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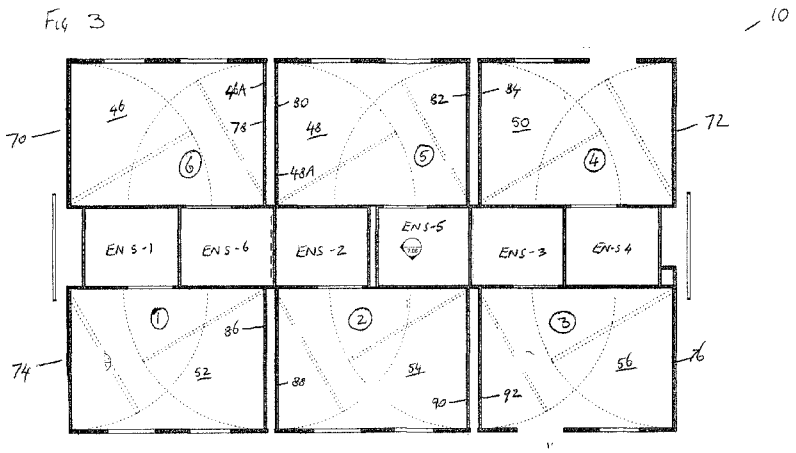

(57) Abstract: ABSTRACT A transportable building is movable between a transport configuration and an erected configuration. The transportable building (10) comprises a fixed floor (24), at least two movable floor portions (46, 48) located on one side of the transportable building, the at least two movable floor portions (46, 48) comprising separate floor portions having spaced edges. The transportable building includes at least two rooms on one side of the transportable building in the erected configuration, wherein at least two spaced internal walls (78, 80) separate one room (5) from an adjacent room (6) of the at least two rooms and wherein each room comprises one of the movable floor portions (48, 50). Improved fire ratings and acoustic ratings are achieved.

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Transportable Building

TECHNICAL FIELD

[0001] The present invention relates to a transportable building.

BACKGROUND ART

[0002] Transportable buildings are used in a number of situations. For example, remote area mining camps or mining towns often include a number of transportable buildings that can simply be transported into place to provide short-term or long-term accommodation for employees of the mining operation. In other instances, transportable buildings are used where only a short term accommodation requirement is needed. For example, in a number of military applications, temporary villages may need to be established for housing military personnel. Transportable buildings are often used in those circumstances because the transportable buildings can be easily moved into the region and can be easily removed from the region once the requirements for the temporary accommodation have been completed. Transportable buildings are also frequently used in disaster relief situations. For example, the 2011 tsunami in Japan resulted in the destruction of tens of thousands of homes. Transportable buildings can rapidly provide liveable temporary accommodation for victims of such disasters.

[0003] For ease of handling and transport, transportable buildings are often sized so that they are of the same size as International Standard (ISO) shipping containers. In a most simple form, the transportable buildings simply comprise a converted shipping container in which a standard shipping container is fitted out with a small kitchen, a bathroom and a bed. Such transportable buildings provide very basic or rudimentary accommodation only.

[0004] It is often desirable to provide remote area accommodation that has a larger living area than can be provided by the floor space of a standard shipping container. For this reason, foldable transportable buildings have been developed. Typically, such foldable, transportable buildings are based upon standard shipping containers, albeit with the width modified to accommodate the floor thickness of the building. The side walls of the shipping containers are modified such that they are hinged to the floor of the shipping container. In order to transport the building, the side walls are folded upwardly and secured in place such that the transportable building adopts the configuration of a standard shipping container. When the building is placed on site, it is expanded into its built configuration or erected configuration by folding the side

walls down about the hinges until the side walls lie parallel to or generally co-planar with the floor section of the shipping container. The side walls of the container then form part of the floor of the building in the built configuration or erected configuration. This has the effect of increasing the floor space of the building.

[0005] Many known foldable, transportable buildings utilise the strong frame of the shipping container as the basis for the building. Indeed, manufacture of such transportable buildings typically involves purchasing a standard shipping container and modifying that shipping container. Advantageously, the shipping container is provided with lifting blocks or other transport connectors that facilitate ready lifting and handling of the shipping container. However, transportable buildings that are based upon converted shipping containers are typically very heavy, often weighing in excess of 24 tonnes. This can increase transport costs and can preclude transport by aeroplane or helicopter.

[0006] One possible solution to the problem of weight in transportable buildings is described in international patent application publication number WO 2007/033498. In this patent application, a containerised portable shelter which is small and light so that it can be moved by helicopter transport but which can also travel through container channels and has increased expandability of the floor space, is described. The containerised portable shelter of this patent application has a fraction (for example, one-half) of the standard ISO width, so that a plurality of modular units can be joined to form a standard ISO container. Two or more modular units can be joined side-by-side and/or end-to-end to form a compound shipping container preferably having ISO freight container characteristics. The modules described in this patent application each include frameworks that are generally similar to the framework of an ISO shipping container. Although this patent application does describe modules that can be transported by helicopter, creation of a shelter having a desirably large floor space requires two or more modules to be connected together. This increases the assembly steps required on site. Furthermore, as each module has a very heavy frame, it would seem that a helicopter can only move one module at a time. Therefore, an increased number of helicopter trips are likely to be required to bring in all the required modules to form a structure on to the worksite.

[0007] Another foldable, transportable building is shown in Australian patent number 2005220257. In its folded configuration, the transportable building of this Australian patent takes the shape of an ISO shipping container. The house comprises a container floor, a floor portion pivotally connected to a side edge of the container floor and a roof portion pivotally connected to the top of the container section. In order to erect the building, the roof portion is folded

outwardly and upwardly and the floor portion is folded outwardly and downwardly.

[0008] Our Australian patent number 2011202177 describes a transportable building comprising a first floor portion, a second floor portion hingedly connected to the first floor portion, the second floor portion comprising a floor having at least one bearer connected to an underneath part of the floor, wherein the building can be configured in a transportable configuration in which the second floor portion is positioned generally perpendicularly to the first floor portion and the building can be configured in a built configuration in which the second floor portion extends generally parallel to or co-planar with the first floor portion, wherein in the transportable configuration, the bearer comprises an elongate member having an open section or a hollow section and a beam positioned in the elongate member. The entire contents of Australian patent number 2011207177 are herein incorporated by cross reference.

[0009] In some uses, transportable buildings are designed to accommodate a number of people. For example, transportable buildings used in mining towns or mining camps are often designed to house fly in, fly out workers. Fly in, fly out workers are typically not related to each other. As a result, it is desirable to provide each worker with their own separate bedroom and bathroom facilities, although communal kitchens and eating facilities are often found to be acceptable. In such cases, it is desirable that the transportable building, when in its expanded condition, provides separate rooms for each individual worker. Indeed, transportable buildings are available that provide separate rooms for anywhere from 2 to 6 or more individuals. In these transportable buildings, a floor portion is folded out and internal walls are fixed in position. The internal walls are often hinged to the floor, to a central frame or to a side wall of the building and pivoted into place once the floor, side walls and roof have been expanded.

[0010] Although separate living quarters are provided in such transportable buildings, it has been found that these transportable buildings can be quite noisy, with noise from one room being transmitted into another room. Furthermore, vibrations that are formed in the floor of one room (for example, by someone walking or jumping in that room) can be transmitted through the floor into the other rooms. Additionally, satisfactory fire ratings can be difficult to achieve in these buildings.

[0011] It will be clearly understood that, if a prior art publication is referred to herein, this reference does not constitute an admission that the publication forms part of the common general knowledge in the art in Australia or in any other country.

SUMMARY OF INVENTION

[0012] The present invention is directed to a transportable building, which may at least partially overcome at least one of the abovementioned disadvantages or provide the consumer with a useful or commercial choice.

[0013] In a first aspect, the present invention provides a transportable building comprising a movable floor that is movable between a transport configuration and an erected configuration, the transportable building including at least two rooms on one side of the transportable building in the erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room in the erected configuration.

[0014] Suitably, two spaced internal walls separate one room from an adjacent room in the erected configuration

[0015] In this embodiment, the two spaced internal walls between each room provide for improved acoustic and thermal insulation between adjacent rooms. Further, the space between the two spaced internal walls may provide a space that can be utilised for provision of utilities, such as electrical and plumbing utilities, in the transportable building. The space between each internal wall may also provide a space in which lifting apparatus for moving the components of the transportable building between the transport configuration and the erected configuration can be located.

[0016] In a second aspect, the present invention provides a transportable building movable between a transport configuration and an erected configuration, the transportable building comprising a fixed floor, at least two movable floor portions located on one side of the transportable building, the at least two movable floor portions comprising separate floor portions having spaced edges, the transportable building including at least two rooms on one side of the transportable building in the erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room of the at least two rooms and wherein each room comprises one of the movable floor portions.

[0017] In this embodiment of the present invention, each room has a floor portion that is separate from and spaced from the floor portion of an adjacent room on that side of the transportable building. Further, two spaced internal walls are located between each room. In combination, the separate floor portions for each room and the two spaced internal walls between each room greatly improve the acoustic and thermal transmission properties of the building in the erected on one side of the transportable building in the erected position on one side of the

transportable building in the erected configuration. Further, improved fire rating can be obtained for the building. The space between the separate floor portions and the space between the two spaced internal walls between each room may also provide space in which lifting apparatus for moving the building between the transport configuration and the erected configuration can be housed. Further, each separate room may be moved from the transport configuration to the erected configuration separately from other rooms. Therefore, if it is desired to only utilise one or some of the rooms of the transportable building, it may be necessary to only move one or some of the rooms from the transport configuration to the erected configuration. Similarly, if one room becomes damaged, it can be moved from the erected position to the transport position without affecting the other rooms.

[0018] In some embodiments of the present invention, movable floor portions are located on either side of the fixed floor.

[0019] The movable floor portions may be moved between the transport position and the erected position by pivoting the movable floor portions, for example, by pivoting the movable floor portions about hinges. In some embodiments, the movable floor portions are pivotally connected to a central frame that houses the fixed floor. In other embodiments, the movable floor portions are pivotally connected to the fixed floor portion.

[0020] In one embodiment, the movable floor portions, when in the transport position, are generally vertical and are located along longitudinal sides of the transportable building.

[0021] The internal walls may be moved from a transport position to an erected position by pivoting the internal walls. In one embodiment, the internal walls are pivotally connected to a central frame of the transportable building. In other embodiments, the internal walls are pivotally connected to fixed walls of the transportable building. In these embodiments, the internal walls may be pivoted about generally vertical axes.

[0022] In another embodiment, the internal walls may be pivotally connected to the movable floor portions. When the movable floor portions are moved to the erected position, each internal wall may be pivoted upwardly about a horizontal axis.

[0023] The transportable building will typically also include outer side walls. The outer side walls may be moved from the transport position to the erected position. The outer side walls may be pivotally connected to outer edges of the movable floor portions. Once the movable floor portions have been moved to the erected position, the outer side walls may be pivoted upwardly until they are essentially vertical when the erected position.

[0024] In another embodiment, the outer side walls may move laterally outwardly from a transport position to an erected position. The outer side walls may move over the erected movable floor portions when moving from the transport position to the erected position and vice versa. In one embodiment, the outer side walls are pivotally connected to internal walls or outer end walls, with the internal walls and outer end walls comprising a first wall portion pivotally connected at one end to a central region, a second wall portion pivotally connected to the first wall portion, with an outer end of the second wall portion being pivotally connected to the outer side walls. In this manner, the internal walls and the outer end walls can move in a concertina-like fashion between the erected and transport positions. When in the transport position, the first wall portion and the second wall portion lie in face-to-face abutment with each other. When in the erected position, the first wall portion and the second wall portion are in alignment with each other to form the outer end wall or the internal wall. The internal wall portions and outer end wall portions are suitably pivotally connected about vertical hinges. This arrangement has the benefit that the floor portions do not have the outer side walls pivotally connected thereto and therefore the movable floor portions are lighter and easier to move between the transport position and the erected position.

[0025] The transportable building will also include at least one movable roof portion. The transportable building may have a fixed roof portion and the movable roof portion may be pivotally movable relative to the fixed roof portion. The movable roof portion may be pivotally connected to a central frame. The movable roof portion may be pivotally connected to an upper part of the central frame. In another embodiment, the movable roof portion may be pivotally connected to the fixed roof portion. The movable roof portion may pivot about a generally horizontal axis.

[0026] The transportable building may also include movable end walls. The movable end walls may be moved between the transport position and the erected position. The movable end walls may be pivotally movable between the transport position and the erected position. The movable end walls may be pivotally connected to a central frame, or they may be pivotally connected to fixed walls in the transportable building. The movable end walls may pivot about a generally vertical axis. In the transport position, the movable end walls may lie adjacent to a central frame or adjacent to fixed internal walls. In the erected position, the movable end walls may extend from the central frame to the outer side wall.

[0027] In another embodiment, the movable end walls comprise a first wall portion pivotally connected to a central frame, or pivotally connected to fixed walls in the transportable building,

and a second wall portion pivotally connected to an outer end of the first wall portion, the second wall portion being pivotally connected to an outer side wall. In this manner, the movable end walls move in a concertina like fashion between the transport position and the erected position, and vice versa. When in the transport position, the first wall portion and the second wall portion lie in face-to-face abutment with each other. When in the erected position, the first wall portion and the second wall portion are in alignment with each other to form the outer end wall.

[0028] In some embodiments of the present invention, the transportable building further includes at least one fixed inner wall. The at least one fixed inner wall may extend in a direction that is generally parallel to a longitudinal axis of the first floor portion and the at least one inner wall may be located inwardly from a side edge of the first floor portion. The at least one fixed inner wall may comprise a first longitudinally extending inner wall spaced from the edges of the first floor portion. The building may have a fixed side wall that, in the transport configuration, provides a side wall of the box-like configuration. One or more rooms may be defined by the first longitudinally extending inner wall and the fixed side wall.

[0029] In another embodiment, the at least one fixed inner wall may comprise a first longitudinally extending inner wall and a second longitudinally extending inner wall, the first longitudinally extending inner wall being spaced from the second longitudinally extending inner wall. The first longitudinally extending inner wall and the second longitudinally extending inner wall may be spaced inwardly from side edges of the first floor portion.

[0030] In some embodiments, the transportable building further comprises opposed fixed end walls extending upwardly from the central floor portion.

[0031] Suitably, the building includes a frame. The frame may include transport connectors at the corners thereof. The transport connectors may comprise ISO standard transport connectors that are able to be used with lifting equipment used to lift ISO standard containers.

[0032] In desirable embodiments of the present invention, the transportable building includes movable floor portions and movable side walls located on either side of a central floor portion. The central floor portion forms part of the boxlike configuration when the building is in its transport configuration. The transportable building may include a central frame. The central frame may have a roof. The roof may comprise a fixed roof. Alternatively, the roof of the central frame may include one or more panels that can be moved from a closed position to an open position to provide access to the upper part of the central frame.

[0033] The movable floor portions may be provided with support legs near an outer edge thereof. The support legs may be pivotally connected to an underside of the movable floor portions. The support legs may move to a generally vertical orientation as the movable floor portions are moved to the erected configuration. The support legs may be housed in a recess or a nacelle in the underside of the movable floor portions when the movable floor portions are in the transport configuration. The support legs may have an adjustable foot so that the effective length of the support legs can be varied to account for variances in ground level.

[0034] The transportable building may include one or more central rooms in the erected house. In some embodiments, the one or more central rooms may be used for services that require plumbing, for example, bathroom, toilet, kitchen or laundry services. In one embodiment, the central rooms are used to form one or more bathrooms in the erected building.

[0035] In some embodiments, the transportable building may further comprise a first movable roof section and a second movable roof section, the first movable roof section and the second movable roof section forming respective side walls of the box-like configuration when the transportable building is in the transport position. The first movable roof section and the second movable roof section may be pivotally movable to the erected position.

[0036] The transportable building may be provided with one or more linear actuators to move the floor portions between the transport position and the erected position. The transportable building may also be provided with one or more linear actuators to move the movable roof between the transport position and the erected position. The linear actuators may comprise one or more pneumatic rams having an arm that can be selectively extended. The actuators may also comprise one or more electrically driven linear actuators. The linear actuators may be driven by an electric motor or by a stepper motor. Hydraulic rams may also be used. Manually actuated linear actuators may also be used. The linear actuators may be mounted to the central frame or to a fixed wall. The linear actuators may be positioned in the space(s) formed between the spaced movable floor portions.

[0037] Any of the features described herein can be combined in any combination with any one or more of the other features described herein within the scope of the invention.

BRIEF DESCRIPTION OF DRAWINGS

[0038] Various embodiments of the invention will be described with reference to the following drawings, in which:

[0039] Figure 1 shows a plan view, with the fixed roof panels removed, of a transportable building in accordance with an embodiment of the present invention. In figure 1, the transportable building is in the transport configuration;

[0040] Figure 2 shows an end view of the transportable building shown in figure 1, with the movable floors and movable roof portions folded outwardly and the outer side walls being moved into the erected configuration;

[0041] Figure 3 shows a plan view of the transportable building shown in figure 1 in the erected configuration. In figure 3, all roofing has been removed so that internal details can be seen;

[0042] Figure 4 shows an end view of the transportable building shown in figure 1 in the erected configuration;

[0043] Figure 5 shows a side view of the transportable building shown in figure 1 in the erected configuration;

[0044] Figure 6 shows an end view with the transportable building shown in figure 1 in the transport configuration;

[0045] Figure 7 shows a side view of the transportable building shown in figure 1 in the transport configuration;

[0046] Figure 8 shows an end cross-sectional view of the transportable building in the erected configuration;

[0047] Figure 9 shows a cross-sectional side view showing details of the joints between the roof, side wall and floor of a transportable building in accordance with embodiment of the present invention. In figure 9, the building is in the erected configuration;

[0048] Figure 10 shows a plan view of the joints between an internal fixed wall, a movable internal wall and an outer side wall in a transportable building in accordance with an embodiment of the present invention. In figure 10, the building is in the erected configuration;

[0049] Figure 11 shows a cross-sectional side view showing details of a joint between a fixed roof and a movable roof portion in a transportable building in accordance with embodiment of the present invention;

[0050] Figure 12 shows a cross-sectional side view showing details of the joints between the

roof, internal walls and floor of a transportable building in accordance with an embodiment of the present invention. In figure 12, the building is in the erected configuration;

[0051] Figure 13 shows a plan view of a transportable building in accordance with another embodiment of the present invention. In figure 13, the roof has been removed for clarity;

[0052] Figure 14 shows a perspective view showing the positioning and use of linear actuators to raise and lower the movable floor portions and the movable roof portions;

[0053] Figure 15 shows an end view of a transportable building in accordance with an embodiment of the present invention in which the roof has been partly raised;

[0054] Figure 16 shows an end view similar to figure 15, but with the roof being fully raised;

[0055] Figure 17 shows a plan view of a roof lifting arm using the embodiments shown in figures 15 and 16;

[0056] Figure 18 shows a side view of the lower connection point of the roof lifting arm used in figure 15;

[0057] Figure 19 shows a front view of the upper roof lifting arm coupler of the roof lifting apparatus shown in figure 15;

[0058] Figure 20 shows a side view of the upper roof lifting arm coupler of the roof lifting apparatus shown in figure 15;

[0059] Figure 21 shows an end view of the transportable building shown in figure 16, with the floor being partly lowered;

[0060] Figure 22 shows an end view similar to that shown in figure 22, but with the floor being fully lowered;

[0061] Figure 23 shows a front view of the connection between the floor actuator arm and the movable floors;

[0062] Figure 24 shows a side view of the connection shown in figure 23;

[0063] Figure 25 shows an end view of a transportable building in accordance with an embodiment of the present invention, with further detail of the upper part of the building being

shown;

[0064] Figure 26 shows an end view of an erected transportable building with central roof access panels being opened;

[0065] Figure 27 shows a perspective view showing the movable floor panels being lowered;

[0066] Figure 28 shows an end cross-sectional view of the transportable building in accordance with one embodiment of the present invention being in the transport configuration; and

[0067] Figures 29 to 36 show perspective views showing a transportable building being moved from the transport configuration shown in 29 to an erected configuration shown in figure 35 and with the central roof access panels being open in figure 36.

DESCRIPTION OF EMBODIMENTS

[0068] It will be appreciated that the drawings have been provided for the purposes of illustrating preferred embodiments of the present invention. Therefore, it will be understood that the present invention should not be considered to be limited solely to the features as shown in the drawings.

[0069] Figure 1 shows a plan view of the transportable building in accordance with an embodiment of the present invention. The building shown in figure 1 is in the transport configuration. In figure 1, the fixed roof panels have been removed for clarity.

[0070] The transportable building 10 has a central fixed region and movable, expandable regions along the longitudinal side edges of the central, fixed region. The central, fixed region includes a central frame that will typically be made from steel. The central frame will normally have dimensions to enable the building to conform with standard ISO sized shipping containers when the transportable building is in the transport configuration.

[0071] The central frame has end members 12, 14 that extend across the upper part of the ends of the central frame. ISO connectors 16, 18 are attached to each upper corner of the end frame. Similarly, ISO connectors 20, 22 are attached to the lower corners of the end frame (see figure 6). The ISO connectors allow the building to be easily moved by standard ISO handling equipment when the building is in the transport configuration.

[0072] The central frame houses a central floor 24 (see figure 2). The central floor is divided into six separate bathrooms, designated in figure 1 as EN-S 1, EN-S 2, EN-S 3, EN-S 4, EN-S 5 and EN-S 6. Each bathroom is provided with a toilet, a hand basin and shower.

[0073] The central region also includes a number of fixed walls, designated by reference numerals 26, 28, 30, 32, 34, 36, 38 and 40. These fixed walls are mounted to or formed around the central frame of the transportable building 10. These fixed walls also form part of each of the bathrooms shown in figure 1.

[0074] The transportable building 10 also includes a first movable roof 42 and a second movable roof 44. First movable roof 42 is located on one longitudinal side of the central frame and second movable roof 44 is located on the other longitudinal side of the central frame. The movable roofs 42, 44 are hingedly connected to the upper sides of the central frame of the transportable building. As shown in figure 1, the movable roofs 42, 44 are positioned in a generally vertical orientation when in the transport configuration. In this configuration, the movable roofs 42, 44 form the side walls of the boxlike configuration of the transportable building 10 in its transport configuration.

[0075] The transportable building 10 also includes a plurality of separate movable floor portions. These are shown by reference numerals 46, 48, 50, 52, 54 and 56. Each of the movable floors is hinged about its lower end to the lower part of the central frame. In the transport configuration, as shown in figure 1, each movable floor is positioned in a generally vertical orientation. Each movable floor is located adjacent to and inwardly of the movable roofs when the building is in its transport configuration.

[0076] As can be seen from figure 1, each movable floor portion on one side of the building (for example, movable floors 46, 48 and 50) is separate to and spaced from the adjacent movable floor portion on that side of the building. As a result, each movable floor can be lowered and raised independently of the other movable floors. One floor portion may be spaced from 10cm to 60cm (or more) from the adjacent floor portion, although a spacing of from 30cm to 50cm may be suitable.

[0077] Each movable floor also has a movable outer side wall hingedly attached to an upper end thereof (when the movable floor is in the transport position). The movable outer side walls are shown by reference numerals 58, 60, 62, 64, 66 and 68. In the transport position, each of the movable side walls is located adjacent to and inwardly of its respective movable floor. For example, movable sidewall 58 is located adjacent to and inwardly of movable floor 46. Movable

side wall 58 is hingedly connected to pivot up and about the upper/outer end of movable floor 46.

[0078] The transportable building 10 also includes movable end walls 70, 72, 74, 76. Each of the movable end walls is hingedly connected to one of the fixed central walls. In the erected configuration of the transportable building, the movable end walls rotate about a generally vertical axis from the position shown in figure 1 (where they lie adjacent to the fixed central walls to the position shown in figure 3.

[0079] The transportable building 10 further includes a number of movable internal walls. The movable internal walls are hingedly connected to the fixed central walls and are able to be pivotally moved about a generally vertical axis of the hinges. Movable internal walls are shown at reference numerals 78, 80, 82, 84, 86, 88, 90 and 92. The movable internal wall 86 is hingedly mounted to central fixed wall 36. Movable internal wall 88 is hingedly mounted to a lateral extension 94 extending from fixed central wall 36. This arrangement allows the internal walls to at least partially overlie another internal wall when the building is in its transport configuration.

[0080] The building also includes service recesses 96, 98 that are located at either end of the central region of the transportable building 10. The service recesses 96, 98 are used to house air conditioning units, hot water systems, electricity cabinets and the like. Doors 100, 102 provide access to the service recesses 96, 98 and allowed the service recesses 96, 98 to be closed as desired.

[0081] Figure 2 shows an end view, partly in cross-section, of the steps involved in moving the transportable building 10 from the transport configuration to the erected configuration. Once the transportable building 10 (in its transport configuration) has been moved to the desired site, is placed on footings or on level ground. The movable roof portions 42, 44 are then folded upwardly and outwardly. The movable floor portions 50, 56 are then folded downwardly and outwardly. Once the movable floor portions are in a generally horizontal orientation, their respective movable side walls 62, 68 fold upwardly and are locked, latched or bolted in place relative to the respective foldable roof portions 42, 44. This is shown schematically in figure 2. Figure 2 also shows the fixed roof panels 104 and the ISO connectors 16. The fixed roof panels 104 extend across the central region of the transportable building 10. When the building is in its transport configuration, the fixed roof panels 104 form the top or roof of the boxlike configuration of the building.

[0082] Figure 3 shows a plan view showing the floor plan of the transportable building 10

when it is in its erected configuration. Figure 3 clearly shows that the movable floors 46, 48, 50, 52, 54 and 56 each comprise separate floors to the other movable floors. For example, movable floor 46 has an internal edge 46A that is spaced from the internal edge 48A of the adjacent movable floor 48. In this manner, noise and vibrations cannot pass directly from movable floor 46 into movable floor 48 when the building is seen its erected configuration. As a result, there is less noise and vibration transmission between the rooms located above each of the movable floors 46 to 56.

[0083] As can also be seen from figure 3, internal wall 78 is separate to and spaced from internal wall 80 when the building is in its erected configuration. In this manner, noise and vibration transmission between the internal walls of each of the rooms is minimised. Further, the space between the adjacent internal walls 78 and 80 also assists in improving the fire rating of the building.

[0084] As a further advantage, apparatus for lowering the movable floor panels and raising the movable roof panels may be positioned in the space between the adjacent movable floors and between the adjacent movable internal walls.

[0085] The building 10 shown in figure 3, has six separate bedrooms 1, 2, 3, 4, 5, and 6. Each bedroom has its own bathroom. For example, bedroom 1 has a door that opens into bathroom ENS-1. Therefore, the building 10 shown in figure 3 can accommodate six separate people. Although the floors of each of the bedrooms are attached to the central region of the transportable building, the floors of each bedroom are largely isolated from the movable floor portions of the adjacent bedroom. Similarly, each bedroom is separated from the adjacent bedroom by two internal walls. For example, bedroom 1 is separated from bedroom 2 by internal walls 86 and 88. Walls 86 and 88 are separate from and spaced apart from each other.

[0086] As a further advantage of the arrangement shown in figure 3, each movable floor portion has a length that is approximately one third of the length of the side of the transportable building 10. As a result, each movable floor portion can be relatively light, thereby enabling easy movement of the movable floor portions between the transport configuration and the erected configuration, and vice versa. Further, if one of the bedrooms becomes damaged, it can simply be folded away and taken out of use without having to repair the entire transportable building or without having to take the entire building or one side of the building out of use.

[0087] Figure 3 also shows movement of the movable internal walls and the movable end walls from their transport position to the erected position. This is shown in dotted outline in

figure 3.

[0088] Figures 4 and 5 show respectively an end view and a side view of the building 10 in its erected configuration. The movable end walls 72 and 76 are shown in figure 4. The services recess doors 102 are opened in figure 4 and it is possible to see the air conditioning units fitted in the service recess 98 in figure 4. One of the air conditioning units is numbered at 106.

[0089] Figure 5 shows a side view of the building 10 in its erected configuration. The movable side walls 64, 66, 68 can clearly be seen in figure 5. It is also apparent in figure 5, the movable sidewall 64 is spaced from the movable side wall 66, and movable side wall 66 is spaced from movable side wall 68. The vertical end frame members 108, 110 of the central frame can also be seen in figure 5.

[0090] Figures 6 and 7 show an end view and a side view, respectively, of the building 10 in its transport configuration. As can be seen from figures 6 and 7, the building 10, when in its transport configuration, has a boxlike shape that is sized and shaped to conform to the size and shape of an ISO shipping container.

[0091] Figure 8 shows an end view, partly in cross-section, of the building 10 in its expanded configuration. In figure 8, bedrooms 3 and 4 can be seen, as can bathroom ENS-3. Other features that are apparent from figure 8 are the adjustable feet 112, 114 that support the outer ends of movable floors 50, 56. The central roof 104 includes a peak 116, with the central roof sloping slightly downwardly therefrom. The angle of slope of the central roof is essentially identical to the angle of slope of the movable roofs 42, 44 when they are in the erected configuration. As there is a slight slope to the roof of the erected building, rain water runs off the roof and does not gather on the roof, as would be the case if the roof was flat.

[0092] In some embodiments, the various movable roofs, floors and walls of the transportable building are made from fibre reinforced polymer material. This enables them to be manufactured by moulding, which allows for a very high degree of accuracy in the manufacture of those components. Further, the moulded fibre reinforced plastic components provide good strength with light weight.

[0093] In some embodiments of the present invention, the panels are shaped to improve sealing between the panels or to provide drainage channels or to control the flow of water from the transportable building when it is in the erected configuration. Figures 9, 10 and 11 show some of the possible details in this regard.

[0094] Figure 9 shows a cross sectional side view showing detail and the shape of the roof, a movable end wall panel and the floor. The movable roof panel 42 is formed with a downwardly extending projection 120. Projection 120 is spaced inwardly from the outer edge 122 of movable roof panel 42. The end wall panel 76 has a small recess 124 at an upper end thereof. This recess 124 is located generally adjacent to projection 120 (in the erected configuration). A weather seal 126 is positioned in recess 124 and this assists in forming a weather seal between the roof 42 and the end wall 76. Further, downwardly extending projection 120 also acts as a physical barrier to rain entering the building. The projection 120 also acts as a drip member such that any water or rain that does run down the projection 120 drips off the outer end of the projection, which is located away from the end wall. The projection 120 also assists in correctly locating the end wall 76 when the end wall is being moved to the erected configuration.

[0095] The end wall panel 76 has a further small recess 128. Recess 128 houses a fire seal 130. The fire seal 130 may be in the form of an intumescent material that expands when exposed to heat or smoke.

[0096] The lower end of end wall 76 includes a downwardly extending projection or lip 132. The floor panel 56 includes an upwardly extending lip 134. The lip 134 assists in locating the lower end of end wall 76 when the end wall 76 is being moved to the erected configuration. The lip 134 also acts as a physical barrier to any water that tries to enter the building. To further improve the seal, a weather seal material 136 is located between downwardly extending lip 132 and upwardly extending lip 134. A drip channel 135 also acts to divert water that may run down the outside of end wall 76 away from the join between the floor and the end wall. A fire seal 138 is located between an end of the end wall panel 76 and the upwardly extending lip 134.

[0097] Figure 10 shows a plan view, in cross-section, showing the bathroom wall 34, the movable end wall 74 and the movable outer side wall 64. As can be seen from figure 10, bathroom wall 34 includes a lateral extension 140. Hinge 142 is used to hingedly connect the movable internal wall 92 to the lateral extension 140 of bathroom wall 34. Bathroom wall 34 is a fixed wall.

[0098] The projection 140 of bathroom wall 34 includes an outwardly extending projection 144 that is of a complementary size and shape to a recess 146 formed in the movable end wall 74. A weather seal 148 and a fire seal 150 are located between the respective ends of the projection 140 and the movable end wall 74.

[0099] A similar arrangement is present at the outer end of the movable end wall 74. In

particular, movable end wall 74 includes a recess 148 that is of a complementary size and shape to a projection 150 formed on the movable outer side wall 64. A weather seal 152 and a fire seal 154 are present between the outer end of movable end wall 74 and the movable outer side wall 64.

[00100] Figure 11 shows a side view, in cross section, showing the fixed roof 104 and the movable roof 44. In figure 11, the movable roof 44 is shown in the transport configuration in dotted outline and is shown in the erected configuration in solid outline.

[00101] The movable roof 44 is connected by hinge 160 to a frame member 162 of the central frame. The fixed roof panel 104 includes a lateral extension 164 having a downwardly extending lip 166 at its outer end. The extension 164 also includes a projection 168 that extends along the longitudinal length of the extension 164.

[00102] The movable roof 44 has an upper, outer surface 170 that, in the erected configuration, forms part of the outer roof of the erected building. An upwardly extending projection 172 is formed at the inner end of the movable roof 44. In the erected configuration, projection 172 is located inwardly of lip 166 of the extension 164 of the fixed roof 104. A wall 174 extends downwardly from the inner edge of upwardly extending projection 172. Wall 174 reaches its lowest point and then curves back upwardly at 176. The walls 174, 176 define a cavity or recess that extends along the longitudinal length of movable wall 44. This cavity or recess can act as a channel along which any rainwater that may enter into the cavity and run along and ultimately drain from the ends of the cavity. In this manner, this cavity acts to collect any rainwater that leaks between the fixed roof 104 and the movable roof 44. This assists in keeping rainwater out of the erected building.

[00103] Also shown in figure 11 is an electrical cable 180 that runs through the roof 44 and electrical cable 182 that extends underneath the fixed roof 104. Appropriate electrical connectors 184, 186, are used to enable electrical cables 180 and 182 to be electrically connected when the movable roof 44 is moved to the transport position.

[00104] Also shown in outline in figure 11 are the movable floor 50, the outer side wall 62, the movable end wall 72 and the movable internal wall 84, with all these walls and floors being in the transport configuration.

[00105] Figure 12 shows a cross-sectional side view showing details of the joints between the roof, internal walls and floor of a transportable building in accordance with an embodiment of the present invention. Figure 12 shows the movable roof 42, internal wall 90, internal wall 92

(only partly shown) and movable floor 54. The internal walls 90 and 92 are spaced from each other, as can be clearly seen in figure 12.

[00106] The roof 42 includes a projection 190 that has a width that is only slightly smaller than the space between the internal walls 90 and 92. The upper end of internal wall 90 includes a recess 192. The upper end of internal wall 92 includes a similar recess 194. A rubber seal material 196 is placed between the recess 192 and the adjacent downwardly extending part of projection 190. A rubber seal material 198 is placed between the recess 194 and the adjacent downwardly extending part of projection 190. This minimises drafts and noise transmission between adjacent rooms. A fire seal material is also placed between the respective internal walls 90, 92 and the roof 42, shown at 200 and 202.

[00107] The lower end of internal wall 90 is provided with a downwardly extending projection 204 that is of complementary size and shape to an upwardly extending projection 206 that is formed on movable floor 54. A weather seal 208 and a fire seal material 210 are positioned as shown.

[00108] The projections 190 and 206 assist in locating the internal wall 90 in the correct position when it is being moved into its erected configuration. The overlapping projections also minimise noise transmission and also allow for improved sealing and for the provision of smoke and fire seal materials.

[00109] Although not shown in the drawings, the use of plural spaced internal walls to separate the rooms of the building may also be applied in instances where a single movable floor is used on one or both sides of the building. Although this may result in increased noise transmission through the movable floors, the use of the plural spaced internal walls to separate the rooms from each other will improve the acoustic, thermal and fire rating properties of the erected building.

[00110] Figure 13 shows a view that is generally similar to figure 3. However, figure 13 is a different embodiment that has differences in the mounting and configuration of the movable end walls and the movable internal walls. Where the features of figure 13 are in common with the features of figure 3, the same reference numeral will be used but with the addition of a "2" to the front of the reference numeral in figure 13. For example, feature 48 in figure 3 corresponds to feature 248 in figure 13.

[00111] Unlike the embodiment shown in figure 3, in the embodiment shown in figure 13, the movable sidewalls 258, 260, 262, 264, 266 and 268 are not pivotally hinged at their lower edges

to their respective movable floor portions. Rather, the movable sidewalls are arranged so that they can move laterally inwardly and outwardly relative to the central frame. In order to describe how this occurs, reference will be made to the room designated "BED 1" in figure 13. In the erected configuration, this room has a floor formed by floor portion 252, an end wall 274, an internal wall 286 and outer side wall 264.

[00112] End wall 274 comprises a first wall portion 273 and a second wall portion 275. First wall portion 273 is pivotally connected by vertical hinges to the central frame or a fixed central wall. The outer end of first wall portion 273 is pivotally connected by vertical hinges to the inner end of second wall portion 275. The outer end of second wall portion 275 is pivotally connected by vertical hinges to one end of the movable side wall 264. Similarly, internal wall 286 comprises a first wall portion 285 that is pivotally connected by vertical hinges to the central frame or a fixed central wall. The outer end of first wall portion 285 is pivotally connected by vertical hinges to the inner end of second wall portion 287. The outer end of second wall portion 287 is pivotally connected by vertical hinges to the other end of the movable sidewall 264.

[00113] The action of moving the side wall 264 between the transport configuration and the erected configuration is shown in dashed outline in figure 13. In particular, once the movable floor portion 252 has been moved to the erected configuration, the movable sidewall 264 can move laterally outwardly from the central part of the transportable building and across the floor portion 252. It can be seen that as the movable sidewall 264 is moved outwardly, the respective wall portions 273, 275 and 285, 287 of the end wall and internal wall pivot about their respective hinges until the first wall portion comes into alignment with the second wall portion to form the respective outer end wall 274 and internal wall 286. In order to move the side wall 264 back to the transport position, the side wall 264 is moved laterally inwardly, which causes the respective first and second wall portions of the end wall and internal wall to fold in a concertina like-fashion. In the transport position, the first wall portion 273 and the second wall portion 275 extend generally parallel to the longitudinal axis of the central frame and the first wall portion 273 is located in face-to-face abutment with the second wall portion 275. The first wall portion 285 and second wall portion 287 of the internal wall 286 adopt a similar configuration.

[00114] The other rooms are arranged in a similar manner. It will be appreciated that the rooms shown in figure 13 as "BED 2" and "BED 5" each include two internal walls, whereas the other rooms formed by the movable part of the building have a movable internal wall and a movable end wall. Further, each of the rooms in the movable part of the building has its own side wall and floor portion. The side wall of one of the rooms is spaced from an adjacent side wall of

the adjacent room and the floor portion of one room is spaced from the floor portion of an adjacent room.

[00115] Figure 14 shows one possible arrangement of linear actuators that may be used to move the roof and floors between the transport position and the erected position.

[00116] Figure 14 shows movable roof 42 and movable floor portion 52. In figure 14, each room in the movable part of the building may be provided with a separate movable roof portion. Alternatively, a single movable roof portion may cover all of the rooms on one side of the building.

[00117] In order to extend the movable roof 42 from the transport position to the erected position, a first linear actuator 300 is mounted to a vertical frame member 302. A second linear actuator 304 is mounted to a vertical frame member 306. Linear actuator 300 includes an arm 308 that is pivotally connected at one end to the underside of movable roof 42. The other end of arm is pivotally and slidably connected to a member 310.

[00118] A further linear actuator 310 is connected to vertical column 302. Another linear actuator 312 is mounted to vertical column 306. Linear actuator 310 includes an extendable arm 314 that is pivotally connected at one end to the movable floor portion 52. The other end of arm 314 is pivotally connected to either vertical column 310 or to a frame or bracket mounted to vertical column 310.

[00119] A drive motor 316 extends and retracts arm 318. Similarly, drive motor 320 extension retracts extendable arm 314. In order to raise the movable roof portion 42, drive motor 316 is energised to cause arm 318 to retract. This causes the inner end of arm 308 (which is of fixed length) to raise upwardly, which, in turn causes the roof portion 42 to pivot outwardly and upwardly to the position show in figure 14. Linear actuator 304 is operated in the same manner to ensure that the roof raises evenly. The linear actuators may be synchronously operated to ensure that the roof does raise evenly.

[00120] To lower the movable floor portion 52, linear actuator 310 is operated by energising the motor 320 to cause the extendable arm 314 to extend. This causes the extendable arm 314 to push the movable floor portion outwardly and downwardly about its pivot point to the erected position shown in figure 14. Linear actuator 312 is operated in the same manner.

[00121] Advantageously, the linear actuators 310, 312 and 300, 304 are positioned in the spaces between adjacent movable floor portions. The linear actuators may be of conventional

design and further detail of the construction of the linear actuators is not required.

[00122] In figure 14, each linear actuator only includes a single arm extending between the actuator and the respective movable floor or movable roof portion. However, multiple arms appear in figure 14 in order to show where the arms will be located as the actuators are used to extend and retract the roof portion and the floor portion.

[00123] Figures 15 to 24 showed various views of another embodiment of the present invention. These figures show the lifting apparatus for raising and lowering the movable roof portions and movable floor portions in more detail. Referring initially to figure 15, the transportable building 400 includes movable roof portion 402. The movable roof portion 402 is hingedly mounted at 404 to the central frame of the building 400. The central frame includes vertical members 406. A drive motor 408 is mounted to the vertical member 406. Drive motor 408 may comprise an electric motor. A guide track 410 (see figure 17) is also mounted to vertical member 406. Guide track 410 may be in the form of a hollow C-section that extends in a generally vertical direction. A linear actuator arm 412 extends along guide track 410. Linear actuator arm 412 either retracts or extends when the drive motor 408 is energised. In this embodiment, the drive motor and the linear actuator arm comprise a linear actuator, such as a Linak brand linear actuator. Alternatively, the linear actuator arm 412 may be caused to rotate in one direction and then in an opposite direction to cause raising and lowering of a connector.

[00124] With reference to figures 17 and 18, the drive motor 408 and linear actuator arm 412 may be, for example, purchased from Linak and may be Linak model 0361351 linear actuator. The linear actuator arm 412 is extendable and retractable. The lower end of linear actuator arm 412 supports an axle 414. Axle 414 supports castor wheels 416 that allow for smooth movement along the guide track 410. A roof lifting arm 418 is connected to the axle 414 through adaptor 420. Adaptor 420 comprises a yoke 422 having spaced arms 424. Arms 424 have openings formed near their lower ends and those openings receive and securely hold the axle 414. The adapter 420 also includes a threaded end 426 that enables it to be threadably attached to a corresponding female threaded opening in the roof lifting arm 418.

[00125] The upper end of roof lifting arm 418 is shown in figures 19 and 20. The upper end of the roof lifting arm 418 has a female threaded opening that is threadably connected to rod end 428. Rod end 428 includes an opening 430 that receives axle 432 that is fixed to U-shaped bracket 434. Bracket 434 is fixed to the underside of movable roof portion 402.

[00126] It will be appreciated that the roof lifting arm 418 can pivot relative to both the linear

actuator arm 412 and the bracket 434. It will be further appreciated that the roof lifting arm 418 is of fixed length. When the linear actuator arm 412 is retracted, the lower end of the linear actuator and 412 moves upwardly towards the drive motor 408. This moves the lower end of roof lifting arm 418 upwardly along the guide track 410. As a result, the movable roof portion 402 is caused to be raised. Figure 15 shows the movable roof portion 402 partly open and figure 16 shows the movable roof portion 402 being fully opened/erected. To lower the movable roof portion 402, the drive motor 408 is energised to cause the linear actuator arm 412 to extend. Figure 18 shows the angle of the roof lifting arm 418 in a closed position (see "A" in figure 18 and an open or erected position (see "B" in figure 18).

[00127] Figures 21 and 22 show the movable floor portion 440 being lowered. In particular, a hinging floor actuator 442 is pivotally connected to a mounting bracket 444 that is, in turn, connected to vertical member 406. The hinging floor actuator 442 has an actuator arm 446 that is connected to an axle that extends between two adjacent movable floor portions, as will be described in more detail with reference to figures 23 and 24.

[00128] As shown in figures 23 and 24, the adjacent movable floor portions 440 and 441 are spaced apart from each other. Respective floor lifting brackets 448, 450 are attached to movable floor portions 440, 441, respectively. Hinge pin adapter plates 452, 454 carry a hinge pin 456. The actuator arm 446 carries an adapter 458 that has an opening 460 that receives the hinge pin 456. In this manner, the lower end of the actuator arm 446 is pivotally connected to the hinge pin 456.

[00129] In order to lower the floor, the hinging floor actuator 442 is energised to cause the actuator arm 446 to extend. This results in lowering of the adjacent movable floor portions 440, 441. Figure 21 shows the floor being partly lowered and figure 22 shows the floor being fully lowered. The extension of the linear actuator arm 446 can be seen by comparing figure 21 (where the actuator arm is only partly extended) to figure 22 (where the actuator arm is fully extended).

[00130] Figure 25 shows a cross sectional end view of the transportable building with the movable roof portions and the movable floor portions in the erected positions and the outer walls and interior walls in the folded or transport positions. In particular, the outer walls 462 and the bifold inner walls 464 can be clearly seen. The bifold inner walls 464 are similar to the inner walls shown in figure 13. Also shown in figure 25 are the movable access hatches 466, 468 that form the roof of the central core of the transportable building. In particular the central core of the building includes a frame that includes the vertical members 406 and crossmember 472. Other

frame members that are positioned in the bottom of the central frame are not shown in figure 25.

[00131] The central frame includes longitudinal members 474, 476 that carry a central roof skin or ridge capping 478. The central roof skin or ridge capping 478 may be sufficiently strong to enable persons to walk thereon. The movable access hatches 466, 468 are hinged at the inner ends to the longitudinal roof members 474, 476, respectively.

[00132] As shown in figure 26, the movable access hatches 466, 468 can pivot upwardly to enable access to the roof or ceiling space of the central core of the building. Gas struts 480, 482 may be provided to facilitate raising and lowering of the access hatches. The access hatches may be provided with lips 484, 486 at the outer ends to help provide a seal when the access hatches are lowered. The hatches extend slightly downwardly when they are fully lowered, to help water flow off the hatches Sealing tape may extend along over the hinge joint between the access hatches in the longitudinal roof members 474, 476, again, to help in forming a seal against ingress of water through the roof.

[00133] The upper outer edges of the central core of the building may carry a gutter arrangement so that any water that forms on the roof of the central core can be removed. Alternatively, in the embodiment shown in figure 25, a cover member 488 may extend between the roof of the central core and the upper surface of the movable roof portions 402 when the movable roof portions 402 are fully erected. The cover member 488 may be in the form of an extruded member having an upper surface that allows water that is flowing off the roof of the central core to pass over the upper surface of the cover member 488 and onto the upper surface of movable roof portion 402. The water then flows down along the movable roof portion 402 and is either collected in a gutter formed on the outer end of the movable roof portions 402 or simply flows off the end of the roof portion 402.

[00134] Figure 27 shows a perspective view of the movable floor portions 440 being lowered. In figure 27, the movable floor portions 440 are shown in a partly lowered state at reference numeral 440A and in a fully lowered state at reference numeral 440B. The actuator arm 446 and the floor lifting bracket 450 can be clearly seen in figure 27.

[00135] Figure 27 also shows the support legs 490 that are pivotally connected to the underside of the movable floor portions 440. Each movable for portion 440 is provided with at least two support legs 490 located near the outer corners of the movable floor portion 440. The support legs 490 are housed within a recess 492 so that the support legs 496 sit flush with the lower surface of the movable floor portion 440 when the movable floor portions are in a vertical

orientation for transport. The support legs 490 are pivotally connected to the movable floor portions 440. The support legs 490 also include adjustable feet 494 so that the effective length of the support legs 490 can be adjusted to account for uneven ground. As the floor portions 440 are lowered, the support legs 490 pivot outwardly under their own weight so that they effectively move into position automatically as the movable floor portions 440 are lowered.

[00136] Figure 28 shows a cross sectional end view of the transportable building in accordance with one embodiment of the present invention in its transport configuration. The upper part of figure 28 shows the in-transit roof detail section and the lower part of figure 28 shows the in-transit base detail section. Referring to the roof detail section of figure 28 first, and starting at the top, a standard international shipping container corner casting 500 is provided. The roof cover member 488, in the form of an extrusion, is shown. The roof cover member 488 is connected to a structural frame edge been 502. The roof hinge 404 is also shown. The movable roof portion 402 forms an outer side wall (of the container shape) in the transport configuration. The movable floor portion 440 is located inwardly of and adjacent to the movable roof portion 402. The outer wall panel 462 and inner bifold inner walls 464 are located inwardly of the movable floor panel 440. The central services core of the building 504 is shown. In the embodiment shown in figure 28, a bathroom module 506 is included in the central services core 504.

[00137] Turning attention to the lower section of figure 28, a hinged floor extension 508 can be seen at the lower end of the movable floor portion 440. A fixed infill floor panel 510 is positioned above a space 512. A floor edge beam 514 forms part of the frame of the central core of the building. A base edge beam 516 is also provided. It carries a standard international shipping container corner casting 518. Also shown in the lower part of figure 28 is the gutter extrusion 520 that is fitted to the end of the movable roof portion 402. An in-transit roof fixing bolt 522 is used to hold the movable roof portion 402 in place during transit, it being appreciated that the movable roof portion 402 forms the outer wall of the transportable building when it is in the transport configuration.

[00138] Figures 29 to 36 show perspective views of the transportable building 400 being erected. In figure 29, the building 400 is in its transport configuration. In this configuration, the building is in the shape of an international standard shipping container having standard international shipping container corner castings at its corners to enable the building to be moved using standard shipping container cranes and the like. In figure 30, the movable roof portions 402 are starting to be raised. In figure 31, the movable roof portions 402 have been fully raised.

In figure 32, the movable floor portions 440 have started to be lowered. As can be seen in figure 32, a plurality of separate movable floor portions 440 are provided, with each movable floor portion 440 being spaced from an adjacent movable floor portion 440. Also shown in figure 32 are the support legs 490.

[00139] In figure 33, the movable floor portions 440 are showing in a fully lowered position. Support legs 490 help support the outer edges of the movable floor portions 440 on the ground or on foundations (not shown). As can be seen in figure 33, each of the movable floor portions 440 are provided with three support legs 490 near their outer edges. In figure 33, the outer walls 462 are still in the in-transport position. Figure 34 shows the outer walls 462 being moved outwardly over the floor portions 440. At the same time, the bifold end walls 520 and the bifold inner walls (not shown) start to fold outwardly. It will be appreciated that the bifold end walls and a bifold inner walls fold outwardly because they are connected to the outwardly moving outer walls 462. Figure 35 shows the transportable building in its in use, erected configuration. In figure 36, the access hatches 466, 468 are shown in the opened position. In this position, it is possible to get access to the roof or ceiling of the central core of the building for servicing and maintenance.

[00140] In the present specification and claims (if any), the word 'comprising' and its derivatives including 'comprises' and 'comprise' include each of the stated integers but does not exclude the inclusion of one or more further integers.

[00141] Reference throughout this specification to 'one embodiment' or 'an embodiment' means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearance of the phrases 'in one embodiment' or 'in an embodiment' in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more combinations.

[00142] In compliance with the statute, the invention has been described in language more or less specific to structural or methodical features. It is to be understood that the invention is not limited to specific features shown or described since the means herein described comprises preferred forms of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the proper scope of the appended claims (if any) appropriately interpreted by those skilled in the art.

CLAIMS

1. A transportable building comprising a movable floor that is movable between a transport configuration and an erected configuration, the transportable building including at least two rooms on one side of the transportable building in the erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room in the erected configuration.

2. A transportable building movable between a transport configuration and an erected configuration, the transportable building comprising a fixed floor, at least two movable floor portions located on one side of the transportable building, the at least two movable floor portions comprising separate floor portions having spaced edges, the transportable building including at least two rooms on one side of the transportable building in the erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room of the at least two rooms and wherein each room comprises one of the movable floor portions.

3. A transportable building as claimed in claim 2 wherein movable floor portions are located on either side of the fixed floor.

4. A transportable building as claimed in claim 2 or claim 3 wherein the movable floor portions are moved between the transport position and the erected position by pivoting the movable floor portions.

5. A transportable building as claimed in any one of the preceding claims wherein the transportable building includes outer side walls in the erected configuration and the outer side walls move laterally outwardly from a transport position to an erected position.

6. A transportable building as claimed in claim 5 wherein the outer side walls move over the movable floor portions that have been placed in the erected configuration when the outer side walls move from the transport position to the erected position and vice versa.

7. A transportable building as claimed in claim 5 or claim 6 wherein the outer side walls are pivotally connected to internal walls or outer end walls, with the internal walls and outer end walls each comprising a first wall portion pivotally connected at one end to a central region, a second wall portion pivotally connected to the first wall portion, with an outer end of the second wall portion being pivotally connected to the outer side walls.

8. A transportable building as claimed in any one of the preceding claims further comprising at least one movable roof portion.

9. A transportable building as claimed in claim 8 wherein the transportable building has a fixed central roof portion and the movable roof portion is pivotally movable relative to the fixed roof portion or the movable roof portion pivotally connected to a central frame.

10. A transportable building as claimed in any one of the preceding claims further comprising movable end walls.

11. A transportable building as claimed in claim 10 wherein the movable end walls are pivotally movable between the transport position and the erected position, or the movable end walls are pivotally connected to a central frame, or the movable end walls are be pivotally connected to fixed walls in the transportable building or the movable end walls comprise a first wall portion pivotally connected to a central frame, or pivotally connected to fixed walls in the transportable building, and a second wall portion pivotally connected to an outer end of the first wall portion, the second wall portion being pivotally connected to an outer side wall.

12. A transportable building as claimed in any one of the preceding claims wherein the transportable building includes a frame, the frame including transport connectors at the corners thereof.

13. A transportable building as claimed in any one of the preceding claims wherein the movable floor portions are provided with support legs near an outer edge thereof.

14. A transportable building as claimed in claim 13 wherein the support legs are pivotally connected to an underside of the movable floor portions.

15. A transportable building as claimed in any one of the preceding claims further comprising one or more linear actuators to move the movable floor portions between the transport position and the erected position and one or more linear actuators to move the movable roof between the transport position and the erected position.

16. A transportable building as claimed in claim 15 wherein the linear actuators are electrically actuated.

17. A transportable building as claimed in claim 15 or claim 16 wherein the linear actuators are positioned in the space(s) formed between the spaced internal walls.

18. A transportable building as claimed in any one of the preceding claims further comprising a first movable roof section and a second movable roof section, the first movable roof section and the second movable roof section forming respective side walls of a box-like

configuration when the transportable building is in the transport position.

19. A transportable building as claimed in any one of the preceding claims comprising movable floor portions and movable side walls located on either side of a central floor portion, the central floor portion forming part of a boxlike configuration when the building is in its transport configuration, the transportable building including a central frame, the central frame having a roof comprising a fixed roof or one or more panels that can be moved from a closed position to an open position to provide access to the upper part of the central frame.

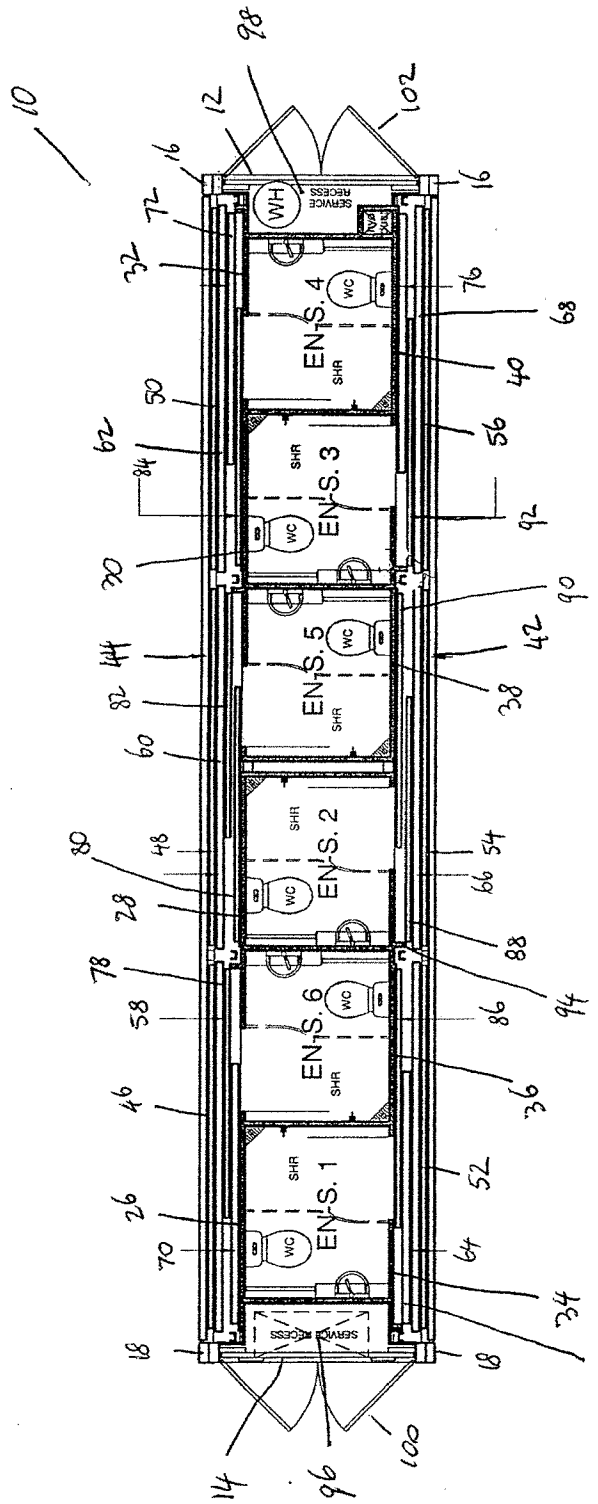
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Fig 1

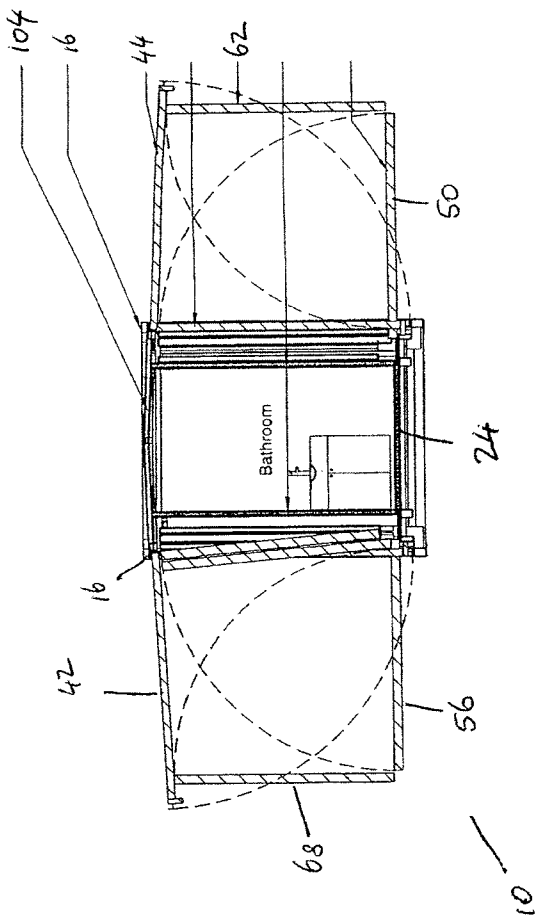

Fig 2

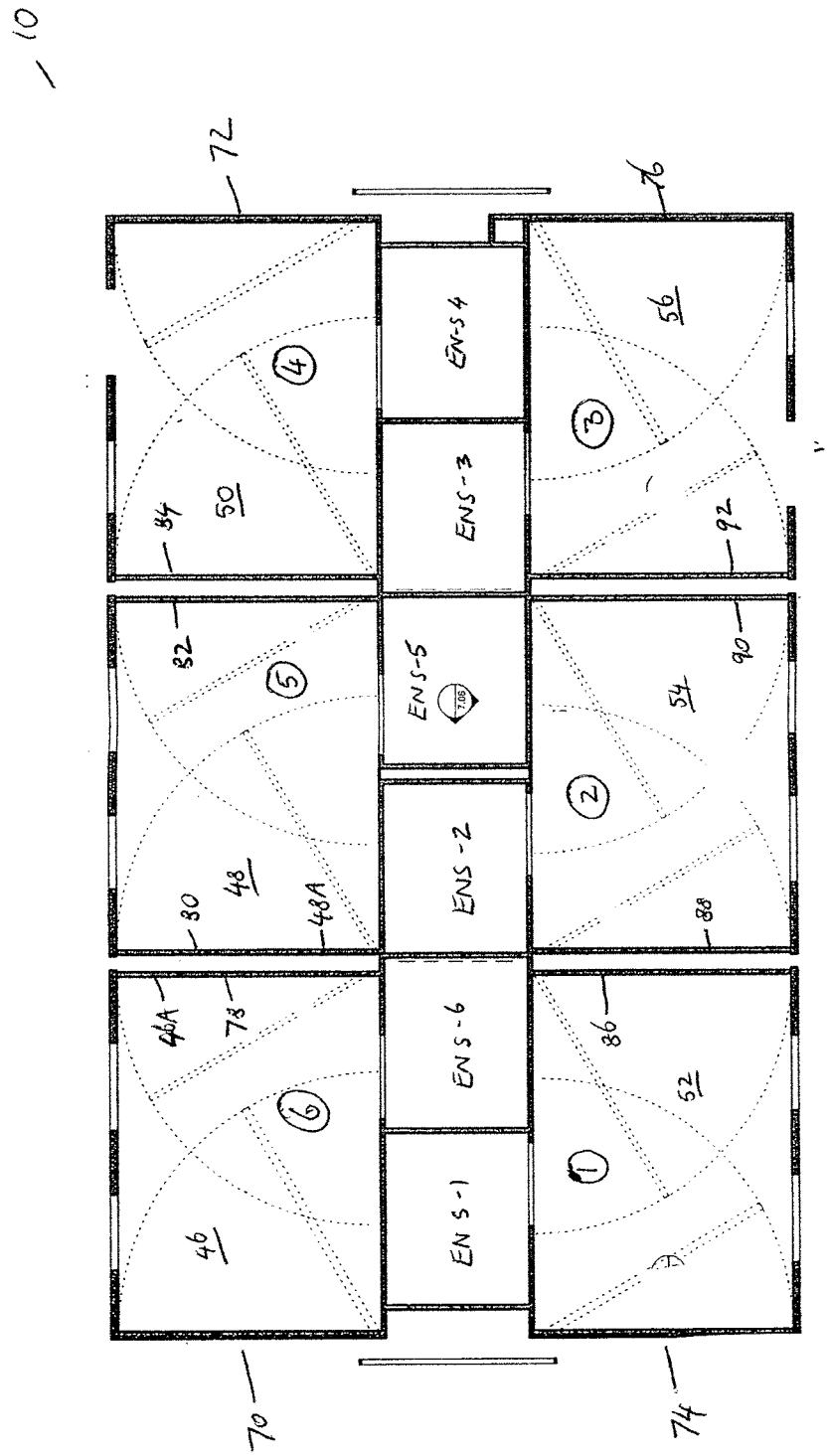
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Fig 3

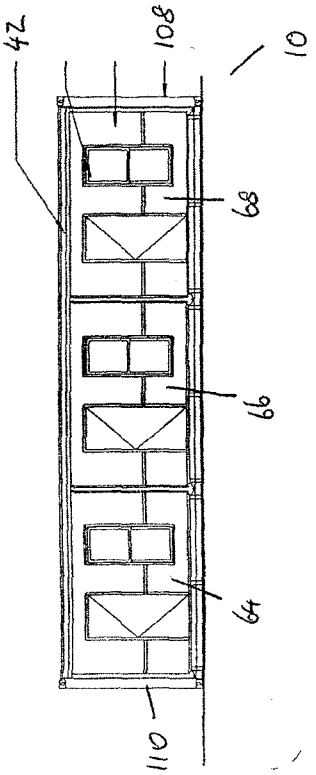

Fig 5

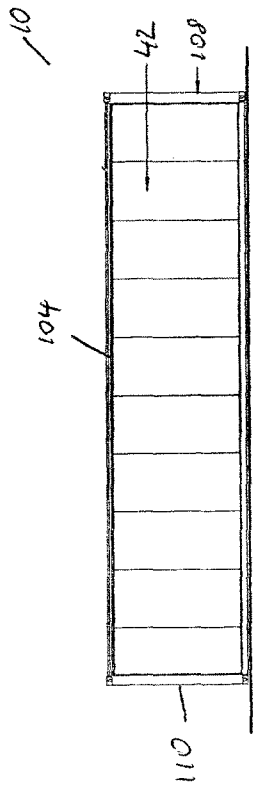

Fig 7

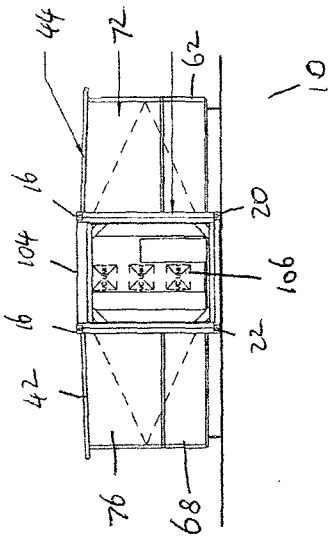

Fig 4

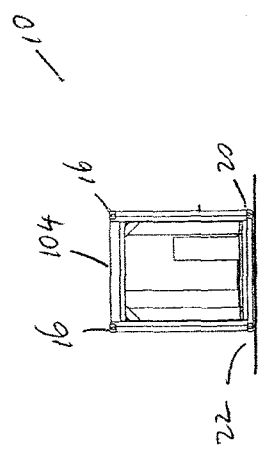

Fig 9

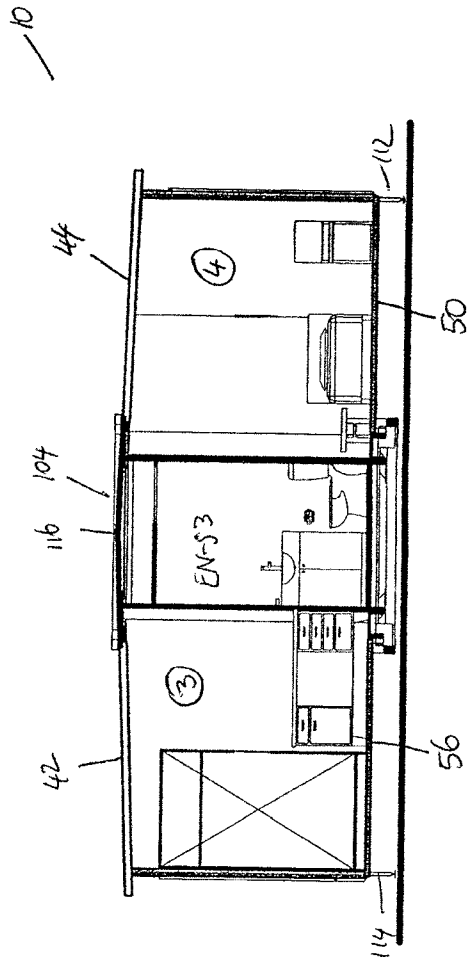

Fig 8

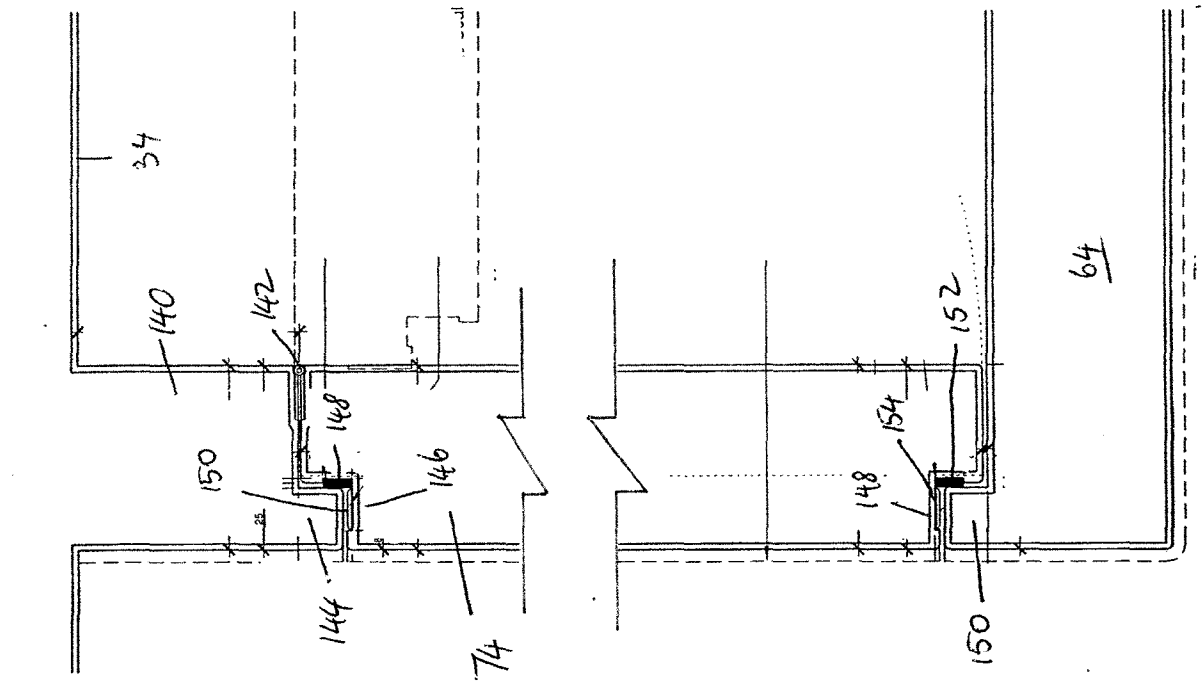
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Fig 10

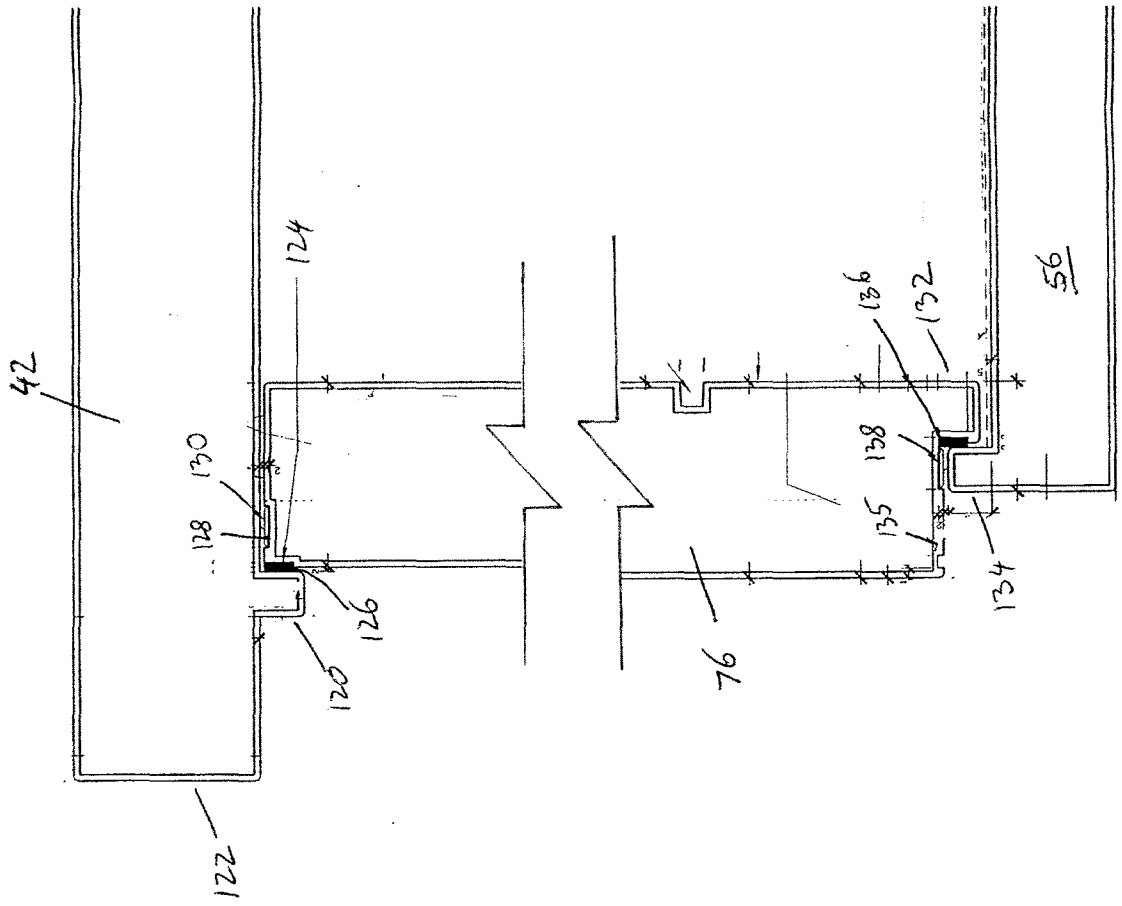
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Fig 9

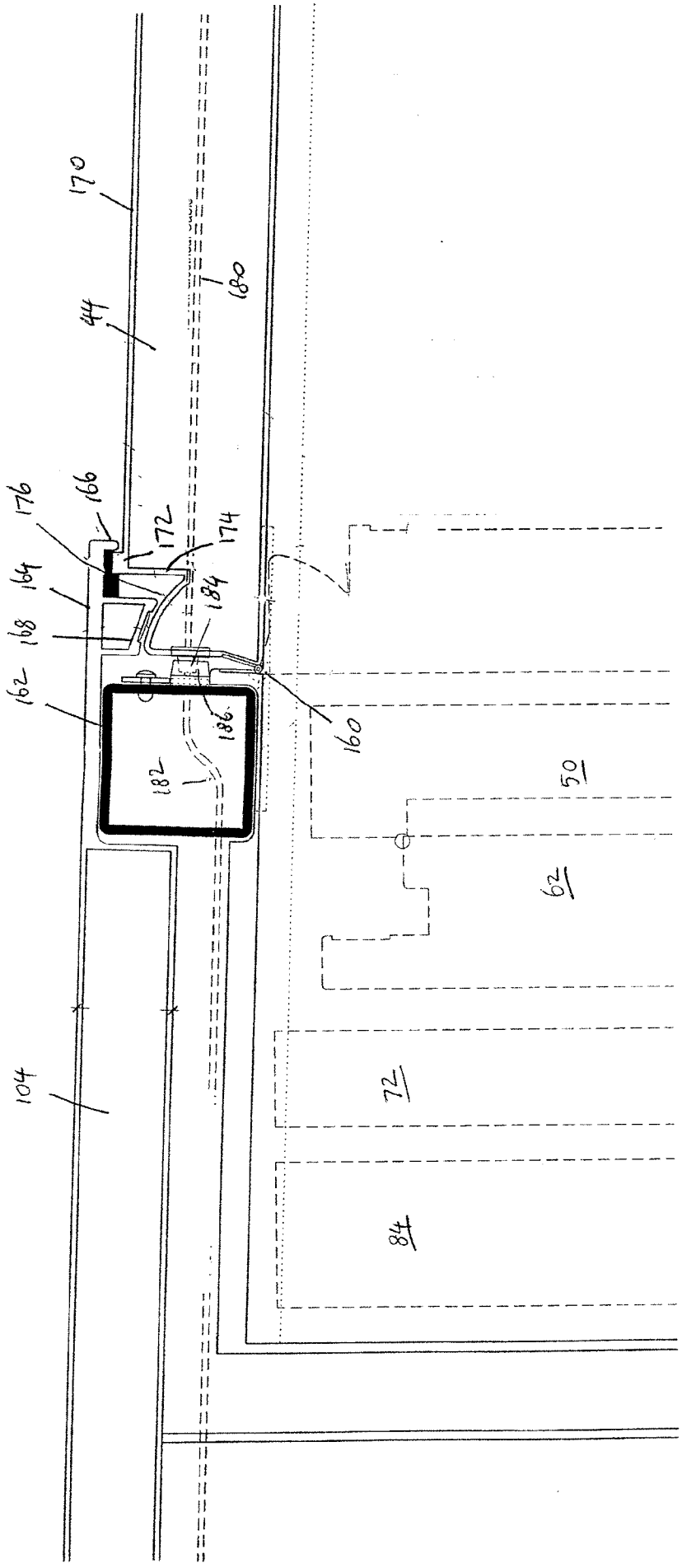
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Fig 11

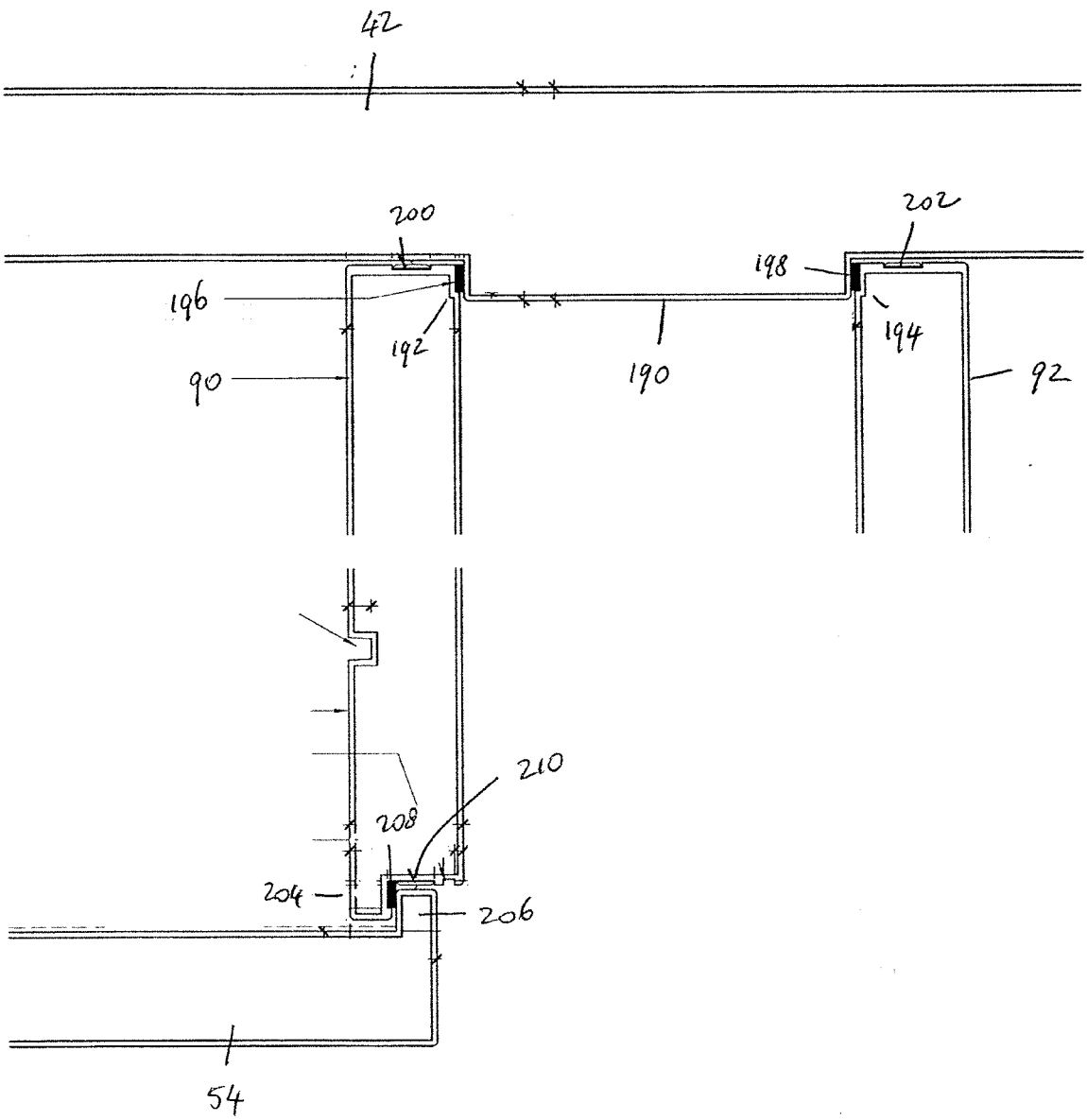
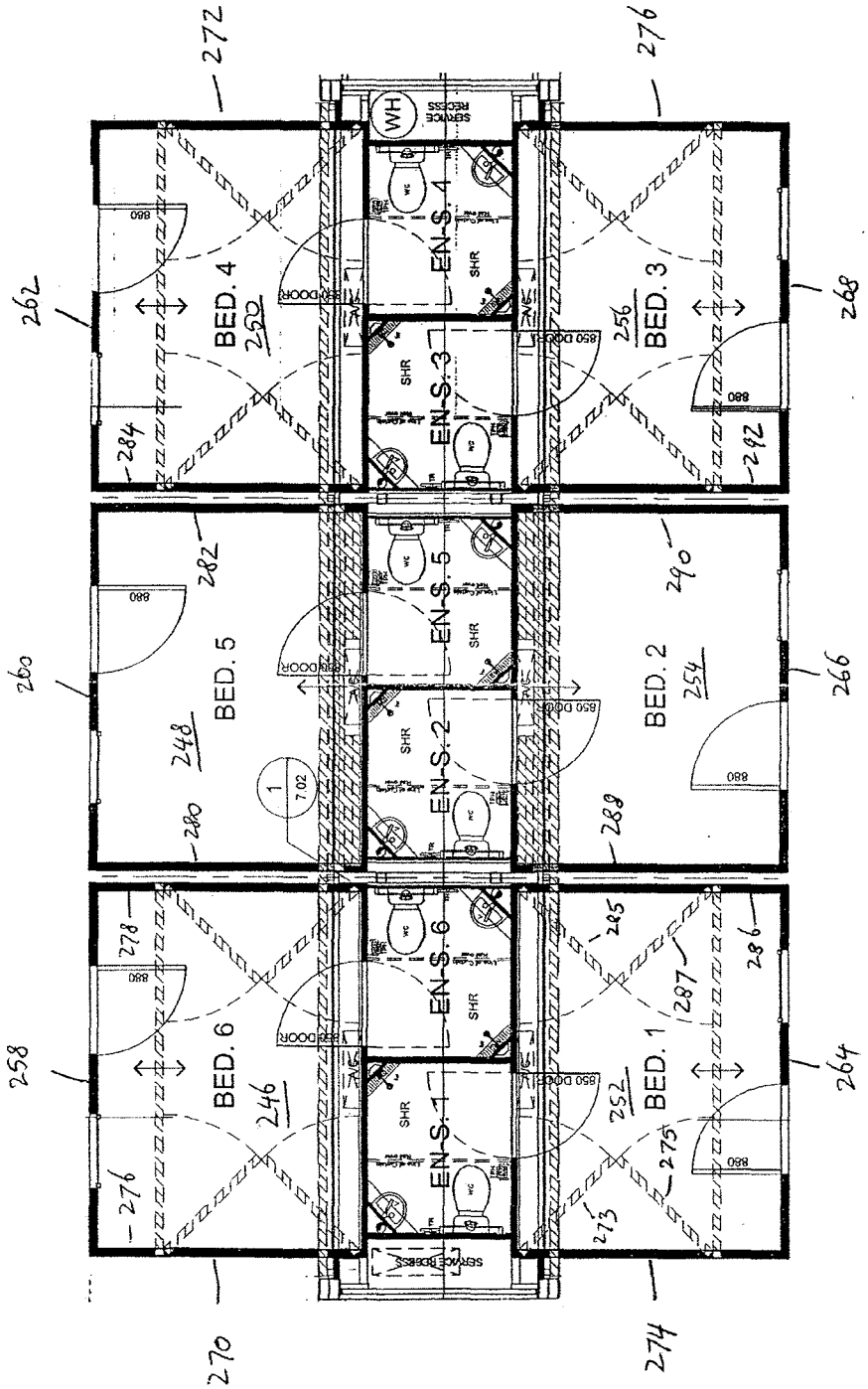


Fig 12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BED. 6
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BED. 1
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EN-S. 3
EN-S. 5
EN-S. 2
EN-S. 6
EN-S. 1
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WC
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Fig 13

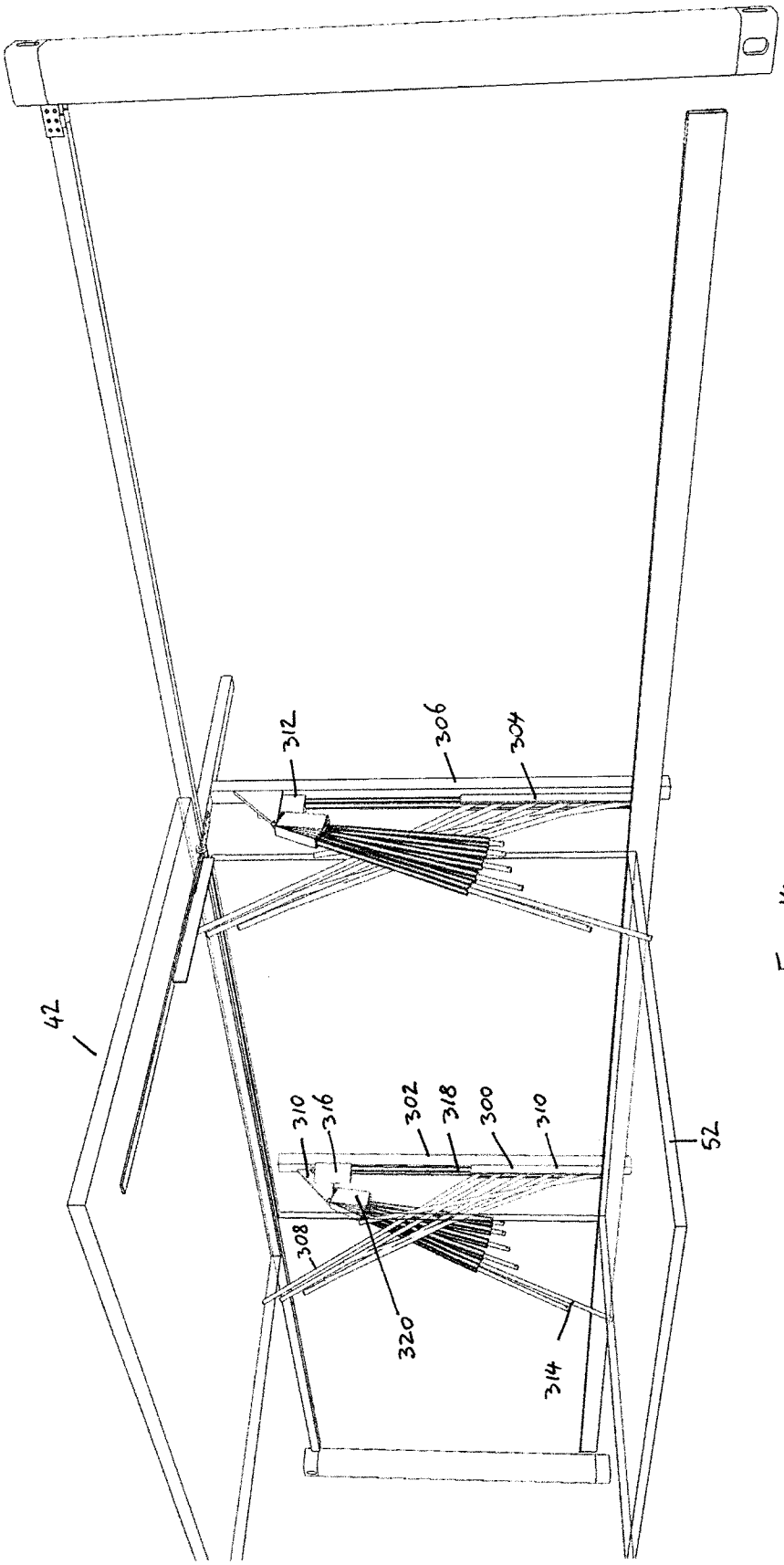

Fig 14

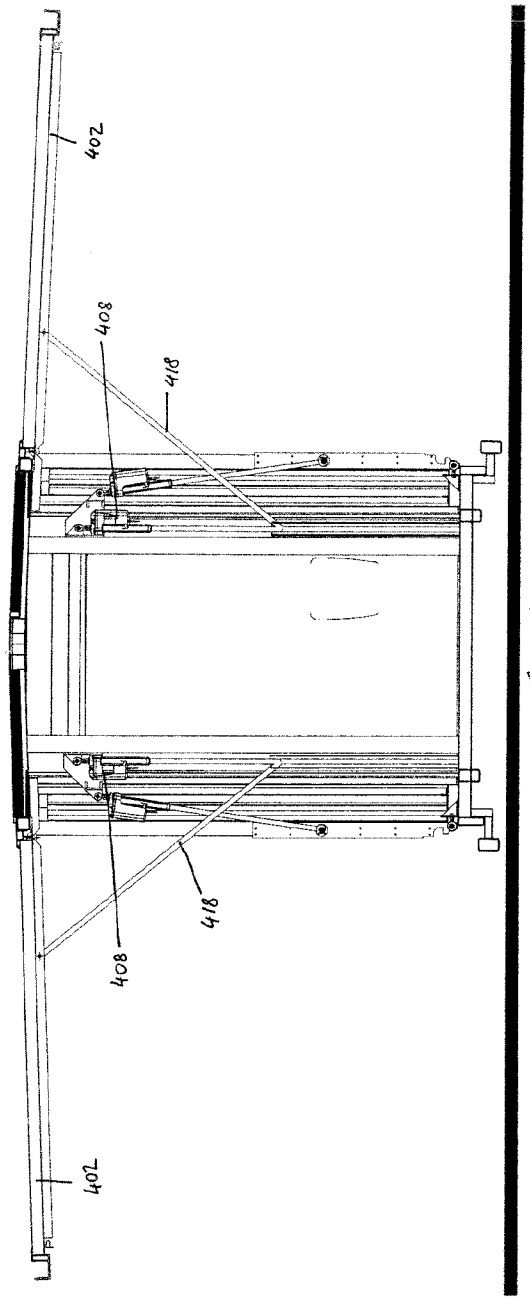

Fig 16

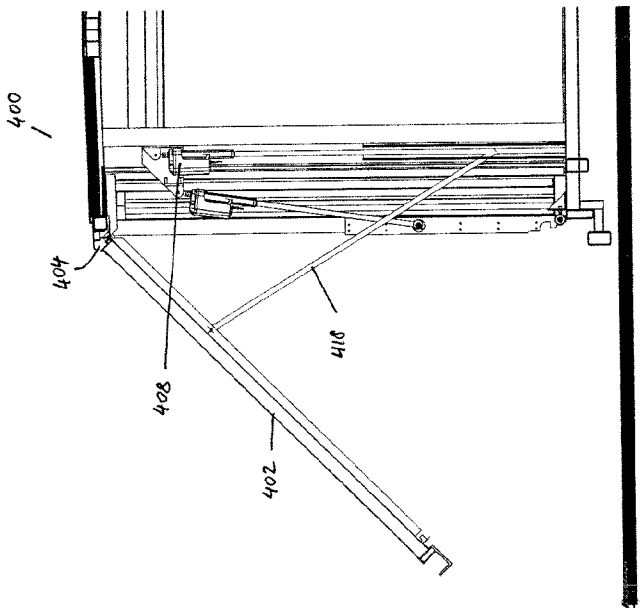

Fig 15

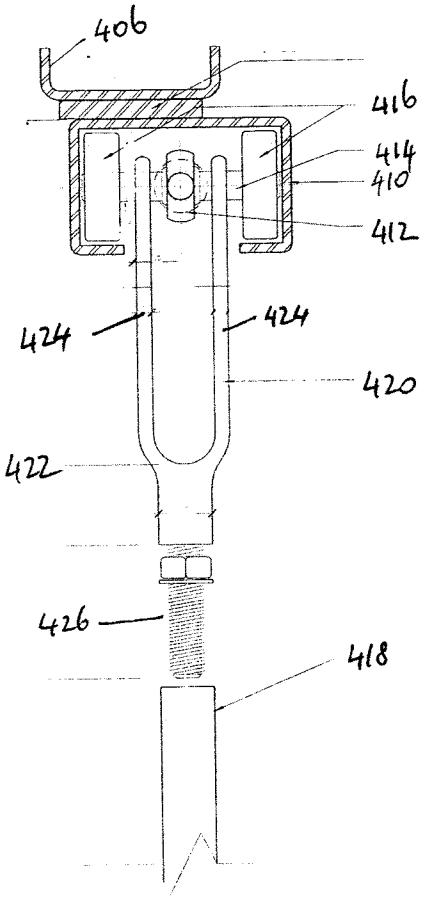

Fig 17

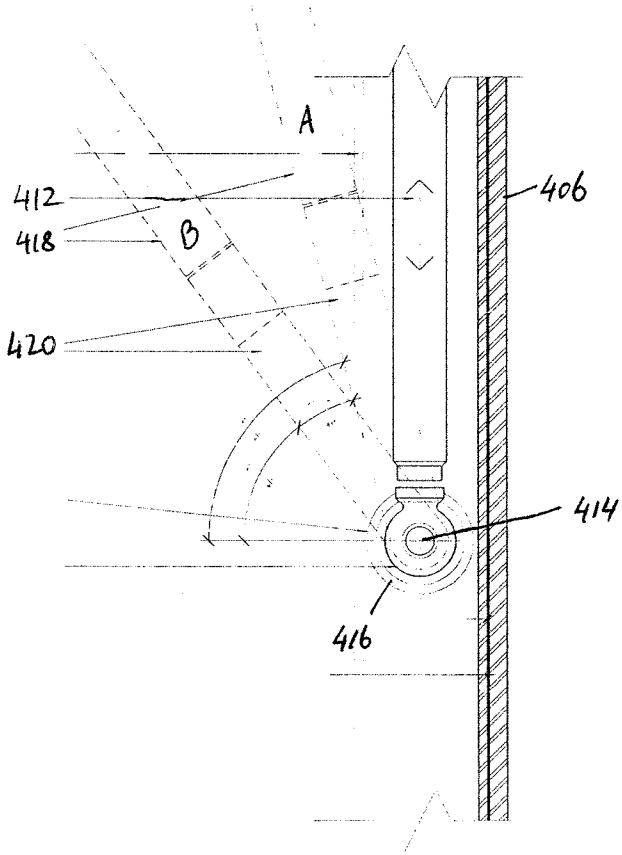

Fig 18

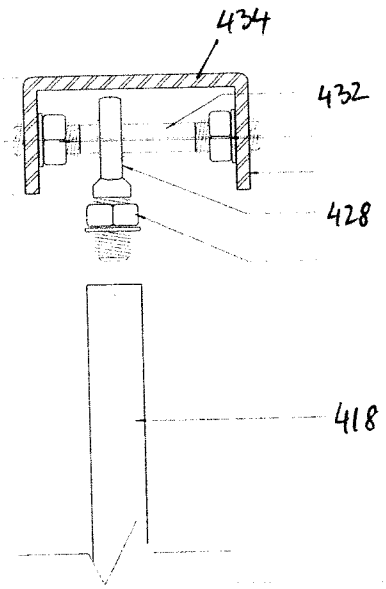

Fig 19

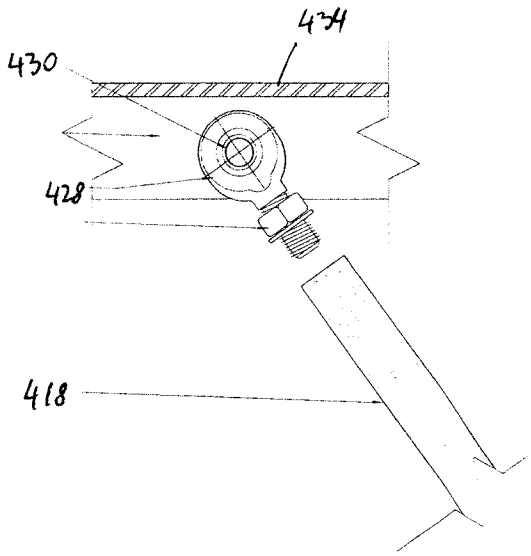

Fig 20

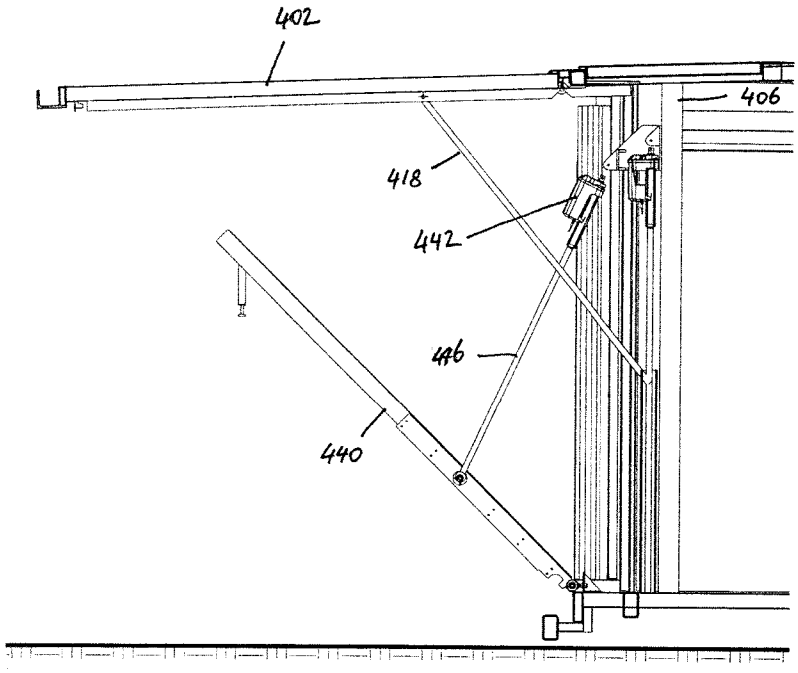

Fig 21

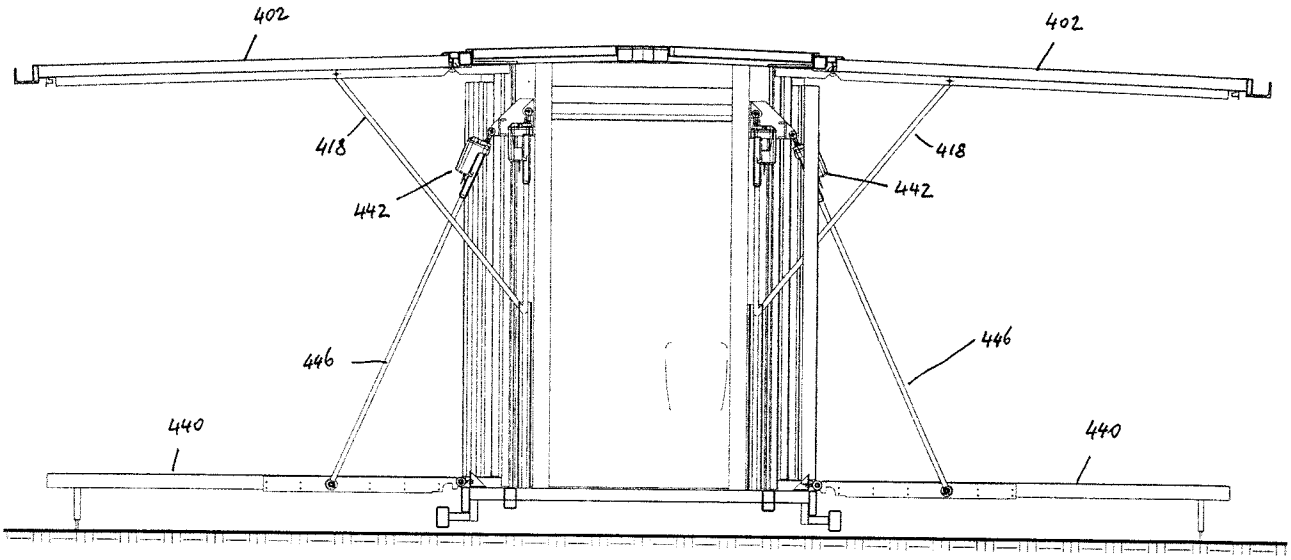

Fig 22

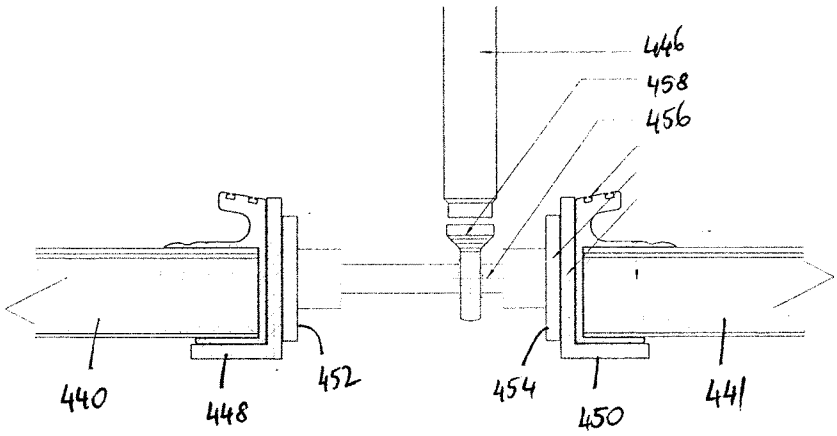

Fig 23

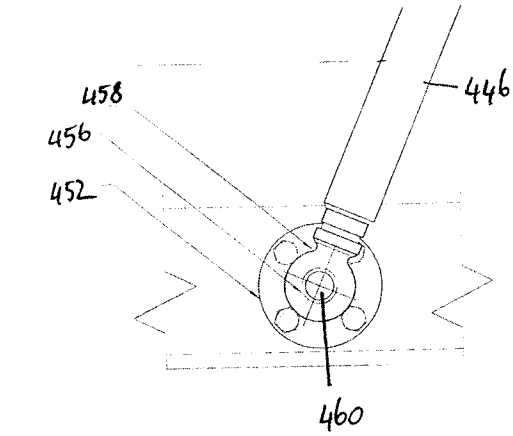

Fig 24

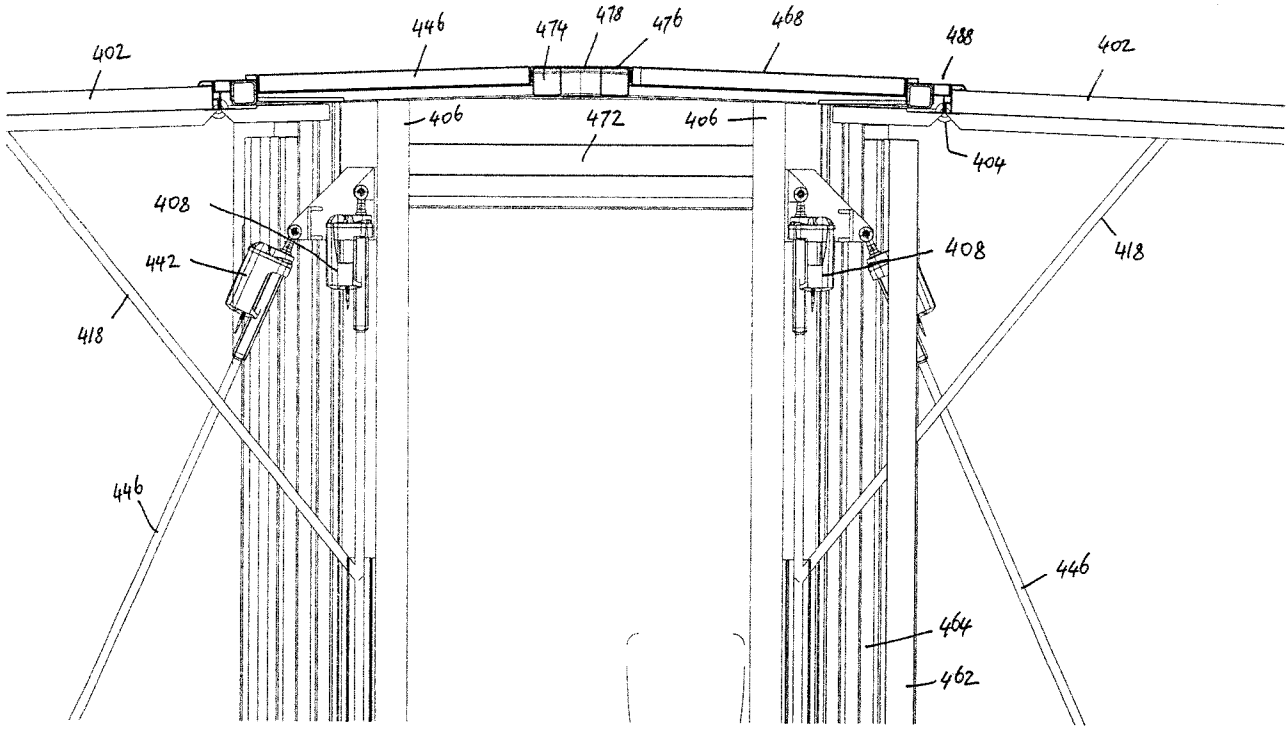
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Fig 25

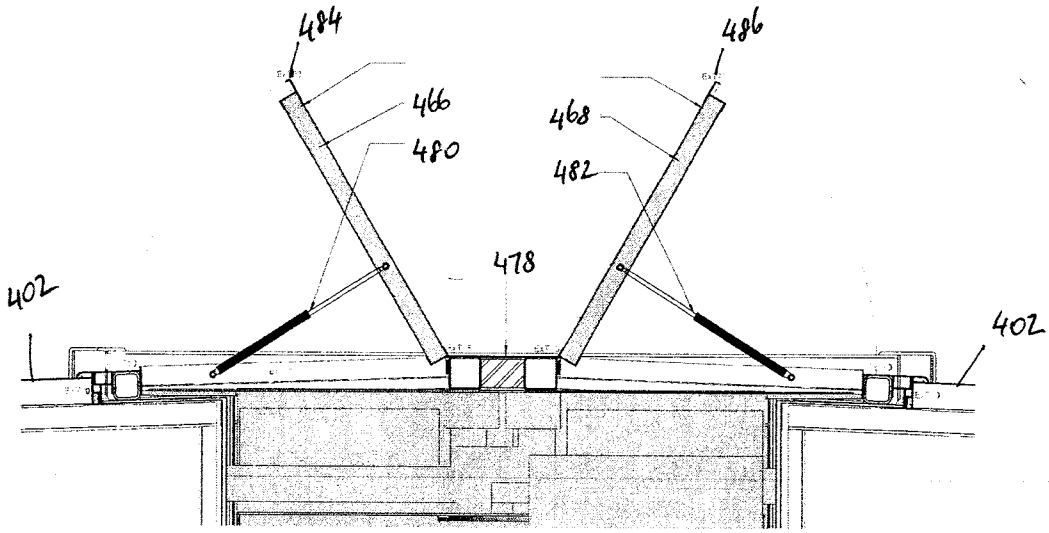
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Fig 26

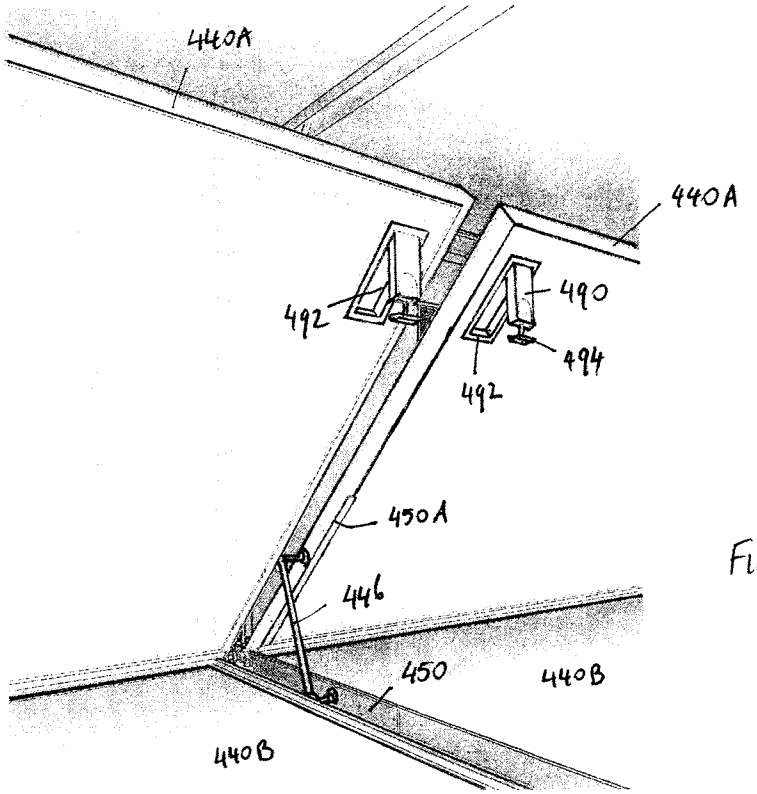
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Fig 27

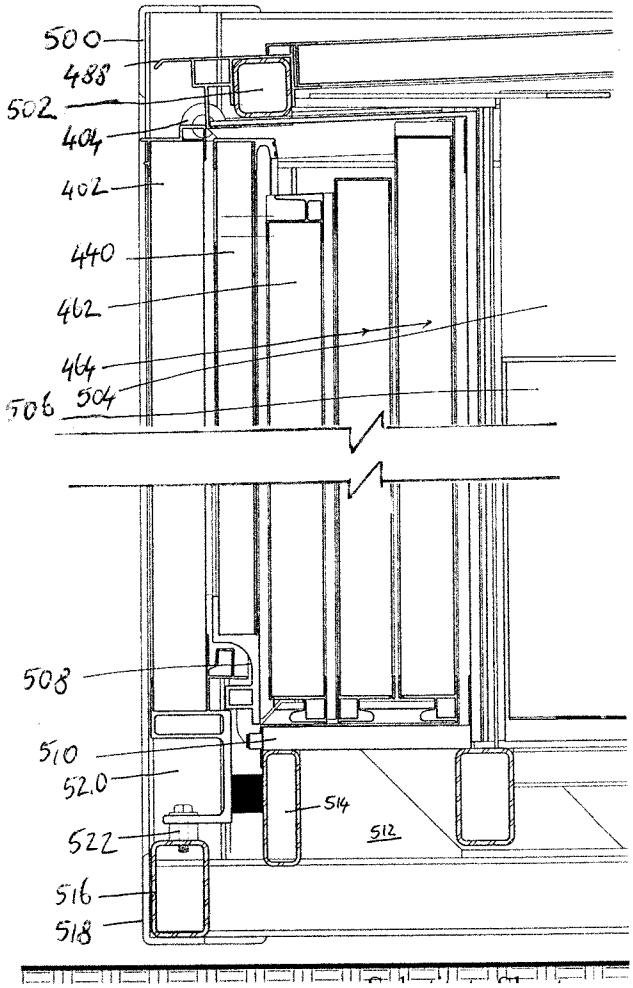
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Fig 28

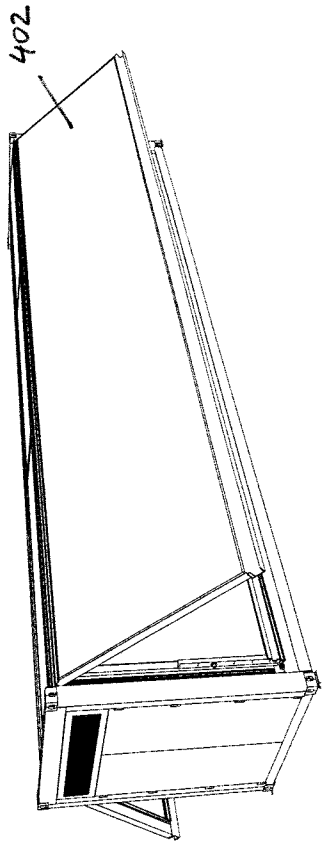

Fig 30

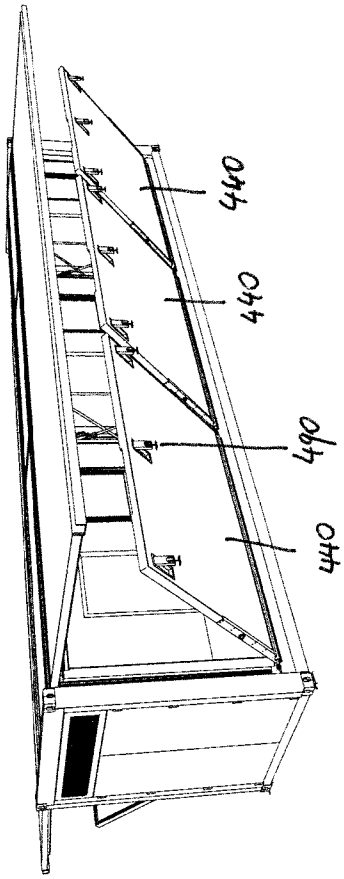

Fig 32

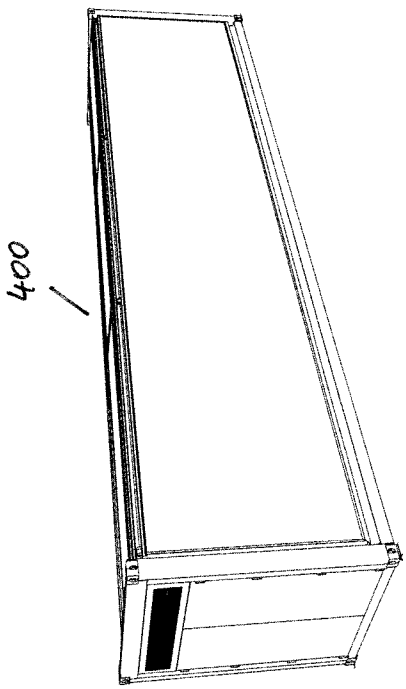

Fig 29

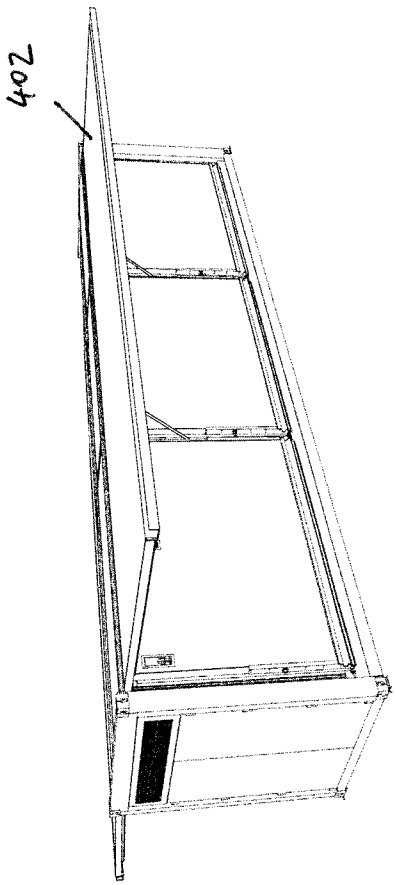

Fig 31

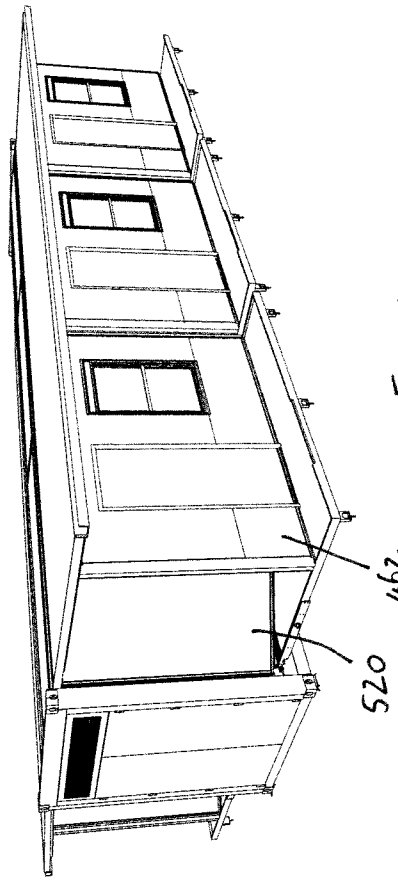

Fig 34

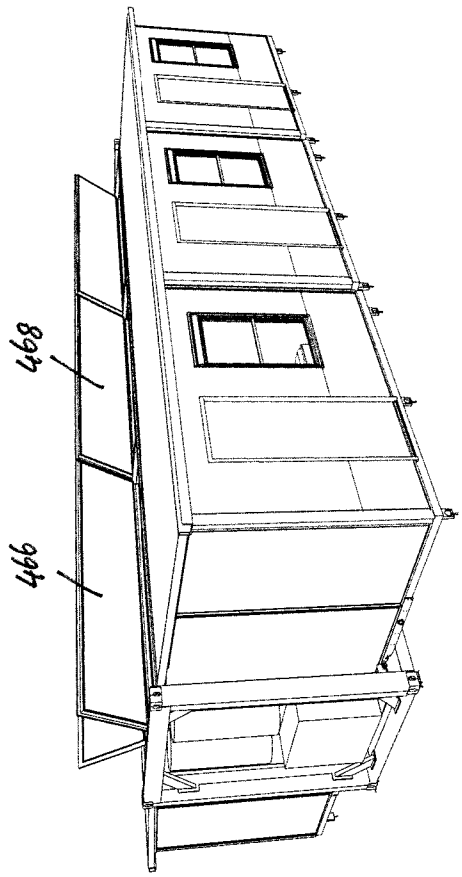

Fig 36

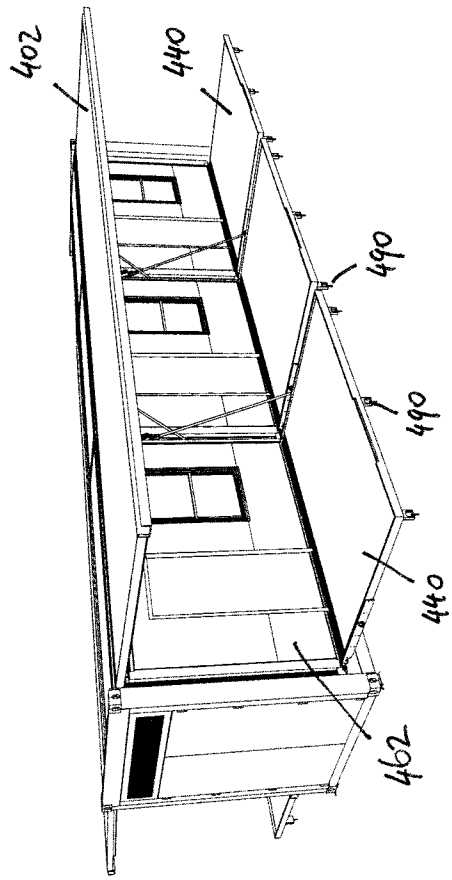

Fig 33

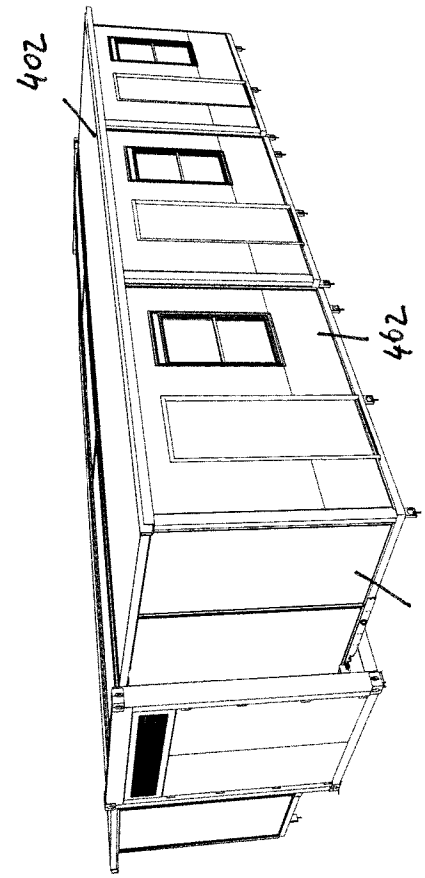

Fig 35

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2015/050065

A. CLASSIFICATION OF SUBJECT MATTER

E04B 1/343 (2006.01) E04H 1/02 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases: EPODOC, WPIAP, TXPEA, TXPEB, TXPEC, TXPEE, TXPEF, TXPEH, TXPEI, TXPEP, TXPES, TXPEPEA, TXPUSE0A, TXPUSE1A, TXPUSEA, TXPUSEB, TXPWOEA with CPC/IPC marks E04B1/343, E04B1/348, E04H1/02, B65D88, E04B2001/34389, E04H2001/1283 and keywords: fold, collapse, expand, extend, concertina, deploy, movable, hinge, pivot, rotate, swing, translate, slide, transport, floor, base, wall, room, compartment, chamber, adjacent, adjoining, neighbouring, plural, several, further, second, two, separate, individual, independent, gap, cavity, hollow, space, oppose, panel, board, divide, partition, internal, interior, inside, building, module, unit, acoustic, thermal, sound, noise and the like.

Database: GOOGLE PATENTS with combinations of keywords: foldable, building, room, individual, wall, floor, partition, adjacent, internal, unconnected and the like. Database: ESPACENET with "MIIHOME" as the applicant.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 April 2015	17 April 2015
Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Bipin Sumant AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262104068

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2015/050065

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

because they relate to subject matter not required to be searched by this Authority, namely:

the subject matter listed in Rule 39 on which, under Article 17(2)(a)(i), an international search is not required to be carried out, including

2. ☐ Claims Nos.:

because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos:

because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

See Supplemental Box for Details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2015/050065**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 8166715 B2 (DE AZAMBUJA) 01 May 2012 Abstract; figures 1-3, 5C, 5D, 6A, 8B, 13-15; column 3 lines 46-50	1, 8-12, 18
X Y	US 4545171 A (COLVIN) 08 October 1985 Abstract; figures 1-2, 6-8, 10, 12-13; column 6 lines 59-62; column 13 lines 8-21 Abstract; figures 1, 8, 12; column 13 lines 8-21	1, 10-11, 19 5-7
Y	US 2012/0317898 A1 (STRACHAN et al.) 20 December 2012 Figures 2A, 2B, 2C; paragraphs 30-36	5-7
A	US 5596844 A (KALINOWSKI) 28 January 1997 Abstract; figures 1-15	1-19

INTERNATIONAL SEARCH REPORT	International application No. PCT/AU2015/050065

Supplemental Box

Continuation of: **Box III**
This International Application does not comply with the requirements of unity of invention because it does not relate to one invention or to a group of inventions so linked as to form a single general inventive concept.

This Authority has found that there are different inventions based on the following features that separate the claims into distinct groups:

•Claims 1 and 5 to 19 are directed to a transportable building. The feature of at least two rooms on one side of the transportable building in an erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room of the at least two rooms is specific to this group of claims.

•Claims 2 to 4 are also directed to a transportable building. The feature of at least two movable floor portions located on one side of the transportable building, the at least two movable floor portions comprising separate floor portions having spaced edges is specific to this group of claims.

PCT Rule 13.2, first sentence, states that unity of invention is only fulfilled when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding special technical features. PCT Rule 13.2, second sentence, defines a special technical feature as a feature which makes a contribution over the prior art.

When there is no special technical feature common to all the claimed inventions there is no unity of invention.

In the above groups of claims, the identified features may have the potential to make a contribution over the prior art but are not common to all the claimed inventions and therefore cannot provide the required technical relationship. The only feature common to all of the claimed inventions and which provides a technical relationship among them is at least two rooms on one side of the transportable building in an erected configuration, wherein at least two spaced internal walls separate one room from an adjacent room of the at least two rooms. However this feature does not make a contribution over the prior art because it is disclosed in:

D1: US 8166715 B2 (DE AZAMBUJA) 01 May 2012 at figure 15 shows three spaced internal wall sections forming the wardrobe that separates two bedrooms on one side of the building.

Similarly, D2: US 4545171 A (COLVIN) 08 October 1985 at figure 12 discloses two spaced internal wall sections (101 and 103) that separate two adjacent rooms on one side (7) of the central core (5) of the building.

Therefore in the light of this document this common feature cannot be a special technical feature. Therefore there is no special technical feature common to all the claimed inventions and the requirements for unity of invention are consequently not satisfied a posteriori.

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2015/050065**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		**Patent Family Member/s**	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
US 8166715 B2	01 May 2012	US 8166715 B2	01 May 2012
		AR 057831 A1	19 Dec 2007
		AU 2006294341 A1	29 Mar 2007
		AU 2006294341 B2	14 Jul 2011
		BR PI0616408 A2	21 Jun 2011
		CA 2623998 A1	29 Mar 2007
		CN 101297086 A	29 Oct 2008
		EP 1941108 A1	09 Jul 2008
		EP 1941108 B1	01 Feb 2012
		JP 2009510282 A	12 Mar 2009
		JP 5097118 B2	12 Dec 2012
		NO 20081917 A	28 May 2008
		PE 06342012 A1	29 May 2012
		PE 06612007 A1	19 Jul 2007
		WO 2007033498 A1	29 Mar 2007
		ZA 200805312 A	30 Sep 2009
US 4545171 A	08 October 1985	CN 85102678 A	10 Sep 1986
		ES 8702973 A1	01 Apr 1987
		ES 8706884 A1	16 Sep 1987
		GR 852406 A1	04 Feb 1986
		IT 1182526 B	05 Oct 1987
		JP S6037344 A	26 Feb 1985
		PT 80808 A	01 Aug 1985
		PT 80808 B	24 Nov 1986
		US 4660332 A	28 Apr 1987
		ZA 8504379 A	29 Jan 1986
US 2012/0317898 A1	20 December 2012	US 8863446 B2	21 Oct 2014
		US 2012186166 A1	26 Jul 2012
US 5596844 A	28 January 1997	AU 6350696 A	09 Feb 1998
		CA 2263456 A1	22 Jan 1998
		WO 9802626 A1	22 Jan 1998

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.