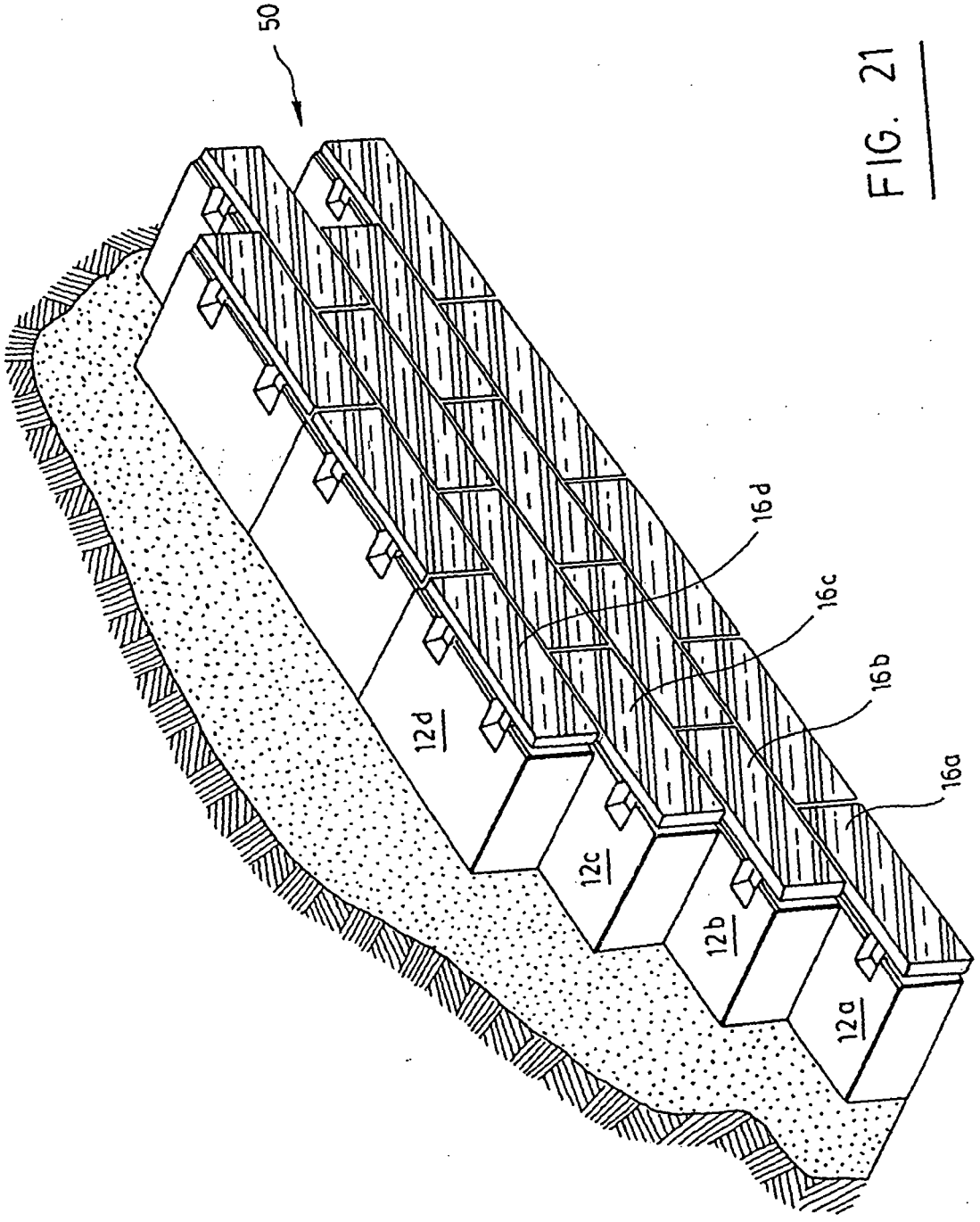

FIG. 21

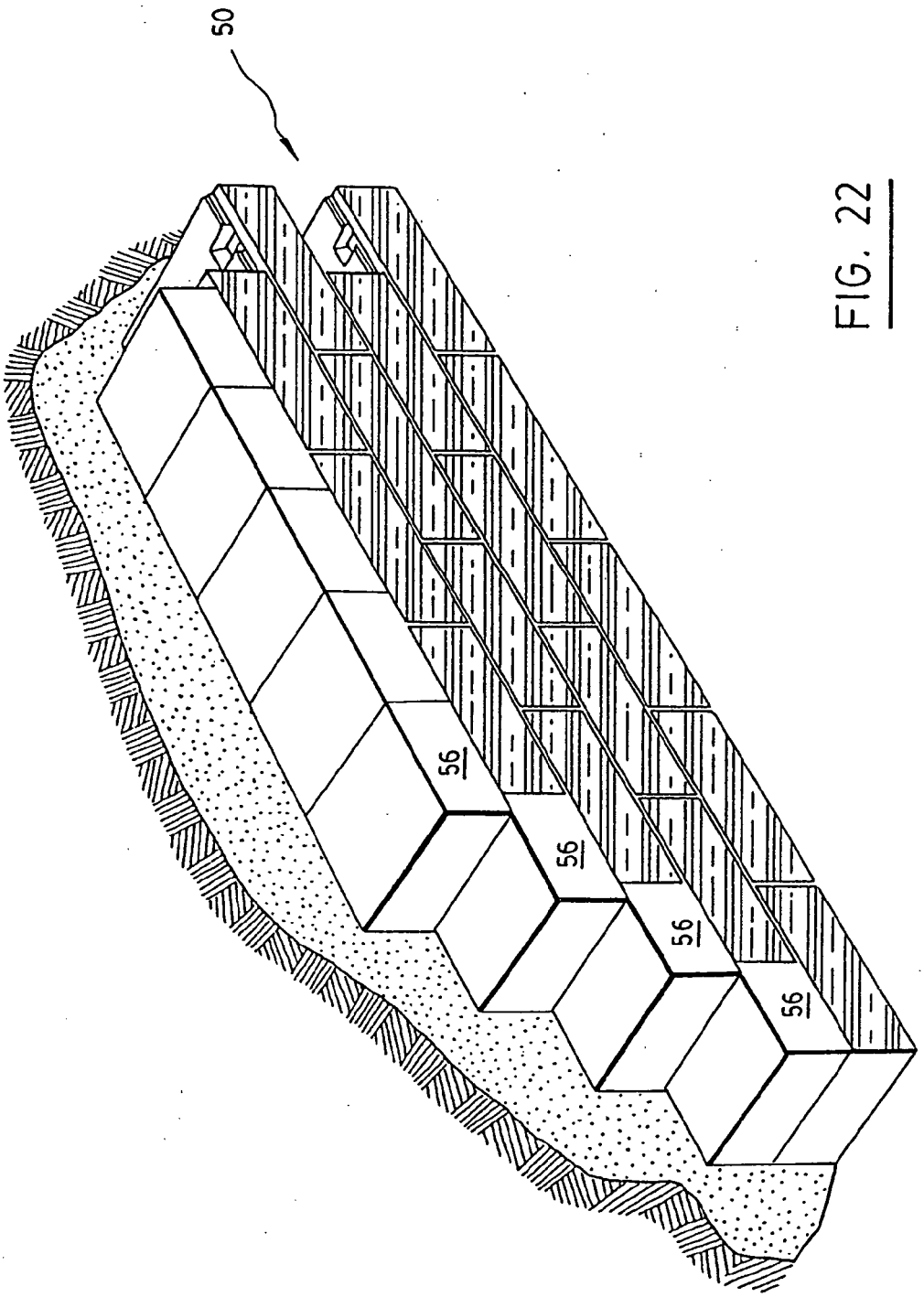

FIG. 22

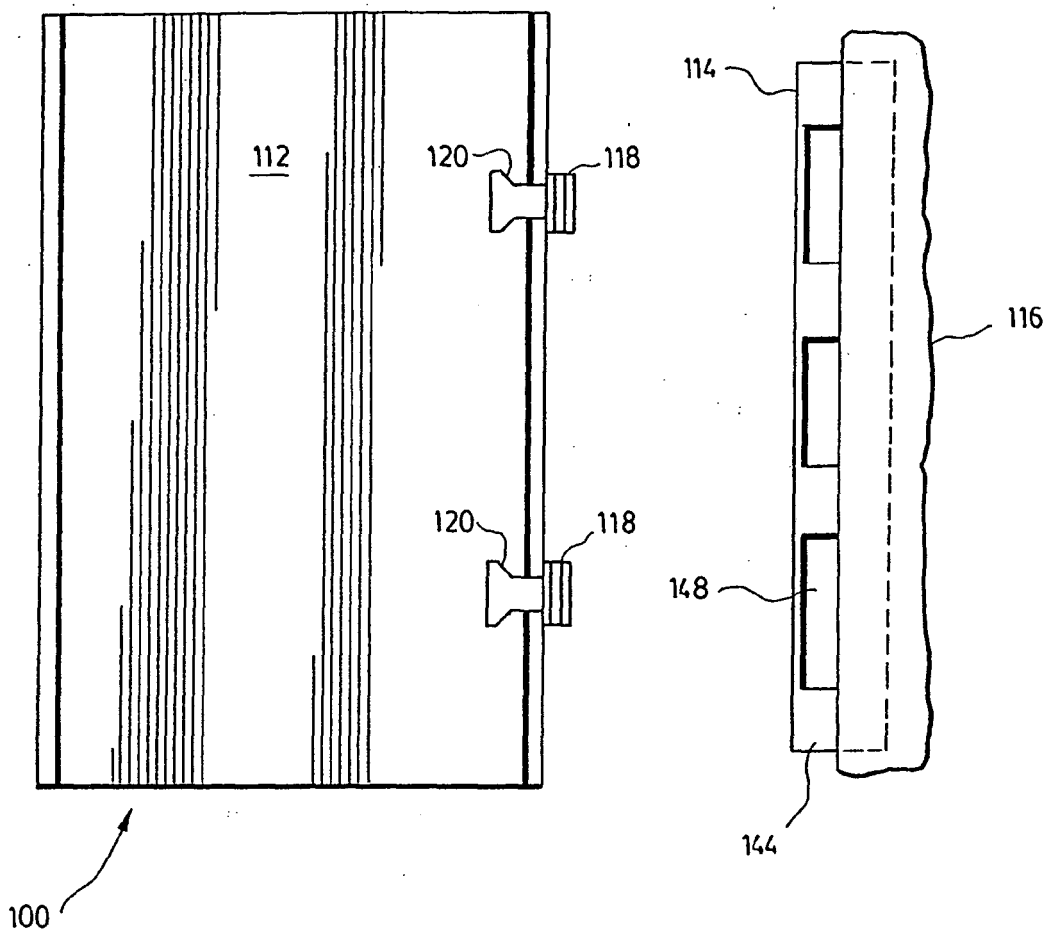
112
120
118
120
118
100
114
116
148
144

FIG. 23

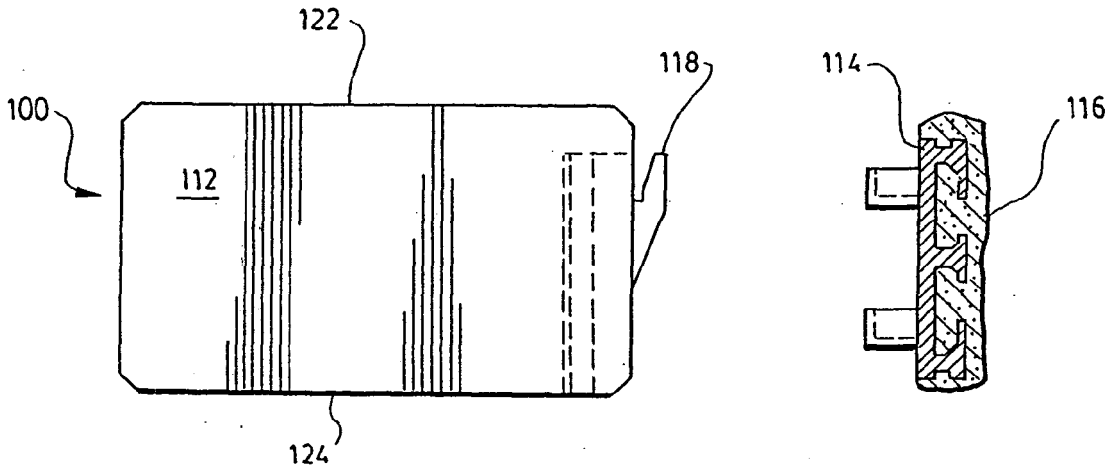
122
118
100
112
124
114
116

FIG. 24

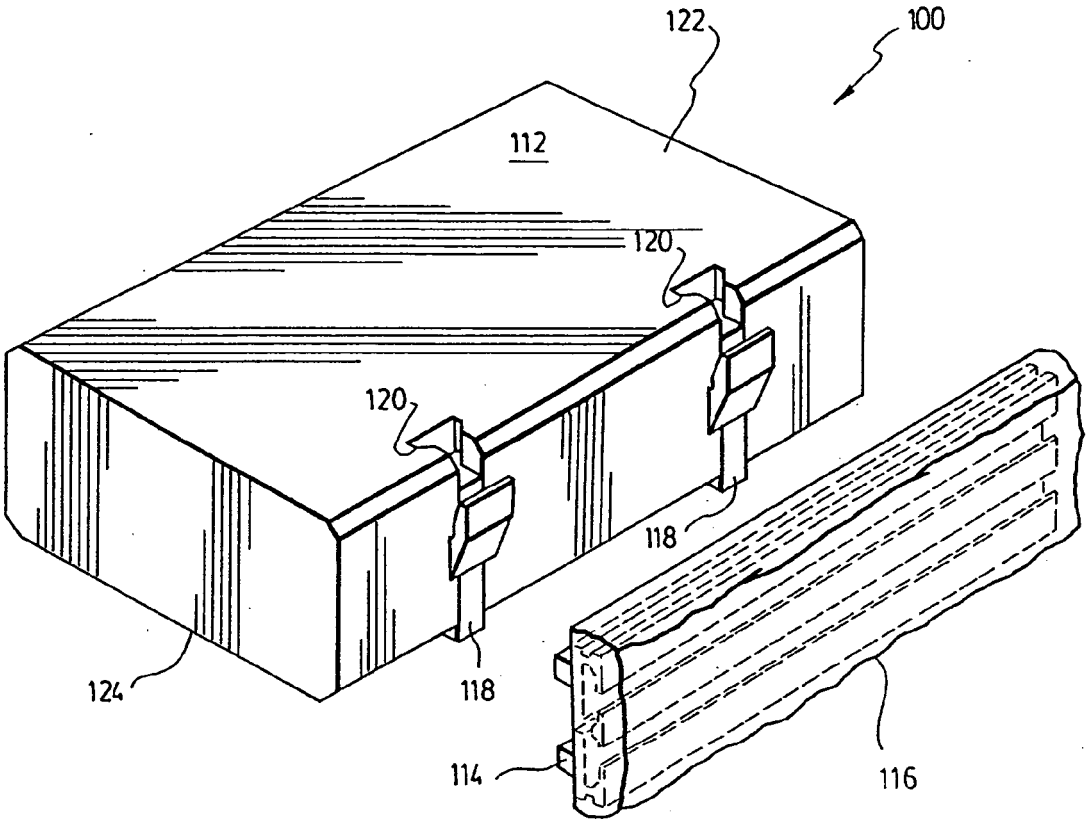
122
100
112
120
120
118
124
118
114
116

FIG. 25

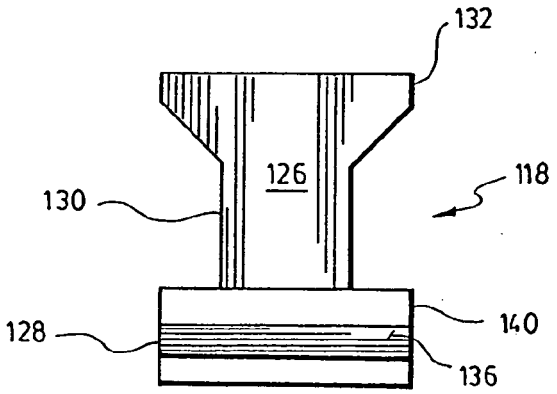
132
126
118
130
140
128
136

FIG. 26

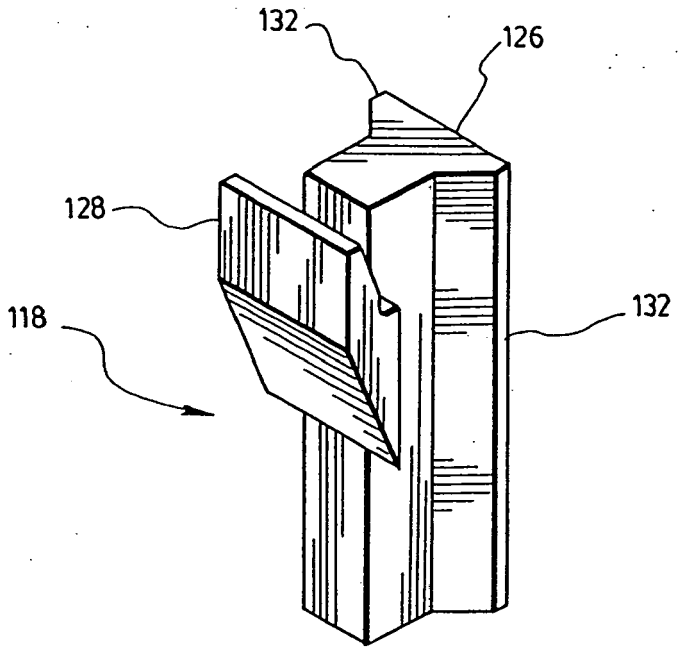

FIG. 27

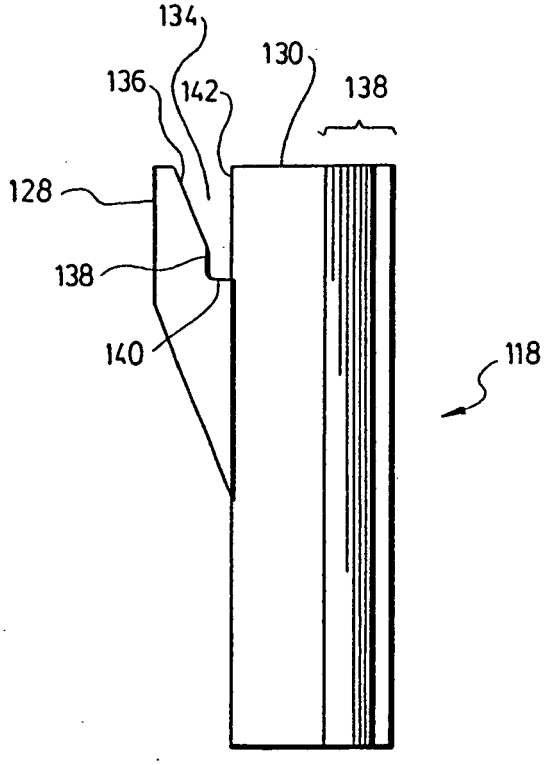

FIG. 28

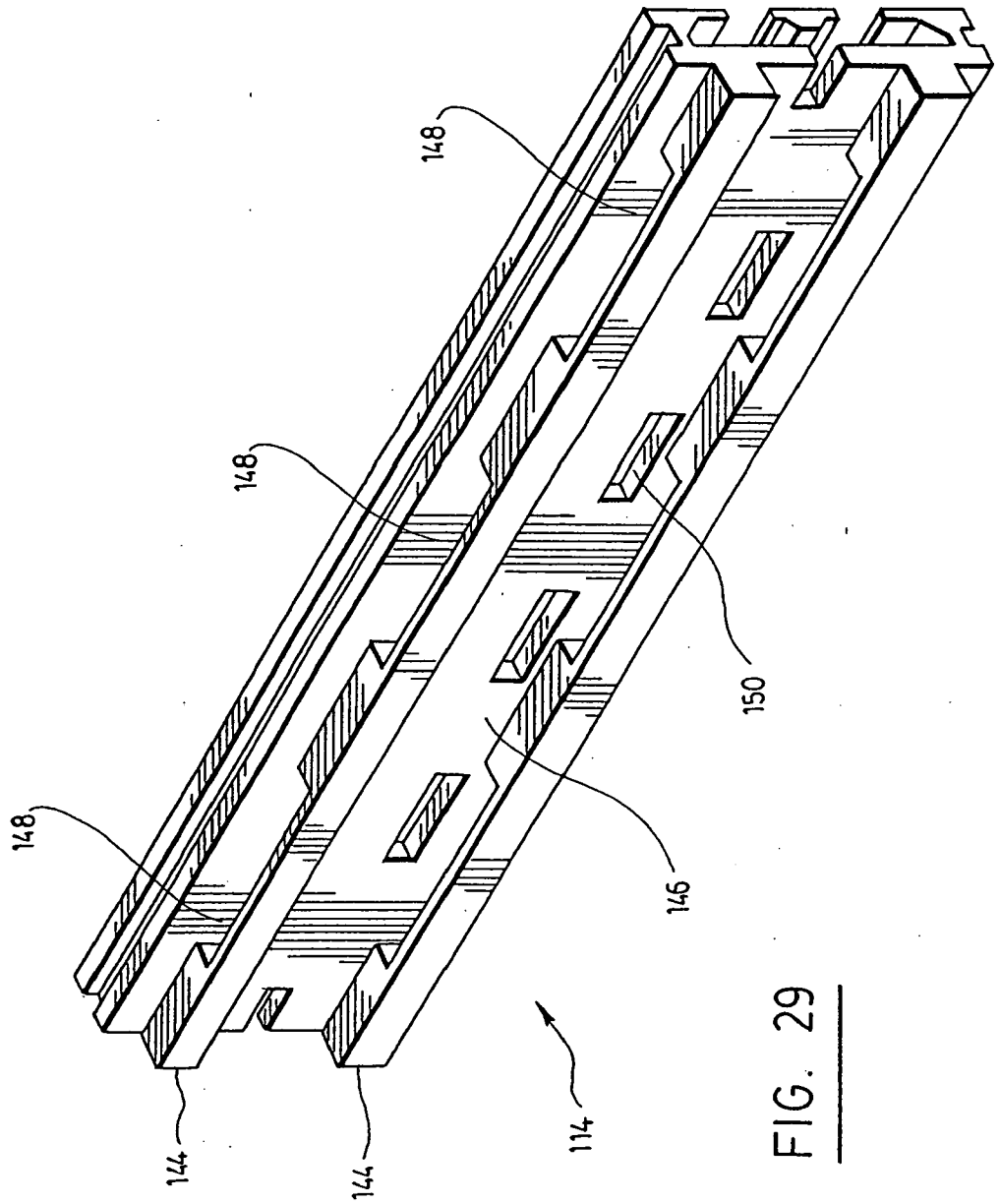

FIG. 29

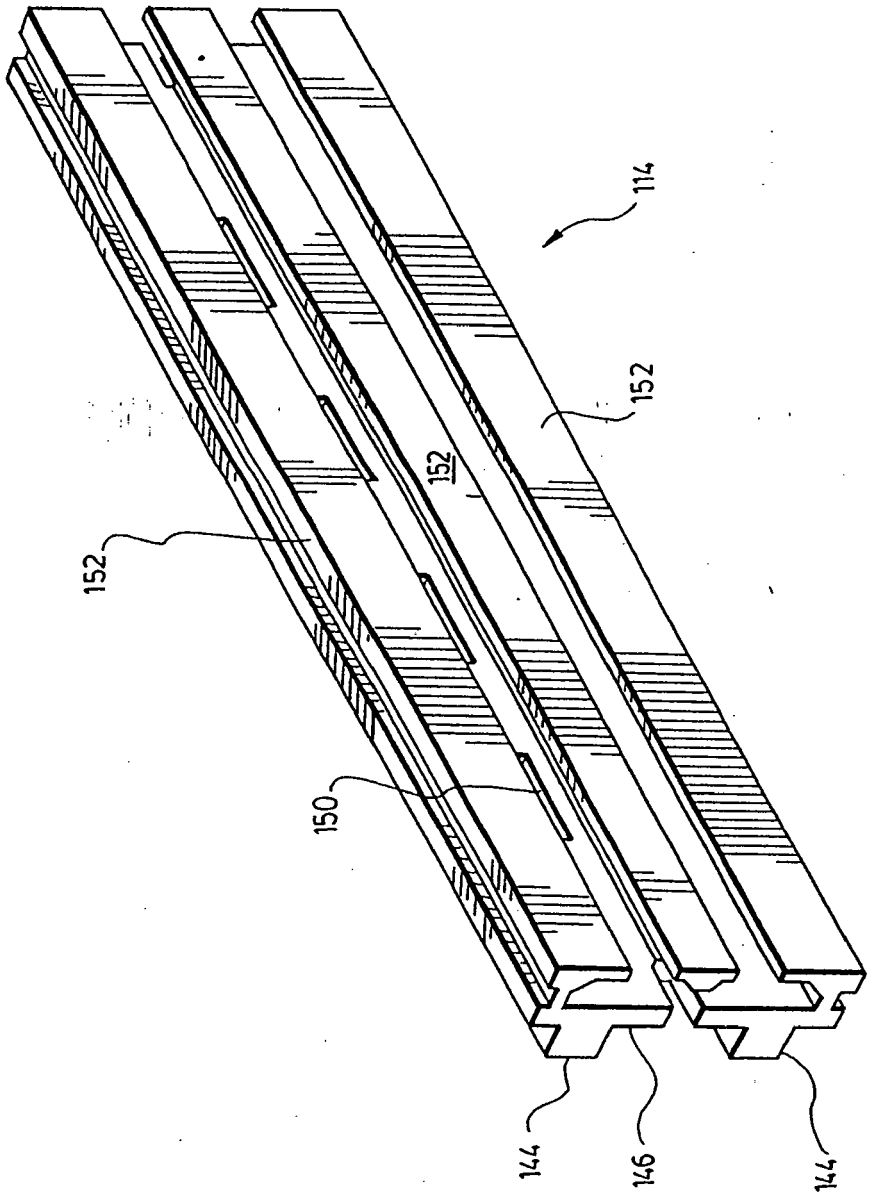

FIG. 30

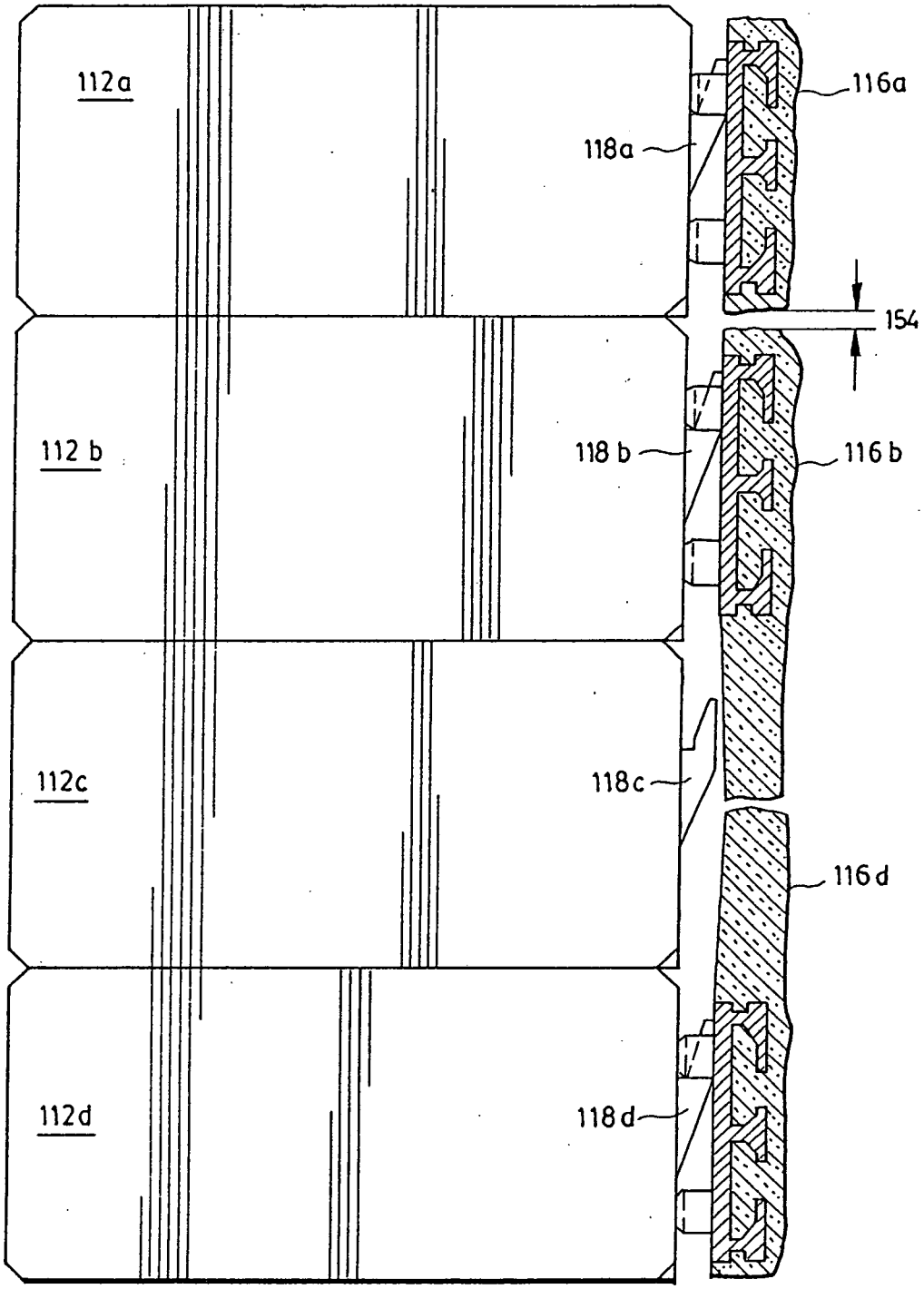

FIG. 31

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 07 5353

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2000 064244 A (GEOSTR CORP) 29 February 2000 (2000-02-29) * abstract * -----	1,2,13, 14,20-22	INV. E02D29/02
A	CA 2 244 348 C (G P IND INC [US]) 11 January 2000 (2000-01-11) * the whole document * -----	1-22	

TECHNICAL FIELDS SEARCHED (IPC)

E02D
E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	25 October 2007	Nilsson, Lars

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

EPO FORM 1503 03.82 (P04C01)

2

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 07 5353

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

25-10-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2000064244 A	29-02-2000	NONE	
CA 2244348 C	11-01-2000	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- CA 2244348 **[0011] [0016]**