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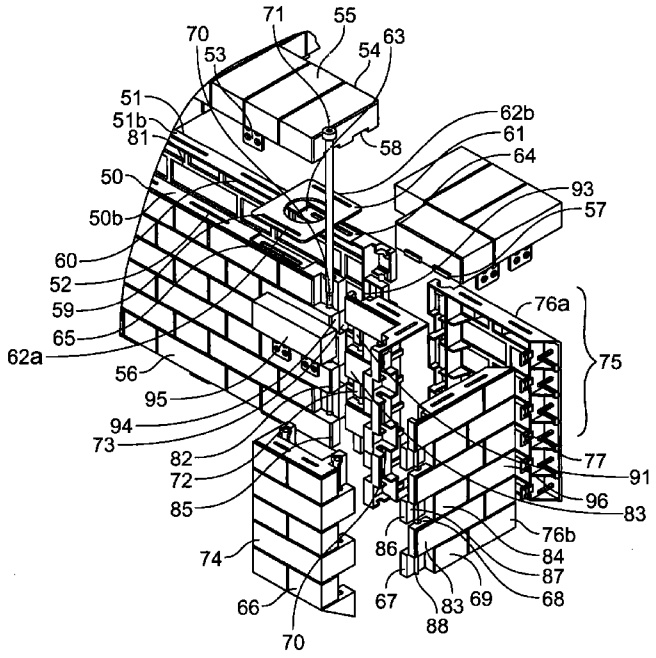


FIG. 26

(57) Abstract: A modular wall assembly (1) is disclosed for an eco-building, comprising at least a first panel (50) having a top edge (50a) and at least a second panel (51) having a top edge (51 a), the at least first and second panel (50), (51) being spaced apart and arranged face to face. A spacer element (59) is provided that is arrangeable in contact with at least a portion of both the top edge (50a), (51 a) of the first and second panel (50), (51). An upper wall member (54) is co-operable with at least a portion of the first and second panel (50), (51) so as to secure the position of the spacer (59). The spacer (59) is configured to maintain a predetermined distance between the at least one first and second panel (50), (51) to define a cavity (60) there-between. The cavity (60) is for receiving settable concrete when in use. Further the panel has a formed, textured surface.

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A modular wall assembly and method for constructing a modular wall

This invention relates to a modular wall assembly, in particular for use with concrete permanent walls used for eco-buildings.

Traditionally walls for boundaries, dwellings and commercial purposes have been built using wood, brick or stone and the construction of such walls has been carried out by skilled tradesman. However, the construction process is slow, costly and hampered by poor weather conditions. Also traditional construction techniques can be dangerous, especially when using heavy bricks or stones and may also be detrimental to the construction workers health, for example skin disease associated with skin contact with mortar. There is also a considerable amount of wasted materials when using the traditional techniques, for example mortar waste or cut bricks.

Concrete is a highly versatile material that is used in many forms of man-made structures from bridges to dwellings. It is a strong, extremely durable, sustainable, low maintenance and highly affordable material which is quick and easy to apply, making it a desirable alternative to the more traditional materials used in the past. It's resistance to fire makes it particularly suitable for use in highly populated areas and for structures used in our every day lives. It is also remarkably environmentally friendly. For example, it is generally locally produced, saving on transport costs and has an energy efficient production process that is relatively low in CO_2 emissions (when compared to some other materials e.g. quarrying of stone). Further, it has an excellent thermal mass enabling the maintenance of internal temperatures of a building and reducing the energy needs for the building i.e. minimising the use of heating and air

conditioning, thereby saving energy consumption over the lifetime of the building. This consequently reduces the cost to the habitant of a dwelling, or user of a commercial property.

The albedo effect is another beneficial property of concrete, whereby light is reflected from the surface of concrete resulting in less heat being absorbed by it. This consequently reduces the heat island effect and consequentially further reduces the energy required for use in air conditioning. The ever increasing cost of energy makes concrete a desirable material to use in construction due to it's energy saving characteristics.

The above-mentioned benefits of using concrete for the walls in buildings is well known, making the material highly desirable for eco-buildings. However, concrete is generally deemed to be aesthetically displeasing to the eye, and therefore is not always readily welcomed for certain applications. The aesthetics of a concrete wall can be improved by the application of panels applied to existing concrete walls.

In WO 99/43904 the panels were used as moulds and are left in situ to provide extra reinforcement. However to construct such a wall, the panels need to be secured in a suitable foundation and props are required to ensure the panels remain in the correct position whilst the concrete hardens. Any misalignment of the props, due to bad weather or human error, has a negative consequence to the orientation of the wall, for example the wall could be set off-vertical. This is especially problematic on sloped surfaces. Furthermore, the chipboard panel may need a protective layer applied thereto, or a layer that is more aesthetically pleasing to the eye. This would also apply if the material was

to be made of metal. Therefore, the panel is not only difficult to install, but takes further time to provide the required surface finish.

Concrete moulds of the type mentioned in WO 99/43904 have a first and second panel separated by a spacer. The spacers are usually fixed between the opposing surfaces of the two panels. However, this is problematic since such panels are constructed in a factory resulting in the need for a bulky structure to be transported to the desired site, which can be costly and inconvenient when placing on site.

WO 2005/014948 overcomes this problem by having a three part hinged spacing arrangement. The hinge arrangement enables the panels to be reconfigured for storage and transport prior to use. However, the hinge is a complicated arrangement formed of costly components. Further, the panels are made of polystyrene and as such are untreated leaving them open to the elements and susceptible to vandalism. The panels are therefore required to be rendered and this additional further process of cladding or tiling the external surface is time-consuming and costly and is best carried out by a skilled labourer.

The energy efficiency of a concrete wall can be improved further by inserting a cavity within the concrete. It is known to insert tubular members between the two parallel panels prior to inserting the concrete between the panels, but this can complicate the construction of the wall, consequently increasing the time and the money for it's installation. This also requires a skilled tradesman to carry out the work.

The present invention is derived from the realisation that there exists a need to provide a simplified wall assembly for use in eco-building that maintains the benefits of known concrete arrangements whilst easing construction of the wall and improving the integrity of alignment and strength of the walls. The assembly also enables cavity walls to be constructed by a low-skilled person in a fast, reliable and easily reproducible manner. The assembly is also safer compared to traditional techniques since heavy stones or bricks are no longer needed to be placed by hand and mortar no longer needs to be touched, since the concrete is filled mechanically. There is also less waste associated with the construction process of the present invention since the panels are precision made and the precise amount of ready mix concrete can be calculated and ordered to site.

According to an embodiment of the invention there is provided a modular wall assembly for an eco-building, comprising

at least a first panel having a top edge;

at least a second panel having a top edge, the at least first and second panel being spaced apart and arranged face to face;

a spacer element arrangeable in contact with at least a portion of both the top edge of the first and second panel; and

an upper wall member co-operable with at least a portion of the first and second panel so as to secure the position of the spacer wherein the spacer is configured to maintain a predetermined distance between the at least one first and second panel to define a cavity there-between, the cavity being for receiving settable concrete when in use.

The upper wall member may have a first and second base portion that is co-operable with a region at the top edge of the first and second panel respectively. The end is the lower surface at opposing ends of the upper wall member. Therefore, ends may means spaced apart portionsof the lower surface of the

The upper wall member may comprise at least a first downwardly projecting protrusion and a second downwardly projecting protrusion spaced apart from the first protrusion; the first panel comprising at least a first trough region and the second panel comprises at least a second trough region, wherein the at least first and second protrusions are co-operably receivable within the at least first and second trough regions respectively.

The spacing element may comprise a first slot and a second slot spaced apart from the first slot such that in use the first and second protrusions pass through the first and second slot prior to being received in the first and second trough regions so as to retain the spacer into position.

The first and second panel may comprise a recessed region on respective top edges for receiving respective ends of the spacing element, the recessed portion may frame the trough region.

The spacing element may comprise a plate having at least a first and second slot arranged proximal to opposing ends of the plate.

The upper wall member may be a subsequent first and second wall panel for increasing the height of the wall assembly.

A top cap may be applied to at least part of the top edge of the uppermost first and second panel once the desired wall height is achieved. Therefore, the

projections extend downwardly from the base of the first and second wall panel respectively.

The upper wall member may comprise a top cap arranged to cover the space between the first and second wall panels. Therefore, the top of the wall assembly is terminated by the top cap.

In a further embodiment of the invention there may be provided a modular wall assembly wherein at least two top caps may be arranged end to end, wherein the first top cap may have at least one projection extending from it's end and the at least further top cap may have a recess located in the adjacent end, wherein in use the protrusion may be receivable in the recess so as to connect the end at least one top cap to the end of the adjacent top cap. This arrangement permits the adjacent top cap to be placed from above.

The first panel may have a formed, textured surface. The exterior surface of the first panel may be textured. The textured external surface of the panel and the panel are an integral unit.

At least part of a side edge of the first panel is contoured and co-operable with at least part of a side edge of an adjacent panel.

At least part of the contoured side edge as viewed from the external surface of the first panel may define an interlocking edge that may be interlocked with a co-operable interlocking edge of the adjacent panel.

The contoured side edge may follow the shape of at least one wall element of the formed surface.

At least one wall element may be a brick element. Alternatively, the at least one wall element may be a stone element.

An external surface of at least one of the first and second panels may have a finished weatherproof surface.

The outer surface may be made from a composite material.

The modular wall assembly may comprise a first planar panel and a second planar panel which may be configured in a parallel arrangement, with respective side edges in alignment.

The modular wall assembly may be connectable to at least one further modular wall assembly via co-operable side edges so as to form a channel, the channel walls may be defined by the co-operable side edges, wherein in use a fixing means may be receivable in at least part of the channel so as to prevent relative movement between the modular wall assembly and further modular wall assembly.

The fixing means may be a pin.

The side edge of the first modular wall assembly may comprise at least one bracket and the side edge of the second modular wall assembly may comprise a tang, or vice versa, wherein the tang may be receivable within the bracket so as to connect the first modular wall assembly to the second modular wall assembly.

A side cap may be included which may be attachable to at least part of a side edge of the wall assembly, for preventing the escape of settable concrete from between the first and second panels.

The modular wall assembly may further comprise a first corner panel which may have a first portion terminated at one end by a tapered edge and second portion terminated at one end by a tapered edge, the respective tapered

edges of the first and second portions may be attached together by means of a tang and bracket arrangement to position the first portion and the second portion substantially perpendicular to each other and a second corner panel comprising an integral part comprising a first arm and a second arm positioned substantially perpendicular to the first arm, wherein the first portion may be arranged to be substantially parallel to the first arm and the second portion may be arranged to be substantially parallel to the second arm.

At least one adjustable foot arrangement may be included for receiving a base portion of the modular wall assembly or a panel thereof.

According to a further aspect of the invention there is provided a method of constructing a wall, comprising

arranging a first panel having a top edge and a second panel having a top edge in spaced relation and face to face,

placing a spacer element on at least a portion of the top edge of a first panel and a second panel and positioning an upper wall member on the top edge of the first and second panel;

securing the position of the spacer element such that it is sandwiched between the first and second panel and the upper wall member;

maintaining a predetermined distance between the first and second panel by means of the secured spacing element to form a cavity there-between ; and

pouring a settable slurry between the first and second panel within the cavity. The method may comprise the first panel having a form worked surface prior to arranging the first panel.

In a further aspect of the invention there is provided a modular wall assembly having a first panel and a second panel, the first panel and the second panel being arranged side edge to side edge, the side edge of the first panel being co-operable with a side edge of the second panel so as to form a channel there-between, the channel walls being provided by the respective edges of the first and second panel, and a fixing device which, in use, is receivable within at least part of the channel so as to prevent relative movement between the first panel and the second panel.

The edge of the first panel may define an interlockable side edge to be interlocked with a co-operable interlockable side edge of the second panel and wherein respective side edges may be configured such that the channel is formed when the first and second side edges are in the interlocked state.

The fixing device may be a pin receivable in the channel.

A bracket may be located on the edge of the first panel and a tang may be extendable from the edge of the second panel, or vice versa, the tang may be receivable within the bracket so as to connect the first panel to the second panel.

The first panel may comprise a planar panel. The second panel may comprise a planar panel. Alternatively, the second panel may be a corner panel and may have a substantially 'L' shape when viewed from it's top edge. Alternatively, the wall panel may be terminated by one end of an end panel comprising a substantially 'U' shape when viewed from it's top edge.

When viewed from the external surface the sides edges may appear castellated. The first panel may have a formed, textured surface.

The exterior surface of the first panel and the second panel may be textured. The textured external surface of the panel and the panel may be an integral unit.

At least part of a side edge of the first panel as viewed from the external surface may be contoured and may be co-operable with at least part of a side edge of the second panel.

The contoured side edge as viewed from the external surface may follow the shape of at least one wall element of the formed surface. The shape means the external outline of the at least one wall element. The at least one wall element may be a brick element. Alternatively, the at least one wall element may be a stone element. The external surface may be regarded as the front of the wall panel as would be viewed by a person once the wall is constructed and the wall panel in-situ.

An external surface of at least one of the first and second panels may have a finished weatherproof surface.

The external surface may be made from a recycled plastic.

According to a further aspect of the invention, there is provided a method of constructing a wall portion, comprising

arranging a first panel having a side edge and a second panel having a side edge arranged in an edge to edge arrangement,

bringing the side edge of a first panel into contact with the side edge of a second panel to form a channel and inserting a fixing means within at least part of the channel so as to secure the first panel and the second panel together to form a first wall portion.

The method may further comprise an interlocking edge of the first panel with a co-operable interlocking edge of the second panel.

The method may further comprise repeating the above-mentioned method steps to form a second wall portion and may subsequently place the first wall portion having a top edge and the second wall portion having a top edge in a spaced and face to face relation. A spacer element may be applied to at least a portion of both the top edge of the first wall portion and the top edge of the second wall and positioning an upper wall member on the top edge of the first and second wall portions so as to secure the position of the spacer element. In the secured position the spacer may maintain a predetermined distance between the at least one first and second wall portions to define a cavity there-between. A settable slurry may then be poured or otherwise applied within the cavity formed between the first and second panel. The settable slurry may be a cementatious material.

According to a further embodiment of the invention there is provided a modular wall assembly for an eco-building, comprising

at least one first panel having a first bracket extending from a surface thereof;

at least one second panel having a second bracket extending from a surface thereof;

the at least one first and second panel being spaced apart and arranged face to face;

a connector clip connectable to the first and second bracket so as to maintain a predetermined distance between the at least one first and second

panel to define a cavity there-between, the cavity for receiving settable concrete when in use, wherein the at least one first panel has a formed, textured surface.

In a further embodiment of the invention, there is provided a modular wall assembly for an eco-building, comprising

at least one first panel having a first bracket extending from a surface thereof;

at least one second panel having a second bracket extending from a surface thereof;

the at least first and second panel being spaced apart and arranged face to face;

a connector clip connectable to the first and second bracket so as to maintain a predetermined distance between the at least one first and second panel to define a cavity there-between, the cavity for receiving settable concrete when in use, wherein the at least one first panel has a formed, textured surface.

Beneficially, the surface on the side which is remote from the bracket is textured.

Desirably, the exterior surface of the panel is textured.

Beneficially, wherein the textured exterior surface of the panel and the panel are an integral unit. This prevents the need to apply a protective layer subsequent to installation of the wall.

Preferably, wherein the first panel has a contoured side edge for, in use, being co-operable with a contoured side edge of an adjacent panel.

Further preferably, wherein the contoured side edge of the panel define interlocking edges to be interlocked with a co-operable interlocking edge of an adjacent panel.

Desirably, wherein the contoured side edge follows the shape of at least one wall element. The wall element is a textured region on the external surface of the panel. External surface means the part of the panel that does not come into contact with the cementatious material applied within the cavity.

Beneficially, wherein the at least one wall element is a brick element. Whilst the wall element may look as though it is a brick, it is actually formed from plastic whilst giving the appearance of a brick wall.

Alternatively, wherein the at least one wall element is a stone element. Similarly, whilst the wall element may look as though it is a stone, it is actually formed from plastic to give the appearance of a stone wall.

Preferably, wherein the first and second brackets have a recess for receiving a correspondingly shaped protrusion located at respective ends of the connector clip. This simplifies the connection means between panels and enables them to be transported from the factory in flat-pack.

Desirably, wherein the first and second brackets have end portions configured to extend parallel to the surface of the respective panels to which they are connected, whereby the recess is positioned on the side of the end portions facing the respective panels. This advantageously helps guide the protrusion of the clip into the recess of the first and second bracket.

Beneficially, wherein the connector clip and the first and second bracket are configurable to be received together in a snap fit. This provides a quick, reliable connection between the connector clip and the brackets.

Preferably, wherein the connector clip is removeably attachable to the first and second bracket. This enables the clip to be removed from the bracket so as to reposition the panels if necessary.

Beneficially, wherein an outer surface of at least one of the first and second panels has a finished weatherproof surface. This prevents the need for cladding or rendering the outer surface, saving time and cost.

Desirably, wherein the outer surface is made from a composite material.

Preferably including a top cap attachable to at least part of a top edge of the modular wall assembly to cover the space between the first and second panels

Additionally, including a side cap attachable to at least part of a side edge of the wall assembly, for preventing the escape of settable concrete from between the first and second panels.

Beneficially, wherein a side edge thereof is configurable to receive a further modular wall assembly. This provides the modular nature of the wall assembly making it suitable for use in many different applications requiring different dimensions.

Desirably, wherein a top edge thereof is configurable to receive a further modular wall assembly. This enables the height of the wall assembly to be varied as desired.

In one embodiment the modular wall system comprises a first corner panel having a first portion and a second portion positioned substantially perpendicular to the first portion and a second corner panel having a first portion and a second portion positioned substantially perpendicular to the first portion, the first portions of respective panels and the second portions of respective panels being parallel. This enables a turn in the wall to be created with ease.

Alternatively, the modular wall assembly comprises a first planar panel and a second planar panel configured in a parallel arrangement, with respective side edges in alignment.

Beneficially, including at least one adjustable foot arrangement. This enables the wall assembly to be levelled on ragged terrain.

Desirably, wherein the foot arrangement has a base plate, wall assembly receiving means and an adjustor disposed there-between for varying the distance between the base plate and the wall assembly receiving means.

Preferably the wall assembly having a tang which extends from a first side edge of a first panel of a first modular wall assembly and which is receivable in a bracket located at a side edge of a first panel in a second adjacent modular wall assembly.

Preferably the wall assembly having a tongue arrangement along at least part of a first side edge thereof and a groove arrangement arranged along at least a second side edge thereof.

In a further aspect of the invention there is included a modular wall assembly clip for use with a first and second wall panel, the clip configured to secure the first and second panel in spaced relation, the clip comprising

a first bracket attached or attachable to a surface of a first panel;

a second bracket attached or attachable to a surface of a second panel;

and a connector portion connectable there-between by means of a snap fit.

Preferably, wherein the connector portion is releasably attachable to the first and second bracket.

In a further aspect of the invention there is included a cavity wall assembly comprising at least two above-mentioned wall assemblies configured in a face to face, spaced apart and parallel arrangement to define a cavity there-between. This further improves the insulation properties of the wall.

Preferably, including a spacer positioned between and attached to the at least two wall assemblies and wherein the spacer is the above-mentioned modular wall assembly clip. Therefore, the same clip design is used for the single skin wall assembly and the cavity wall assembly, ensuring the cavity wall assembly can be created with ease.

In a further aspect of the invention there is included a method of constructing a wall, comprising

arranging a first panel having a first bracket extending from a surface thereof and a second panel having a second bracket extending from a surface thereof in spaced relation,

securing a connecting clip between the first and second bracket so as to maintain the predetermined distance between the first and second panel to form a cavity there-between; and

pouring a settable slurry between the first and second panel within the cavity, wherein the first panel has a formed textured surface.

In a further aspect of the invention there is included a method of constructing a wall, comprising

arranging a first panel having a first bracket extending from a surface thereof and a second panel having a second bracket extending from a surface thereof in spaced relation,

securing a connecting clip between the first and second bracket so as to maintain the predetermined distance between the first and second panel to form a cavity there-between; and

pouring a settable slurry between the first and second panel within the cavity.

Desirably, the clip is placed over end portions of the first and second bracket so as to enable a snap fit.

Beneficially, the clip is placed over end portions of the first and second bracket via movement of the clip in an upwards or downwards direction parallel to the planar surface of the panels. The clip may be placed into position subsequent to placing the first and second panel in spaced relation and at the predetermined distance to be maintained. Preferably, comprising adjusting the alignment of the first and second panel, using an adjustable foot arrangement.

Beneficially, the method further comprising coupling further modular wall assemblies until the desired wall height or length is achieved.

Desirably, wherein a top cap is subsequently fitted to a top edge of the uppermost first and second panel once the desired wall height is achieved.

In a further aspect of the invention there is provided a method of constructing a cavity wall, including:

arranging a first and second wall assembly according to claim 1 in a spaced apart and parallel configuration;

configuring a connector clip between first and second brackets located on adjacent surfaces of respective first and second wall assemblies so as to secure the first and second wall assembly in spaced relation; and

pouring a settable slurry between first and second panels of each wall assembly.

In a further aspect of the invention there is provided an eco-building incorporating the above-mentioned modular assembly.

Whilst the invention has been disclosed above it extends to any inventive combination of the features set out above, or in the following description, drawings or claims.

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

Figure 1 is a perspective view of the wall assembly of the invention;

Figures 2a is a perspective view of a connector clip forming part of the wall assembly of Figure 1;

Figure 2b is a perspective view of the brackets forming part of the wall assembly of Figure 1;

Figure 2c is a perspective view of the connector clip and the brackets in a connected state;

Figure 3 is an exploded perspective view of an internal surface of a panel of the wall assembly of Figure 1;

Figure 4a is a side view of a secondary fixing means in an unconnected state;

Figure 4b is a side view of a secondary fixing means in a connected state;

Figure 5 is a perspective view of the wall assembly of Figure 1 with a top cap applied thereto;

Figure 6 is a cross-sectional view of the top cap;

Figure 7a is a planar view of a corner wall panel assembly in the unconnected state;

Figure 7b is a planar view of the corner wall assembly in the connected state;

Figure 8a is a perspective view of an outer surface of a wall panel having a tongue portioned side edge;

Figure 8b is a perspective view of an outer surface of a wall panel having a groove portioned side edge;

Figures 9a is a front view of an adjustable foot arrangement;

Figure 9b is a side view of an adjustable foot arrangement;

Figure 10 is a side view of the modular wall assembly of Figure 1 in use with the adjustable feet;

Figure 11 is a cross-sectional view of the wall assembly of Figure 1 with an end cap attached at either end;

Figure 12a is a perspective view of an end cap of a first embodiment with groove terminated side edges;

Figure 12b is a perspective view of an end cap of a first embodiment with tongue terminated side edges;

Figure 13a is a perspective view of an end cap of a second embodiment with groove terminated side edges;

Figure 13b is a perspective view of an end cap of a second embodiment with tongue terminated side edges;

Figure 14 shows a cross-section of an exploded wall assembly with feet and top cap; and

Figures 15a to 15d show the steps for constructing a wall using the wall assembly of Figure 1, the adjustable base plate of Figures 9a and 9b; and the top cap of Figure 6;

Figure 16 shows a cross-section of a cavity wall created using a pair of wall assemblies of Figure 1;

Figure 17 shows a side edge of panel of the wall assembly for use in a cavity wall;

Figure 18 shows the external face of a wall panel with the brick effect;

Figure 19a shows a first end of a wall panel;

Figure 19b shows a second end of a wall panel which is co-operable with the first end of an adjacent panel;

Figure 19c shows a rear view of the fence panel of 19b;

Figure 19d shows an upper-sectional view of the rear of the wall panel at a region near to the top of the panel;

Figure 20a shows a perspective view of the outer surface of an end panel;

Figure 20b shows a perspective view of the inner surface of an end panel;

Figure 21a shows the inner surface of a corner panel;

Figure 21b shows an outer surface of a corner panel;

Figure 22a shows an inner surface of a corner panel;

Figure 22b shows an outer surface of a corner panel;

Figure 23a shows a perspective view of a first end of an end cap;

Figure 23b shows a perspective view of a second end of an end cap;

Figure 24a shows a first top cap;

Figure 24b shows a second end cap co-operable with the top cap of Figure 24a;

Figure 25a shows a first perspective view of a corner top cap having a first connecting means;

Figure 25b shows a second perspective view of the top corner cap having a second connecting means;

Figure 26 shows an exploded perspective view of a modular wall assembly having an alternative connecting means; and

Figure 27 shows a part exploded view of a modular wall structure in which the modular wall assembly of Figure 26 is applied.

Referring firstly to Figure 1, there is shown a modular wall assembly 1 having a first and second planar panel 2a, 2b separated in a parallel arrangement by a spacing means 3. The respective side edges of the panels 2a, 2b are in alignment. The adjacent surfaces of the wall assembly are the internal surfaces 4a, 4b of the panels 2a, 2b which come into contact with the settable concrete 5 that is applied there-between. The panels 2a, 2b are left in situ and provide a small reinforcement effect, although the majority of the strength is borne by the set concrete 5 contained there-between.

The spacing means 3 comprises three parts 6, 7, 8 as shown in Figures 2a to 2c. The first part 6 extends from the internal surface 4a of the first panel 2a and attached thereto, the second part 7 extends from the internal surface 4b of the second panel 2b and attached thereto and the third part 8, being a linking member or connecting clip 9, is configured to extend between the free end of the first and second parts 6, 7 so as to maintain a spaced relation between the first and second panel 2a, 2b in a face to face arrangement. Therefore, a predetermined distance is maintained between the first and second panel 2a, 2b. The spacing means 3 is arranged substantially perpendicular to the planar surface of the first and second panel 2a, 2b, although other angles could be implemented if desired.

The spacing 3 between the panels 2a, 2b is defined by the length of the spacing means 3 implemented i.e. the width of the walls can be adjusted by using shorter or longer spacing means 3. The first part of the spacing means 6 is a mirror image of the second part of the spacing means 7, but both comprise an elongate bracket having a substantially L-shaped profile. The first bracket 6 extends from the internal surface 4a of the panel 2a to which it is connected, perpendicular to the surface of the first panel and extending towards the second panel 2a and then turns at a corner whereby the bracket extends parallel to the panel 2b in a spaced relation therewith to create an end portion 10a. The resulting end portion 10a of the bracket is therefore the free or remote end of the bracket which is spaced from the panel 2a to which it is connected. The end portion 10a is terminated at it's top edge by a lip 11 which extends towards the surface 4a of the panel 2a to which it is connected, so as to form a recess 12a

below the lip. Alternatively, the side of the end portion facing the panel to which it is connected contains a recess therein.

Similarly, the second part of the spacing means 7 is configured such that the lip 10b extends towards the internal surface 4b of the second panel 2b thereby creating a recess 12b. Therefore, the lips 10a, 10b of respective brackets 6, 7 extend away from each other.

The third connection part 8, or linking member is a connector clip 9 that is formed of a substantially elongate element 13 terminated at either end by arm portions 14a, 14b extending perpendicular to the longitudinal axis of the elongate element 13. The connector clip 9 has a substantially U-shaped cross section. The internal edges of the arm portions 14a, 14b are terminated by a flange or protrusion 15a, 15b extending inwardly towards each other. The first flange 15a of the clip 9, and the lip 11a and recess 12a of the first bracket 6, are co-operable; and the second flange 15b of the clip 9, and the lip 11b and recess 12b of the second bracket 7, are co-operable. Therefore, the first arm portion 14a of the connector clip cooperates with the first bracket 6 and the second arm portion 14b of the connector clip cooperates with the second bracket 7. When connected, the resulting spacing means 3 acts as a brace member located between the first and second panel 2a, 2b. When the panels 2a, 2b are to be separated by a predetermined distance, the flanged ends of the clip 14a, 14b are inserted past the lips 11a, 11b and are received in the respective recesses 12a, 12b of the brackets in a snap fit. The lip, recess and flange arrangements prevent separation of the clip 9 from the brackets 6, 7 in the reverse direction of motion so as to form a locked state. An unlocked state may only be achieved if

the flange or protrusion 15a, 15b of the clip 9 is forced to extend past the respective lips 11a, 11b of the respective brackets 6, 7. Therefore, on application of a tool, the clip 9 and brackets 6, 7 may be detached prior to the insertion of any settable concrete between panels so as to reposition panels if necessary.

The distance between the first and second panel 2a, 2b is determined by the width of the clip and bracket arrangement. To optimise the locked state, the recesses 12a, 12b of the first and second brackets 6, 7 receive a correspondingly shaped protrusion or flange 15a, 15b located at respective ends of the connector clip 9. The clip 9 and the brackets 6,7 are formed of a resilient material that also has the strength to maintain the desired distance between the first and second panel 2a, 2b, for example plastic or a composite material.

Figure 3 shows that two brackets 6, 7 are applied to the inner surfaces 4a, 4b of the panels 2a, 2b in a spaced apart arrangement such that the first bracket 6a for the first panel 2a is applied adjacent a first side edge of the panel and a second bracket 6b on a first panel 2a is positioned adjacent the other side edge of the panel 2a, although the number of brackets per panel need not be limited to two and the position of the brackets may differ in vertical height if desired, however the bracket arrangement must correspond to the bracket arrangement on the partner panel to which it is to be connected.

The panels 2a, 2b are finite in size, therefore for wall lengths that are greater than the width of a panel multiple panels are to be installed side by side. Therefore, Figure 3 also shows a secondary bracket 16 forming half of the secondary fixing means 17, whereby a tang 18 extending past the side edge of a

neighbour panel is to be inserted within the channel 19 of the secondary bracket, so as to fixably secure the side edge of a first panel to a side edge of a second adjacent panel 2c. The tang 18 is moulded to the internal surface 4a of the first panel and the secondary bracket 16 is moulded to the internal surface 4c of the second neighbour panel 2c. As shown in Figure 4a and 4b, the tang 16 is an elongate member, the free end 18a of which extends past the side edge of the panel 2a to which it is affixed. The other end is attached to the internal surface 4a of the panel 2a (or alternatively is an integral part thereof).

The free end of the tang is terminated by a barb 20 and is configured to permit insertion of the tang 16 through the channel 19 of the secondary bracket 16 on application of a force in a first direction, but once the barb 20 extends past the remote end 19a of the secondary bracket 16, it returns to it's un-biased state and extends past the outer wall 19b of the secondary bracket 16 so as to prevent extraction of the tang 18 from the secondary bracket 16 on application of movement in a second direction opposing the first direction, as shown in Figure 4b.

Figures 1 and 4 also show the use of a co-operable tongue 21 and groove 22 arrangement enabling the panel 2a of a first modular wall assembly 1 to be configured to receive a corresponding side edge of a panel of a further modular wall assembly 1a. Ultimately, the tongue 21 and groove 22 arrangement permits a tight joint between neighbouring panels 2a, 2c and minimises gaps there-between which would allow concrete to escape. The tongue 21 and groove 22 arrangement is applicable to all the edges of the panel and as such is beneficial for arranging the panels 2a, 2c in a side to side or in a

stacked arrangement. For example, in the side to side assembly shown in Figure 3, the first panel 2a has a tongue 21 which co-operates with a groove 22 of a panel of a second, adjacent wall assembly 2c. The tongue 21 extends continuously along a significant length of the side edge of the first panel 2a, but this need not be the case, whereby an array of spaced tongue portions may instead be implemented along the edge of the panel. The tongue 21 is the male part of the arrangement and the groove 22 the female part, whereby the two parts are co-operable. The groove 22 compliments the shape of the tongue 21 such that a snug fit of the tongue therein is enabled. Figure 1 shows that the top tongue 21a extends the entire width of a first edge (top edge) of the panel 2a and the opposing edge (base edge) has a groove which extends along the entirety of the width of the panel, although this need not be the case, and the tongue and groove may extend along only part of the width of the panel. It is shown in Figure 1 that opposing edges of a panel have different termination portions. However, it is also valid for only tongues 21 or grooves 22 to be applied to the side edges of a given panel 2a. Of course, this arrangement would then require two different types of panel to be made available. Figure 1 also shows that both the first panel 2a and the second panel 2c have the tongue arrangement at the upper side edge (top) of the wall and the groove arrangement at the lower side edge (base) of the wall.

In order to enclose the concrete completely within the wall, thereby covering the space between the first and second panel 2a, 2b, a top cap member 23 may be applied to the top edge of the modular wall assembly over the upper tongues 21a of the first and second panel 2a, 2b, so as to straddle the

two tongues 21a and secure the first and second panels 2a, 2b together as shown in Figure 5. Figure 6 shows the top cap member 23 to have a substantially inverted U-shaped cross section and a groove 23a at the first end and a tongue (not shown) at the second end, to permit interlocking and therefore stability between adjacent top cap members. The thickness of the side walls of the top cap member 23 are chosen so as to lie flush with the outer surface of the panels. A plastic rod 24 extends from the internal surface of the top cap member 23 so as to stabilise the top cap 23 into the required position, by extending into the settable concrete 5 positioned between the panels 2a, 2b and allowing the concrete 5 to subsequently set, thereby maintaining the top cap member 23 in the desired position. The top cap member 23 is of use to protect the concrete 5 and provides an aesthetically pleasing terminus to the wall 25.

Figures 7a and 7b shows the corner wall assembly 26 which is to be implemented with the before-described planar wall assembly. It comprises an inner corner wall panel 26a spaced apart from an outer corner wall panel 26b. The corners create a 90 degree angle, but other angles may be implemented if desired. The inner corner panel 26a has a first portion 27a and a second portion 27b positioned substantially perpendicular to the first portion 27a and the outer corner panel 26b has a first portion 28a and a second portion 28b positioned substantially perpendicular to each other, whereby the first portions 27a, 28a of respective panels and the second portions 27b, 28b of respective panels 26a, 26b are configured in a parallel arrangement.

Similar to the standard planar wall panel arrangement the inner corner wall panel 26a has a groove 22 at one side edge and a tongue 23 at the other

side edge. The outer corner wall panel 26b also has this arrangement, whereby at one end of the corner wall assembly the parallel portions have the same termination type. The secondary fixing means 17 will also be used to further ensure the corner wall assembly and the planar wall assemblies remain in a secured position. Further, the clip 9 and bracket 6, 7 arrangement maintains the desired distance between the inner corner wall panel 26a and the outer corner wall panel 26b. The corner wall panel assembly 26 is further joined to the end of a linear wall panel assembly 1 with a spring dowel (not shown), or other suitable fixing means.

The outer surface 29 of the panels 2a, 2b, i.e. those which are positioned remotely from the concrete, are finished to look like a desired material. For example, Figures 8a and 8b show the composite face of the wall with a brick effect. Alternative effects may be implemented, for example stone or wood. The outer surface 29 is weatherproof removing the need for a cladding (or other) process to be applied. In contrast, the internal wall 4a of the panel 2a is finished with a plain yet roughly textured surface that encourages the concrete 5 to adhere to the internal surface 4a of the panel 2a.

Figures 9a and 9b show the adjustable foot arrangement 30 of the wall assembly 1 whereby a base plate 31 is positioned at the base of the foot and a panel receiving portion 32 is configured at the top of the foot 30 with an adjustor 33, for example a screw and thread arrangement 33a, located there-between. The panel receiving portion 32 has a slot 34 for receiving the base of the wall assembly 2a and for tightly holding it in place. The screw and thread 33a of the adjustor 33 is rotatable enabling variation in the distance between the base plate

31 and the panel receiving portion 32 so as to level the wall assembly when it is constructed on uneven terrain.

Figure 10 shows how the wall assembly is received in the slot 34 of the panel receiving portion 32.

Similar to the need to make the top of the wall aesthetically pleasing to the eye, when a wall is not intended to be joined to another wall assembly an end cap 35 may be applied as shown in Figure 11. Similar to the top cap 23, this is an elongate portion having a substantially U-shaped cross-section so that it can be secured to the end of a wall assembly. The end cap 35 prevents the escape of settable concrete from between the first and second panels. The elongate ends of the end panel either have the tongue 21 or the groove 22 arrangement to be applied to corresponding grooves 21 or tongues 22 of the planar 1 or corner wall panels 26. Whilst the lower region of the end cap 35 will have a groove, the top end may have either a tongue 21 or a groove 22 as required and shown in Figures 12a and 12b. The end cap 35 is secured to the assembly with a spring dowel (not shown). Alternatively, other fixing means may be suitably applied, e.g. a rivet. In an alternative arrangement, the end cap may be enclosed at it's top end as shown in Figures 13a and 13b.

Figure 14 shows the modular aspect of the wall assembly and, importantly, the stackable nature of the panels 2a, 2b, wherein the top edge of a panel is configurable to receive a bottom edge of a panel in a further modular wall assembly 1b. Therefore multiple wall assemblies are coupled together. The foot 30 is at the lowermost part of the wall arrangement. The grooved end 23a at the base of the panel (lower end) is inserted into the slot 35 of the panel

receiving portion 32 of the foot 30. The walls of the slot 35 extend along the internal and external surface of respective panels 2a, 2b. The connector clip 9 is then applied by placing the clip over end portions of the first and second bracket so as to enable a snap fit. The clip is placed over end portions of the first and second bracket via movement of the clip in an upwards or downwards direction parallel to the planar surface of the panels and subsequent to the panels being placed in spaced relation and at the predetermined distance to be maintained.

Alternatively, the connector clip 9 can be applied prior to the panels 2a, 2b being received by the slot 35 of the foot 30. A second panel assembly 1b may then be applied to the top edge of the first panel assembly 1, whereby the lower end grooves of the second panel assembly 1b receive the respective upper end (top) tongues of the first panel assembly 1. The connector clip 9 is then applied so as to maintain the distance between the planar panels of the second panel assembly. Alternatively, the connector clip 9 can be applied prior to mating the tongues 21 of the first panel assembly 1 with respective grooves 22 of the second panel assembly 1b. At the top of the stacked wall, and once the desired wall height has been achieved, a top cap 23 is positioned. The end result is an instantly installed seamless wall structure.

As shown in Figures 15a, 15b, 15c and 15d, in use, the feet 30 incorporating the panels 2a, 2b are inserted into a trench. The panels 2a, 2b are then locked into position with the connector clip 9 and the feet 30 are configured to the desired height so as to level or align the arrangement. Concrete 5 is then poured into the trench up to the top of the trench. Concrete 5 is also inserted between the panels 2a, 2b until a point just below the top of the panels 2a, 2b.

The concrete foundation is then given 48hrs to set. Once the foundation has set, a second row of panels 2c, 2d are stacked on top of the first row, ensuring that respective tongue 21 and grooves 22 co-operate appropriately. The connecting clips 9 are then inserted in respective brackets 6, 7 and secondary fixing means 17 are applied so as to lock the second row of panels to the first row of panels. This continues until the desired height of the wall is achieved. Concrete 5 is then poured between the panels 2a, 2b until it reaches just below the top of the top-most row. Finally the top wall cap 23 is fitted into place and the whole structure is left for the concrete 5 to set. This method optimises the alignment of the wall and removes the need to use props or other bracing techniques to keep the wall in the optimum position while the foundation is setting, which can be cumbersome, time consuming and incorrectly implemented.

A pair of wall assemblies 1a, 1b may be arranged in a face to face, spaced apart and parallel configuration to create a cavity 36 there-between. Such a cavity wall arrangement 39 is shown in Figure 16 and improves insulation of the wall. To enable this to work effectively the adjacent panels 37a, 37b of respective wall assemblies 1a, 1b have a bracket arranged on both faces thereof, as shown in Figure 17. In addition the internal walls of the cavity wall arrangement 39 will have plain, yet rough surfaces on both sides as the composite finish is not required on the internal surfaces. This then allows a connecting clip 9 to be applied between brackets so as to lock the adjacent faces 37a, 37b of the first and second wall assemblies 1a, 1b together in a spaced relation. The connecting clip 9 and bracket arrangement 6, 38 once

again acts as a spacer to fix the distance between wall assemblies 1a, 1b and maintain the width of the cavity 36. The connector clip 9 and the brackets 7, 38 are received in a snap fit as the projections or flanges or protrusions 15a, 15b of the connector clip 9 are received by the recesses in the brackets. This is achieved by placing the clip over the end portion of respective brackets.

A top cap 23 is then resized and arranged to cover the top of the cavity wall arrangement 39. The arrangement provides three chambers 40a, 40b, 40c. Concrete 5 is then only filled in the external chambers 40a, 40b of the cavity wall arrangement 39 and the central or intermediate chamber 40c remains a void. This arrangement removes the need to insert separate tubular elements between panels, which can be a cumbersome and time consuming process and the width of the cavity can be adjusted by merely varying the length of the connector clip and bracket assembly.

Beneficially, this wall assembly enables the panels to be delivered flat packed to site and allows a wall that is attractive, robust and weatherproof to be created instantly, whereby such a wall also benefits from the desirable properties of concrete so as to provide an economical structure that is aesthetically pleasing to the user which can satisfy building requirements in areas of outstanding natural beauty.

Figures 18 to 25b show a wall panel having a textured surface, whereby the texture forms a mock brick finish 41 on the exterior surface 42 of the panel 2a. Therefore, the shape of the exterior surface gives the appearance that the panel 2a is made of a material that differs from the material from which the panel is actually formed e.g. in Figure 18 the panel 2a has the appearance of being

made from brick, when actually it is made from a plastic. The finish of the elements would be in their natural recycled plastic colour. Alternatively, a composite material may be used instead of a plastic.

A stone surface effect may be provided instead of a brick effect whereby a stone and mortar finish is then applied as a liquid, for example a paint. A stone dust is present which makes the exterior surface of the panel look and feel like genuine stone once the liquid finishing layer dries.

In both cases the external surface of the panel and the panel material itself are an integral unit i.e. the brick effect is not a result of a separate coating or layer being applied to the panel after the panel has been installed. This arrangement enables the panel 2a to remain in situ so as to provide additional strength to the structure, whilst removing the need to apply a finishing layer to the outer surface of the panel which is a cumbersome and time consuming process.

The textured surface offers a variety of benefits to the resulting wall. For example the plastic panels are stronger due to the textured formations on the external surface which are shaped as brickwork or stone blocks. This textured formation ultimately provides a backbone which reinforces the structure of the panel.

The resin or paint finish adds an additional waterproofing to the panels to prevent the ingress of damp inside the walls. It also prevents sun bleaching or weathering, protects against frost and extreme summer heat contracting and expanding effects on the plastic, allows graffiti/damage to be covered over with

the original stone paint and allows for owners to apply a change of colour to their façade depending on the current fashion trend.

As shown in Figures 19a and 19b, the first panel 2a has a contoured side edge at the front of the panel for, in use, being co-operable with a contoured side edge at the front (or external side) of an adjacent panel. Therefore, only a part of the side edge of the wall panel needs to be contoured. This helps to align the adjacent fence panels improving the modular nature of the panels. The contoured side edge of the panel effectively defines interlocking edges 43a, 43b to be interlocked with a co-operable interlocking edge of an adjacent panel. This further improves the strength and integrity of the joint between the adjacent panels and the interlocking brick design also hides or masks the joint between two adjacent panels. At least part of an edge of the first panel 2a therefore has a castellated edge 43c rather than a continuous linear edge whereby the joint or contoured side edge follows the shape of one end of a wall element. The wall element may be at least one brick element. In the case of the stone surface effect, the wall element is a stone element and the contoured side edge follows the shape of the stone elements located on the external surface of the panel.

Figures 19a and 19b further show how the protrusion 44 of the castellated edge is arranged with a channel 45 for receiving part of an adjacent panel. The protrusion 44 then extends along a surface of the adjacent panel whereby the external surface 44a of the protrusion lies flush with the external surface 42 of the adjacent panel. Therefore, the part of the adjacent panel that is received in the channel 45 of the protrusion 44 is non-textured and is a part of the panel that has a recess 46 that is cutaway by a thickness matching the channel wall of the

protrusion. The protrusion 44 has the appearance of one end of a brick element. It is also shown that the connector portions are still utilised to lock the adjacent panels together.

In figures 20a and 20b the internal surface is shown to be smooth.

In Figure 26 there is shown an alternative embodiment of the invention, comprising a first and second planar panel 50, 51 arranged face to face and spaced apart to form a parallel configuration or a wall panel pair. The first and second panels 50, 51 have a top edge.

An array of trough regions 52 are provided in the top edge 50a, 51a of the respective panels 50, 51. The first and second panels 50, 51 are arranged such that respective side edges 50b, 50b', 51b, 51b'are aligned. Also the trough regions 52 are relatively spaced such that respective trough regions 52 may be aligned. The trough regions 52 are configured for receiving downwardly extending protrusions 53 extending from an upper wall member 54. For example a first and second protrusion 53a, 53b may be spaced apart from each other, for example they may be arranged at opposing side edges 54a, 54b of the upper wall member 54. The upper wall member 54 may be for example a subsequent wall panel pair positional above the first wall panel pair for increasing the height of the wall assembly, or alternatively a top cap 55 arranged to cover the space between the first and second wall panels 50, 51. Alternatively, in the case of multiple stacked wall panel pairs, the top cap 55 may be applied to the uppermost wall panel pair, once the desired wall height is achieved.

The upper wall member has a first and second lower side that is co-operable with a region at the top of the first and second panel 50, 51 respectively.

The top cap 55 is formed of an elongate section having a width equating to the distance between external faces 56 of the first and second panel 50, 51. This provides an external surface that appears to be substantially straight. The downwardly extending protrusions 53 of the top cap 55 ensure that the top cap 55 is secured to the top edge of the first and second panel 50, 51. Adjacent top caps 55a, 55b may also be applied end to end 55a', 55b'. Therefore, to maintain the relative position of a first and second top cap 55a, 55b, the first top cap 55a has at least one projection 57 extending from a first end 55a' and the second top cap 55b has a recess 58 at a first end 55b' for receiving the projection 57 of the first top cap 55a. The recess 58 is positioned towards the base 59 of the second top cap 55b such that the first top cap 55a is applied and the second top cap 55b is subsequently positioned such that the projection 57 in received within the recess 58. A lip portion (not shown) may be provided on a surface of the projection 57 to further aid securement of the projection 57 within the recess 58.

A spacer element 59 is also included to provide improved reinforcement of the panel pair and to maintain a predetermined distance between the first and second panel 50, 51 so as to define a cavity 60 there-between. The cavity 60 is for receiving settable concrete when in use. The spacer element 59 is arranged to be in contact with at least a portion of both the top edge of the first 50a and the top edge of the second panel 51a. The upper wall member 54 is configured so as to secure the position of the spacer element 59. The spacer element 59

comprises a flat plate 61 having an elongate aperture or slot 62a located at one side of the plate 61' and a second elongate aperture or slot 62b located on the opposing side of the plate 61''. Each slot or aperture 62a, 62b extends through the plate 61. A circular aperture 63 is also provided at the central region of the plate 61.

In use the first slot 62a of the plate 61 is aligned with one of the trough regions 52a of the first panel 50 and the second slot 62b of the plate 61 is aligned with one of the trough regions 52b of the second panel 51. This permits the protrusions 53a, 53b located at a first and second side of the upper wall member 54 to pass through the slots 62a, 62b and to extend into the respective trough regions 52a, 52b of the first and second panel 50, 51. This arrangement ensures that the spacer element 59 is secured in position since it is sandwiched between the top edge of the first and second panels 50a, 51a and the bottom edge of the upper wall member 54. The trough region 52 to which the spacer element 59 is applied is surrounded by a recessed portion or collar 64 in which the spacer element 59 is receivable. At one side edge of the recessed portion is a raised delimiting portion. This raised portion 65 ensures continuity of the external surface 56 of each wall panel 50, 51. Therefore, the top edge 50a, 51a of both the first and second panel 50, 51 have recessed areas 64 having a depth substantially equal to the thickness of the spacer element 59. The first end 59a of the spacer element 59 is receivable in the recess 64 of the first panel 50 and the opposing end of the spacer element 59b is receivable in the recess 64 of the second panel 51, such that the spacer element 59 extends across the cavity 60 formed between the first and second panels 50, 51.

The first panel 50 has a formed textured surface 66 e.g. the exterior surface 56, that is viewable by the user when the panel is in situ, is textured. The textured 66 external surface 56 and the first panel 50 are an integral unit. Alternatively the external surface of both the first and second panel may be formed of a textured surface. The textured surface on the external surface 56 of the first panel 50 need not be the same as the textured surface on the external surface 56 of the second panel 51.

At least part of the side edge 50b of the first panel 50 is contoured and co-operable with at least part of a side edge 51b of an adjacent pane 51. For example, at least part of the contoured side edge as viewed from the external surface 56 of the first panel 50 defines an interlocking edge 67a to be interlocked with a co-operable interlocking edge 67a of an adjacent panel 51 (or vice versa). The contoured side edge as viewed from the external surface 56 (or front face of the panel) of the first 50 or second 51 panel follows the shape of the at least one wall element 68 of the formed surface.

Figures 26 and 27 show the at least one wall element to be brick 69. However, alternatively the wall element may be stone, or wood.

When an edge 50b of the first wall assembly 1 is connected to a corresponding and co-operable edge 51b of the second wall assembly 1b channel 70 is formed and a fixing device 71 is provided, which in use, is receivable within the channel 70, so as to prevent relative movement between the first and second wall assemblies. The fixing device 71 is shown in Figure 26 to be a fixing pin. Whilst it is more secure to apply an elongate fixing pin to

extend along the full length of the channel 70, it is an option to only provide a fixing pin that extends along only a portion of the channel 70.

As a further precautionary measure the first wall assembly 1 is further attached to the second wall assembly 1b by means of a tang 72 and bracket 73 arrangement, wherein the first wall assembly 1 comprises a tang 72 and the second wall assembly 1b comprises a bracket 73 (or vice versa), wherein the tang 72 is configured to be receivable and securable within the bracket 73.

The external surface 56 of the modular wall assembly has a finished weatherproof surface. A suitable material for the external or outer surface 56 is a composite material.

A side cap 74 can be used to terminate a side edge 1c of the wall assembly so as to prevent the escape of settable concrete.

Also a corner assembly 75 is formed of a first corner panel 76 having a first portion 76a terminated at one end by a tapered edge 76a' and second portion 76b terminated at one end by a tapered edge 76b'. The respective tapered edges 76a', 76b' of the first and second portions 76a, 76b are attached together by means of a tang 77 and bracket (not shown) arrangement. The first portion 76a and the second portion 76b are positioned and retained substantially perpendicular to eachother. A second corner panel 77 comprising an integral part comprises a first arm 77a and a second arm 77b positioned substantially perpendicular to the first arm 77a. The first portion 76a is arranged to be substantially parallel to the first arm 77a and the second portion 76b is arranged to be substantially parallel to the second arm 77b so as to create a cavity 60 there-between. A spacer element 59 is implemented to maintain the relative

spacing between the first corner panel 76 and the second corner panel 77, which can be considered to be the external and internal corner panels respectively.

An adjustable foot arrangement (not shown) is provided for receiving a base portion of the modular wall assembly 1 (or a single panel thereof).

The wall 78 is constructed by arranging a first panel 50 having a top edge 50a and a second panel 51 having a top edge 51a in spaced relation. Then the spacer element 59 is placed on at least a portion of the top edge 50a, 51a of a first panel 50 and a second panel 51. A settable slurry is poured between the first and second panel 50, 51 within the cavity 60, and the upper wall member 54 is positioned either prior to or subsequent to the application of the slurry. In practice, it is likely that at least one upper wall member 54 will be required to stabilise the first and second panel 50, 51 as the slurry is being applied to the cavity 60. Specifically, the upper wall member 54 is placed on the top edge 50a, 51a of the first and second panel 50, 51 so as to sandwich the spacer element 59 between the top edge of the first and second panel and the base of the upper wall member 54. The spacer element 59 maintains a predetermined distance between the first and second panel 50, 51 so as to form a cavity 60 there-between. The first panel 50 has a formed worked surface prior to arranging the first panel 50 into position i.e. the formwork is not applied subsequent to assembly of the wall panel.

The top cap 55 may be filled with concrete such that no air gap is provided in the internal cavity 60 of the wall assembly 1. This is of particular use in a demarcation boundary wall, as opposed to a wall for a building.

It is clear that two wall assemblies 1, 1b may be provided in parallel arrangement and the top cap 55 may be sized to pass over the top edge of the two wall assemblies 1, 1b using the same principle. Therefore, a cavity wall arrangement (not shown) may also be provided using this embodiment of the invention, wherein the spacer element 59 will be applied in the same way between adjacent walls of parallel wall assemblies 1a, 1b (not shown).

Whilst the modular assembly can be varied in height by applying subsequent modular wall assemblies as mentioned above, it may also be varied in length. This is achieved by attaching the side edge 50b of a first wall panel to the side edge 80b of a second wall panel 80. For example, a first wall panel 50 and a second wall panel 80 are arranged side edge to side edge and are attachable relative to each other by means of a fixing device 71, for example a fixing pin.

The external surface of a first wall panel 50 and a second wall panel 80 are configured to be continuous.

The side edge of the first panel 50 is co-operable with the side edge of the second panel and are configured to form a channel 70. The channel walls 70a are provided by the respective edges 50b, 80b of the first and second panel 70, 80. A fixing device 71 is provides such that in use the fixing device is receivable in at least part of the channel 70 so as to prevent relative movement between the first panel 50 and the second panel 80.

The channel 70 is effectively a cylindrical bore formed by the co-operable edges 50b, 80b of the first and second panel 50, 80 as they are brought together.

Each of the panels 50, 80 have an external surface 56 which is viewable when the wall 78 is constructed and an internal surface 81 that is brought into contact with the cement applied to a cavity formed in a parallel modular wall assembly. The panels remain in situ once the concrete has been applied and set.

When viewed from the external surface 56, the side edge of the first panel 50 appears to be castellated 82. Therefore, the edge of the external surface has the appearance of alternating peak 83 and trough 84 regions positioned along the vertical axis (or height) of the first panel 50. These shall hereafter be referred to as the trough region 84' and the peak region 83'.

When a peak region 83' of a second panel 80 is mated with a trough region 84' of the first panel 50 a seamless joint is formed when viewed from the external surface. Therefore, the edge 50b of the first panel 50 is defined by an interlocking edge 85 to be interlocked with a co-operable interlocking edge 86 of the second or adjacent panel 80 and wherein respective intelocking side edges 85, 86 are configured such that the channel 70 is formed when the first and second interlocking side edges 85, 86 are in the interlocked state. The fixing device 71 is an elongate portion, for example a pin having an external diameter co-operable with the diameter of the channel 70 i.e. enabling the pin 71 to be received in the channel 70, but to minimise the spacing between the side walls of the pin 71 and those of the channel 70.

In reality at the trough region 84, the side of the first panel 50 terminates at the same point, but a recess region 87 is provided to give the appearance of a trough region 84 as a person views the external surface 56 of the first panel 50

in use. The recess region 87 further contains a groove which has a semi-circular cross-section. The groove faces towards the exterior surface 56 of the first panel 50 and extends between the edges of the lower and upper peak regions 83a, 83b. The inner surface of the peak region 89 facing away from the exterior surface 56 and to be received by the recessed region 87 also comprises a groove 88' having a semi-circular cross section and which extends vertically along the inner surface between the upper and lower edges 83a, 83b of the peak region. The peak regions 83 of the second panel 80 are arranged to be received by respective recesses contained in the first panel 50, such that, when viewed from the external surface 56, the side edge of the peak regions 83 of the second panel 80 comes into contact with the side edges of the trough regions 84 of the first panel 50. When the respective peak and trough regions 83, 84 are brought together, the grooves having a semi-circular cross section align and an elongate cylindrical channel 70 is formed. Therefore, the side walls 70a of the channel 70 is formed by alternate panel edges 50b, 80b.

The side edge 50b of the first panel 50 also contains an aperture 73 located at the height of a peak region 83c. This is for receiving a correspondingly shaped protrusion 72 extending from the side edge 80b of the second panel 80 at the corresponding trough region 84c. For example this may be considered to act in the same way as a tang and bracket arrangement. The protrusion 90 may be terminated by a lip portion 90 that is co-operable with a catch (not shown) located inside an aperture 92 on the first portion.

Therefore, a type one edge 93 and a type two edge 94 forms the co-operable edges. The type one edge 93 comprises alternative trough and peak

regions 83, 84 where the peak region 84 is terminated at the side edge (towards the inner surface 81 of the panel) by an aperture 89. Therefore, an array of apertures 89 are provided at spaced intervals along the height of the side edge 50b of the wall panel with a type one edge 93. As mentioned above, the recess region 87 is provided on the external surface 56 side of the panel 50 at the level of the trough regions 84. The recess region and the apertures are offset from each other along the thickness of the wall panel.

A type two edge 94 is also formed of a peak 83 and trough 84 region (to cooperate with the peak and trough region 83, 84 of the type one edge). The peak region 83, located towards the external surface 56 of the panel 80 is receivable in the recess 87 of the type one trough region of the first panel 50. The protrusion 90, located towards the internal surface 81 of the panel, extends from a side edge of the panel at the vertical level of the trough regions 84. The peak region 83 and the protrusion 90 alternate along the height of the panel. Therefore, the projections are provided in spaced intervals along the height of the wall panel 80.

Whilst the peak and trough regions extend in the same direction from a side of the panel 80 i.e. perpendicular to the longitudinal side of the panel, the protrusions 90 and peak portion 83 are arranged to be positioned at opposing side faces of the panel 80, therefore they are offset from each other along the thickness of the panel. Therefore, they extend from the side edges of the panel 80 in an offset parallel arrangement, where the height of the protrusion 90 is either above or below the height of the peak portion 83. The peak portion 83 takes the shape of the formed surface, e.g. has the shape of a brick 69.

The combination of the overlapping nature of the side edges 50b, 80b provided by the bringing together of the complimentary peak and trough regions 83, 84, the co-operable nature of the protrusion and aperture 72, 73 and the insertion of the fixing pin 71 within the channel 70 creates a secure arrangement between adjacent panels 50, 80. A given panel of the modular wall system will have one edge of type one and the other edge of a type 2. Alternatively, panels may only have edge type one or edge type two. Either way, a fully modular wall assembly is provided which permits a stacking effect of the wall panels.

As per the first embodiment of the invention a variety of modular sections may be provided of different shapes and applications so as to provide different required wall assembly arrangements. For example, in Figure 26 there is shown a wall having a right angular corner piece 75. The section of wall comprises a straight wall section and a corner section comprising the outer corner wall panel 76 and the inner corner wall panel 77. The inner corner wall panel 77 is formed of a single integral portion and is formed of an 'L' shaped panel (as viewed from above) having the type one edge 93 and type two edge 94 at respective ends. The outer corner wall panel 76 is formed of two separate straight portions 76a, 76b that are each terminated at one end by a tapered edge 76a', 76b'. From the internal edge of the first straight portion is provided a tab that is receivable in a co-operable aperture located in the second straight portion. On combination of the first tapered straight portion 76a and the second tapered straight portion 76b is provided an outer corner wall panel 76. A top cap 55a is provided to be fitted over the resulting corner wall panel arrangement. It is formed of a substantially L shaped portion.

In Figure 26 there is shown an end panel or end cap 74 having a substantially 'U shape that is provided to terminate the corner arrangement. Similar to the other modular sections the end panel 74 has a type one edge 93 and a type 2 edge 94. Both the corner assembly 75 and end panels (or side cap) 74 may be attached to the planar wall panel 50, 51, 80 as described above, since they are terminated with the type one of two edges as appropriate.

A single brick cap 95 may also be provided that is co-operable with a larger top cap portion 55. This can be particularly useful for wall constructions having complicated shapes. For example, the single brick cap 95 would usually be applied as a topper for the end panel 74.

Figures 26 and 27, show how a complex wall structure may be formed by using the modular sections described above.

The external surface 56 of a panel 50 of the modular wall assembly 1 has a textured surface 66, for example has a brick effect 69. Alternatively, other building material effects may be provided, for example stone. Contrary to the first embodiment of the invention the textured surface will not be a provided by a resin bond, but will instead coloured recycled plastic 96 is applied to provide a realistic brick or stone effect. Therefore, the external surface of the panel appears to be fabricated from the more traditional materials, when in fact they are constructed of concrete.

The external surface 56 of the modular wall assembly 1 has a finished weatherproof surface.

The wall portion may be constructed by arranging a first panel 50 having a side edge 50b and a second panel 80 having a side edge 80b in an edge to

edge arrangement. The side edge 50b of the first panel 50 is then brought into contact with the side edge 80b of the second panel 80 so as to form a channel 70. A fixing device 71 is then inserted within at least a portion of the channel 70 so as to secure the first panel 50 and the second panel 80 together to form a first wall portion 97.

As the first and second side edge 50ab, 80b are brought together, the first interlockable edge 67a is interlocked with the second co-operable interlockable side edge 67b.

This method is then repeated to provide a second wall portion 98. The first wall portion 97 and the second wall portion 98 are arranged in a spaced and face to face arrangement. A spacer element 59 is applied to at least a portion of both the top edge 97a of the first wall portion 97 and the top edge 98a of the second wall portion 98. An upper wall member 54 is positioned on the top edge 97a, 98a of the first and second wall portions 97, 98 so as to secure the position of the spacer element 59. The spacer element 59 therefore is configured to maintain a predetermined distance between the at least one first and second wall portions 97, 98 to define a cavity 60 there-between. A settable slurry or other cementatious material may be poured or otherwise applied between the first and second wall portions 97, 98 within the cavity 60 either subsequent to providing the upper wall member 54 (assuming there is still an aperture available to insert the slurry) or prior to applying the upper wall member 54. The upper wall member 54 may be a top cap 55, or a subsequent wall panel portion pair (not shown) to be stacked above respective wall panel portions 97, 98.

Various modifications to the principles described above would suggest themselves to the skilled person. For example, instead of being integrally formed with the panel, the brackets and secondary fixing clip may be separate and distinct parts attachable to the internal surface of the panel by a fixing means e.g. a physical fixing means such as a screw or chemical fixing means such as an adhesive.

When constructing the wall, enforcement rods may also be used to provide extra strength and steel re-enforcement wire mesh can be fitted prior to fitting the connector clips.

Whilst standard wall panels are 1 m by 0.4 m, any size of panel may be producible as desired. Further, whilst a planar and a corner panel assembly has been described, other shapes can be produced, for example a curved structure or a tapered corner assembly.

When considering a cavity wall arrangement 39, whilst only two wall assemblies have been described, more than two wall assemblies may be implemented creating more than 1 void region, thereby further improving the insulation characteristic of the wall.

Whilst the end 35 and top cap 23 have been described as being substantially 'U'-shaped, other shapes may be preferred, for example a 'V' shape and the corners of the end cap may be tapered, curved or sharply pointed.

Another settable slurry material may be implemented instead of concrete.

In the second embodiment the channel is defined by a series of plates having a U shaped aperture that act as a guiding means and for forming a

channel having spaces between wall portions, rather than a continuous channel wall.

The channel may alternatively have a non-circular cross-section.

In the embodiment using the second connection means, the external surface 56 may alternatively be made of a composite material.

Claims

1. A modular wall assembly for an eco-building, comprising

at least a first panel having a top edge;

at least a second panel having a top edge, the at least first and second panel being spaced apart and arranged face to face;

a spacer element arrangeable in contact with at least a portion of both the top edge of the first and second panel; and

an upper wall member co-operable with at least a portion of the first and second panel so as to secure the position of the spacer wherein the spacer is configured to maintain a predetermined distance between the at least one first and second panel to define a cavity there-between, the cavity being for receiving settable concrete when in use.

2. A modular wall assembly according to claim 1, wherein the upper wall member has a first and second base portion that is co-operable with a region at the top edge of the first and second panel respectively.

3. A modular wall assembly according to claim 1 or claim 2, wherein the upper wall member comprises at least a first downwardly projecting protrusion and a second downwardly projecting protrusion spaced apart from the first protrusion; the first panel comprising at least a first trough region and the second panel comprises at least a second trough region, wherein the at least first and second protrusions are co-

operably receivable within the at least first and second trough regions respectively.

4. A modular wall assembly according to claim 3, wherein the spacing element comprises a first slot and a second slot spaced apart from the first slot such that in use the first and second protrusions pass through the first and second slot prior to being received in the first and second trough regions so as to retain the spacer into position.
5. A modular wall assembly according to any preceding claim, wherein the first and second panel comprises a recessed region on respective top edges for receiving respective ends of the spacing element, the recess portion framing the trough region.
6. A modular wall assembly according to any preceding claim, wherein the spacing element comprises a plate having at least a first and second slot arranged proximal to opposing ends of the plate.
7. A modular wall assembly according to any preceding claim, wherein the upper wall member comprises a subsequent first and second wall panel for increasing the height of the wall assembly.
8. A modular wall assembly according to claim 7, wherein a top cap is applied to at least part of the top edge of the uppermost first and second panel once the desired wall height is achieved.
9. A modular wall assembly according to any of claims 1 to 6, wherein the upper wall member is a top cap arranged to cover the space between the first and second wall panels.

10. A modular wall assembly wherein at least two top caps are arranged end to end, wherein the first top cap has at least one projection extending from it's end and the at least further top cap has a recess located in the adjacent end, wherein in use the protrusion is receivable in the recess so as to connect the end of the at least one top cap to the end of the adjacent top cap.
11. A modular wall assembly according to any preceding claim, wherein the first panel has a formed, textured surface.
12. A modular wall assembly according to any preceding claim, wherein the exterior surface of the first panel is textured.
13. A modular wall assembly according to claim 12 wherein the textured external surface of the panel and the panel are an integral unit.
14. A modular wall assembly according to any preceding claim, wherein at least part of a side edge of the first panel is contoured and co-operable with at least part of a side edge of an adjacent panel.
15. A modular wall assembly according to claim 14, wherein the contoured side edge follows the shape of at least one wall element of the formed surface.
16. A modular wall assembly according to claim 15, wherein the at least one wall element is a brick element.
17. A modular wall assembly according to claim 15, wherein the at least one wall element is a stone element.
18. A modular wall assembly according to any preceding claim, wherein at least part of the side edge of the first panel defines an interlocking

edge to be interlocked with a co-operable interlocking edge of an adjacent panel.

19. A modular wall assembly according to any preceding claim, wherein an external surface of at least one of the first and second panels has a finished weatherproof surface.

20. A modular wall assembly according to any preceding claim, wherein the outer surface is made from a recyclable plastic.

21. A modular wall assembly according to any preceding claim, wherein the modular wall assembly comprises a first planar panel and a second planar panel configured in a parallel arrangement, with respective side edges in alignment.

22. A modular wall assembly according to any preceding claim wherein the modular wall assembly is connectable to at least one further modular wall assembly via co-operable side edges so as to form a channel, the channel walls being defined by the co-operable side edges, wherein in use a fixing means is receivable in at least part of the channel so as to prevent relative movement between the modular wall assembly and further modular wall assembly.

23. A modular wall assembly according to claim 19, wherein the fixing means is a pin.

24. A modular wall assembly according to claim 22 or claim 23, wherein the side edge of the first modular wall assembly comprises at least one bracket and the side edge of the second modular wall assembly comprises a tang, or vice versa, wherein the tang is receivable within

the bracket so as to connect the first modular wall assembly to the second modular wall assembly.

25. A modular wall assembly according to any preceding claim, including a side cap attachable to at least part of a side edge of the wall assembly, for preventing the escape of settable concrete from between the first and second panels.

26. A modular wall assembly according to any preceding claim, comprising:

a first corner panel having a first portion terminated at one end by a tapered edge and second portion terminated at one end by a tapered edge, the respective tapered edges of the first and second portions being attached together by means of a tang and bracket arrangement to position the first portion and the second portion substantially perpendicular to eachother and a second corner panel comprising an integral part comprising a first arm and a second arm positioned substantially perpendicular to the first arm, wherein the first portion is arranged to be substantially parallel to the first arm and the second portion is arranged to be substantially parallel to the second arm.

27. A modular wall assembly according to any preceding claim, further comprising at least one adjustable foot arrangement for receiving a base portion of the modular wall assembly.

28. A method of constructing a wall, comprising

arranging a first panel having a top edge and a second panel having a top edge in spaced relation and face to face,

placing a spacer element on at least a portion of the top edge of both a first panel and a second panel and positioning an upper wall member on the top edge of the first and second panel;

securing the position of the spacer element such that it is sandwiched between the first and second panel and the upper wall member;

maintaining a predetermined distance between the first and second panel by means of the secured spacer to form a cavity there-between; and

pouring a settable slurry between the first and second panel within the cavity.

29. A method of constructing a wall, comprising providing a panel having a form worked surface prior to arranging the panels.

30. A modular wall assembly having a first panel and a second panel, the first panel and the second panel being arranged side edge to side edge,

the side edge of the first panel being co-operable with a side edge of the second panel so as to form a channel there-between, the channel walls being provided by the respective edges of the first and second panel, and

a fixing device which, in use, is receivable within at least part of the channel so as to prevent relative movement between the first panel and the second panel.

31. A modular wall assembly according to claim 30, wherein the side edge of the first panel defines an interlocking edge to be interlocked with a co-operable interlocking side edge of the second panel and wherein respective side edges are configured such that the channel is formed when the first and second side edges are in the interlocked state.
32. A modular wall assembly according to claim 30 or 31, wherein the fixing device is a pin receivable in the channel.
33. A modular wall assembly according to any of claims 30 to 32, wherein a bracket is located on the edge of the first panel and a tang is extendable from the edge of the second panel, or vice versa, the tang being arranged to be receivable within the bracket so as to connect the first panel to the second panel.
34. A modular wall assembly according to any of claims 30 to 33, wherein the first panel comprises a planar panel.
35. A modular assembly according to claim 34, wherein the second panel comprises a planar panel.
36. A modular wall assembly according to any of claims 30 to 34, wherein the second panel is a corner panel having a substantially 'L' shape when viewed from it's top edge.
37. A modular wall assembly according to any of claims 30 to 34, wherein the first wall panel is terminated by one end of an end panel comprising a substantially 'U' shape when viewed from it's top edge.

38. A modular wall assembly according to any of claims 30 to 37, wherein when viewed from the external surface the sides edges are castellated.
39. A modular wall assembly according to any of claims 30 to 38, wherein the first panel has a formed, textured surface.
40. A modular wall assembly according to any of claims 30 to 39, wherein the exterior surface of the first panel and the second panel are textured.
41. A modular wall assembly according to claim 40, wherein the textured external surface of the panel and the panel are an integral unit.
42. A modular wall assembly according to any of claims 30 to 41, wherein at least part of a side edge of the first panel as viewed from the external surface is contoured and co-operable with at least part of a side edge of the second panel.
43. A modular wall assembly according to claim 42 wherein the contoured side edge as viewed from the external surface follows the shape of at least one wall element of the formed surface.
44. A modular wall assembly according to claim 43, wherein the at least one wall element comprises a brick element.
45. A modular wall assembly according to claim 43, wherein the at least one wall element comprises a stone element.
46. A modular wall assembly according to any of claims 30 to 45, wherein an external surface of at least one of the first and second panels has a finished weatherproof surface.

47. A modular wall assembly according to any of claims 30 to 46, wherein the external surface is made from a recycled plastic.

48. A method of constructing a wall portion, comprising

arranging a first panel having a side edge and a second panel having a side edge arranged in a side edge to side edge arrangement,

bringing the side edge of a first panel into contact with the side edge of a second panel to form a channel and inserting a fixing means within at least part of the channel so as to secure the first panel and the second panel together to form a first wall portion.

49. A method according to claim 48, further comprising interlocking an interlocking edge of the first panel with a co-operable interlocking edge of the second panel.

50. A method according to claim 48 or 49, wherein the method comprises repeating forming a second wall portion and subsequently placing the first wall portion having a top edge and the second wall portion having a top edge face to face and in spaced relation,

applying a spacer element to at least a portion of the top edge of both the first wall portion and the second wall portion and positioning an upper wall member on the top edge of the first and second wall portions so as to secure the position of the spacer element, maintaining a predetermined distance between the at least one first and second wall portions by securing the position of the spacer;

providing a cavity between the first wall portion and second wall portion; and

pouring a settable slurry between the first and second panel within the cavity

51. A modular wall assembly for an eco-building, comprising

at least one first panel having a first bracket extending from a surface thereof;

at least one second panel having a second bracket extending from a surface thereof;

the at least one first and second panel being spaced apart and arranged face to face;

a connector clip connectable to the first and second bracket so as to maintain a predetermined distance between the at least one first and second panel to define a cavity therebetween, the cavity for receiving settable concrete when in use, wherein the first panel has a formed, textured surface.

52. A modular wall assembly for an eco-building, comprising

at least one first panel having a first bracket extending from a surface thereof;

at least one second panel having a second bracket extending from a surface thereof;

the at least one first and second panel being spaced apart and arranged face to face;

a connector clip connectable to the first and second bracket so as to maintain a predetermined distance between the at least one first and second panel to define a cavity there-between, the cavity for receiving settable concrete when in use.

53. A modular wall assembly according to claim 51 or 52, wherein the surface of the panel on the side remote from the bracket is textured.

54. A modular wall assembly according to claim 35, wherein an exterior surface of panel is textured.

55. A modular wall assembly according to claim 54 wherein the textured external surface of the panel and the panel are an integral unit.

56. A modular wall assembly according to any of claims 51 to 55, wherein at least part of a side edge of the first panel is contoured and co-operable with at least part of a side edge of an adjacent panel.

57. A modular wall assembly according to claim 56, wherein the at least part of the contoured side edge of the first panel defines an interlocking edge to be interlocked with a co-operable interlocking edge of an adjacent panel.

58. A modular wall assembly according to claim 56 or 57 wherein the contoured side edge follows the shape of at least one wall element of the formed surface.

59. A modular wall assembly according to claim 58, wherein the at least one wall element is a brick element.

60. A modular wall assembly according to claim 58, wherein the at least one wall element is a stone element.

61. A modular wall assembly according to any of claims 51 to 60, wherein the first and second brackets have a recess for receiving a correspondingly shaped protrusion located at respective ends of the connector clip.

62. A modular wall assembly according to claim 61, wherein the first and second brackets have end portions configured to extend parallel to the surface of respective panels to which they are connected, whereby the recess is positioned on the side of the end portions facing the respective panels.

63. A modular wall assembly according to claim 61 or 62, wherein the connector clip and the first and second bracket are configurable to be received together in a snap fit.

64. A modular wall assembly according to any of claims 51 to 63, wherein the connector clip is removably attachable to the first and second bracket.

65. A modular wall assembly according to any of claims 51 to 64, wherein an outer surface of at least one of the first and second panels has a finished weatherproof surface.

66. A modular wall assembly according to claim 65, wherein the outer surface is made from a composite material.

67. A modular wall assembly according to any of claims 51 to 66, including a top cap attachable to at least part of a top edge of the modular wall assembly to cover the space between the first and second panels.

68. A modular wall assembly according to any of claims 51 to 67, including a side cap attachable to at least part of a side edge of the wall assembly, for preventing the escape of settable concrete from between the first and second panels.

69. A modular wall assembly according to any of claims 51 to 68, wherein a side edge thereof is configurable to receive a further modular wall assembly.

70. A modular wall assembly according to any any of claims 51 to 69, wherein a top edge thereof is configurable to receive a further modular wall assembly.

71. A modular wall assembly according to any any of claims 51 to 70, comprising:

a first corner panel having a first portion and a second portion positioned substantially perpendicular to the first portion and a second corner panel having a first portion and a second portion positioned substantially perpendicular to the first portion, the first portions of respective panels and the second portions of respective panels being parallel.

72. A modular wall assembly according to any of claims 51 to 71, wherein the modular wall assembly comprises a first planar panel and a second planar panel configured in a parallel arrangement, with respective side edges in alignment.

73. A modular wall assembly according to any of claims 51 to 72, further including at least one adjustable foot arrangement.

74. A modular wall assembly according to claim 73, wherein the foot arrangement has a base plate, wall assembly receiving means and an adjustor disposed there-between for varying the distance between the base plate and the wall assembly receiving means.

75. A modular wall assembly according to any of claims 51 to 74, wherein the modular wall assembly is connectable to at least one further modular wall assembly via a tang and bracket arrangement.

76. A modular wall assembly according to any of claims 51 to 75, further including a tongue arrangement along at least part of a first side edge thereof and a groove arrangement arranged along at least a second side edge thereof.

77. A modular wall assembly clip for use with a first and second wall panel, the clip configured to secure the first and second panel in spaced relation, the clip comprising:

a first bracket attached or attachable to a surface of a first panel;

a second bracket attached or attachable to a surface of a second panel;

and a connector portion connectable there-between by means of a snap fit.

78. A modular wall assembly clip according to claim 77, wherein the connector portion is releasably attachable to the first and second bracket.

79. A cavity wall assembly comprising at least two wall assemblies of any of claims 1 to 29 configured in a face to face, spaced apart and parallel arrangement to define a cavity there-between.

80. A cavity wall assembly comprising at least two wall assemblies of any of claims 51 to 76 configured in a face to face, spaced apart and parallel arrangement to define a cavity there-between.

81. A cavity wall assembly according to claim 80, including a spacer positioned between and attached to the at least two wall assemblies.

82. A cavity wall assembly according to claim 81, wherein the spacer is the modular wall assembly clip of claim 77.

83. A method of constructing a wall, comprising

arranging a first panel having a first bracket extending from a surface thereof and a second panel having a second bracket extending from a surface thereof in spaced relation, securing a connecting clip between the first and second bracket so as to maintain a predetermined distance between the first and second panel to form a cavity there-between ; and

pouring a settable slurry between the first and second panel within the cavity, the first panel having a form worked surface prior to arranging the first panel.

84. A method of constructing a wall, comprising

arranging a first panel having a first bracket extending from a surface thereof and a second panel having a second bracket extending from a surface thereof in spaced relation, securing a

connecting clip between the first and second bracket so as to maintain a predetermined distance between the first and second panel to form a cavity there-between ; and

pouring a settable slurry between the first and second panel within the cavity.

85. A method of constructing a wall according to claim 83 or 84, comprising placing the clip over end portions of the first and second bracket so as to enable a snap fit.

86. A method according to claim 85, comprising placing the clip over end portions of the first and second bracket via movement of the clip in an upwards or downwards direction parallel to the planar surface of the panels.

87. A method according to claim 86, wherein the clip is placed into position subsequent to the panels being placed in spaced relation and at the predetermined distance to be maintained.

88. A method of constructing a wall according to claim 83 to 87, further including adjusting the alignment of the first and second panel using an adjustable foot arrangement.

89. A method of constructing a wall according to claim 83 to 88, further including coupling further modular wall assemblies until the desired wall height or length is achieved.

90. A method of constructing a wall according to claims 83 to 89, wherein a top cap is subsequently fitted to a top edge of the uppermost first and second panel once the desired wall height is achieved.

91. A method of constructing a cavity wall, including:

arranging a first and second wall assembly according to claim 51 or claim 52 in a spaced apart and parallel configuration;

configuring a connector clip between first and second brackets located on adjacent surfaces of respective first and second wall assemblies so as to secure the first and second wall assemblies in a spaced relation; and

pouring a settable slurry between first and second panels of each assembly.

92. An Eco-Building incorporating a modular wall assembly according to any of claims 1 to 29.

93. An Eco-Building incorporating a modular wall assembly according to any of claims 30 to 50.

94. An Eco-Building incorporating a modular wall assembly according to any of claims 51 to 78.

95. An Eco-Building incorporating a cavity wall arrangement according to any of claims 79 to 82.

96. A modular wall assembly as hereinbefore described with reference to Figures 1 to 15 and 18 to 25b.

97. A modular wall assembly clip as hereinbefore described with reference to Figures 2a, 2b and 2c.

98. A cavity wall assembly as hereinbefore described with reference to Figures 16 and 17.

99. A modular wall assembly as hereinbefore described with reference to Figures 26 and 27.

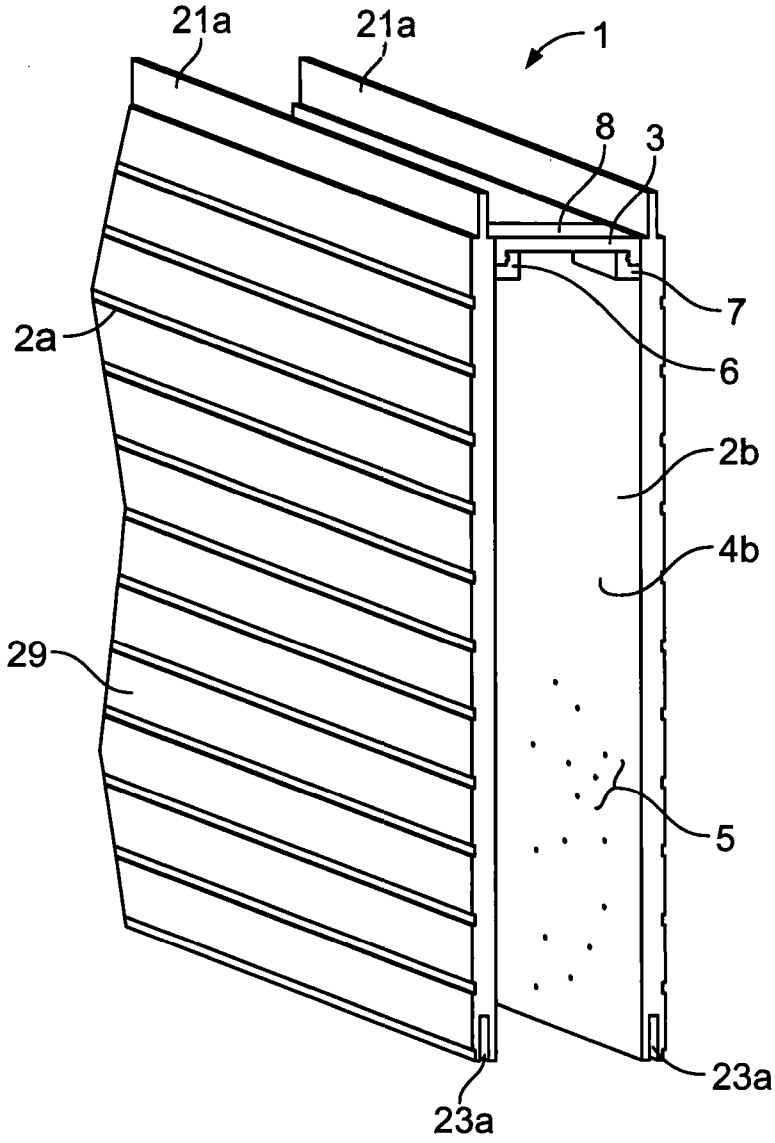


FIG. 1

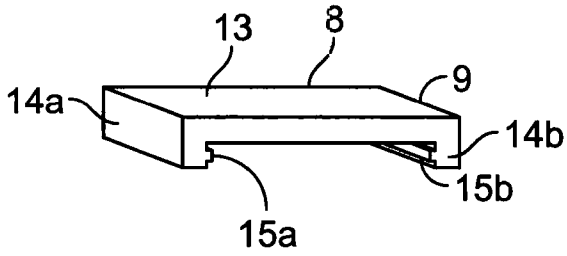


FIG. 2A

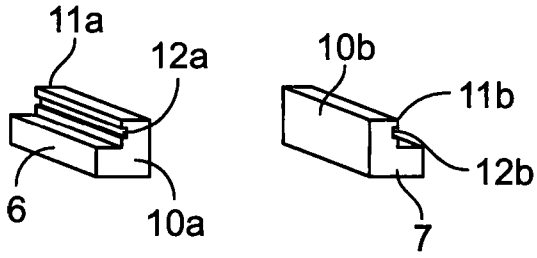


FIG. 2B

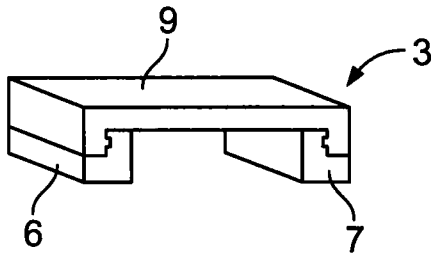


FIG.2C

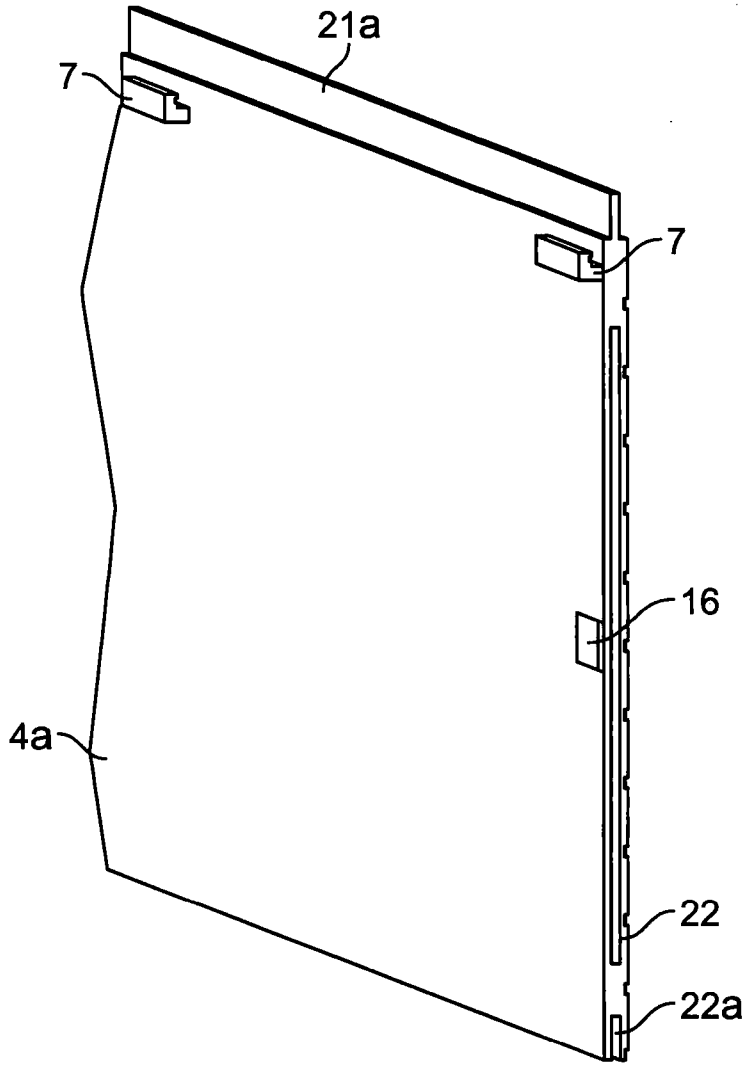


FIG. 3

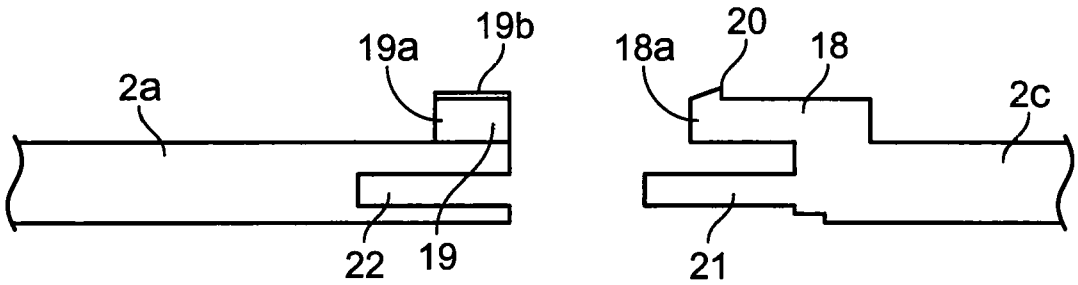


FIG. 4A

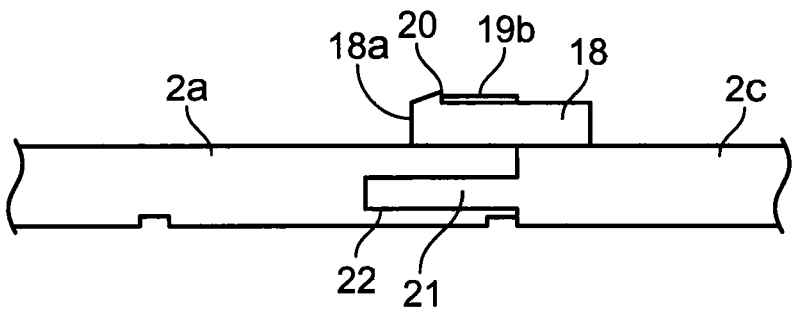


FIG. 4B

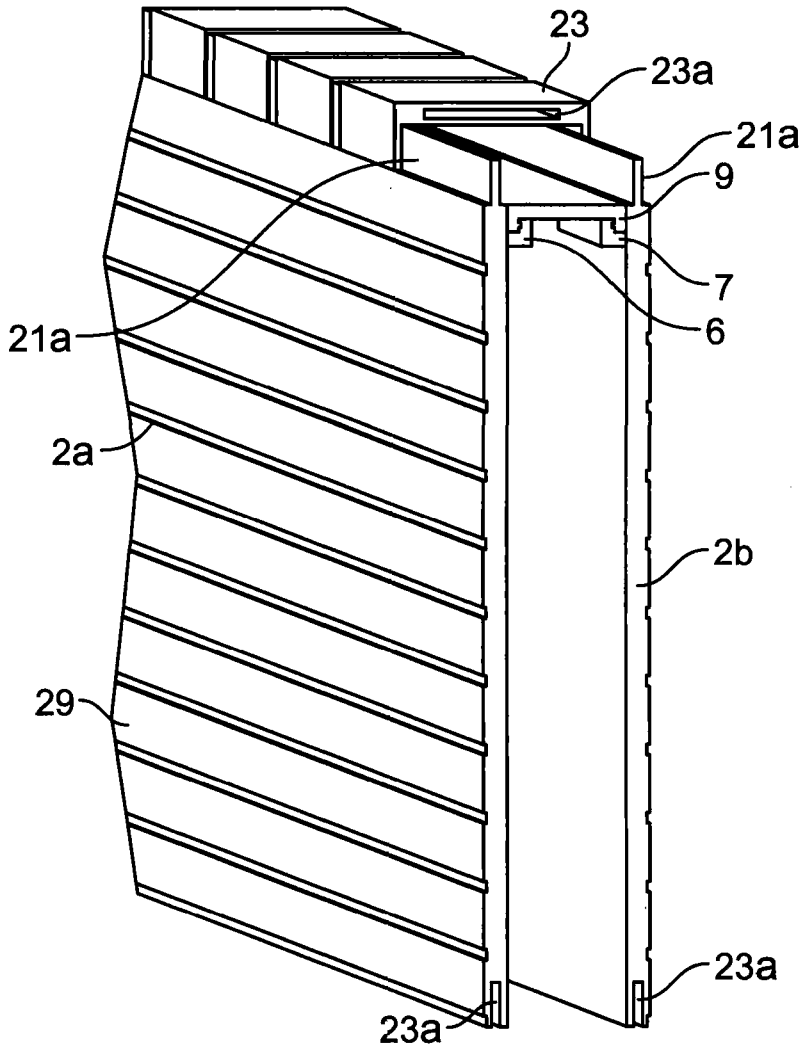


FIG. 5

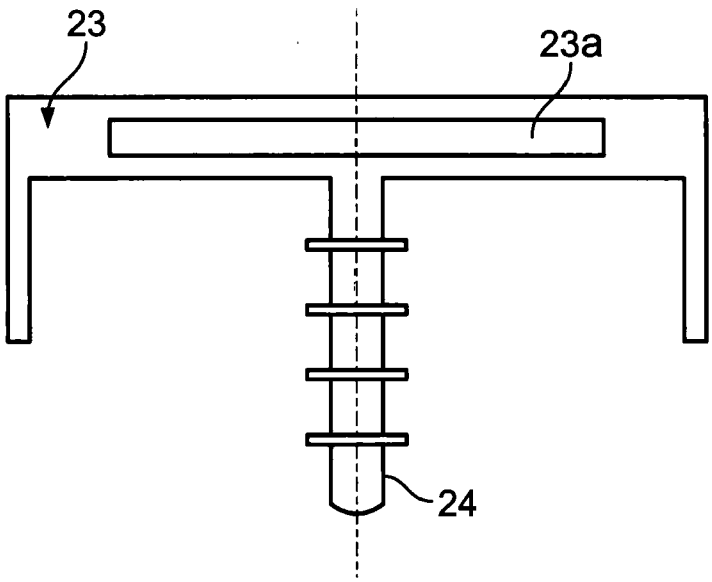


FIG. 6

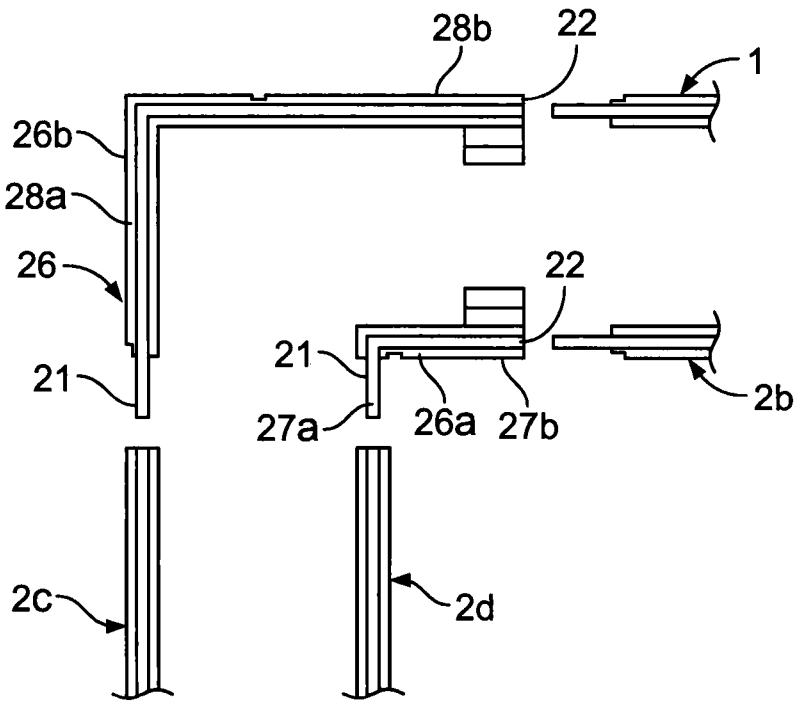

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FIG. 7A

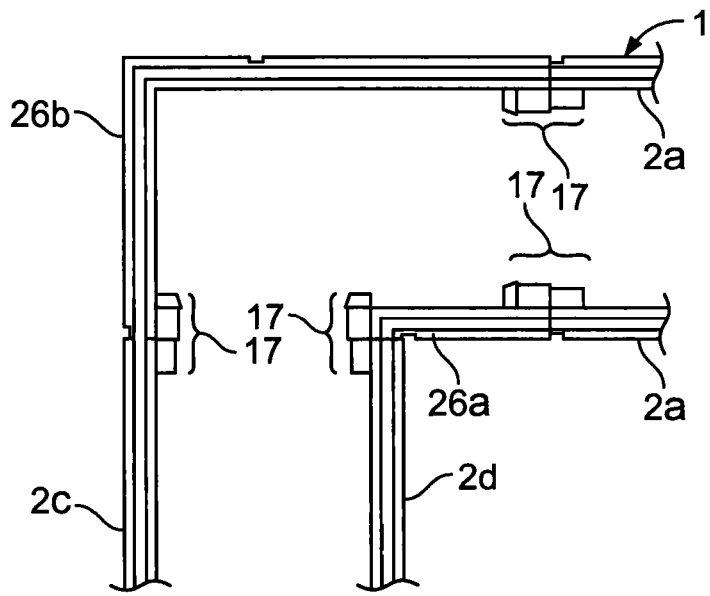

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FIG. 7B

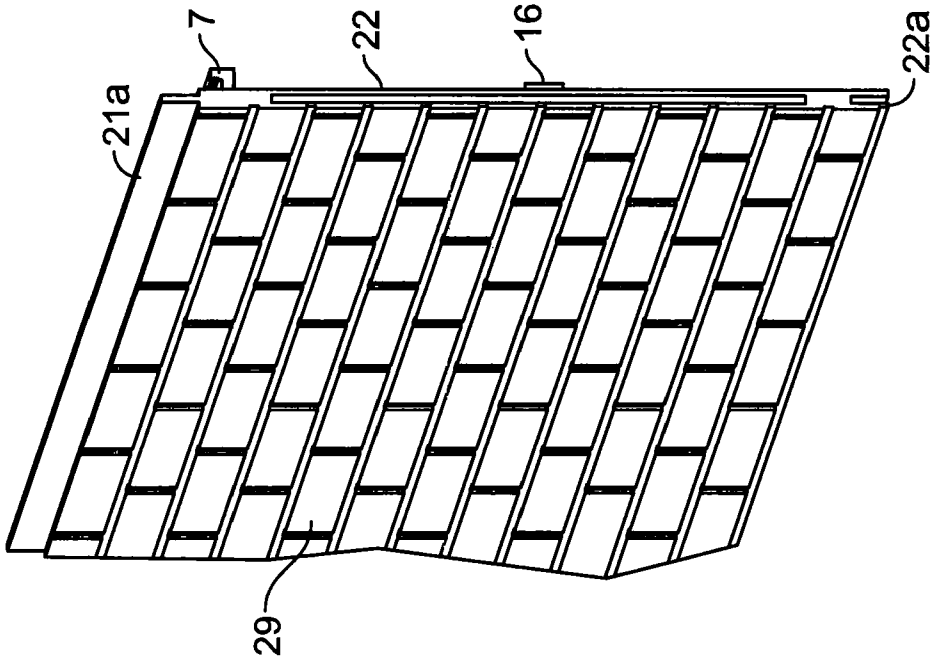


FIG. 8B

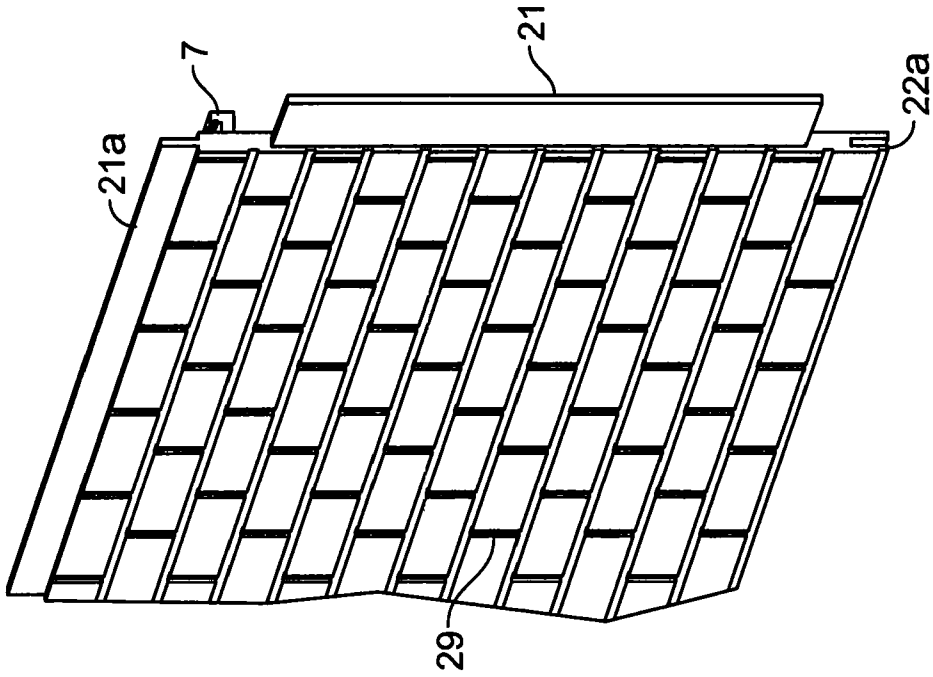


FIG. 8A

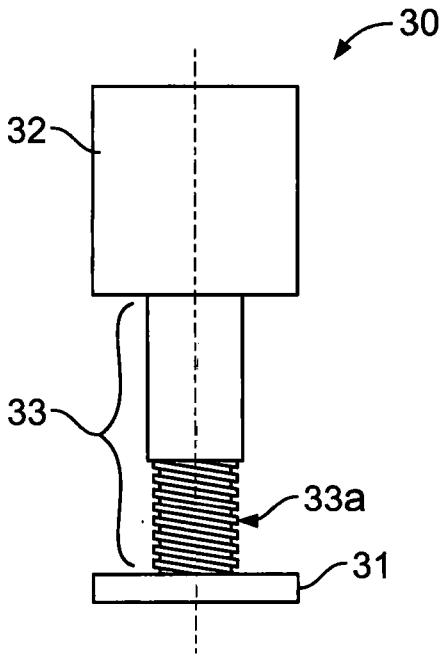


FIG. 9A

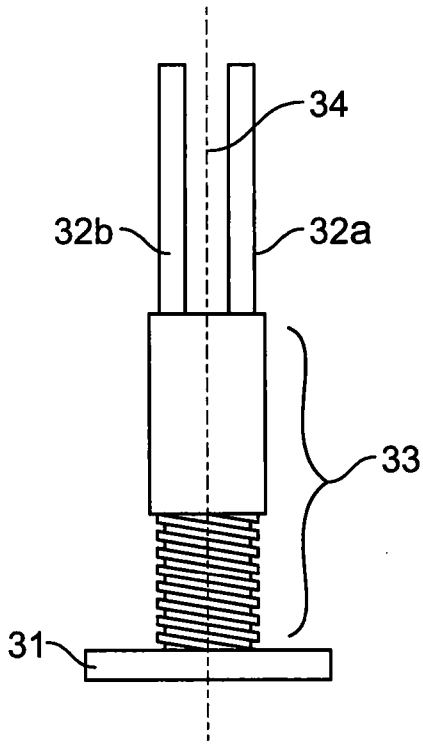


FIG. 9B

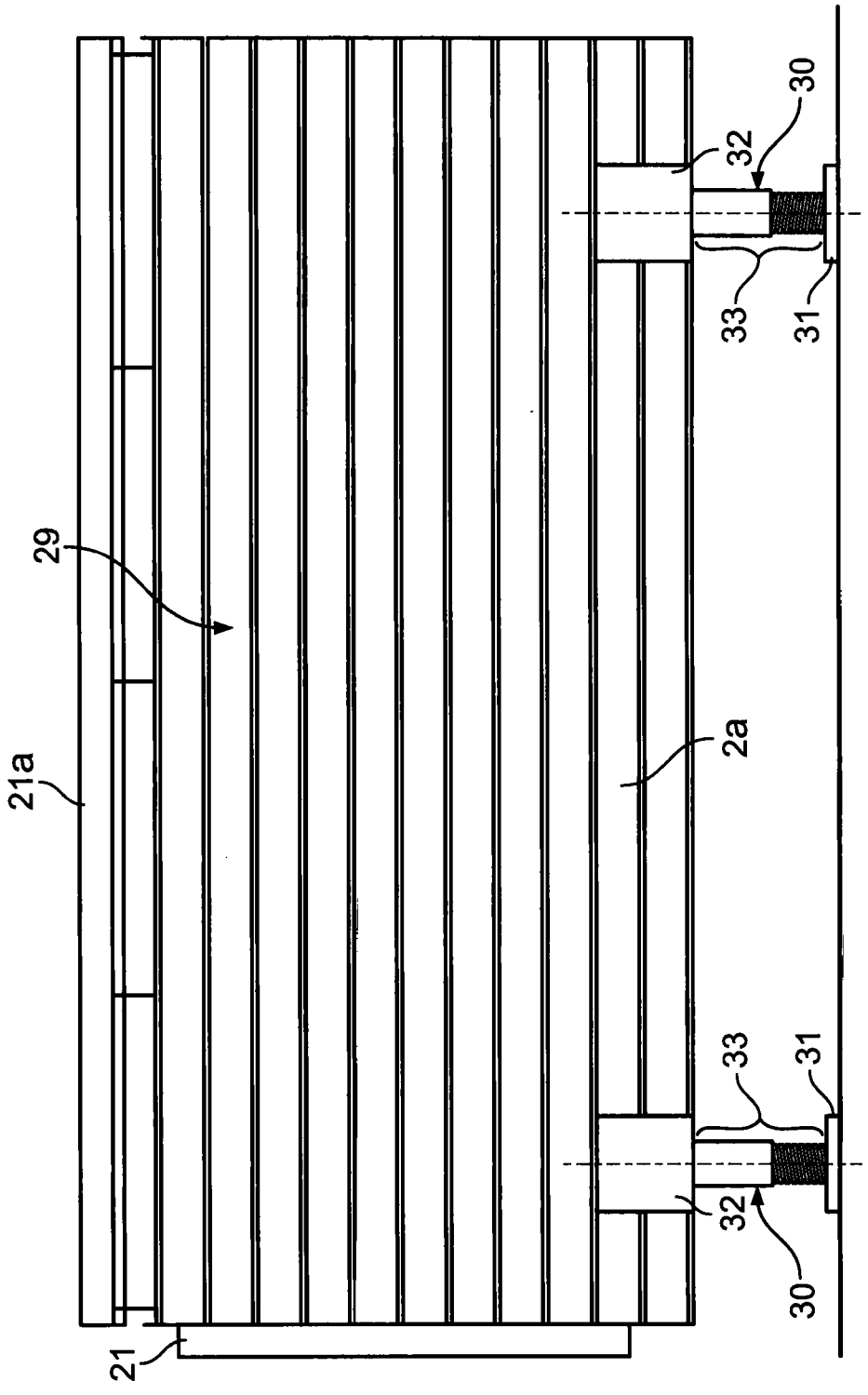


FIG. 10

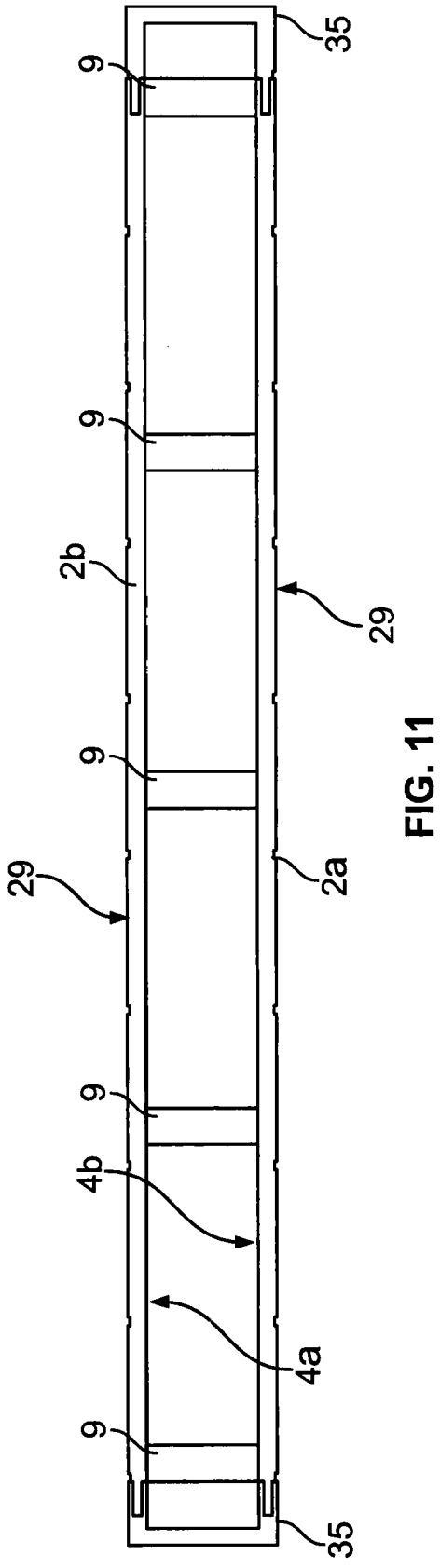


FIG. 11

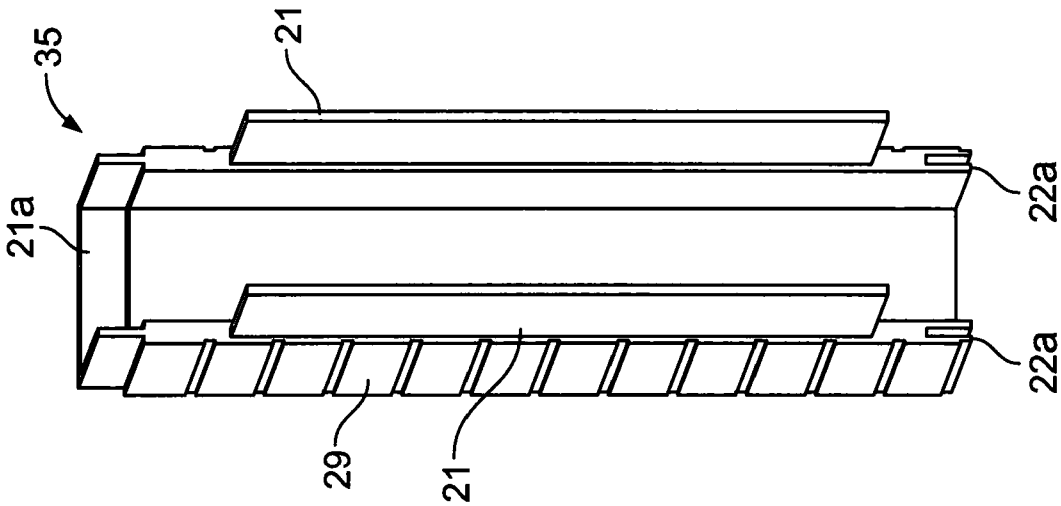


FIG. 12B

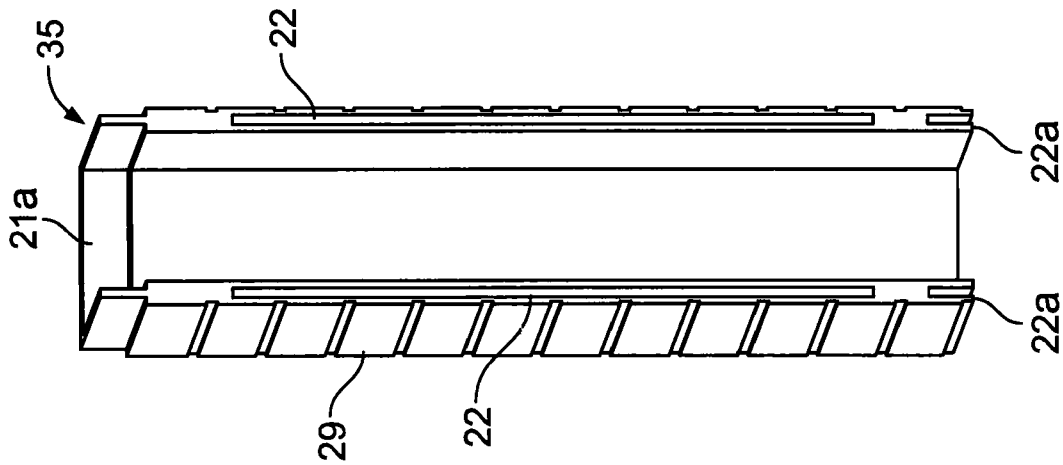


FIG. 12A

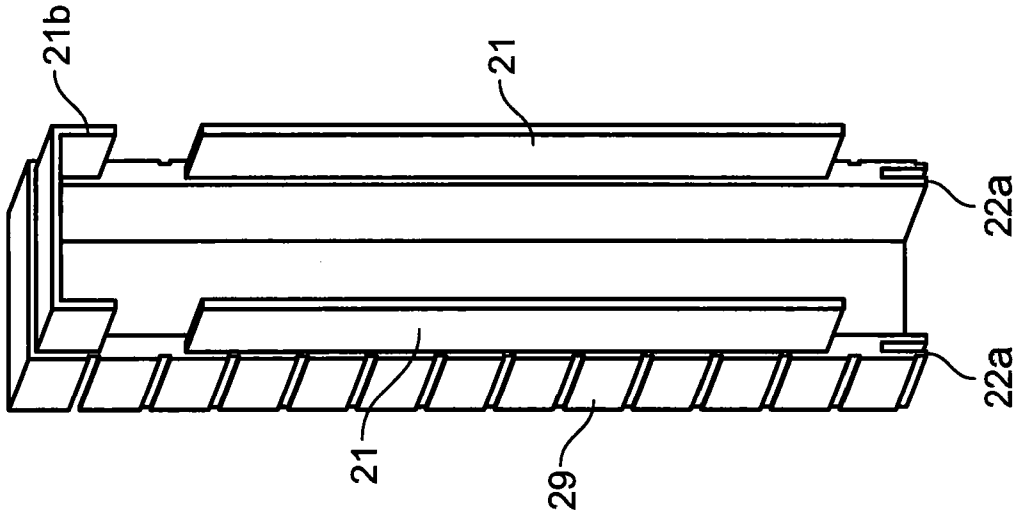


FIG. 13B

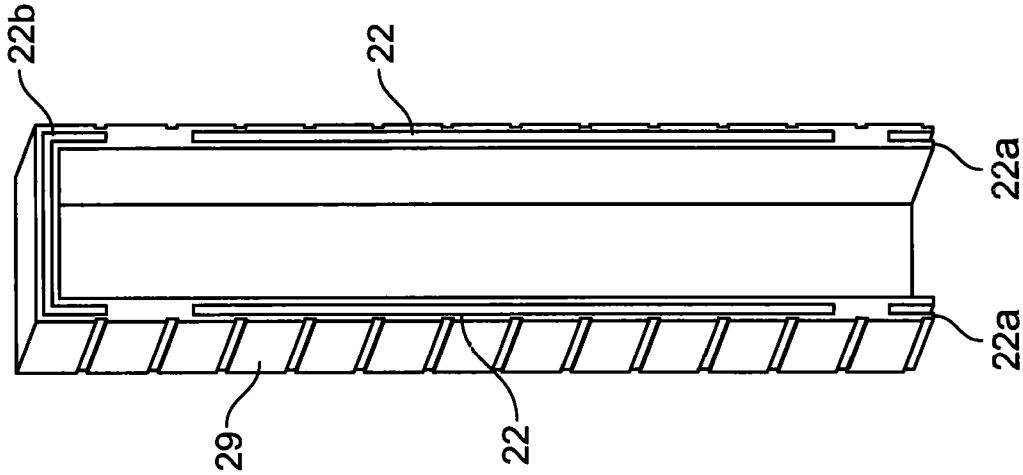


FIG. 13A

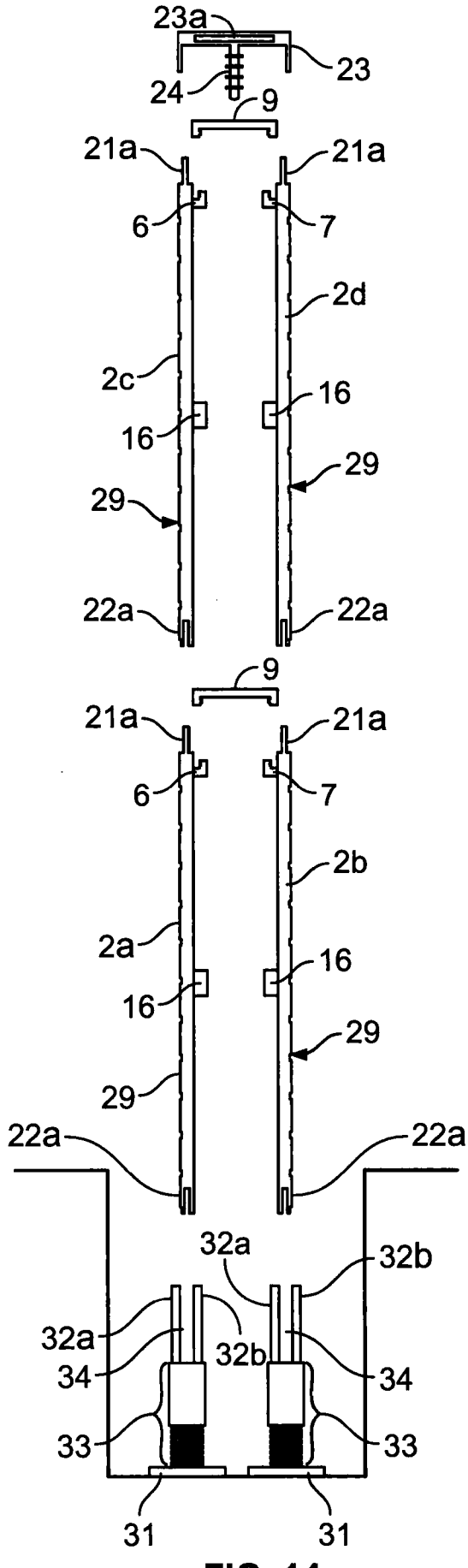

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FIG. 14

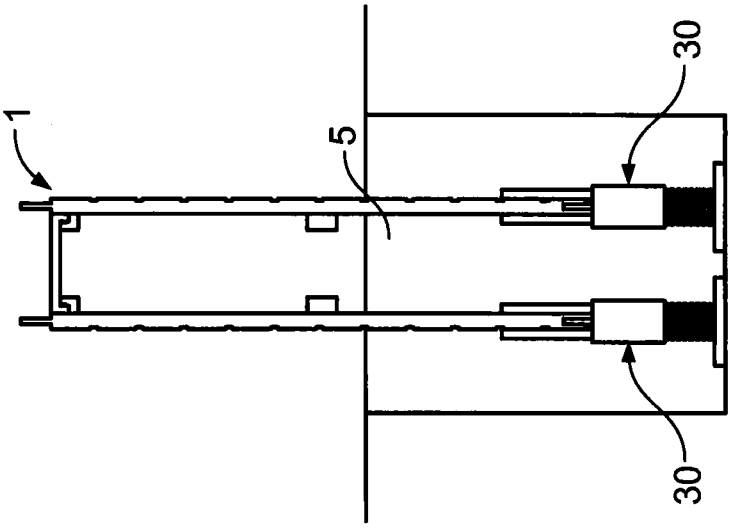


FIG. 15B

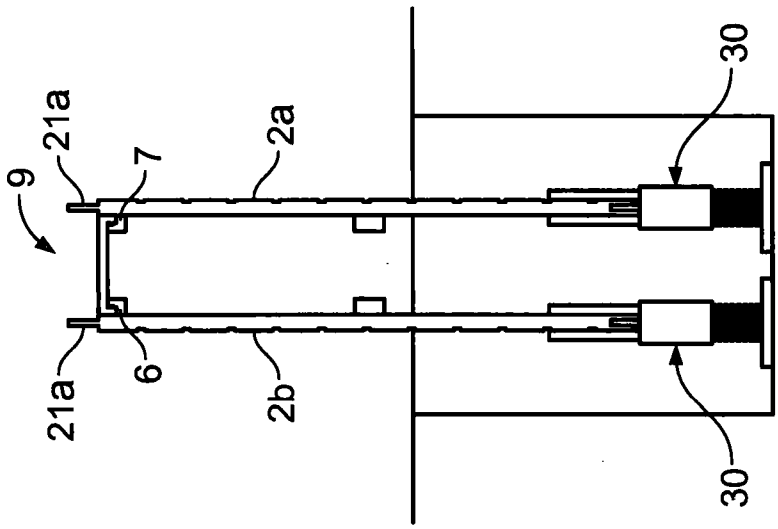


FIG. 15A

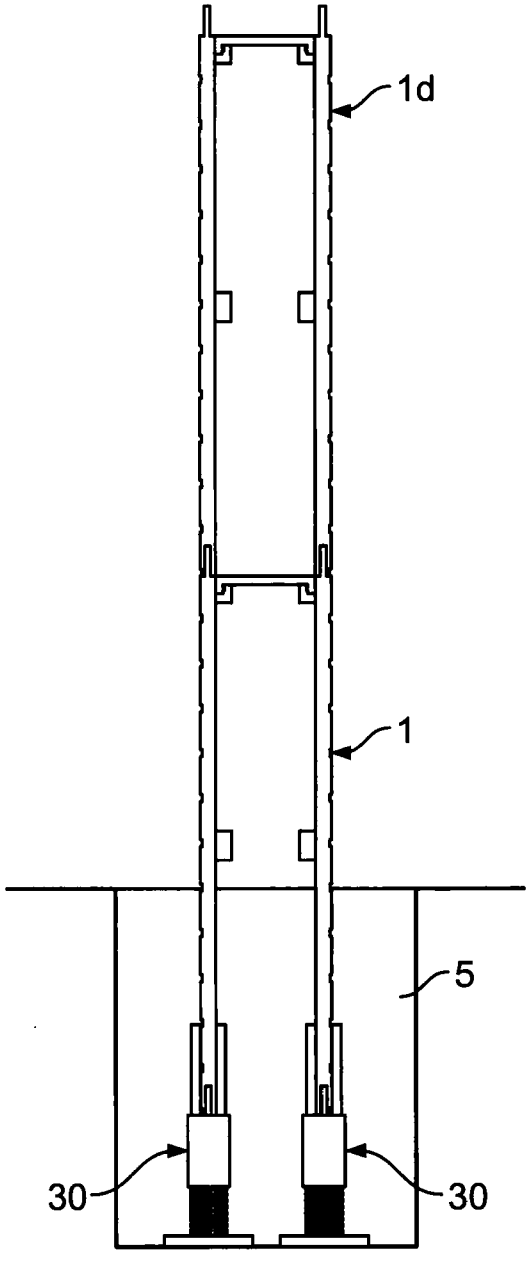


FIG. 15C

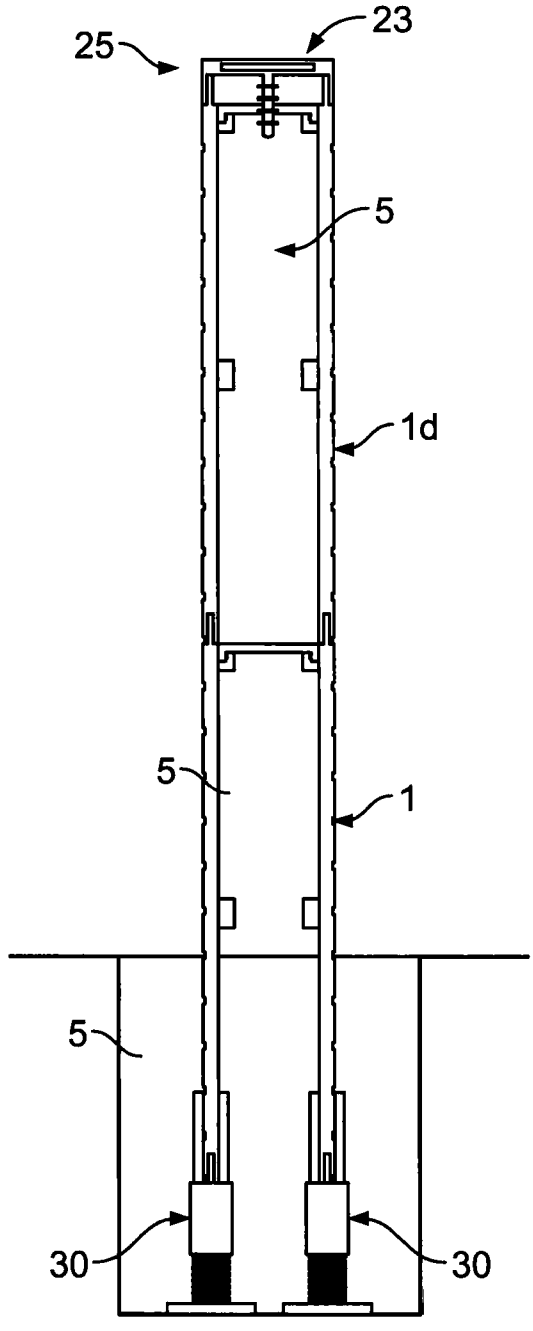


FIG. 15D

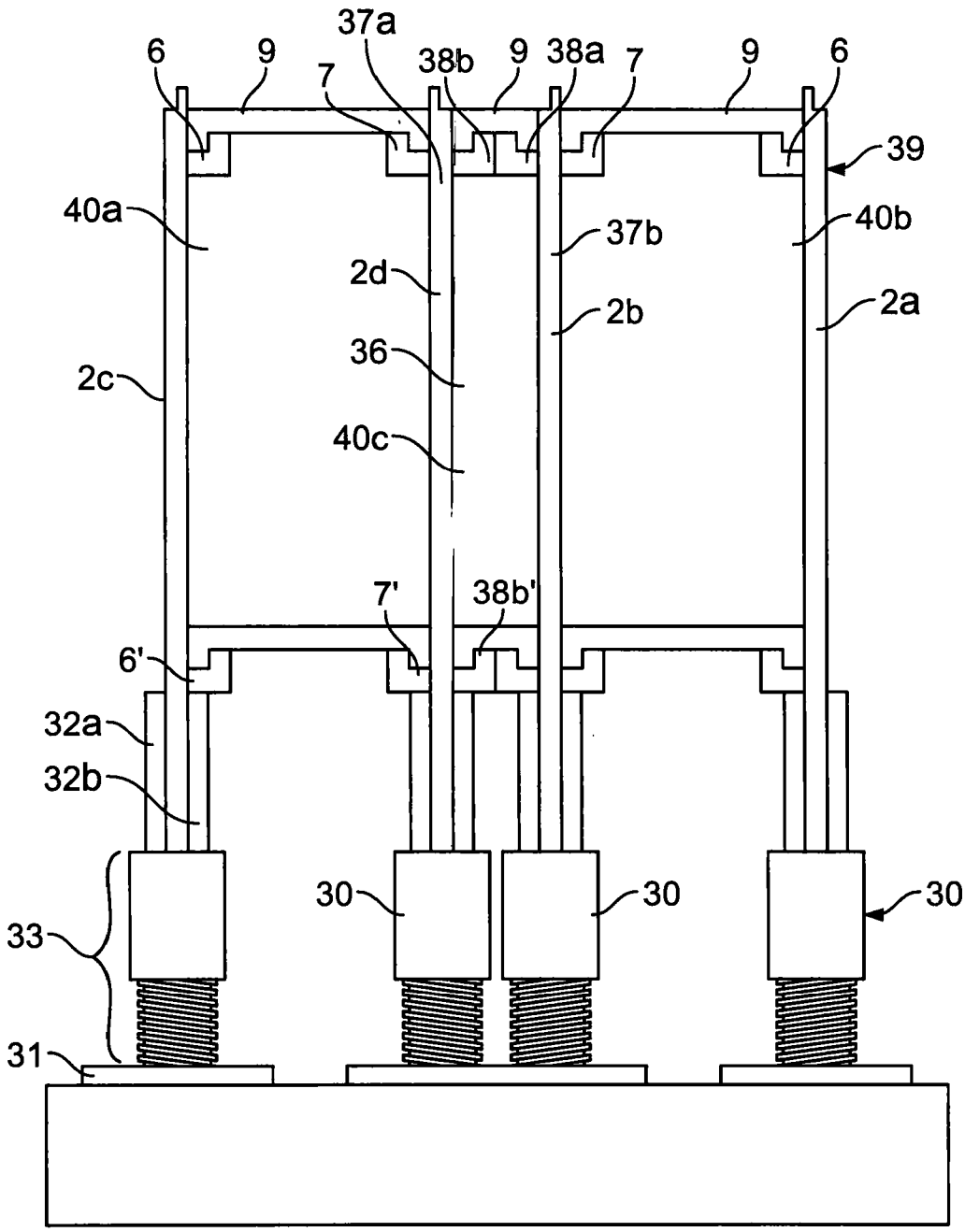

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FIG. 16

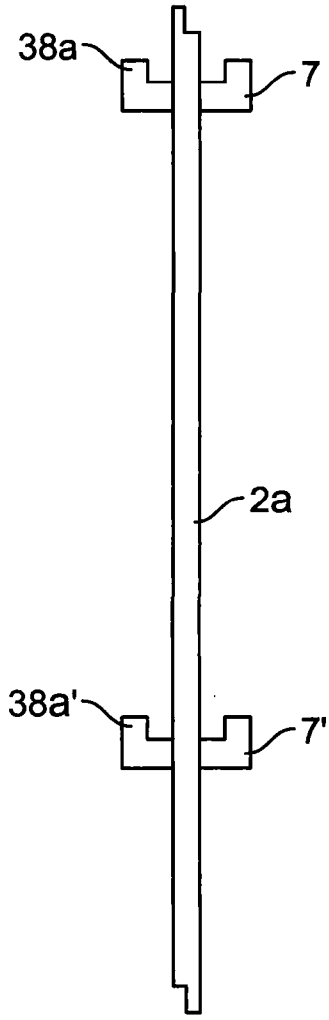


FIG. 17

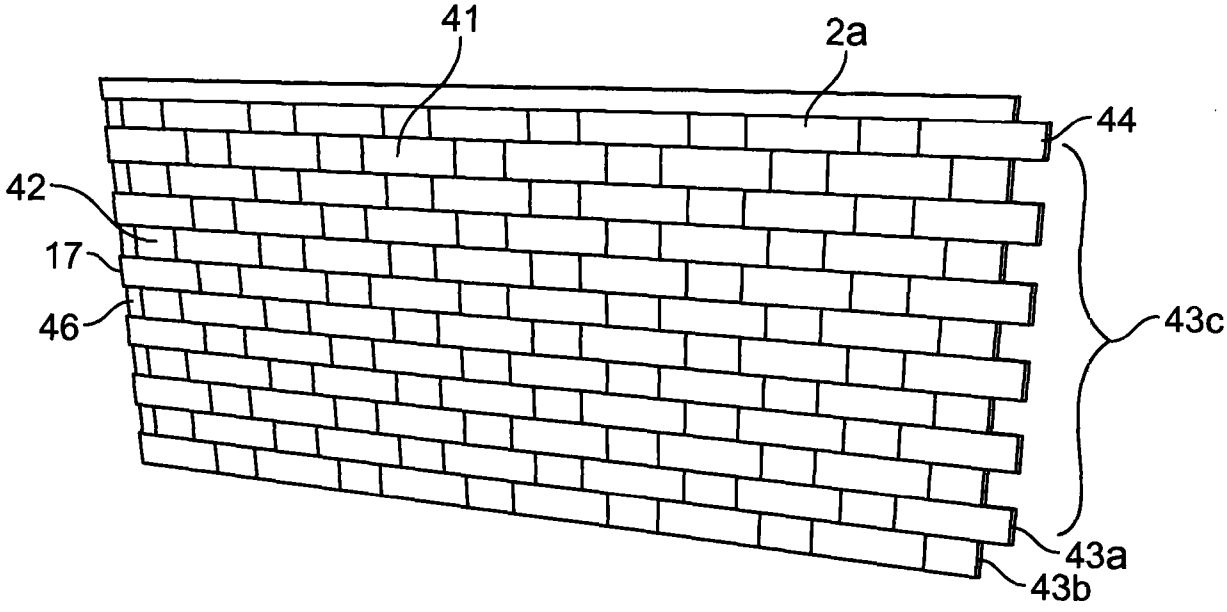


FIG. 18

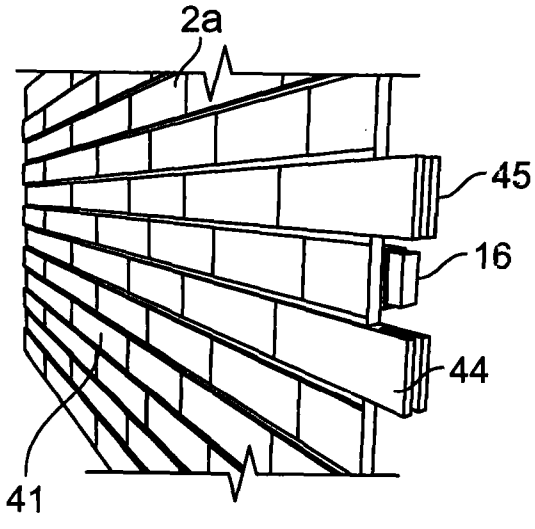


FIG. 19A

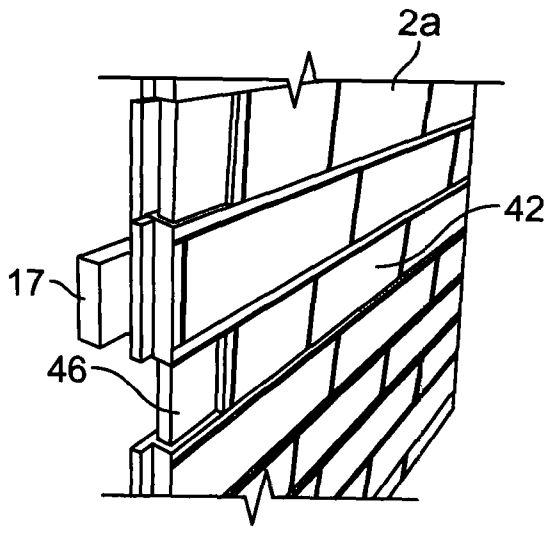


FIG. 19B

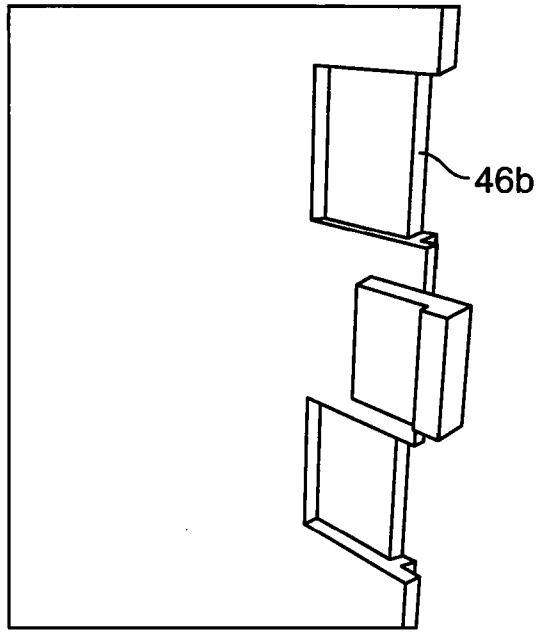


FIG. 19C

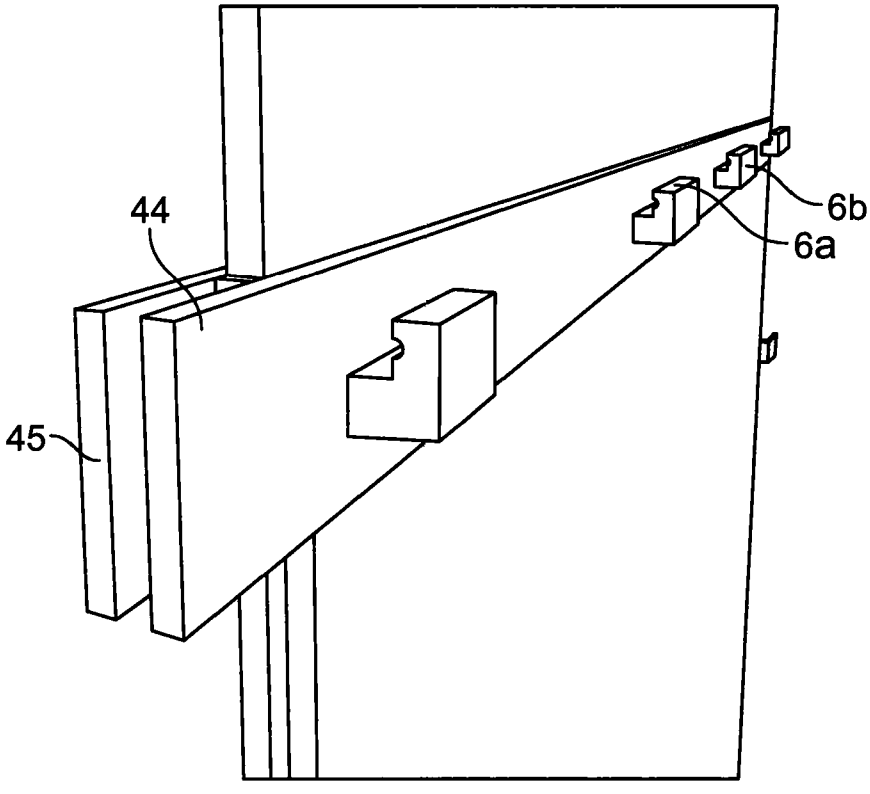


FIG. 19D

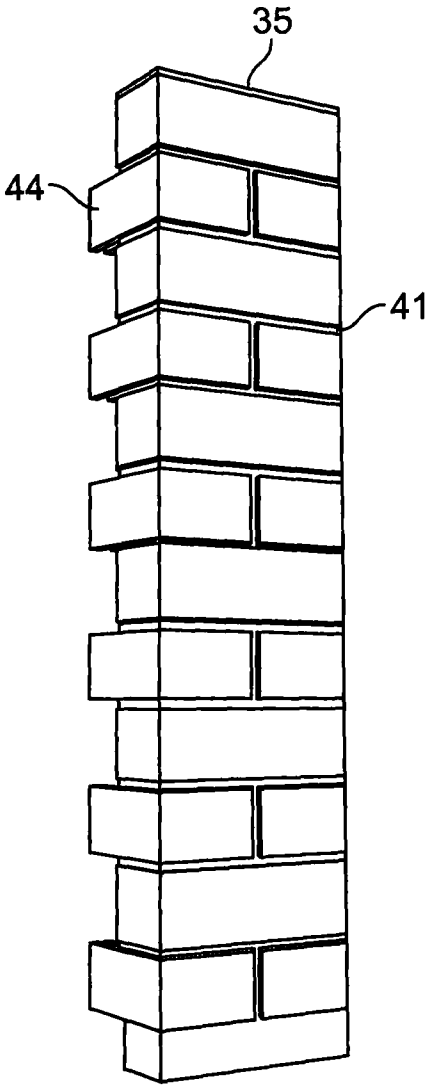


FIG. 20A

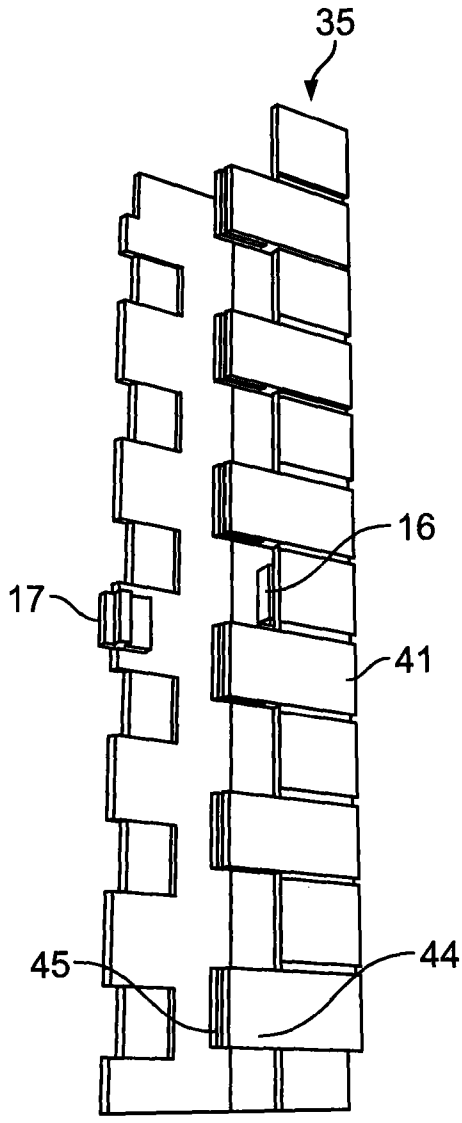


FIG. 20B

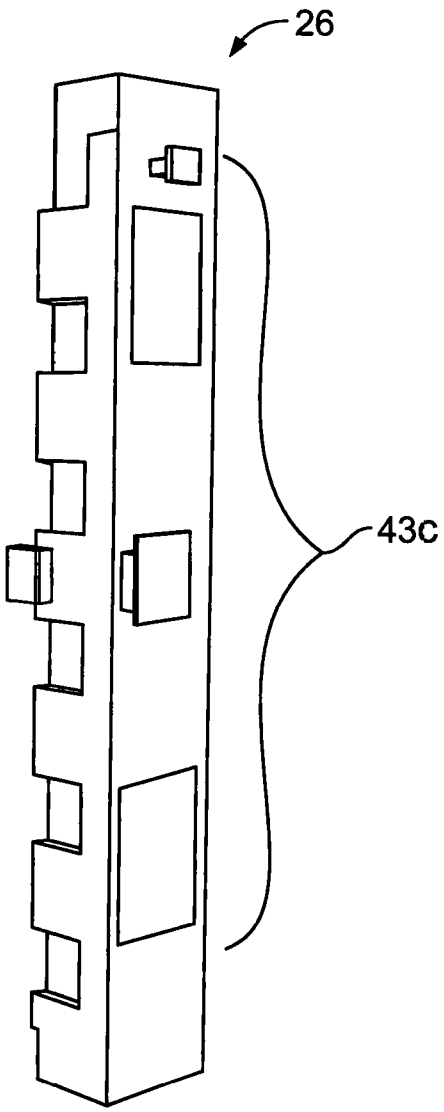


FIG. 21A

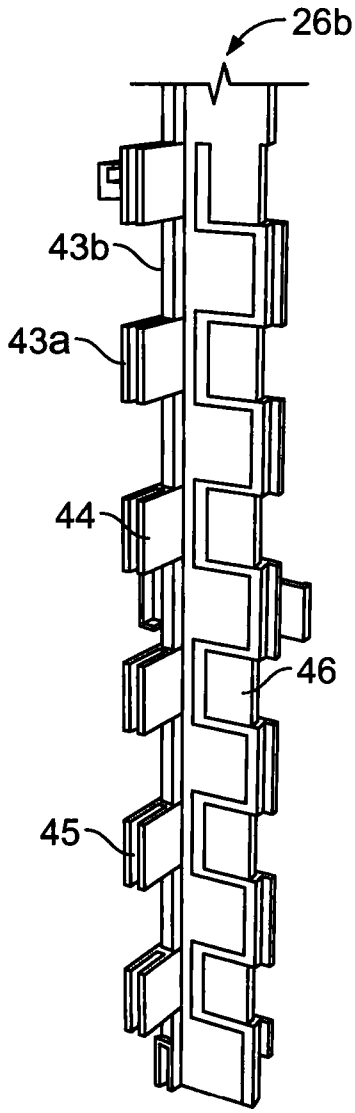


FIG. 21B

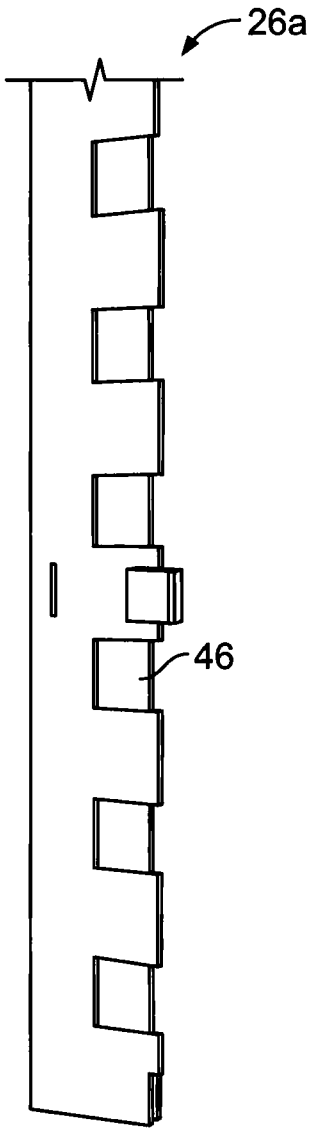


FIG. 22A

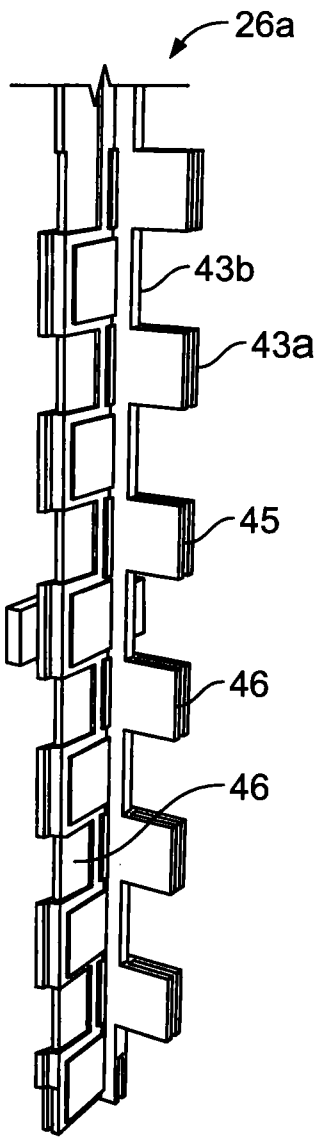


FIG. 22B

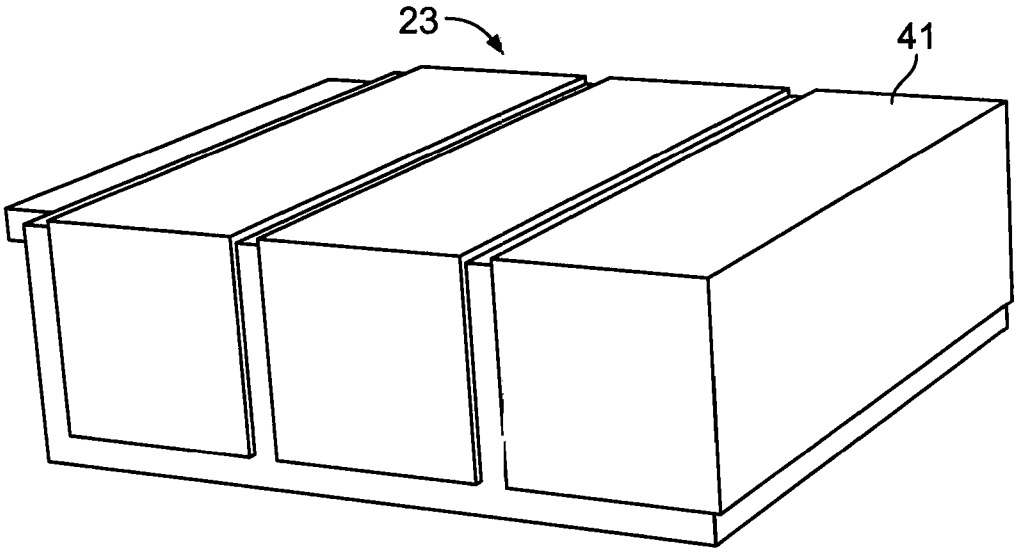


FIG. 23A

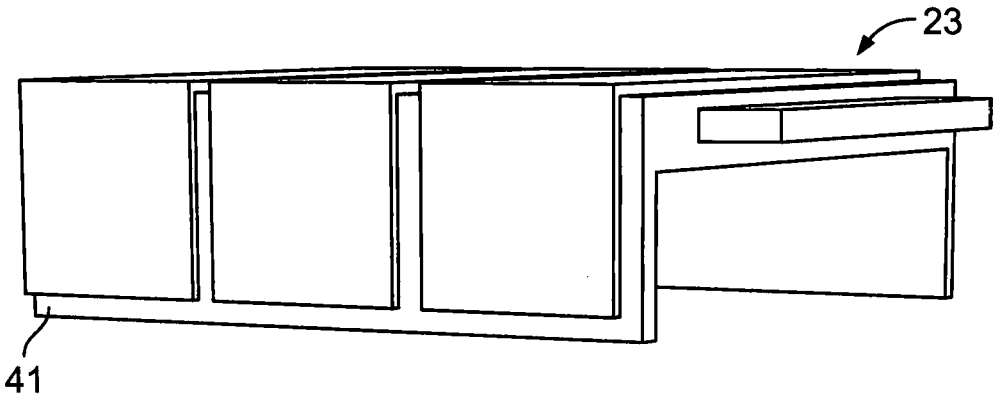


FIG. 23B

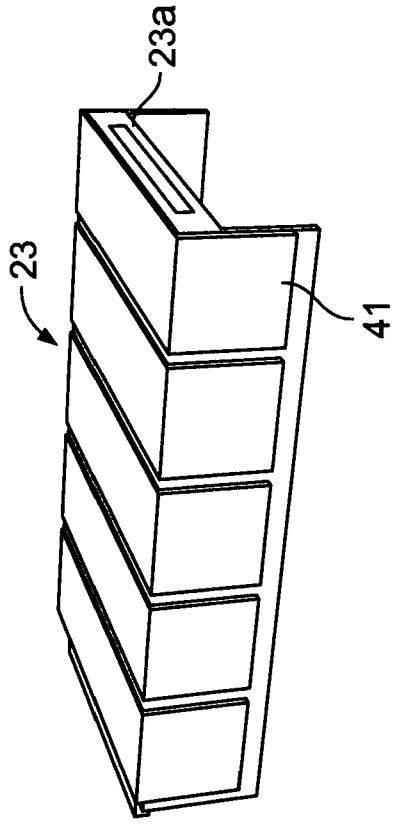


FIG. 24A

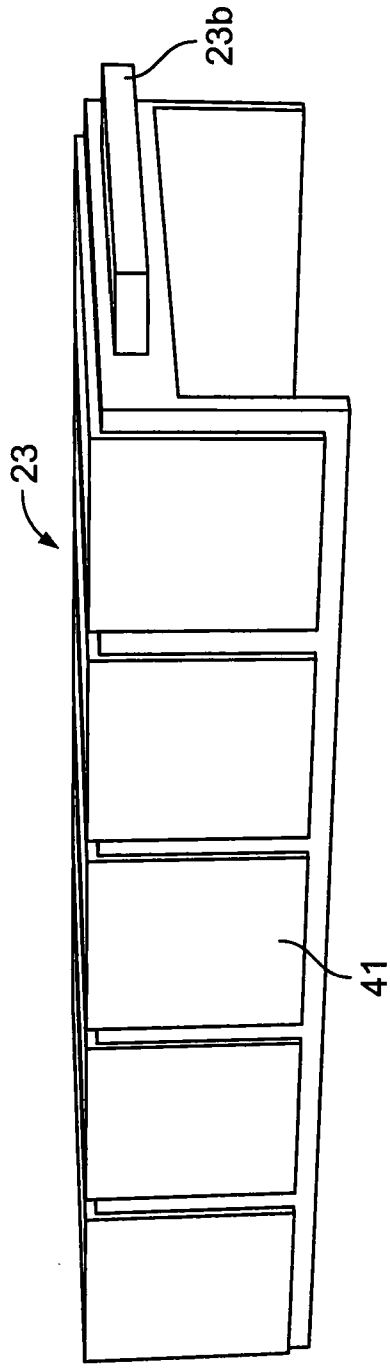


FIG. 24B

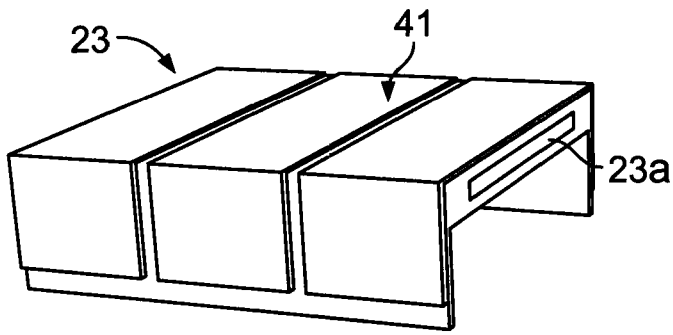


FIG. 25A

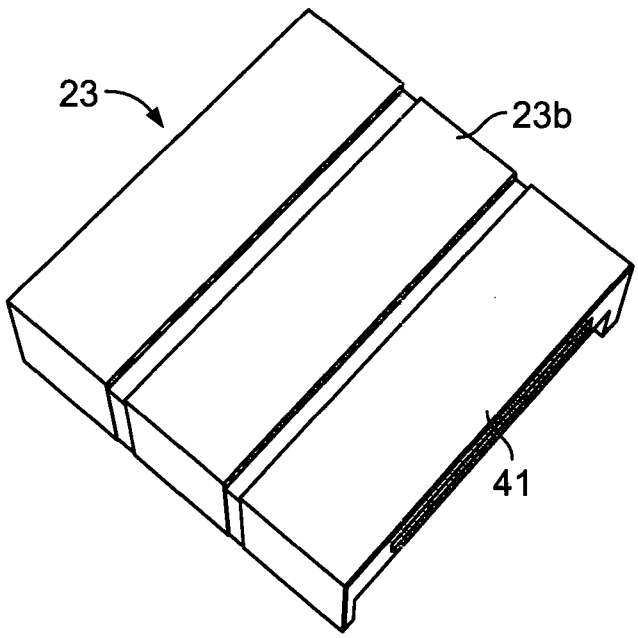


FIG. 25B

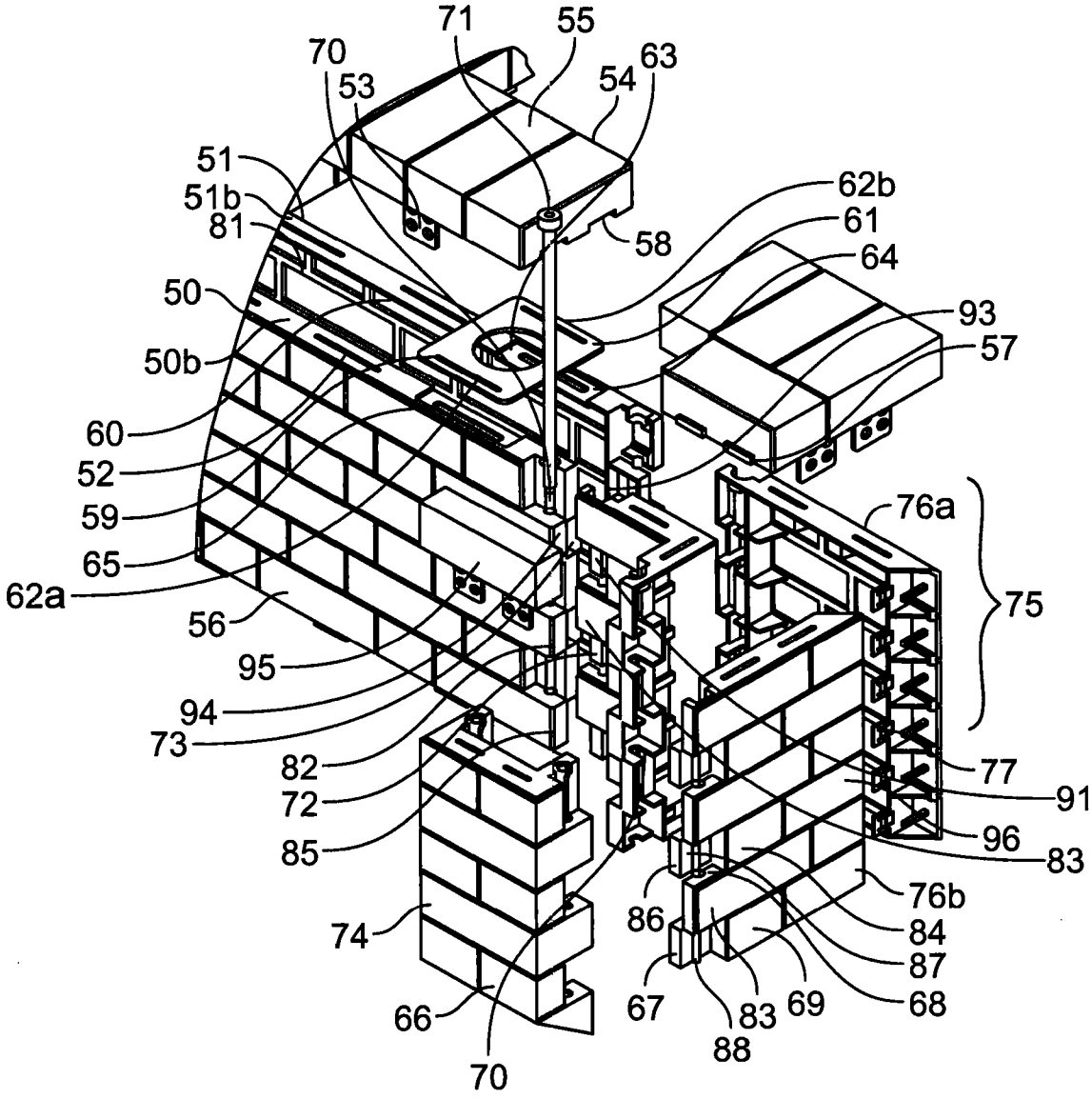

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FIG. 26

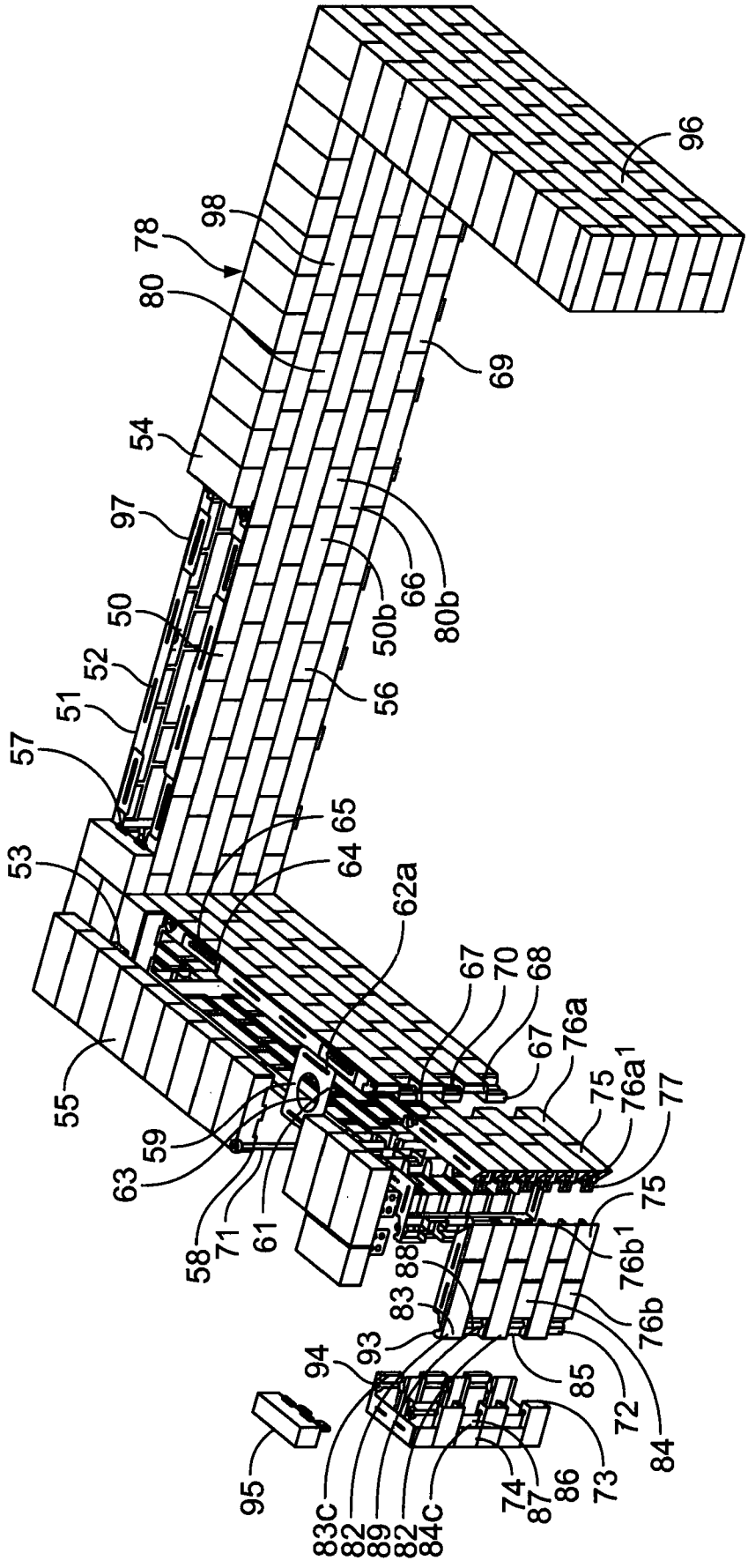

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FIG. 27