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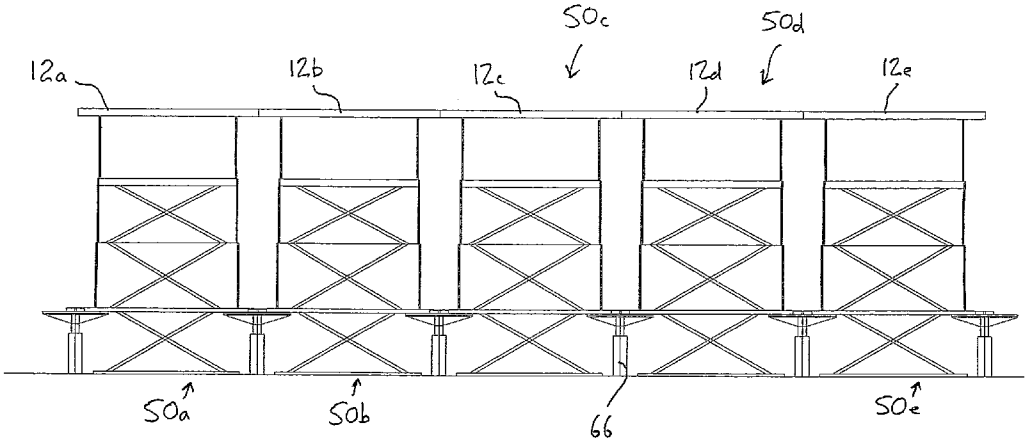
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(54) Title: SURFACE ASSEMBLY



(57) Abstract: A modular surface assembly comprises a plurality of surface modules, each module comprising a surface element having an exterior face; each module further comprising a means for moving the surface element from a first position to a second position; in the first position the surface elements of a plurality of the modules being aligned such that the exterior faces of the modules lie in substantially the same plane; and in the second position the surface elements of adjacent modules being out of alignment. The modular assembly is particularly useful as a floor assembly, for use in displays, exhibition stands, theatres, film sets, and the like. When arranged vertically, the assembly is especially suited for use as an advertising display.

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SURFACE ASSEMBLY

The present invention relates to an apparatus for providing a variable surface, in particular an apparatus for providing a variable flooring surface or for providing a variable vertical surface, especially one for use in advertising or the like. The assembly find particular use, but not limited to, displays for exhibitions, conventions and the like, and advertising hoardings, for example as in place in many towns and cities and visible from the road.

In conventional manners of construction, structural components, such as walls, ceilings and floors, are provided with surfaces that are substantially flat. In this respect, the term 'flat' is a reference to a surface that extends in just two dimensions. However, needs arise in which surfaces, such as ceilings, walls and floors, are required or desired to have surfaces with a shape and configuration extending in three dimensions. Such situations arise in the case of sets in studios for the recording of films and television programmes, and sets for theatre productions. Further examples of such situations include displays and stands at conventions and exhibitions, and in shops, in particular department stores and the like with relatively large display areas. To meet the needs for display surfaces of varying shapes and heights, it is known to provide rigid, permanent or semi-permanent structures on which objects may be placed and supported, for example in the case of display stands at exhibitions and conventions. Similar structures are used to provide temporary display stands in museums and the like. Theatres and studio sets use a variety of different structures and assemblies to provide support for props and scenery and to provide a range of surfaces on which actors and performers may work.

There is a need for a means for providing a surface with shape and configurations in three dimensions that is readily adaptable to a variety of situations and locations. In addition, there is a need for such a means that allows a given space or area to be readily modified or altered, to cater for changes in the overall use of the

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space or area, or to allow the specific form and function of the space or area to be changed or altered.

According to the present invention there is provided in a first aspect a modular surface assembly comprising a plurality of surface modules, each module comprising a surface element having an exterior face; each module further comprising a means for moving the surface element from a first position to a second position; in the first position the surface elements of a plurality of the modules being aligned such that the exterior faces of the modules lie in substantially the same plane; and in the second position the surface elements of adjacent modules being out of alignment.

The surface assembly of the present invention is modular. That is, the assembly comprises a plurality of individual surface units or modules, which may be combined to form an extensive surface of the desired proportions. It is a significant advantage of the present invention that each module is substantially self contained, thus providing total flexibility in the manner in which the modules can be combined to accommodate the needs and constraints of a given situation.

The modular assembly of the present invention may be used to provide a floor or a ceiling, in which case the modules are arranged with the exterior faces of the surface elements substantially horizontal. When the modular assembly is used to provide a floor, the modules with the surface element in the second position will be raised above those in the first position. Modules in either the first or second position may be used to support objects.

The modular assembly may also be used to provide a vertical surface, such as a wall or partition.

In a preferred embodiment, the movement of the surface element is substantially perpendicular to the plane occupied by the exterior faces when in the

first position. Thus, taking a substantially horizontal floor assembly as an example, movement of the surface element of each module will be substantially vertical.

In one preferred embodiment, the surface elements of modules in the second position are oriented such that the exterior face is parallel to the plane occupied by the exterior face when the module is in the first position. Thus, again taking a substantially horizontal floor assembly as an example, the modules in the first and second positions will provide an assembly characterized by a series of parallel, horizontal surfaces of varying heights.

In a give assembly, the modules may all have a second position at the same distance from the first position. However, it is also possible to provide the assembly with a variety of different modules, in which different modules have second positions at different distances from the first position. Accordingly, when used to provide a floor assembly, for example, the invention is characterized by a plurality of modules with surface elements at different heights.

It is preferred that each module of the assembly of this invention includes a means for locking the surface element in the second position. In addition, the module may include a means for locking or supporting the surface element in the first position. Each module may simply allow the surface element to be locked in a single second position. Alternatively, the module may provide means whereby the surface element may be locked in a plurality of discrete locations between the first and second positions. In this way, the assembly may provide greater flexibility in the position of the various modules such that, when used as a floor assembly, for example, the modules may be arranged at different heights to accommodate different objects for display, or the like. In a preferred arrangement, the surface element of each module may be arranged to be moveable to and locked in any position between the first and second positions, thus providing an infinite variety of arrangements. In such a case, the first and second positions represent the extremes of movement of the surface element of the given module.

The surface element of each module may be moved manually, by hand. However, it is preferred to provide each module with a drive means for moving the surface element between the first and second positions. Examples of suitable means include electric motors, linear actuators and/or hydraulic systems. Such drive means may also provide the means for locking the surface element in position.

Each module may be provided with a control panel for operation of the drive means to position the surface element of the module where required. However, in one preferred embodiment, the assembly is provided with a control system allowing the modules to be operated remotely.

In a simple form, each module comprises a surface element, a support for the surface element in the first position and a means for supporting and retaining the surface element in the second position. Examples of such means include one or more telescopic legs and a collapsible support frame. In a preferred embodiment, a module may comprise a housing extending from the surface element, such that when the surface element is in the second position, the housing extends between the surface element and the position occupied by the surface element when in the first position. A particularly preferred housing comprises a plurality of housing elements arranged telescopically, so as to allow the housing to extend as the surface element is moved from the first to the second position.

The modules may be provided with a range of light assemblies and projectors, allowing particular lighting effects to be achieved. This may be of particular use for display and advertising purposes. In one preferred arrangement, each module has key components, such as the surface element and the housing, if present, of a transparent or translucent material, allowing light emitted from the light assembly within the module to radiate outwards.

The space occupied by the module when the surface element is in the second position between the surface element and the first position may be adapted for use as storage.

Each module preferably comprises a base structure, with the surface element being supported on the base structure when in the first position. In such a case, the assembly may provide a form of false floor, for example, with the individual modules resting on the actual floor of the room or location. The base structure may house the drive means and/or lighting assemblies, if present in the module. The base structure advantageously includes members extending between the surface elements of adjacent modules, to thereby provide a substantially continuous surface.

The modular assembly of the present invention may be employed as a stage, a display stand or arrangement, or in any location where a variable support and display surface is desirable, for example a shop, library, gallery, museum, showroom, or the like.

In a further aspect, the present invention provides a kit comprising a plurality of modules as hereinbefore described. The kit preferably also comprises a means for remotely adjusting the position of individual modules. The means for remote control may comprise a computer or control panel, connected to the individual modules by way of cables or by infrared. A particular advantageous kit includes software for allowing the user to experiment with arrangements and visualize the module orientations, before adjustment of the assembly takes place.

The present invention also provides a module for use in a modular assembly as hereinbefore described.

As noted hereinbefore, the display assembly of the present invention may be used in a vertical orientation to provide a display for images, in particular for use in advertising and the like. Structures for supporting advertising displays are well

known in the art. Much use has been made of a simple vertically oriented board, onto which advertising material in the form of printed paper sheets is applied. For larger displays, a plurality of separate printed sheets are employed, which, when combined in the correct positions, make up a complete picture or poster. Such display systems are commonly seen in towns and cites, secured to the sides of buildings or as free-standing assemblies. The systems are often sited where they can be visible from passing vehicles, such as automobiles and trains. Other sites for such systems include locations where people regularly gather, such as bus stations, railway stations, and the like.

In addition to the fixed form of display, certain moving display systems are also known. For example, it is known to form a display from a plurality of, generally vertical, sub-assemblies. Each sub-assembly has two or more surfaces which may be oriented by rotation to align and form the display. A particular image or picture is distributed across corresponding surfaces of the sub-assemblies, such that can be moved into and out of view. While this system allows the image being displayed to vary, it is still limited in terms of the complexity of the display that can be presented to viewers.

There is a need for a means for providing an assembly with shape and configurations in three dimensions that is capable of providing a complex surface for displaying complex images, preferably dynamic images, in particular for use in advertising. It would be most advantageous if the system could be readily installed in existing advertising locations with little or no modification and without the need to accommodate more space than is already allocated.

The display system of the present invention provides a significantly improved and versatile means for displays, such as advertising and the like, when the surfaces fo the system are arranged to extend vertically. Accordingly, in a further aspect of the present invention there is provided a vertical display system for the display of information, the system comprising a plurality of surface assemblies arranged in a

display matrix, each surface assembly comprising a surface element having a display surface, the surface element of each surface module being movable in a direction substantially perpendicular to the plane of the display surface, the system comprising the plurality of surface assemblies such that each surface element has a first position and a second position, whereby in the first position the surface elements of the plurality of surface assemblies form a substantially vertical contiguous display surface and in the second position the surface elements are displaced from the plane of the contiguous display surface to form one or more secondary display surfaces.

The surface assembly of the present invention is particular advantageous in that it can be modular. That is, the assembly may comprise a plurality of individual surface assemblies each in the form of a module, which combine to form an extensive surface of the desired proportions. It is a significant advantage of the present invention that each module may be substantially self contained, thus providing total flexibility in the manner in which the modules can be combined to accommodate the needs and constraints of a given situation.

In one preferred embodiment, the surface elements in the second position are oriented such that the display surface is parallel to the contiguous surface when the surface elements are in the first position.

In a given assembly, the surface elements may all have a second position at the same distance from the first position. However, it is also possible to provide the system with a variety of different surface assemblies, in which different assemblies have second positions at different distances from the first position. This provides an additional degree of freedom when designing and operating a display, such as an advertising hoarding.

It is preferred that the surface element of each surface assembly of the system of this invention is movable to a plurality of positions between the first and second positions, in particular may be arranged to lie at any position between the first and

second positions. In such a case, the first and second positions represent the extremes of movement of the surface element of the given surface assembly.

The surface element of each surface assembly may be positioned manually, by hand, for example when the display is being set up and installed. In such a case, the surface assembly will be used to provide a static display, for example a static advertising display. However, it is a particular advantage of the display system of the present invention that the surface elements may be moved so as to create a dynamic display. In this way, the display may change over a period of time, for example according to a predetermined display routine. Accordingly, it is preferred to provide each surface assembly with a drive means for moving the surface element between the first and second positions. Examples of suitable means include electric motors, linear actuators and/or hydraulic systems.

Each surface assembly may be provided with a control system for controlling the movement of the surface element. However, for a complex display routine, it is necessary to provide a central control system with a suitable processor able to control the position and movement of the surface elements to provide the required display. Accordingly, the display system preferably comprises a control system having a processor for controlling the movement of each surface element between the first and second positions. The processor may be provided with a data storage device, such as a hard drive, ROM or RAM, which may be used to store display routines. The processor then retrieves display data from the central data storage device.

In one advantageous embodiment, the control system comprises an interface for receiving programming data for the display routines. Most conveniently, the interface allows data and controls to be input remotely. For example, several display systems may be linked to a network and programmed and controlled from a central location. Alternatively, the display system may comprise a RF or infrared interface, whereby data may be exchanged with the control system locally to the display. This

is particularly useful when the display system is located in a position that is generally inaccessible.

In a particularly preferred embodiment, one or more surface assemblies may comprise an intermediate surface element extending from the surface element, such that when the first surface element is in the second position, the intermediate surface element extends partially or completely between the surface element and the position occupied by the surface element when in the first position. The intermediate surface element may extend from each of one or more edges of the first surface element. In this way, the intermediate surface element provides a further display surface on which information, such as a portion of the advertising display, may be provided.

The intermediate surface element may be in the form of rigid or elastic sheets extending from the respective edge of the first surface element. In one preferred arrangement, the intermediate surface element is in the form of a flexible sheet that is arranged in a compact condition, such as a concertina manner or on a roll, when the surface element is in the first position, and extended when the surface element is in the second position. In an alternative arrangement, the intermediate surface element is arranged as a set of surface element portions arranged to move telescopically between an extended and a retracted position.

Information to be displayed is disposed on the exposed surface of the surface element. In addition, a display may utilize the exposed surface of the intermediate surface element. The surface assemblies may be provided with a range of light assemblies and projectors, allowing particular lighting effects to be achieved. In one preferred arrangement, each surface assembly has key components, such as the surface element and, if present, the intermediate surface element, of a transparent or translucent material, allowing light and images emitted from the light assembly within the surface assembly to radiate outwards. In this way, images may be projected onto inner surfaces of the display system, to be viewed from outside the display system. In addition, or as an alternative, the surface element and/or the intermediate surface

elements of one or more modules in the system may be provided with screens, such as liquid crystal displays (LCD) and the like, for showing images. The screens may be operated via the central control unit, as described hereinbefore. Alternatively, each screen may have its own processor for operating and controlling the display of images and information.

In a further aspect, the present invention provides a kit comprising a plurality of surface assemblies as hereinbefore described. The kit preferably also comprises a means for remotely adjusting the position of individual surface assemblies. The means for remote control may comprise a computer or control panel, connected to the individual surface assemblies by way of cables or by infrared. A particular advantageous kit includes software for allowing the user to experiment with arrangements and visualize the surface assembly orientations, before adjustment of the assembly takes place.

The present invention also provides a modular surface assembly for use in a modular assembly as hereinbefore described.

Embodiments of the present invention will now be described, by way of example only, having reference to the accompanying figures, in which:

Figure 1 is a cross-sectional view of a module of one embodiment of the modular assembly of the present invention for use in a floor assembly, with the module shown in the second or raised position;

Figure 2 is a cross-sectional view of the module of Figure 1 in the first or lowered position;

Figure 3 is a cross-sectional view of a modular floor assembly comprising five modules of Figures 1 and 2, all in the second or raised position;

Figures 4a to 4d are a series of perspective views of the module of Figures 1 and 2 with the surface element in a variety of positions;

Figure 5 is a perspective view of a floor assembly comprising approximately 240 modules of Figures 1 and 2 arranged in a rectangular array, with several modules in a variety of positions;

Figure 6 is a front elevation of a display system according to a second embodiment of the present invention;

Figure 7 is a sectional view of a modular surface system of the display assembly shown in Figure 6;

Figure 8 is a side elevational view of the display system shown in Figure 6, with a column of surface assemblies in a first position;

Figure 9 is a side elevational view of the display system shown in Figure 6, with a column of surface assemblies in a second position;

Figure 10 is a side elevational view of the display system shown in Figure 6, with a column of surface assemblies in a third position;

Figure 11 is a side elevational view of the display system shown in Figure 6, with a column of surface assemblies in a fourth position;

Figure 12 is a plan view of the display assembly shown in Figure 6 with two columns of surface assemblies in different positions;

Figure 13 is a view of the front of the display assembly of Figure 12 along the line of sight represented by arrow B;

Figure 14 is a view of the front of the display assembly of Figure 12 along the line of sight represented by arrow C;

Figure 15 is a front elevational view of a display system according to a third embodiment of the present invention; and

Figure 16 is a perspective view of the display system of Figure 15.

The present invention will be further described and illustrated by the accompanying drawings relating to specific embodiments that provide a floor assembly and a vertical advertising display assembly. It will be understood that this is merely for illustration purposes only and that the present invention is not limited in its application to floors and vertical advertising displays, as discussed hereinbefore and hereafter.

Referring to Figure 1, there is shown a single floor module, generally indicated as 2. The module 2 comprises a base structure 4, having legs 6, arranged in a square pattern. Support members 8 extend between adjacent legs 6. A surface element 10 extends parallel to the support members 8 and substantially horizontally. The major portion of the upper surface of the module 2 is provided by the upper face 12 of the surface element 10. The surface element 10 is supported by a plurality of support struts 14, which cooperate to provide a support structure for the surface element 10. A housing, generally indicated as 16, extends downwardly from the surface element 10 and comprises three housing portions 18a, 18b and 18 c, arranged telescopically, such that housing portions 18b and 18c may be accommodated wholly within the housing portion 18a.

An electric motor 20 provides drive to raise and lower the surface element 10 by way of the support struts 14.

The module in Figure 1 is shown with the surface element 10 in the raised or second position for clarity. In normal operation, it is likely that the module will have the surface element 10 in the lowered or first position, as shown in Figure 2. The module shown in Figure 2 is that of Figure 1, with elements such as the support struts 14 and motor 20 omitted for clarity. In this position, the surface element 10 rests upon the support members 8 and is supported by the legs 6. As can be seen, the housing portions 18a, 18b and 18c are accommodated within the confines of the base structure 4.

In use, the module 2 may be operated so as to move the surface element 10 from the lowered or first position shown in Figure 2 to any position between the first position and the raised position shown in Figure 1. A means for locking the surface element in place at the desired height is provided (not shown).

As an alternative to the arrangement of support struts 14 shown in Figure 1, the surface element 10 may be supported and moved by way of one or more hydraulic lifts of known configuration. Again, such a mechanism includes a means for locking the surface element 10 as the desired height.

Referring to Figure 3, there is shown a floor assembly comprising five modules 50a, 50b, 50c, 50d and 50e of the type shown in Figures 1 and 2. All five modules are shown with the surface elements 12a to 12e in the raised position. From Figure 3, it can be seen that in an array of modules such as that shown, adjacent modules share the legs of the base structures. Thus, the leg 66 is shared by the adjacent modules 50c and 50d.

As can be seen in Figure 3, the surface elements 12a to 12e are contiguous and cooperate to provide a substantially flat and unbroken surface. This surface can be used to support items for show or display. Alternative uses of the surface include use as a table or seating, depending upon the height to which the surface elements are set. In this respect, reference is made to Figures 4a to 4d, which show a single module of

the type shown in Figures 1 and 2 in perspective view in a range of positions, with the surface element 12 arranged and locked at a variety of different heights. It will be appreciated that the different heights lend themselves to different applications. Thus, the orientation of the module as shown in Figure 4a is useful as a floor upon which people may walk or items, such as items of furniture, may be supported. The module shown in Figure 4b may be used, for example, to provide seating. Similarly, the module shown in Figure 4c may be employed as a table or bench. Finally, the module shown in Figure 4d may serve as a display for items, such as sculptures or ornaments.

Referring to Figure 5, there is shown an entire floor assembly in perspective view, generally indicated as 100, comprising modules of the type shown in Figures 1 and 2. As discussed above in relation to Figure 3, adjacent modules share portions of the base structure, in particular the legs. As before, the surface elements of adjacent modules are contiguous and combine to form a substantially continuous floor surface. As shown in Figure 5, groups of modules, indicated as 110, 112 and 114, are in the raised positions, with the surface elements arranged at different heights to provide a variety of different support surfaces.

In a preferred arrangement, the base structure may comprise extendable members that can be extended from the floor assembly for use, for example, as the legs of additional tables or as support members for other structures, such as shelving, display units, lighting, and the like. In one arrangement, the extendable members may be housed within and extend from the legs of the base structure. Alternatively, the base structure may be provided with slots or recesses to accommodate support members for the aforementioned uses. Again, the slots and/or recesses may be provided in the upper portions of the legs of the base structure. The components to be connected to the support members and/or the support members themselves may conveniently be stored within the modules, when not in use.

It is preferred that an assembly, such as that shown in Figure 5, consists entirely of modules as hereinbefore described. However, it may be desired to employ

one or more modules that comprise a base structure and a surface element that is not moveable between the first and second positions. If a large portion of the assembly surface is required to remain in a given plane, such as to provide a floor on which people will stand and walk, it is possible to employ just some of the hereinbefore described modules in key locations within the assembly.

Referring to Figure 6, there is shown a vertical display assembly, generally indicated as 502. The assembly comprises a pair of vertically extending, generally cylindrical support columns 504. However, it will be understood that the assembly may be mounted to a different support structure, or support by a pre-existing structure, such as the wall of a building. In the embodiment shown in Figure 6, the assembly comprises a plurality of modular surface assemblies 510. In the arrangement shown in Figure 6, the display assembly 502 is formed by 35 modules arranged in a 7 by 5 matrix of modular surface assemblies 510. It will be appreciated that the modules 510 may be arranged in other patterns or matrices utilizing different numbers of modular surface assemblies, as the demands of the display dictate.

The assembly shown in Figure 6 has the display surface formed solely by surface assemblies as hereinbefore and hereinafter described. It will be appreciated that the display surface may be formed from a combination of fixed surface elements, in combination with surface assemblies having moveable surface elements.

A single modular surface assembly 510 is shown in greater detail in Figure 7. The surface assembly 510 comprises a support structure, generally indicated as 514, having a plurality of struts 516, arranged in a square pattern. Support members 518 extend between adjacent struts 516. A surface element 520 extends parallel to the support members 518 and substantially vertically oriented. The surface element 520 is supported by a plurality of support struts 524, which cooperate to provide a support structure for the surface element 520. An extendable intermediate surface element, generally indicated as 526, extends from the surface element 520 to the support members 518. The intermediate surface element 526 comprises three surface portions

528a, 528b and 528 c, arranged telescopically, such that the surface portions 528b and 528c may be accommodated wholly within the surface portion 528a. The surface assembly 510 may comprise a single intermediate surface element 526 extending from the surface element 520 to the support structure. The arrangement shown in Figure 7 comprises two such intermediate surface elements. It is preferred that sufficient intermediate surface elements 526 are provided to enclose the space defined between the surface element 520 and the support structure 514. In this way, the maximum amount of surface area is available for the display of information.

As an alternative to the arrangement of surface portions 528a to 528c shown in Figure 7, the intermediate surface element 526 may comprise a single surface portion, which may be folded, for example as a concertina, and allowed to unfold as the surface element 520 is displaced from the support structure 514. A further alternative is to arrange the intermediate surface element 526 as a sheet of suitable material that may be stored on a roll, from where it may be unwound as the surface element 520 moves.

An electric motor 530 provides drive to move the surface element 520 by way of the support struts 524.

The modular surface assembly 510 in Figure 7 is shown with the surface element 520 in the second position displaced from the support structure 514.

In use, the modular surface assembly 510 may be operated so as to move the surface element 520 from a first position, which the surface element 520 is in contact with or adjacent the support members, to the second position shown in Figure 7. In a preferred arrangement, the surface element 520 may be moved to any position between the first position and the second position shown in Figure 7. A means for locking the surface element in place at the desired position is preferably provided (not shown).

As an alternative to the arrangement of support struts 524 shown in Figure 7, the surface element 520 may be supported and moved by way of one or more hydraulic systems of known configuration. Again, such a mechanism preferably includes a means for locking the surface element 520 at the desired position.

Referring again to Figure 6, it can be seen that the 35 modular surface assemblies 510 combine, such that the surface of the surface element 520 of each module 510 provides a portion of a contiguous display surface. In use, a display, in particular an advertising display, is provided on the display surface. This may be moved in whole or in portions by the operation of the respective modular surface assembly 510. In addition, the intermediate surface elements of the modular surface assemblies 510 may also be employed to display information. Examples of positions for the modular surface assemblies of the display system of Figure 6 will now be described.

Referring to Figure 6, the overall display is comprised of a major portion 600, in which the information being displayed is set out on a first display surface formed of modular surface assemblies with their surface elements in the first position. A portion of the display is set out on a second display surface formed by a column of modular surface assemblies 610 with their surface elements displaced horizontally from the plane of the first display surface. A third display surface 620 is shown in Figure 6 and is formed by the intermediate surface elements of the modular surface assemblies in the column 610.

This third display surface is shown in more detail in Figure 8, where the third display surface 620 is clearly visible from the side of the display assembly. This provides the advantage that the display system can be used to show information, such as advertising material, to viewers who are in a position relative to the display such that a conventional two-dimensional advertising display could not be seen fully or at all. This effect is increased by the arrangement shown in Figure 9, where the modular surface assemblies 510 in the column 610 have been extended to displace the surface

elements 520 further from the support structures 514, revealing a larger third display surface on the intermediate surface elements. Following the same principle, still larger third display surfaces are shown in Figures 10 and 11, achieved by having the surface elements 520 of the modular surface assemblies in the column 610 displaced still further from the support structure 514.

Referring to Figure 12, the display assembly 502 of Figure 6 is shown, in plan view, with the surface assemblies 510 arranged in a further pattern. In particular, two columns of surface assemblies, 610a and 610b have been positioned with their respective surface elements displaced from the major portion 600 of the display surface. The surface assemblies in column 6have been extended to a position to form a second display surface 700 on the surface elements 520 and third display surfaces 710 on each of the intermediate surface assemblies. The surface assemblies in column 610b have been extended to a position, different to that of column 610a, to form a fourth display surface 720 on the respective surface elements 520 and fifth display surfaces 730 on the respective intermediate surface assemblies.

The versatility of the display system arranged as shown in Figure 12 can be appreciated by considering a viewer standing at various positions with respect to the display. A first viewer 750 standing centrally in front of the display with a line of sight represented by the arrow A in Figure 12 would see the display as a single surface, comprising display surfaces 600, 700 and 720, all of which would be viewed from directly in front. This view is the front elevation shown in Figure 6. It will be noted that only the surface of each surface element 520 can be seen, regardless of the position of each module 510 within the system.

A second viewer 760 standing in front and to one side of the display would have a line of sight represented by the arrow B in Figure 12. The second viewer in this position would see a display made up of display surfaces 600, 700, 710, 720 and possibly 730. As will be appreciated, this viewer would see a significantly different, but not necessarily totally unrelated, display to that of the first viewer. This view is

shown in Figure 13. In particular, it will be noted that in the view shown in Figure 13, the display surfaces 710 and 730 become visible, with portions of the display surface 600 being occluded. A third viewer 770 standing further to one side of the display would have a line of sight represented by the arrow C in Figure 12, giving a different view again of the display on display surfaces 600, 700, 710, 720 and 730. This view would be different again to that seen by the first and second viewers. The image seen by the third viewer is as shown in Figure 14. In particular, in the view shown in Figure 14, a better view of the display surfaces 710 and 730 is obtained, with more of the display surface 600 being obscured. In this way, a viewer moving in relation to the display 52 can be presented with a wide variety of different images and displays, that change with the movement of the viewer.

Referring to Figure 15, there is shown a further embodiment of the display system of the present invention. The display system of this embodiment, generally indicated as 802, is of the same general construction as that of the first embodiment shown in Figure 6, with the difference that the columns of individual modules have each been replaced by a single columnar module 810 extending the full height of the display. Each columnar module 810 comprises an elongate rectangular surface element 804 having a corresponding display surface 806. A side perspective view of the display system of Figure 15 is shown in Figure 16. As will be seen, two columnar modules 810a and 810b have been extended to provide additional display surfaces 820a and 820b.

It will be understood that the modules 510 of the first embodiment and the columnar modules 810 of the second embodiment may be combined in a single display system, as required for the particular display.

The overall effect of the display system of the present invention is to provide a display that is three dimensional in form and that can change from the perspective of the viewer, as the viewer moves with respect to the display. Further effects can be achieved by having the surface assemblies active and moving, to hide and reveal

intermediate surface elements. It will be readily appreciated that these effects can be achieved by the assembly of the present invention while occupying the same position and area as conventional, two-dimensional advertising boards and hoardings.

In addition, the display system of the present invention, by utilizing the intermediate surface elements, allows information to be viewed by a viewer from a much wider field of view than with conventional signs and boards. In particular, the present invention allows information to be seen and understand by a viewer standing in a position where the line of sight is at an acute angle to the main display surface. In particular, the system allows the view to see information at any position within an arc of 180° in front of the display, the view varying between solely a plan view of the information on the display surface of the surface elements to solely a plan view of the information contained on one or more intermediate surface elements. This aspect is particularly advantageous for advertising purposes, as it allows a considerably larger audience to be reached with a single installation.

CLAIMS

1. A modular surface assembly comprising a plurality of surface modules, each module comprising a surface element having an exterior face; each module further comprising a means for moving the surface element from a first position to a second position; in the first position the surface elements of a plurality of the modules being aligned such that the exterior faces of the modules lie in substantially the same plane; and in the second position the surface elements of adjacent modules being out of alignment.

2. The modular surface assembly according to claim 1, wherein the modules are arranged such that the exterior face of each module is substantially horizontal.

3. The modular surface assembly according to claim 2, wherein the modules are arranged such that the exterior face is uppermost, so as to provide a floor surface or a surface upon which objects may be supported.

4. The modular surface assembly according to claim 1, wherein the modules are arranged such that the exterior face of each module is substantially vertical.

5. The modular surface assembly according to any preceding claim, wherein the movement of the surface elements is substantially perpendicular to the plane occupied by the exterior faces when in the first position.

6. The modular surface assembly according to any preceding claim wherein the surface elements of modules in the second position are oriented such that the exterior face is in a plane substantially parallel to the plane occupied by the exterior faces when in the first position.

7. The modular surface assembly according to any preceding claim, wherein each module comprises a means for locking the surface element in the second position.

8. The modular surface assembly according to any preceding claim, wherein each module comprises a means for moving the surface element between the first and second positions.

9. The modular surface assembly according to claim 8, wherein the means for moving the surface element is operable remotely.

10. The modular surface assembly according to claim 8 or 9, wherein the means for moving the surface element comprises a hydraulic system or an electric motor.

11. The modular surface assembly according to any preceding claim, wherein each module comprises a housing extending from the surface element when in the second position, the housing extending between the surface element and the position occupies by the surface element when in the first position.

12. The modular surface assembly according to claim 11, wherein the housing comprises a plurality of elements arranged telescopically.

13. The modular surface assembly according to any preceding claim, wherein at least one of the modules comprises one or more light assemblies.

14. The modular surface assembly according to claim 13, wherein the light one or more light assemblies directs light through the surface element.

15. The modular surface assembly according to any preceding claim, wherein the space between the surface element of one or more modules when in the second position and the first position is useable for storage.

16. The modular surface assembly according to any preceding claim, wherein each module comprises a base structure, the surface element being supported on the base structure when in the first position.

17. The modular surface assembly according to claim 16, wherein adjacent modules in the assembly have common base structure components.

18. The modular surface assembly according to claim 16 or 17, wherein the base structure comprises members extending between the surface elements of adjacent modules, so as to provide a substantially continuous surface.

19. A stage comprising a modular surface assembly according to any preceding claim.

20. A display comprising a modular surface assembly according to any of claims 1 to 18.

21. A kit comprising a plurality of modules as defined in any of claims 1 to 18.

22. The kit according to claim 21, further comprising a means for remotely adjusting the position of individual modules.

23. The kit according to claim 22, further comprising software for visualizing the arrangement of modules, prior to adjusting the position of individual modules.

24. A module for use in a modular surface assembly as defined in any of claims 1 to 18.

25. A vertical display system for the display of information, the system comprising a plurality of surface assemblies arranged in a display matrix, each surface assembly comprising a surface element having a display surface, the surface element

of each surface module being movable in a direction substantially perpendicular to the plane of the display surface, the system comprising the plurality of surface assemblies such that each surface element has a first position and a second position, whereby in the first position the surface elements of the plurality of surface assemblies form a substantially vertical contiguous display surface and in the second position the surface elements are displaced from the plane of the contiguous display surface to form one or more secondary display surfaces.

26. The display system of claim 25, wherein one or more surface assemblies comprises an intermediate surface element extendable upon movement of the surface element from the first to the second position, the intermediate surface element when extended forming a tertiary display surface.

27. The display system of claim 26, wherein the intermediate surface element is perpendicular to the plane of the vertical contiguous display surface.

28. The display system of claim 26 or 27, wherein the intermediate surface element is flexible and stored in a compact state when the surface element is in the first position.

29. The display system of claim 28, wherein the intermediate surface element is stored on a roll or in a folded arrangement.

30. The display system of claim 26 or 27, wherein the intermediate surface element comprises one or more rigid surface portions.

31. The display system of claim 30, wherein the intermediate surface element comprises a plurality of rigid surface portions that extend and contract telescopically.

32. The display system of any of claims 25 to 31, wherein the surface element is movable to any position between the first and second positions.

33. The display system of any of claims 25 to 32, wherein each surface assembly comprises a means for locking the surface element in the second position.

34. The display system of any of claims 25 to 33, wherein each surface assembly comprises a means for moving the surface element between the first and second positions.

35. The display system of claim 34, wherein the means for moving the surface element is operable remotely.

36. The display system of claim 34 or 35, wherein the means for moving the surface element comprises a hydraulic system or an electric motor.

37. The display system of any of claims 25 to 36, wherein at least one of the surface assemblies comprises one or more light assemblies.

38. The display system of claim 37, wherein the light one or more light assemblies directs light through the surface element and/or, if present, the intermediate surface element.

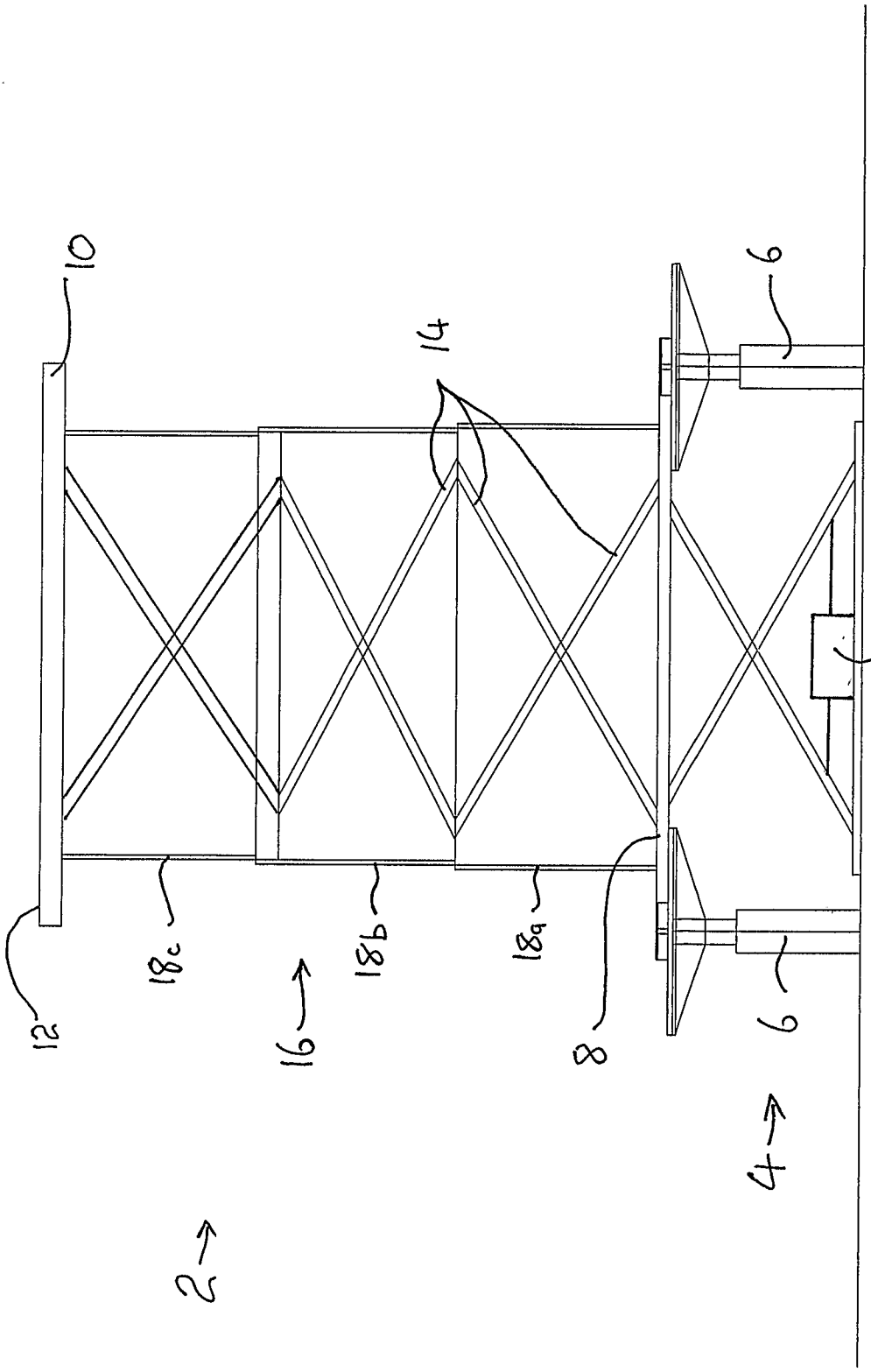


Figure 1

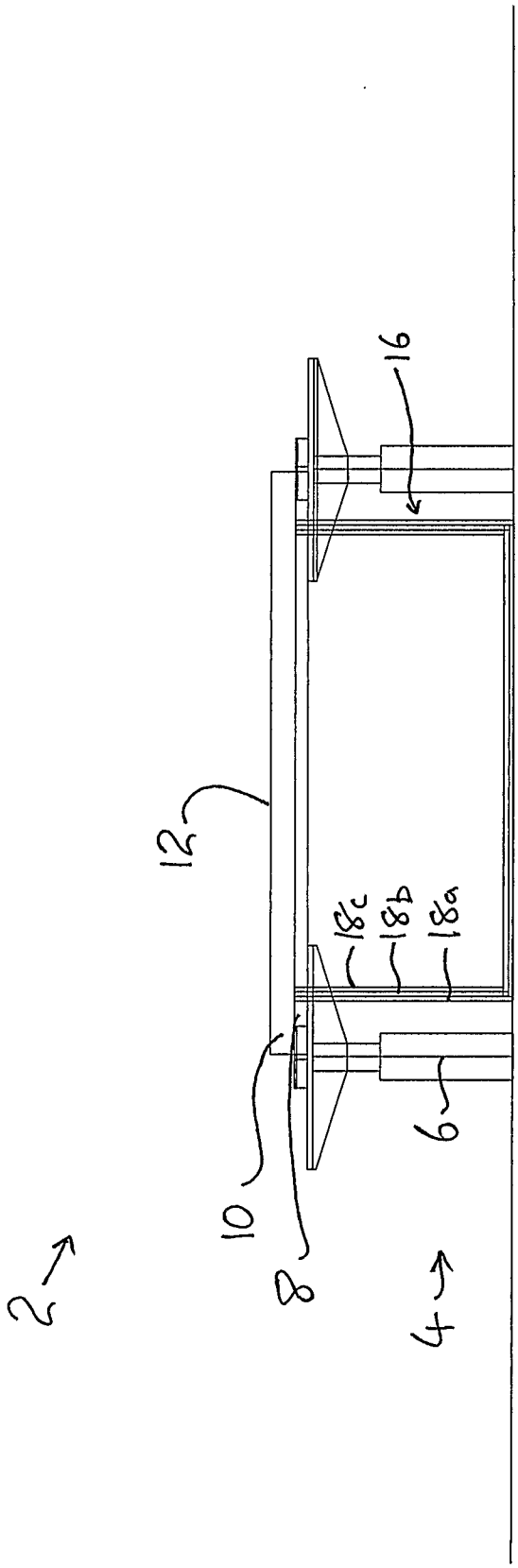


Figure 2

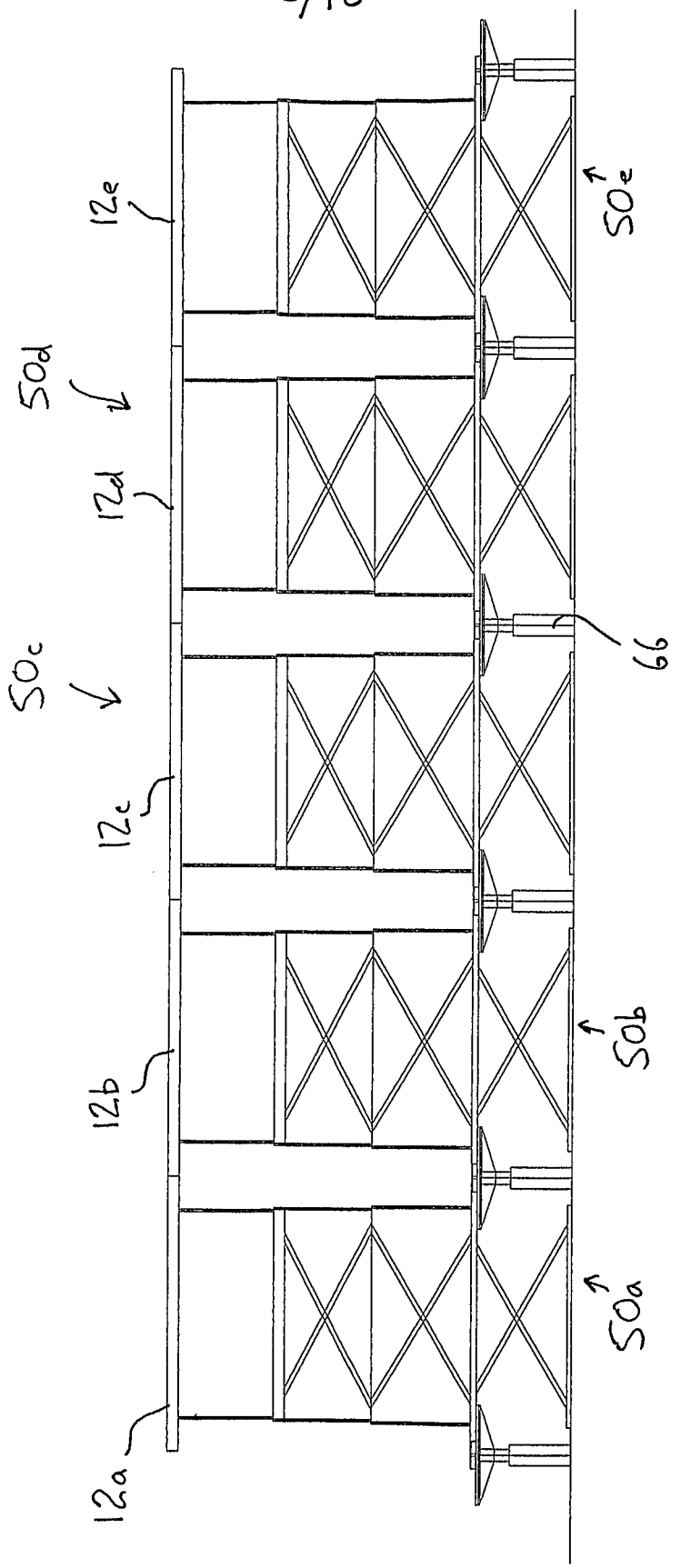


Figure 3

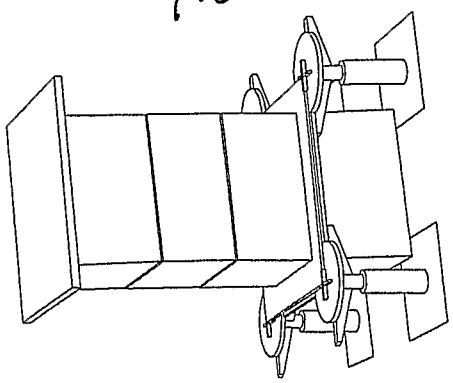


Figure 4d

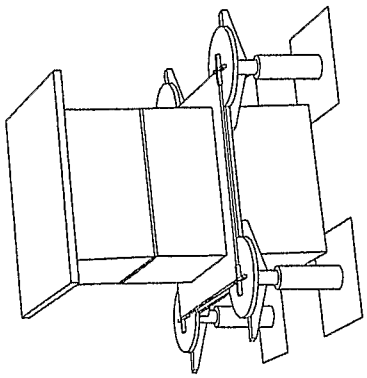


Figure 4c

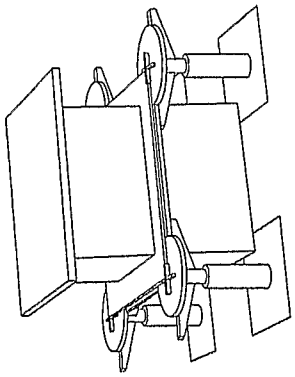


Figure 4b

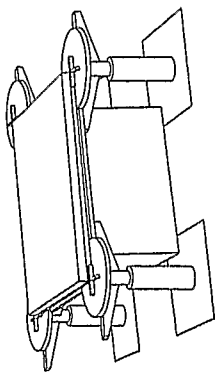


Figure 4a

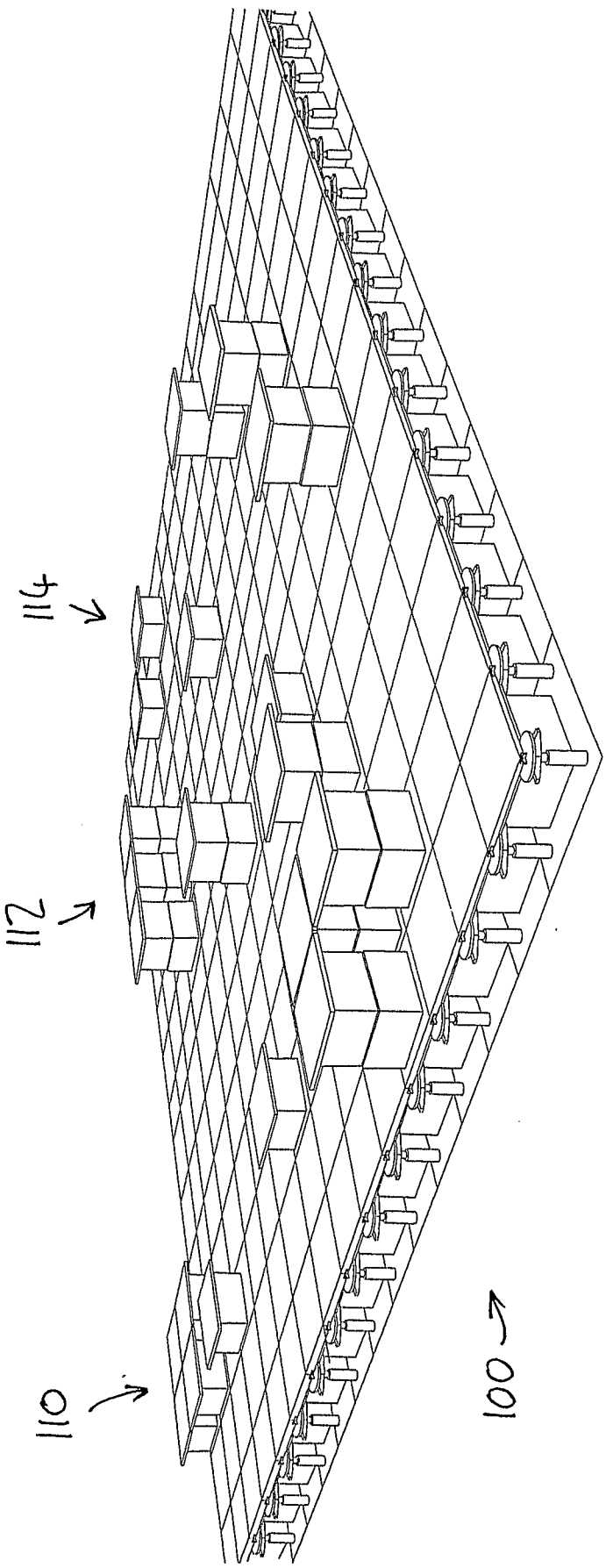


Figure 5

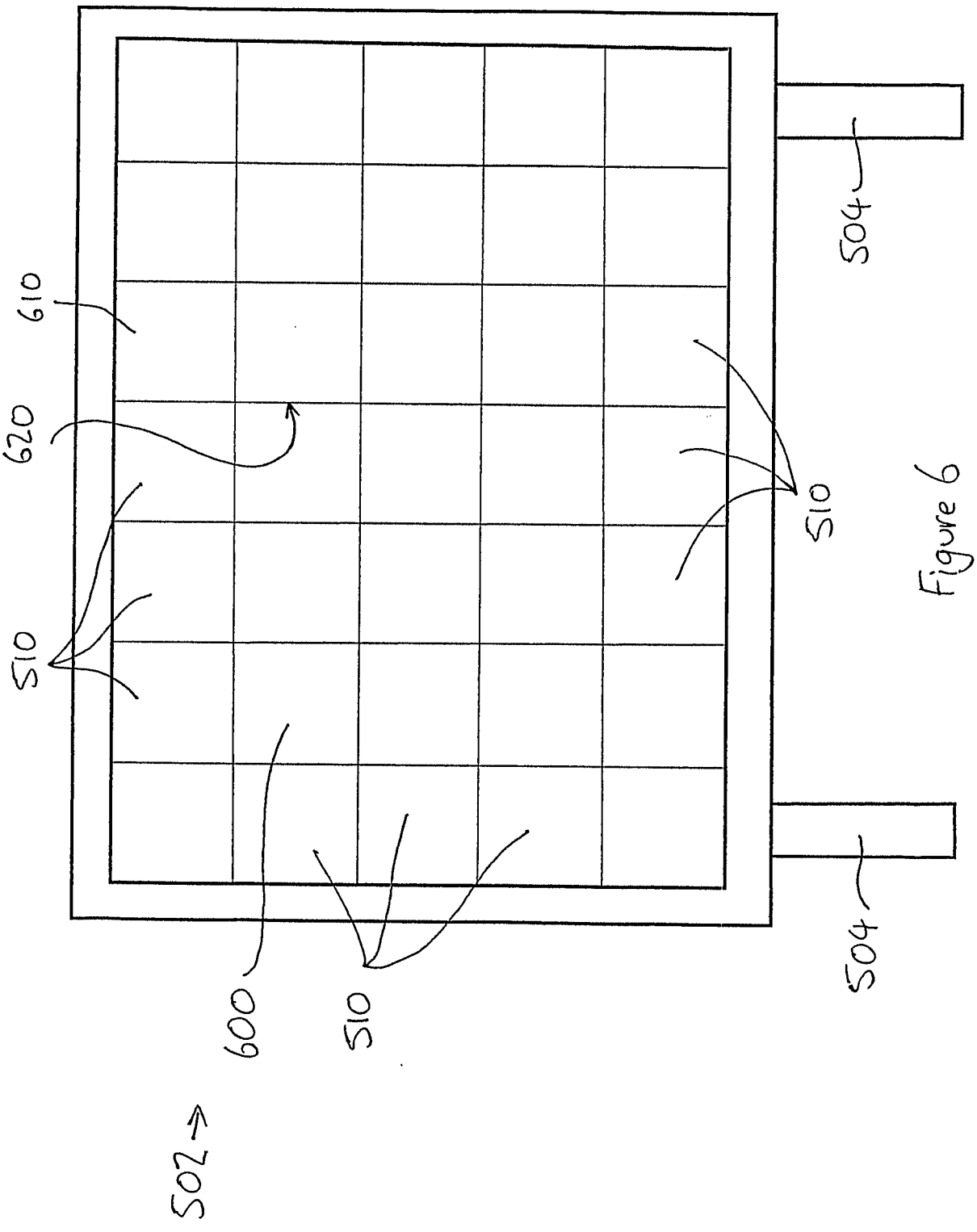


Figure 6

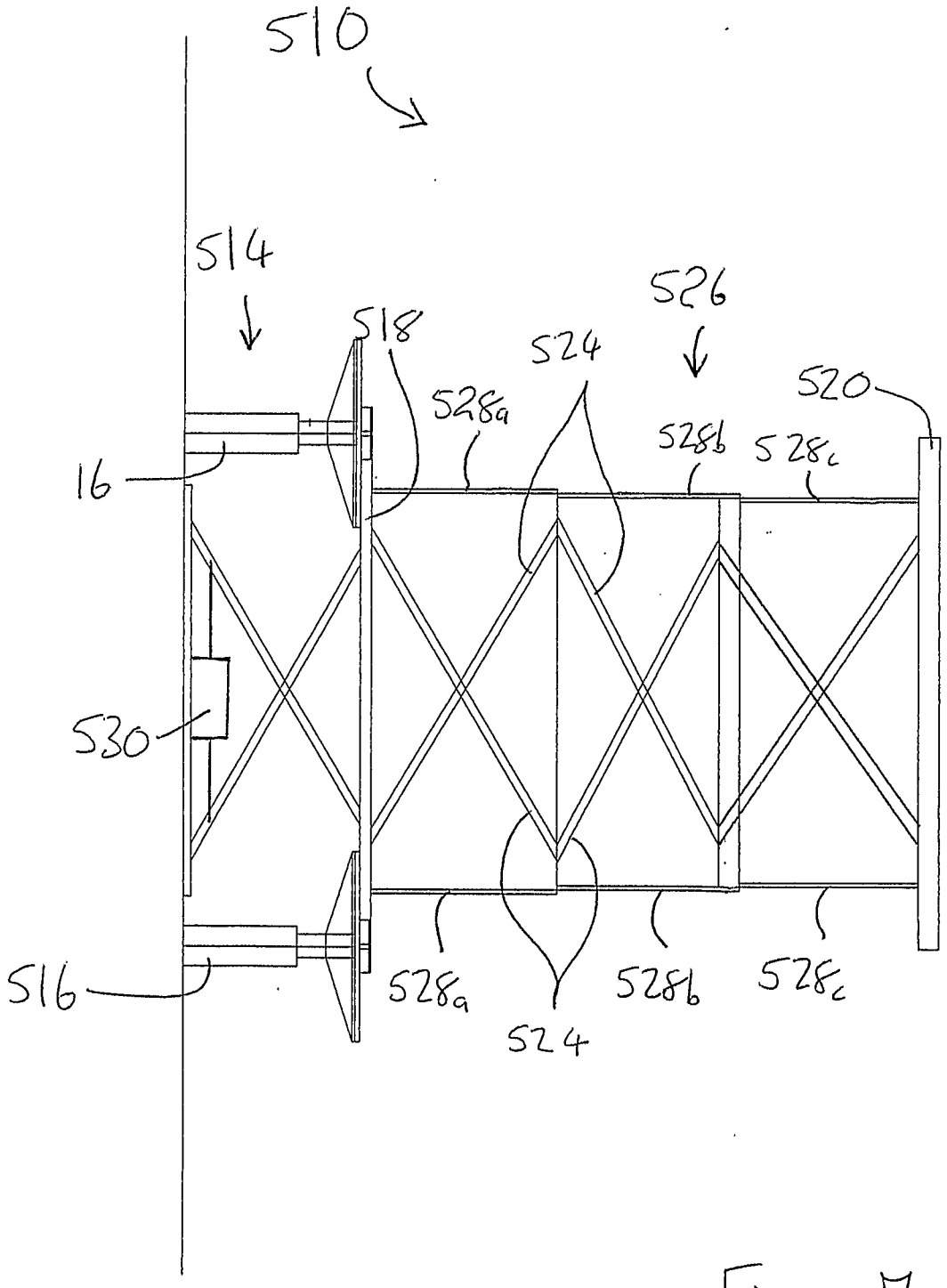

510
514
518
524
526
520
528a
528b
528c
16
530
516
528a
524
528b
528c

Figure 7

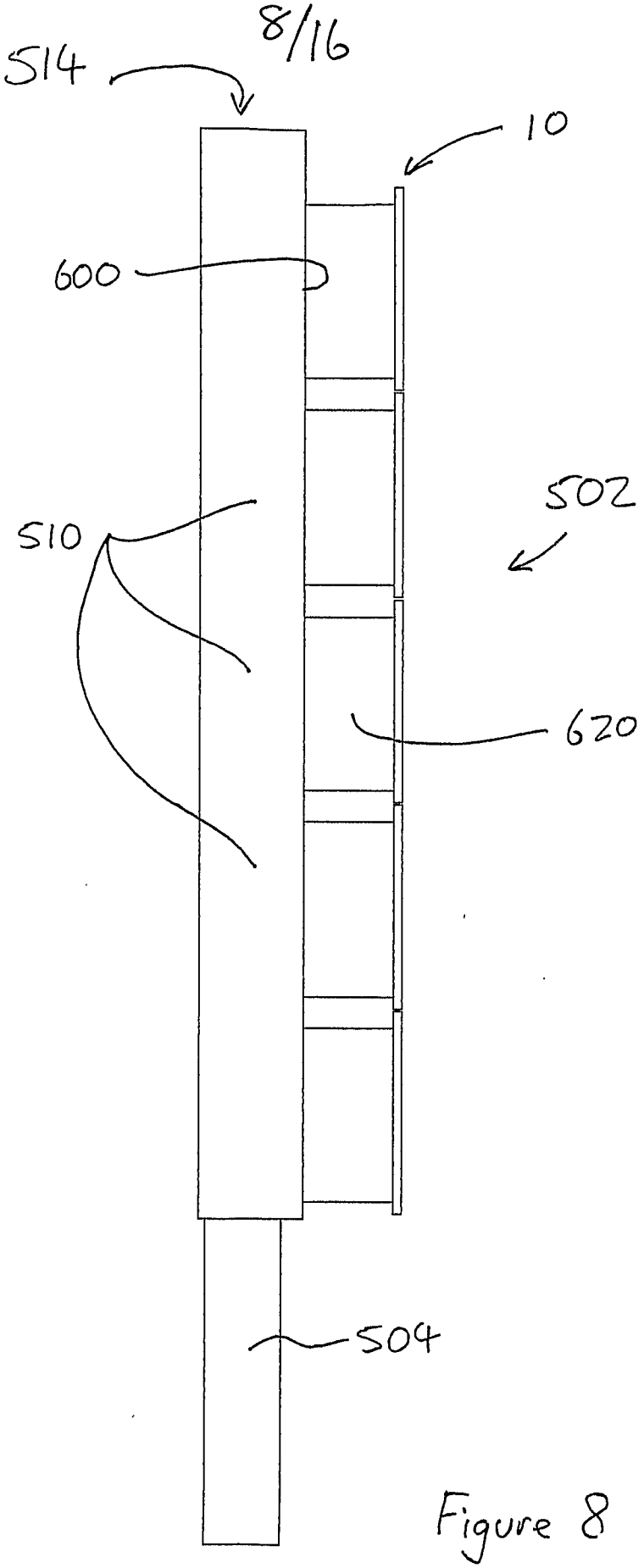


Figure 8

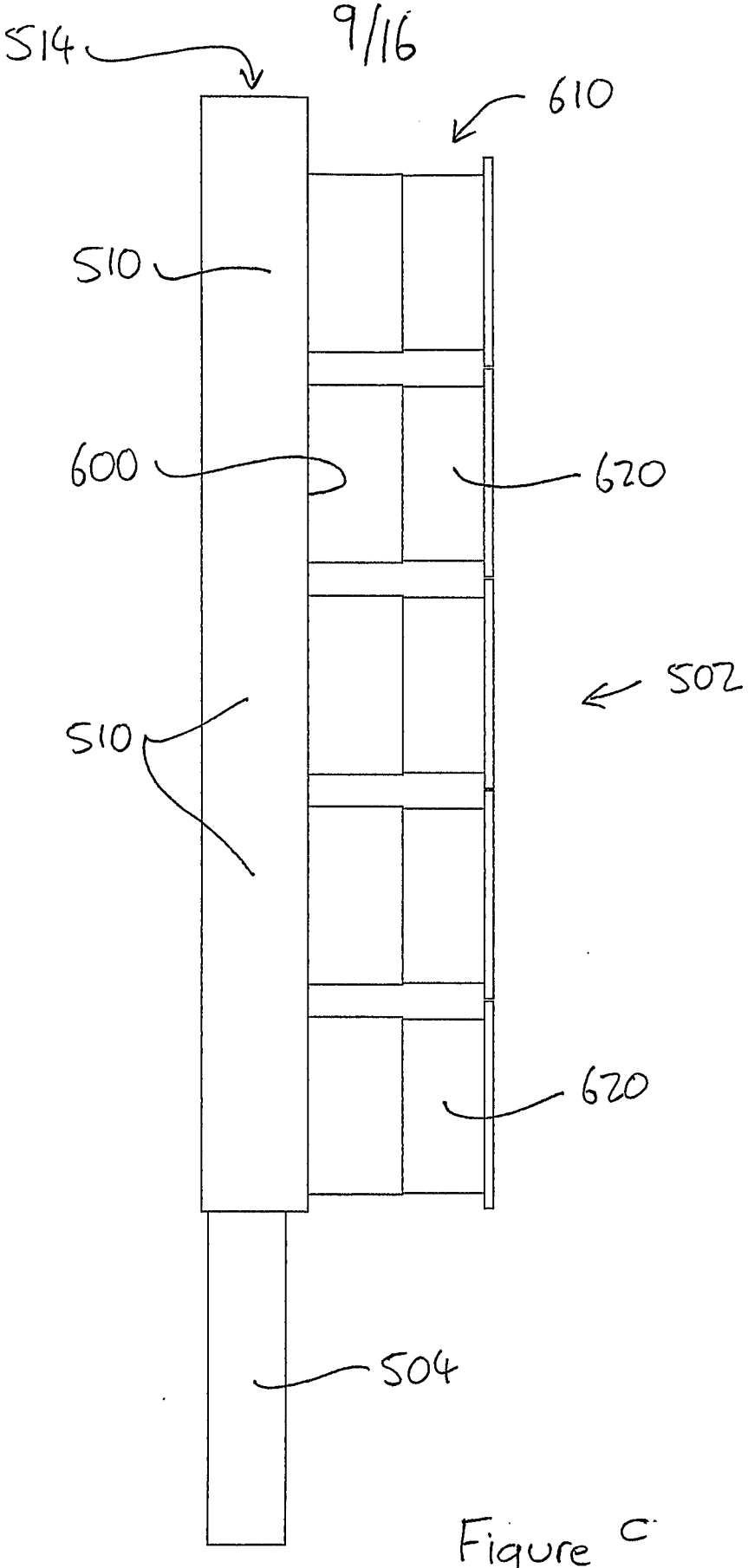


Figure 6

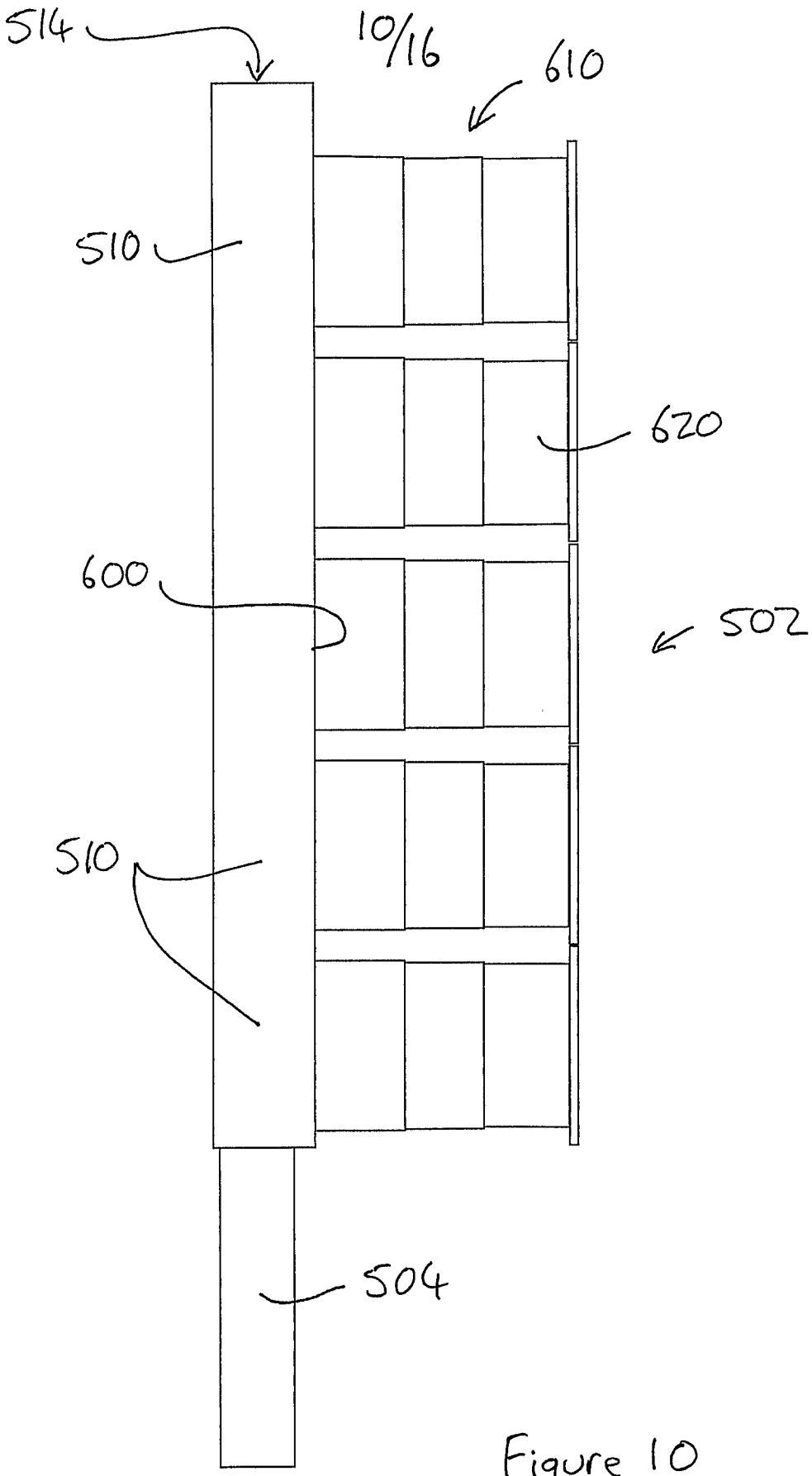


Figure 10

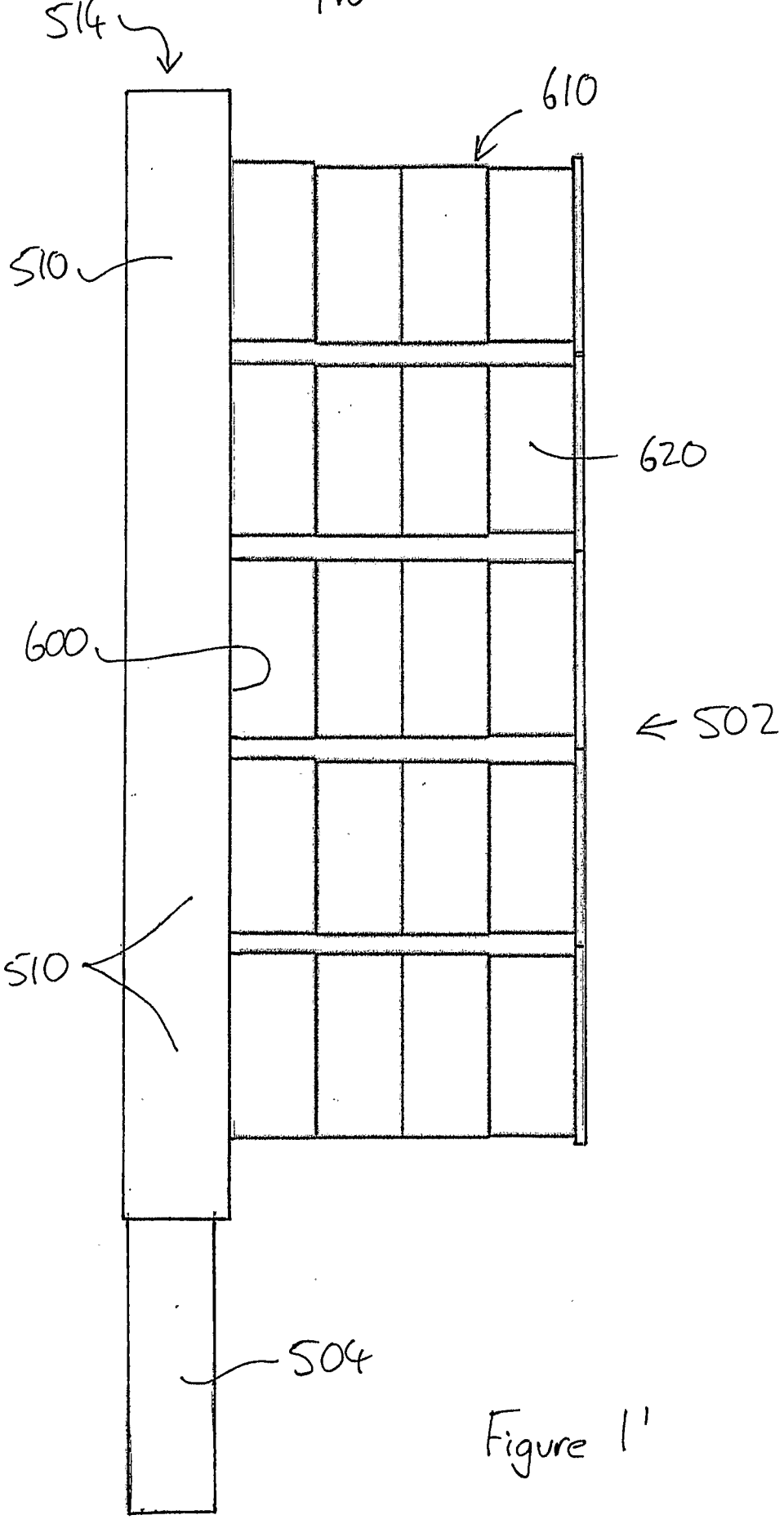


Figure 1'

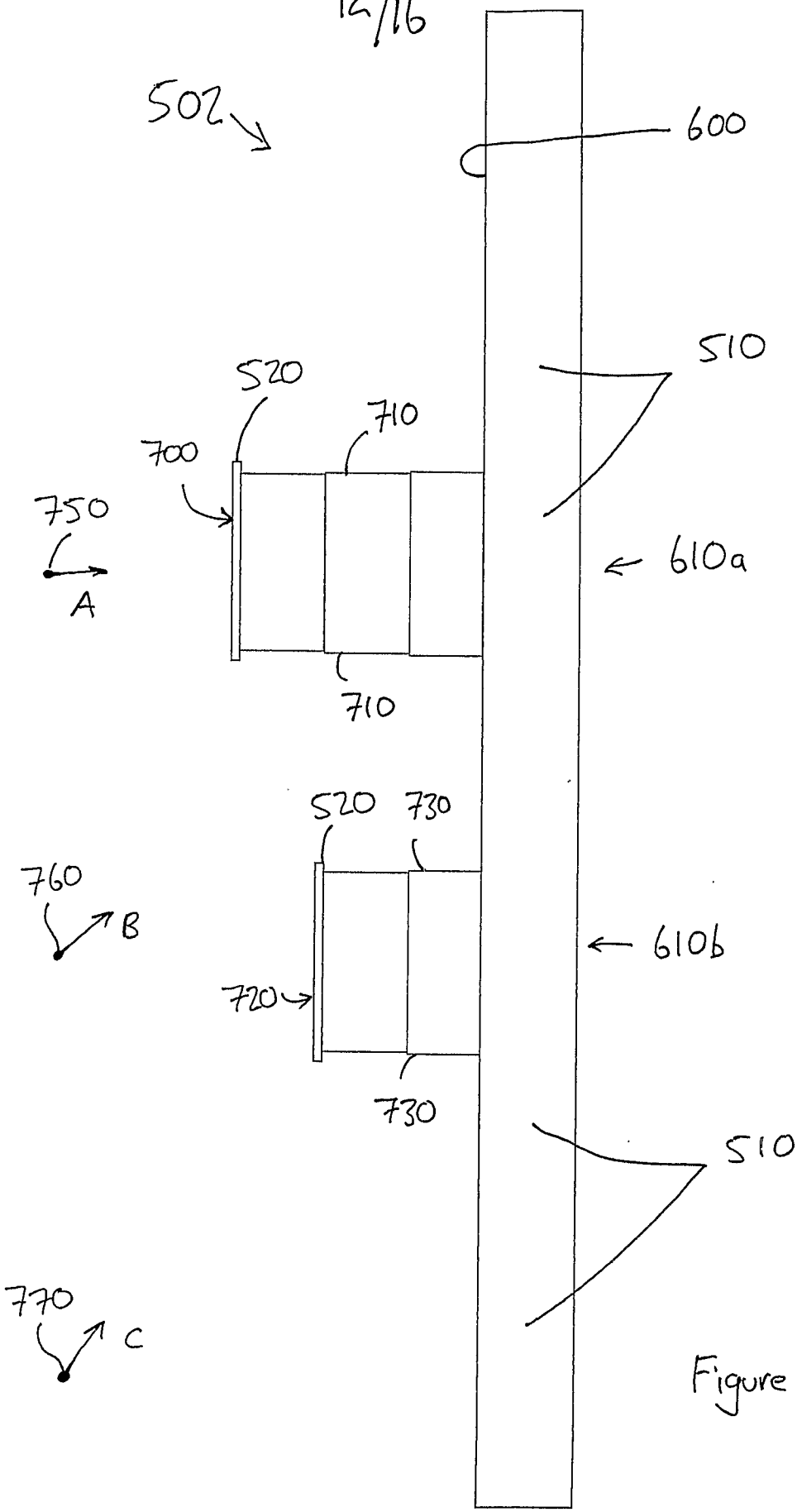

502
600
510
520
710
700
750
A
610a
710
520
730
760
B
610b
720
730
510
770
C

Figure 12

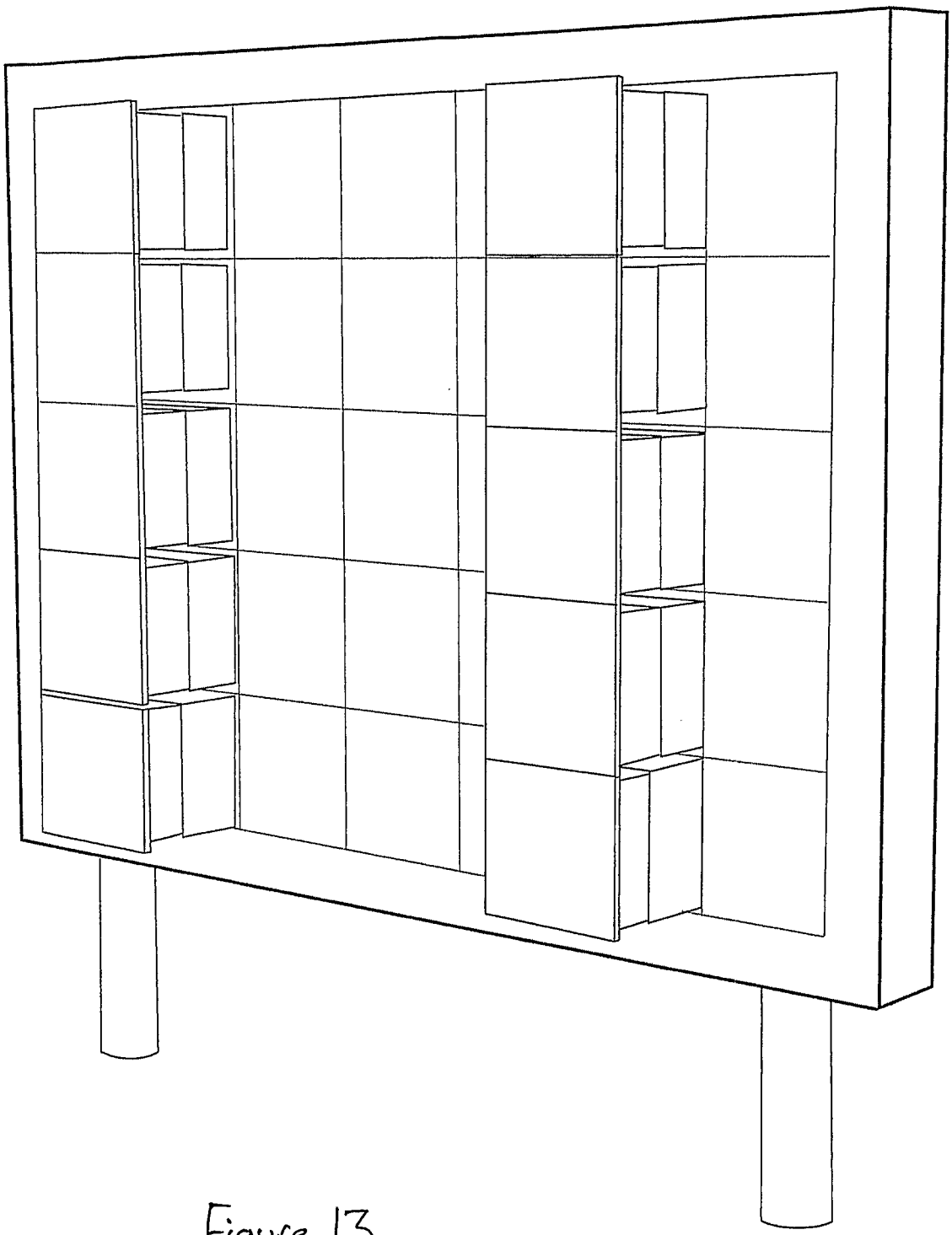


Figure 13

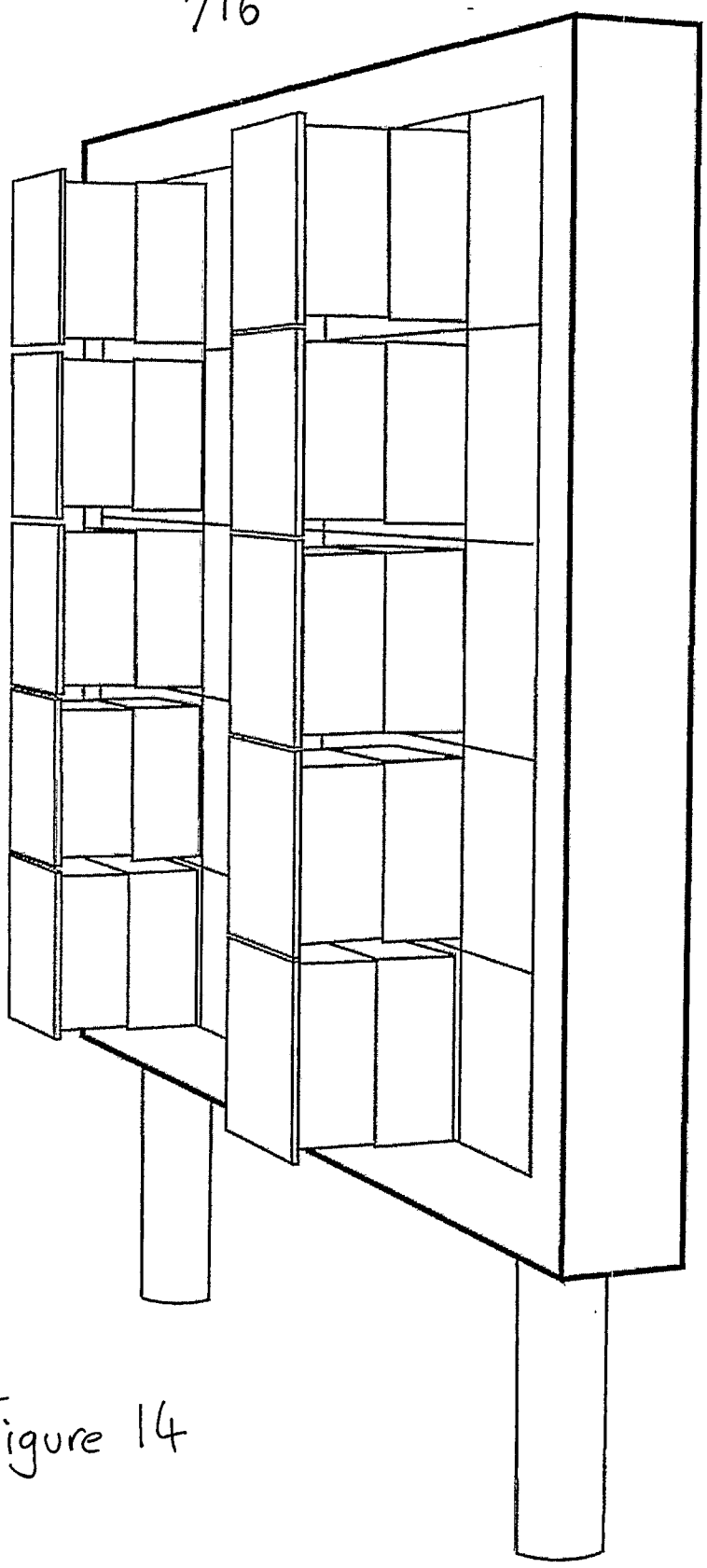


Figure 14

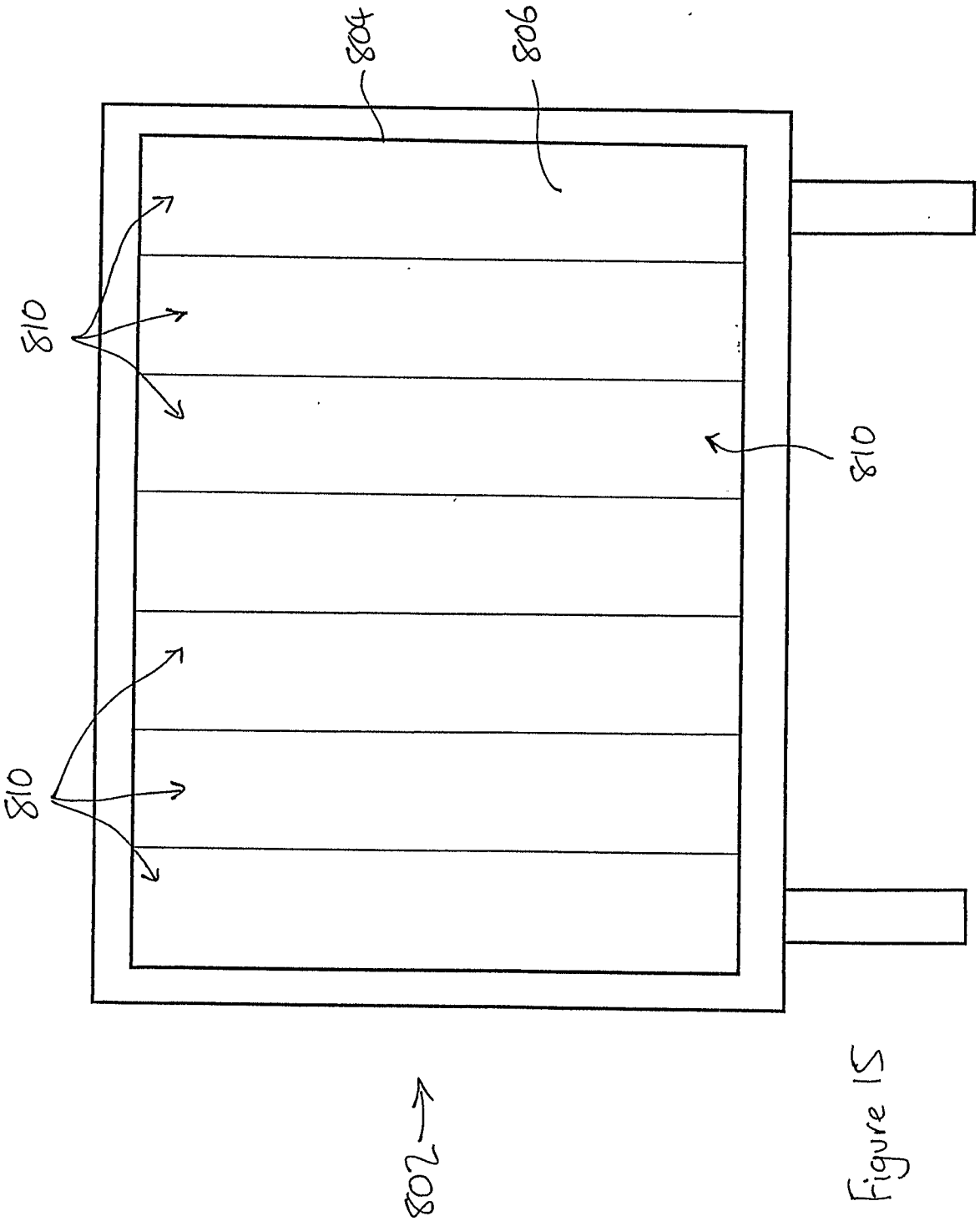


Figure 15

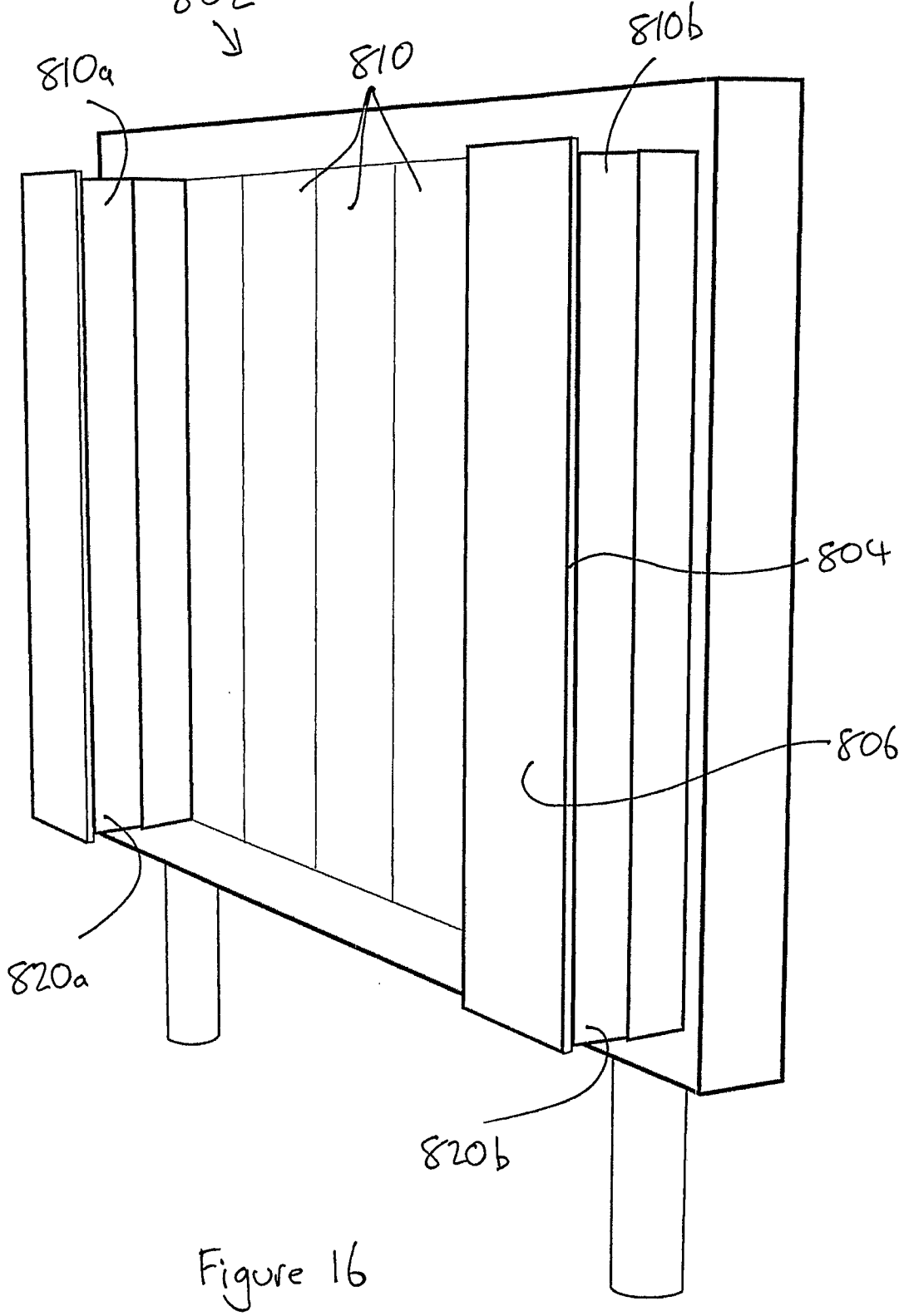


Figure 16