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(54) **Transportable sanitary unit**

(57) Transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and sidewalls extending in between them, which walls can be converted between a-particularly retracted- transport position and a -particularly ex-

tended-operational position, in which the unit has a larger height, wherein the unit is equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers.

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## Description

### BACKGROUND OF THE INVENTION

**[0001]** The invention relates to a transportable residential space, particularly equipped as a sanitary unit.

**[0002]** Residential spaces, including service spaces, that can be transported, set up and used as units, are generally known in various appearances, such as office unit, sanitary unit (toilet unit, shower unit), kitchen unit, sleeping unit, etcetera. The dimensions of said units vary strongly. Furthermore they have different ways to be handled, such as by using a hook, a tilting mechanism or corner fittings (known from ISO standard containers).

**[0003]** When transporting said residential units the entire contents thereof are transported along, not just the optional inventory, but mostly air. There are fully collapsible residential units, but inventory cannot be transported along with them.

**[0004]** The transportation costs have gone up considerably over the past few years. Transporting residential units therefore also becomes increasingly more expensive. As the demand for residential units, particularly for temporary use, still grows for instance for events, building sites, humanitarian aid, disasters, peace missions, war missions, post-war reconstruction etcetera, the need for transport in this field will continue to increase, however.

### SUMMARY OF THE INVENTION

**[0005]** It is an object of the invention to provide a residential space designed as a sanitary unit that can be efficiently transported.

**[0006]** It is an object of the invention to provide a residential space designed as a sanitary unit that is suitable for efficient group transportation.

**[0007]** It is an object of the invention to provide a residential space designed as a sanitary unit that is advantageous as regards the required transportation energy.

**[0008]** It is an object of the invention to provide a residential space designed as a sanitary unit that is suitable for temporary deployment on a site of use and can advantageously be transported to and from it.

**[0009]** According to one aspect the invention provides a transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and walls extending in between them, which walls can be converted between a -particularly retracted- transport position and a -particularly extended- operational position, in which the unit has a larger height, wherein the unit is equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers. In that way one or more sanitary units can advantageously be transported to and from a site of use, such as an event site, and yet provide an at least substantially fully fledged sanitary facility at that location.

**[0010]** The bottom may offer room to a common drain pipe for the toilet bowls, urinals and/or showers. In a wa-

ter-saving embodiment the drain pipe is connected to a vacuum drainage system.

**[0011]** In one embodiment the walls can be converted telescopically.

**[0012]** The walls may comprise an upper wall attached to the covering and a lower wall attached to the bottom, wherein the upper wall and the lower wall preferably are of approximately similar height. In one embodiment the upper wall and the lower wall can be slid vertically into each other. In another embodiment the upper wall and the lower wall can be slid along each other in vertical direction, wherein the bottom preferably is part of a lower section of the unit and the covering is part of an upper section of the unit which can be moved in vertical direction with respect to each other.

**[0013]** The walls may form one or more sidewalls of the unit.

**[0014]** The walls may form partitions/inner walls for shielding off sub-spaces for the toilet bowls and/or showers.

**[0015]** One or more sidewalls can be provided with doors for each sub-space.

**[0016]** In one embodiment the sidewalls are part of a separation of a sub-space to the outside.

**[0017]** In one embodiment sub-spaces have been formed by pairs of boxes, each having three upright walls, on both sides of the sub-space and opposite the entrance to the sub-space, as rear wall, which walls preferably are formed as one unity, such as of polyester, wherein both boxes are open on the entry side and on the sides facing each other and wherein the upper box that is part of the upper section of the unit, is oriented vertically reversed with respect to the lower box that is part of the lower section. Both boxes of a pair have such dimensions that, when converting, their upright walls can be slid vertically along each other.

**[0018]** In one embodiment an inner wall forms a partition wall between two series of urinals and/or toilet bowls, the individual branch lines of which (bowls or urinals) to the drain pipe are at least partially incorporated in the partition wall. The partition wall may have a lower partition wall and an upper partition wall, wherein the lower partition wall is divided into a first part and a second part that each support the toilet bowls or urinals of a respective series, and between them define an accommodation space for the upper partition wall. The upper partition wall can be entirely free of fluid pipes, each lower partition wall part provides support to the bowls or urinals, respectively, of both series and offers room to the corresponding individual branch line for each bowl or urinal and together with the other lower partition wall part offers room to the upper partition wall in the transport position.

**[0019]** The toilet bowls, urinals and/or shower heads preferably are arranged in the section of the unit comprising the bottom, so that the pipe system can remain in its place during the conversion activities.

**[0020]** The sanitary residential unit in the transport position preferably has half a standard height of a standard

freight container. Because in the lowered, particularly retracted position, the sanitary residential unit has half a standard height, two of such sanitary units, in lowered, particularly retracted position, placed on top of one another, will as regards height correspond with an uncollapsible standard container (ISO) of standard height. In that way within a same transport volume two - retracted - sanitary residential units can be moved. Two retracted sanitary residential units take up as much room as one regular standard container. Due to half the height of the sanitary residential spaces during transportation the sanitary inventory can furthermore at least substantially remain in the residential space and there is room for transporting other goods that are required at the destination, such as gangways, barriers.

**[0021]** In the operational position the sanitary residential unit can have a full standard height of a standard container, so that in a multiple transport with an odd number of units a standard height can always be provided if one unit is not retracted.

**[0022]** The standard height will particularly be the height of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container that are used a lot nowadays. They are 8.6 ft, 8.6 ft and 9.6 ft respectively. These are standard containers under the ISO standard.

**[0023]** Adaptation to standard transportation facilities for freight containers is increased if the length and width of the sanitary unit equal the length and width, respectively, of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container, that means 20'x8', 40'x8' and 45'x 8', respectively.

**[0024]** If the length and width of the sanitary unit equal the length and width, respectively, of a 20 ft. TEU container and the height in the transport position equals half a height of a 45 ft. High Cube container, an advantageous adaptation to transportation means, particularly trucks, is obtained that are often adapted to the 20 ft. of the TEU, and in the operational position a larger overlap can be realised between parts of the unit that slide into/along each other during the conversion.

**[0025]** The handling of the unit according to the invention is further improved if it is provided with ISO corner fittings on the corners, preferably all corners.

**[0026]** In one embodiment the upper sidewall and the lower sidewall of at least one sidewall comprise an upper door part and a lower door part, respectively, for forming an entrance door to the residential space in the operational position, wherein the upper door part and the lower door part can hinge about a vertical hinge centre line and are attached to the covering and bottom by an upper hinge and a lower hinge, respectively, particularly to a frame section for them, particularly a horizontal frame section, wherein the hinge centre lines of the upper hinge and the lower hinge are in line with each other. This increases the freedom of design for the relative position of the upper sidewall and the lower sidewall, as no hinges need to be attached to them that are in line with the hinge centre lines. The upper door part and the lower door part

can be provided with connecting parts for mutual connection in the operational position, so that a door is obtained that can be operated as one unity. In one embodiment the upper door part and the lower door part can be vertically slid into each other. In another embodiment the upper door part and the lower door part can be slid along each other in vertical direction.

**[0027]** In one embodiment the doors are detachable and in the transport position of the unit they can be stored in the unit, for after conversion of the unit into the operational position being hung at the wanted locations.

**[0028]** The unit can be provided with an operable conversion device for converting the walls between the transport position and the operational position and vice versa. Extending the unit can be effected in various ways; manually, pneumatically, locomotory or hydraulically. The conversion device may comprise manually driven cables, chains and the like, and optionally a pulley system for them. In a compact embodiment the cylinders are housed in the covering or the bottom of the unit. Particularly the bottom is suitable for this purpose. The cylinders may for instance drive cables that run through the bottom or covering to the corner columns and transfer lifting forces in the columns for extending the unit. In one embodiment the unit can be converted from the transport position into the operational position by means of a fork-lift truck, of which the fork engages the upper section, particularly the covering.

**[0029]** It is an object of the invention to provide a residential space designed as a unit that can efficiently be transported.

**[0030]** It is an object of the invention to provide a residential space designed as a unit that is suitable for efficient group transportation.

**[0031]** It is an object of the invention to provide a residential space designed as a unit that is advantageous as regards the required transportation energy.

**[0032]** According to a further aspect the invention provides a transportable (residential) unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and sidewalls extending in between them, which sidewalls can be converted, particularly telescopically extendable/retractable, between a -particularly retracted- transport position, in which the residential unit has half a standard height of a standard freight container, and a -particularly extended- operational position, in which the unit has a larger height. Because in the lowered, particularly retracted position, the residential unit has half a standard height, two of such units, in lowered, particularly retracted position, placed on top of one another, will as regards height correspond with a fixed standard container (ISO) of standard height. In that way within a same transport volume two - retracted - residential units can be moved. Two retracted residential units take up as much room as one regular standard container. Due to half the height of the residential spaces during transportation the inventory can furthermore at least substantially remain in the residential space and

there is room for transporting other goods that are required at the destination, such as gangways, barriers. Furniture and/or pipes can at least substantially be fully housed in the section of the unit comprising the bottom.

**[0033]** In the operational position the unit preferably has a full standard height, so that in multiple transport with an odd number of units a standard height can always be provided if one unit is not retracted.

**[0034]** The unit can be equipped in various ways, depending on the intended use, such a sleeping unit, sanitary (short stay) unit, kitchen.

**[0035]** In one embodiment, especially for events, the unit is equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers.

**[0036]** Further embodiments thereof have been described in claims 18-41, the contents of which should be considered inserted herein.

**[0037]** According to a further aspect the invention provides a transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and walls extending in between them, which walls can be converted between a -particularly retracted- transport position and a -particularly in vertical direction extended- operational position, wherein the walls each comprise an upper wall attached to the covering and a lower wall attached to the bottom, wherein the upper wall and the lower wall of at least one sidewall comprise an upper door part and a lower door part, respectively, for forming an entrance door to the residential space in the operational position, wherein the upper door part and the lower door part can hinge about a vertical hinge centre line and are attached to the covering and the bottom by means of an upper hinge and a lower hinge, respectively, wherein the hinge centre lines of the upper hinge and the lower hinge are in line with each other. The upper door part and the lower door part can in that case be provided with connecting parts for mutual connection in the operational position. In one embodiment the upper door part and the lower door part can be vertically slid into each other. In another embodiment the upper door part and the lower door part can be slid along each other in vertical direction.

**[0038]** In order to prevent that during manipulation during transportation the unit changes from the transport position into the operational position the unit can be provided with means for locking the unit in the transport position. The unit can be equipped in various ways, depending on the intended use, such as a sleeping unit, sanitary (short stay) unit, kitchen.

**[0039]** In one embodiment, especially for events, the unit is equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers.

**[0040]** According to a further aspect the invention provides an assembly of two units according to the invention, stacked onto one another.

**[0041]** According to a further aspect the invention provides an assembly of a number of transportable units according to the invention, wherein one unit has a length

L corresponding with the standard length of a standard freight container and n units have a length L' corresponding with  $1/n \times L$ , wherein n is an integer. In an embodiment that is advantageous to transportation by truck, L is 20 ft. of a 20' TEU container. The invention also provides a truck or trailer onto which an assembly according to the invention has been placed.

**[0042]** The aspects and measures described in this description and the claims of the application and/or shown in the drawings of this application may where possible also be used individually. Said individual aspects may be the subject of divisional patent applications relating thereto. This particularly applies to the measures and aspects that are described per se in the sub claims.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0043]** The invention will be elucidated on the basis of a number of exemplary embodiments shown in the attached drawings, in which:

Figures 1A and 1B show an isometric view of a first exemplary embodiment of a sanitary unit according to the invention, in the transport position and the operational position, respectively;

Figures 2A,B and 2C,D show a vertical cross-section and a vertical longitudinal section, respectively, of two units of figure 1A stacked onto each other and a vertical cross-section and vertical longitudinal section, respectively, of one unit of figures 2A,B in the operational position of figure 1B;

Figures 2E and 2F show schematic depictions of a cylinder accommodated in the bottom of the sanitary unit of figures 2A-D, in the transport position and the operational position, respectively;

Figures 3A,B and 3C,D show a vertical cross-section and a vertical longitudinal section, respectively, of two other sanitary units according to the invention stacked onto each other, in the transport position, and a vertical cross-section and a vertical longitudinal section, respectively, of one unit of figures 3A,B in the operational position;

Figures 4A,B and 4C,D show a vertical cross-section and a vertical longitudinal section, respectively, of yet two other sanitary units according to the invention stacked onto each other, in the transport position, and a vertical cross-section and a vertical longitudinal section, respectively, of one unit of figures 4A,B in the operational position;

Figures 5A,B and 5C,D show a vertical cross-section and a vertical longitudinal section, respectively, of yet two other sanitary units according to the invention stacked onto each other, in the transport position,

and a vertical cross-section and a vertical longitudinal section, respectively, of one unit of figures 5A,B in the operational position;

Figures 6A and 6B show views of a two-part door for a unit according to the invention, in the transport position and the operational position, respectively;

Figure 7 shows a side view of an assembly of units according to the invention, during transportation;

Figures 8A and 8B show a view of a smaller unit according to the invention, in the transport position and the operational position, respectively and figures 8C and 8D show an example of the furnishing of such a unit; and

Figure 9 shows a schematic top view of an arrangement of use with the assembly of units of figure 7.

#### DETAILED DESCRIPTION OF THE DRAWINGS

**[0044]** The container-shaped sanitary unit 1 of figures 1A and 1B comprises a lower section 1a and an upper section 1b. The lower section 1a comprises a bottom 2a, longitudinal side walls 3a, end sidewalls 4a and in a usual manner longitudinal girders 6a, cross girders 7a and columns 8a. The upper section 1b comprises a covering 2b, longitudinal side walls 3b, end sidewalls 4b and in a usual manner longitudinal girders 6b, cross girders 7b and columns 8b, also see figures 2A,B. The girders 6a,b and 7a,b and columns 8a,b meet each other in the corners, where standard (ISO) corner fittings 5 are situated. The columns 8a,b are locked with respect to each other, such that they are capable of absorbing vertical weight forces and also in case of lifting forces exerted on the corner fittings 5 on the covering 2b they do not move relative to each other in order to facilitate loading onto a truck, train, ship, etc.

**[0045]** In figure 1A the container-shaped unit 1 is shown in the retracted transport position in which it has a length L of 20 ft., a width B of 8 ft. and a height H1 of 4 ft. and 9 inches. As a result the unit 1 has the length and width of a 20' TEU container indeed, but half the standard height of 0.5 Hs of a - in this case different - standard container, in this case a High Cube container (9 ft., 6 inches).

**[0046]** When for transportation two container-like units 1 in the condition of figure 1A are stacked onto one another, then the joint height, also see figures 2A and 2B, equals the standard height Hs of a High Cube container, namely 9 ft. and 6 inches. The length 20 ft. is advantageous for transportation by a truck adapted to TEU container transport, with or without ditto trailer, also see figure 7.

**[0047]** In figure 1B the unit 1 has been converted from the transport position into the operational position, in which the height is H2 that may equal  $2 \times H1 (=Hs)$ . The

upper section 1b is extended upwards and in that position the columns 8a,b are locked with respect to each other, wherein the longitudinal girders 6a,b, cross girders 7a,b and columns 8a,b form a frame. The longitudinal sidewalls 3a,b and the end sidewalls 4a,b now form longitudinal sidewalls 3 and end sidewalls 4. They can be designed in various ways, a longitudinal sidewall 3 with doors 20 (also see figures 6A,B) and an end sidewall 4 with washbasins 37 is shown. A mirror wall behind the washbasins slides down behind the washbasins 37 when telescopically retracting the unit.

**[0048]** This can be seen in figures 2A,B. The mutual locking of the columns 8a,b takes place by means of a locking pin 40, that can be inserted and secured in a suitable hole of a vertical series of holes in the columns 8a,b, both in the transport position of figures 2A,B and in the operational position of figures 2C,D. By choosing H1 to be half the standard height (0.5 Hs) of a High Cube container (L= 45 ft., B= 8 ft., H=9 ft. 6 inches) instead of half the standard height (0.5 x 8 ft., 6 inches) of a 20' TEU container, the overlap of the columns 8a and 8b in the operational position may have a larger length. The larger overlap may be advantageous to the design of the connection (as well as its stability) between both columns 8a,b in the operational position.

**[0049]** In the stacked position of figures 2A,B all outer dimensions of the units 1, also the appendages, remain within the standard dimensions in question, in this case that means the 20 ft. length, the 8 ft. width and the 9 ft. 6 inches height.

**[0050]** For extending the unit 1 into the operational position, a central cylinder 10 has been disposed in the bottom 2a, within the profile of the bottom 2a, wherein at the end of the piston rod 11 an attachment plate 12 is arranged. Onto the plate 12 cables 13 (also see figures 2E and 2F) are attached that circulate around pulleys 14c,d in the bottom 2a to the four corners, where they are guided around pulleys 14a into a vertical direction, to pulleys 14b in the upper end of columns 8a, see figures 2B and 2D. The outer ends of the cables 13 are attached to the lower end of the columns 8b. Thus nearly the entire conversion device is accommodated in lower section 1a.

**[0051]** When retracting the piston rod, from the position of figure 2E to the one of figure 2F, the cables 13 are pulled in and their outer ends pulled up, while taking along the lower end of the columns 8b upwards, until the position of figure 2C,D is achieved. In extended position the extended part of the unit with columns 8b still largely remains in the unextended columns 8a in order to form a stable unity. The locking takes place in the part where the columns overlap each other.

**[0052]** The locking of the extended position therefore takes place both in the fully retracted position and the fully extended position. In the retracted position said locking offers the telescopically retracted unit an undetachable character and provides a high degree of rigidity of the unity in order to comply with the demands transportation of the unit makes. In the extended position the lock-

ing provides safety and relieves the hoisting cables and the cylinders. Locking can be carried out automatically, mechanically, pneumatically, hydraulically or manually.

**[0053]** The sidewalls 3a,b, 4a,b and columns 8a,b can slide into/out of or along each other depending on the manner of construction and specifications of the extended unit and the technical demands made to it. The extension system can also be incorporated in one or several columns that can be located elsewhere in the unit than the corner columns. If the functionality of the unit does not permit placing the hoisting system in the bottom it can also be incorporated elsewhere in order to provide the same functionality.

**[0054]** In figures 2A-D the inner space of the unit is divided by longitudinal partition wall 60 into two series of sub-spaces, namely sub-spaces 30 for urinals 32 and sub-spaces 31 for toilet bowls 33, wherein the adjacent sub-spaces are separated from each other by inner walls 29a,b wherein inner wall part 29a is part of the lower section 1a and inner wall part 29b is part of the upper section 1b. The wall parts 29a,29b can slide along each other when retracting/extending the unit 1. On the longitudinal sides both series of sub-spaces are accessible via individual doors 20 (figures 1A,B). All the pipework for slops and for drainage (34,35) is housed in the lower section 1a. In case of urinals, doors and making sub-spaces can be dispensed with, instead thereof partitions can be mounted to the centre wall, which if necessary can also be divided into a part attached to the upper section and a part attached to the lower section of the unit, for during conversion being telescopically extended to have the desired height in the operational position.

**[0055]** The device can also be designed differently. For instance in figures 3A-D an example is given of a combination of sub-spaces 30 for urinals 32 and sub-spaces 31 for toilet bowls 33 in combination with sub-spaces for showers 39. In figures 4A-D a set-up is shown having only sub-spaces 38 for showers 39. In figures 5A-D a set-up is shown having only sub-spaces 31 for toilet bowls 33.

**[0056]** Figures 2C and 3C illustrate that the partition wall 60, forming a main separation between two series of toilet bowls and/or urinals, is divided into a two-part lower partition wall 61a and an upper partition wall 61b. For each toilet bowl or urinal, each lower partition wall part 61a houses a drain/branch 62 for discharging water/urine/faeces to a central drain pipe 63 arranged in the bottom which drain pipe can be connected to a vacuum system. Both lower partition wall parts 61a define an accommodation space 64 for the upper partition wall 61b in the transport position of the unit 1.

**[0057]** In the example of figures 1A,B the doors 20 are built up from a lower door part 20a, that is part of the lower section 1a, and an upper door part 20b that is part of the upper section 1b. The lower door part 20a is provided with a lock with handle 21. Particular is that each of the door parts 20a,b is not attached to a post by a hinge but to the bottom 2a and the covering 2b by hinges

22a,b. Their hinge centre lines S1 and S2 are in line with each other, so that the extended door 20 is able to hinge and function as one unity. The (entrance) doors 20 can be equipped with individual locks with which the door can be locked both in the extended position and in the retracted position. Hinge positions along the vertical edges of the door parts 20a,b do not have to be taken into consideration. By means of locking pins 23 both door part 20a,b are connected to each other so that they are swung together during use. Suitable hinges for that purpose are known from shower walls and walls of refrigeration spaces, for instance see the hinges from the Prisma series by CR Laurence of Europe GmbH. The door parts 20a, b can slide both into or along each other. Optionally the doors can also be designed so as to fold up.

**[0058]** In the embodiment shown in figures 8C and 8D series of sub-spaces 28' are formed by boxes 28a' and 28b'. The upright walls 29', of which those situated at the unit ends may form sidewalls of the unit, are also divided into an upper wall part 29a' and a lower wall part 29b' that are part of the lower section 1a' and the upper section 1b', respectively. Said boxes 28a', 28b' each comprise three upright walls, namely on both sides (29a', 29a' and 29b', 29b') of the sub-space and opposite the entrance, as rear wall (20a' and 20b'), that preferably are formed as one unity with each other, such as of polyester. The boxes furthermore preferably have a bottom and covering, respectively, integrally formed with the boxes. On the entry side (not to be seen in the drawing, facing rearwards) and on the sides facing each other both boxes are open. The upper box, that is part of the upper section of the unit, therefore is reversed with respect to the lower box, that is part of the lower section. When converting the unit from the transport position of figure 8C into the operational position of figure 8D the upright box walls are able to slide closely along each other. A comparable set-up is also possible for larger units, such as unit 1, discussed above.

**[0059]** An assembly 100 of four units 1 can be transported by means of a truck with trailer, see figure 7, with units 1 according to the invention, wherein two stacked units each having height H1 together take up height Hs that equals a standard height of a standard container in this case 9 ft., 6 inches of a High Cube container.

**[0060]** It is also possible to transport a complete "sanitary village" with the truck combination of figure 7. Such a village is shown in figure 9, and comprises three sanitary units 1 and five smaller units 1' that can be converted from a transport position into an operational position in a manner comparable to units 1, see figures 8A,8B wherein in the transport position they have a height corresponding to H1 of units 1. In figure 7 said smaller units 1' are indicated with hatched lines. Just like the units 1, the units 1' are provided with the standard corner fittings 5 and they have an 8ft. length L', equalling the width of the unit 1 and a width B' of an entire fraction of the length L of unit 1, in this case 1/5 thereof, 4 ft. The units 1' can be furnished as shower rooms, toilet rooms and/or urinal

rooms, particularly with the said boxes, and in the shown set-up form a closure of the area 101 at the ends of the units 1. By means of the gate 102 an enclosed and controllable sanitary area 101 is thus provided, accessible through one closable entrance 103.

**[0061]** Instead of doors window panels can also be used in both the upper section 1b and the lower section 1a. Entrance doors and inspection doors can be used in both the upper section and the lower section. Entrance doors that utilise the fully extended height are constructed so as to be retractable such that a proper operation in the extended position is guaranteed.

**[0062]** The frame of the unit can be made of steel or stainless material having sufficient strength to guarantee the functionality in the retracted and in the extended position. In the future new materials may be used if strength, price and weight provide a suitable balance for the purpose described herein.

**[0063]** If necessary special cross-connections in the construction can be used to strengthen the frame so that this construction complies with specific demands as regards the specific furnishing and function of the unit.

**[0064]** Retractable vertical (intermediate) columns that are not a part of the bearing structure can also be made of steel or stainless material. The part into which the other part slides will be designed stronger and larger than the part that slides in.

**[0065]** The walls and doors can be made of several materials, depending on the furnishing of the unit. The part sliding in can be made of lightweight, thin and strong material.

**[0066]** Providing intermediate walls of insulated sandwich panels is one of the options to protect the technical components against weather influences. In the resultant sub-space, protection against frost or air-conditioning can be applied.

**[0067]** In case the unit is furnished as a shower, urinal and/or toilet unit the floors can be mounted sloping inwardly inclined. Against a partition wall or rear wall, in the floor, drains can be mounted through which cleaning water and or rain water can drain away. This contributes to water not running out of the unit on the front side in front of the doors and thus affecting the condition of the soil, so that formation of mud in front of the entrance doors is limited.

**[0068]** The unit may among others be provided with a boiler system, water storage tanks, waste water tanks, generator sets, vacuum pumps etc.

**[0069]** Coupling all toilets, urinals, showers, washbasins and all other devices that produce waste water, can be effected by means of a waste water pipe system. This system passes the waste water to a vacuum pump that processes it and discharges it. As a result a high degree of hygiene is realised and this sanitary system also reduces the use of water to a high degree in comparison with a conventional toilet flushing system. However, placing standard sanitary fittings with drainage under the influence of gravity/head is also possible, or a combination

thereof with a vacuum system.

**[0070]** On the inside the unit can be provided with lighting, particularly at the upper section 1b. If a battery or generator is present it will preferably be accommodated in lower section 1a. The connection with the fixtures can then take place through flexible lines that are capable of following the converting motion of the unit. Fixtures and lamps that are constructed so as to be lightweight are considered as much as possible in order to keep the overall weight of the unit as light as possible.

**[0071]** On the bottom corners the unit can be provided with one or more jack systems in order to set the unit horizontally or in any position.

**[0072]** The covering itself may be substantially shape-retaining, plate-shaped or flexible, such as cloth-shaped, if the covering itself will not be loaded with additional external weight. During transportation the covering cloth will be protected by the longitudinal girders 6b and the cross girders 7b.

**[0073]** The bottom and/or the covering can be provided with an extendable panel that may serve as step for the door panels or as shelter/sunscreen. These panels that can be slid out of the covering may be provided with lighting and or publication panels for information or advertising.

**[0074]** The examples given relate to the application of the residential space as a sanitary facility.

**[0075]** The unit according to the invention can be transported with standard transportation, by truck, train, barge, sea ship and is particularly transportation cost-effective and can be used worldwide. After transportation the unit is folded down and ready to be used within a few minutes.

**[0076]** It is not the object of the unit to transport commodities, such as piece goods. Only permanent furnishings that can be designed in many ways will inextricably be transported with the unit.

**[0077]** The above description is included to illustrate the operation of preferred embodiments of the invention and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an expert.

## Claims

1. Transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and upright walls extending in between them, which walls can be converted between a - particularly retracted- transport position and a -particularly extended-operational position, in which the unit has a larger height, wherein the unit is equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers.
2. Transportable unit according to claim 1, wherein a common drain pipe for the toilet bowls, urinals and/or

showers is incorporated in the bottom, wherein preferably the drain pipe is connected to a vacuum drainage system.

3. Transportable unit according to claim 1 or 2, wherein the upright walls comprise an upper wall attached to the covering and a lower wall attached to the bottom, wherein the upper wall and the lower wall preferably are of approximately similar height and/or wherein the upper wall and the lower wall can be slid vertically into or along each other, wherein the bottom preferably is part of a lower section of the unit and the covering is part of an upper section of the unit which can be moved in vertical direction with respect to each other. 5
4. Transportable unit according to claim 1, 2 or 3, wherein the upright walls form partitions/inner walls for shielding off sub-spaces for the toilet bowls and/or showers, wherein preferably a sidewall of the unit is provided with doors for the sub-spaces. 10
5. Transportable unit according to any one of the preceding claims, wherein the upright walls form sidewalls that can be part of a separation of a sub-space to the outside. 15
6. Transportable unit according to claim 3 or a claim depending thereon, wherein sub-spaces have been formed by pairs of boxes, each having three upright walls, on both sides of the sub-space and opposite the entrance to the sub-space, as rear wall, which walls preferably are formed as one unity, such as of polyester, wherein both boxes are open on the entry side and on the sides facing each other and wherein the upper box that is part of the upper section of the unit is oriented vertically reversed with respect to the lower box that is part of the lower section of the unit. 20
7. Transportable unit according to claim 4 or a claim depending thereon, wherein an inner wall forms a partition wall between two series of urinals and/or toilet bowls, the individual branch lines of which to the drain pipe are at least partially incorporated in the partition wall. 25
8. Transportable unit according to claim 7, wherein the partition wall has a lower partition wall and an upper partition wall, wherein the lower partition wall is divided into a first part and a second part that each support a toilet bowl or urinal of a respective series, and between them define an accommodation space for the upper partition wall. 30
9. Transportable unit according to any one of the preceding claims, wherein the toilet bowls, urinals and/or shower heads are arranged in the lower section of the unit comprising the bottom. 35

10. Transportable unit according to any one of the preceding claims, wherein the unit has half a standard height of a standard freight container, and an extended operational position, in which the unit has a larger height, wherein preferably, in the operational position the unit has a full standard height of a standard container, wherein preferably the standard height is the height of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container. 40
11. Transportable unit according to claim 10, wherein the length and width of the unit equal the length and width, respectively, of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container. 45
12. Transportable unit according to claim 11, wherein the length and width of the unit equal the length and width, respectively, of a 20 ft. TEU container and the height in the transport position equals half a height of a 45 ft. High Cube container. 50
13. Transportable unit according to any one of the preceding claims, provided with ISO corner fittings on the corners, preferably all corners. 55
14. Assembly of two transportable units according to any one of the preceding claims, stacked onto one another.
15. Assembly of a number of transportable units according to any one of the preceding claims, preferably together with a truck or trailer on which they have been placed, wherein one unit has a length L corresponding with the standard length of a standard freight container and n units have a length L' corresponding with  $1/n \times L$ , wherein n is an integer, wherein preferably L is 20 ft. of a 20' TEU container.
16. Transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and sidewalls extending in between them, which walls can be converted between a - particularly retracted- transport position, in which the unit has half a standard height of a standard freight container, and a -particularly extended- operational position, in which the unit has a larger height.
17. Transportable unit according to claim 16, wherein in the operational position the unit has a full standard height of a standard freight container.
18. Transportable unit according to claim 16 or 17, wherein the standard height is the height of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container.
19. Transportable unit according to claim 16, 17 or 18,



wherein the length and width of the unit equal the length and width, respectively, of a 20 ft. TEU container, a 40 ft. TEU container or a 45 ft. High Cube container.

20. Transportable unit according to claim 18 and 19, wherein the length and width of the unit equal the length and width, respectively, of a 20 ft. TEU container and the height in the transport position equals half a height of a 45 ft. High Cube container.
21. Transportable unit according to any one of the claims 16-20, wherein the sidewalls can be telescopically converted.
22. Transportable unit according to any one of the claims 16-21, wherein the sidewalls each comprise an upper sidewall attached to the covering and a lower sidewall attached to the bottom, wherein the upper sidewall and the lower sidewall preferably are of similar height.
23. Transportable unit according to claim 22, wherein the upper sidewall and the lower sidewall can be slid vertically into each other.
24. Transportable unit according to claim 22 wherein the upper sidewall and the lower sidewall can be slid vertically along, adjacent to each other.
25. Transportable unit according to any one of the preceding claims, wherein the upper sidewall and the lower sidewall of at least one sidewall comprise an upper door part and a lower door part, respectively, for forming an entrance door to the residential space in the operational position, wherein the upper door part and the lower door part can hinge about a vertical hinge centre line and are attached to the covering and bottom by an upper hinge and a lower hinge, respectively, particularly to a frame section for them, particularly a horizontal frame section, wherein the hinge centre lines of the upper hinge and the lower hinge are in line with each other.
26. Transportable unit according to claim 25, wherein the upper door part and the lower door part are provided with connecting parts for mutual connection in the operational position.
27. Transportable unit according to any one of the preceding claims, provided with an operable conversion device for converting the sidewalls between the transport position and the operational position and vice versa.
28. Transportable unit according to claim 27, wherein the conversion device is provided with a manual operation.

29. Transportable unit according to claim 28, wherein the conversion device comprises manually driven cables, chains and the like, and a pulley system for them.

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30. Transportable unit according to claim 29, wherein the conversion device is provided with hydraulic or pneumatic cylinders.

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31. Transportable unit according to claim 30, wherein the cylinders are housed in the covering or the bottom of the unit.

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32. Transportable unit according to any one of the preceding claims, provided with means for locking the unit in the transport position.

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33. Transportable unit according to any one of the claims 16-32, equipped as a sanitary unit having a series of toilet bowls, urinals and/or showers.

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34. Transportable unit according to claim 33, wherein a common drain pipe for the toilet bowls, urinals and/or showers is incorporated in the bottom.

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35. Transportable unit according to claim 34, wherein the drain pipe is connected to a vacuum drainage system.

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36. Transportable unit according to claim 33, 34 or 35, wherein the unit is provided with partitions/inner walls for shielding off sub-spaces for the toilet bowls and/or showers.

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37. Transportable unit according to claim 36, wherein the sidewall is provided with doors for each sub-space.

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38. Transportable unit according to claim 36 or 37, wherein the inner walls comprise an upper inner wall attached to the covering and a lower inner wall attached to the bottom, that preferably can be telescopically slid into/out and/or along each other in vertical direction.

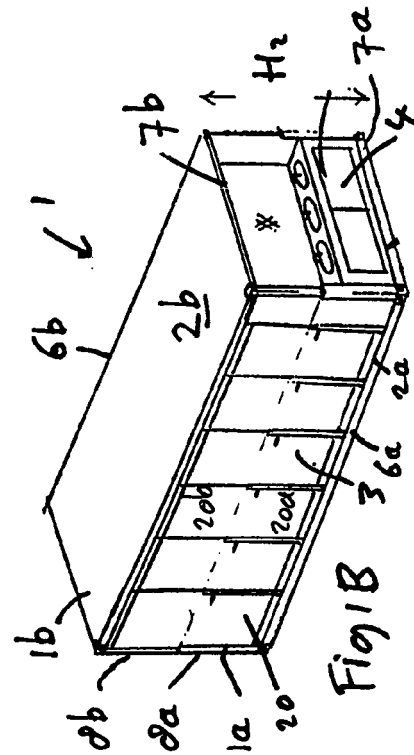
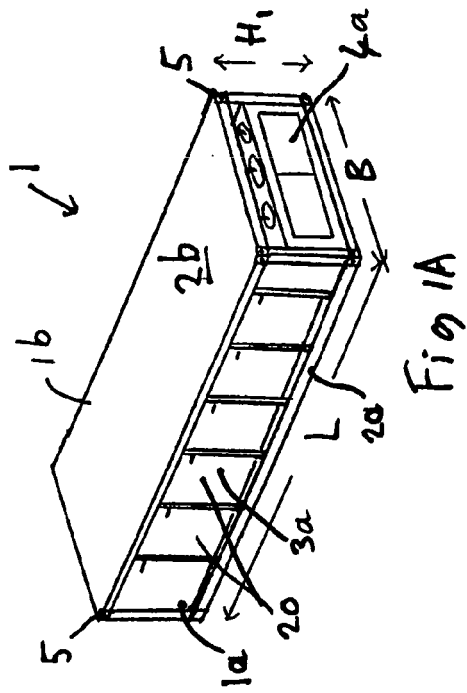
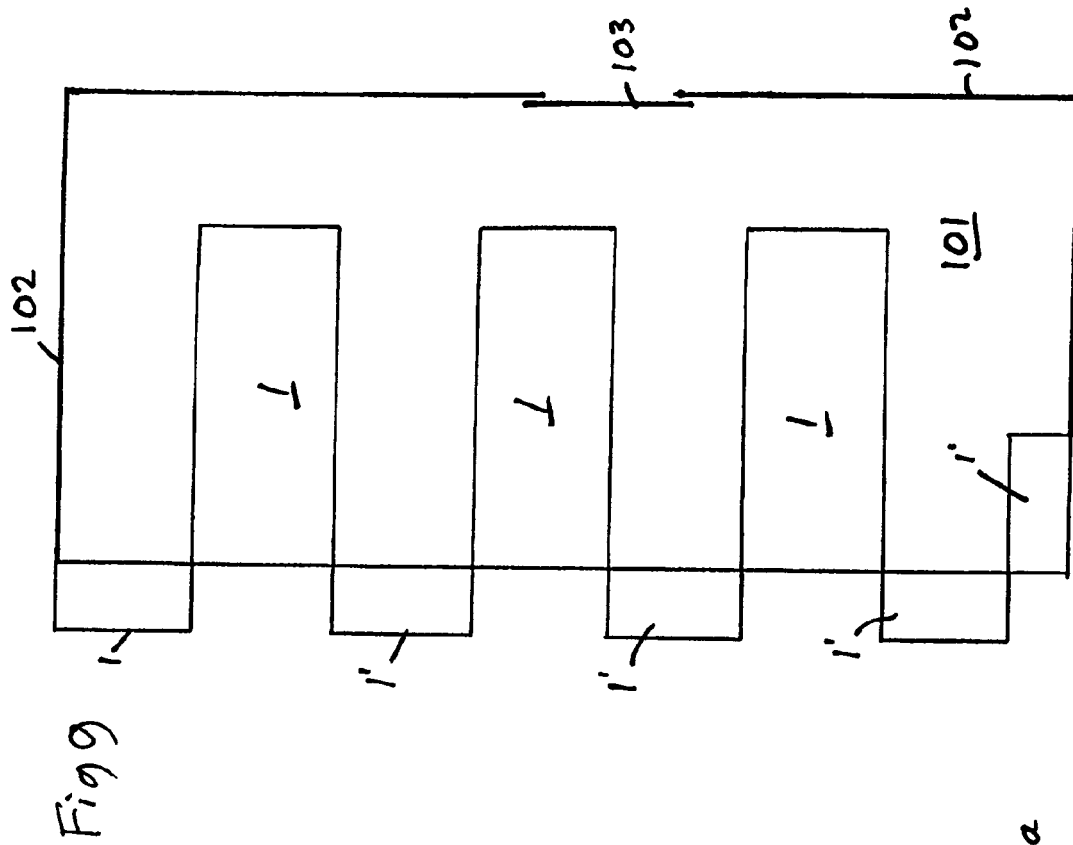
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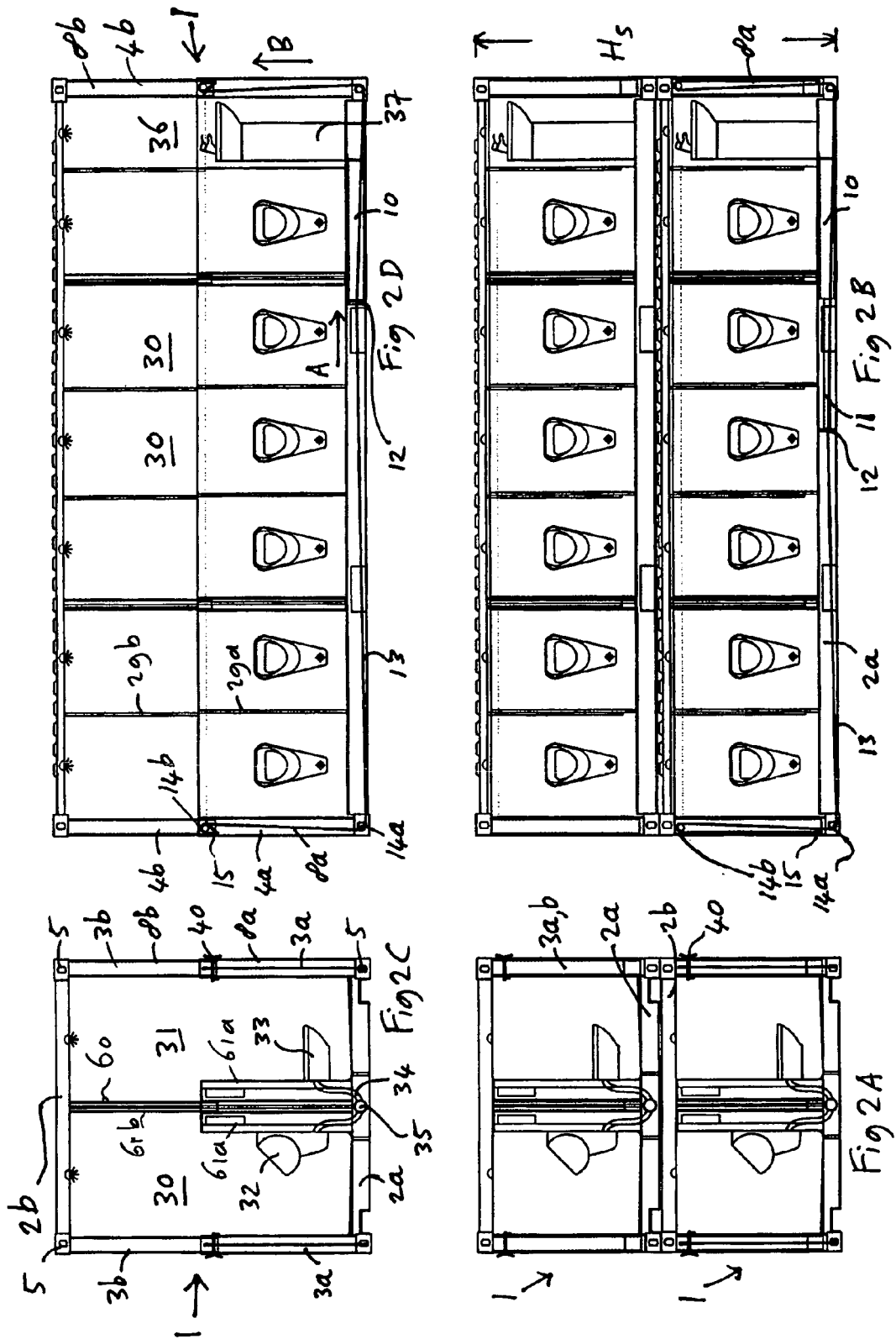
39. Transportable unit according to any one of the claims 34-38, wherein an inner wall forms a partition wall between two series of urinals and/or toilet bowls, the individual branch lines of which to the drain pipe are at least partially incorporated in the partition wall.

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40. Transportable unit according to claims 38 and 39, wherein the partition wall has a lower partition wall and an upper partition wall, wherein the lower partition wall is divided into a first part and a second section part that each support a toilet bowl or urinal of a respective series, and between them define an accommodation space for the upper partition wall.

41. Transportable unit according to any one of the claims 33-40, wherein the toilet bowls, urinals and/or shower heads are arranged in the section of the unit comprising the bottom. 5
42. Transportable unit for forming a straight parallelepiped-shaped residential space, provided with a bottom and a covering, and walls extending in between them, which walls can be converted between a - particularly retracted- transport position and a -particularly in vertical direction extended- operational position, wherein the sidewalls each comprise an upper wall attached to the covering and a lower wall attached to the bottom, wherein the upper wall and the lower wall of at least one sidewall comprise an upper door part and a lower door part, respectively, for forming an entrance door to the residential space in the operational position, wherein the upper door part and the lower door part can hinge about a vertical hinge centre line and are attached to the covering and the bottom by means of an upper hinge and a lower hinge, respectively, wherein the hinge centre lines of the upper hinge and the lower hinge are in line with each other. 10 15 20 25
43. Transportable unit according to claim 42, wherein the upper door part and the lower door part are provided with connecting parts for mutual connection in the operational position. 30
44. Transportable unit according to claim 42 or 43, wherein the upper door part and the lower door part can be vertically slid into each other. 35
45. Transportable unit according to claim 42 or 43, wherein the upper door part and the lower door part can be slid along each other in vertical direction. 40
46. Assembly of two transportable units according to any one of the claims 16-45, stacked onto one another. 45
47. Assembly of a number of transportable units according to any one of the claims 16-46, wherein one unit has a length L corresponding with the standard length of a standard freight container and n units have a length L' corresponding with  $1/n \times L$ , wherein n is an integer. 50
48. Assembly according to claim 47, wherein L is 20 ft. of a 20' TEU container. 55
49. Assembly according to claim 47 or 48, placed on a truck or trailer.





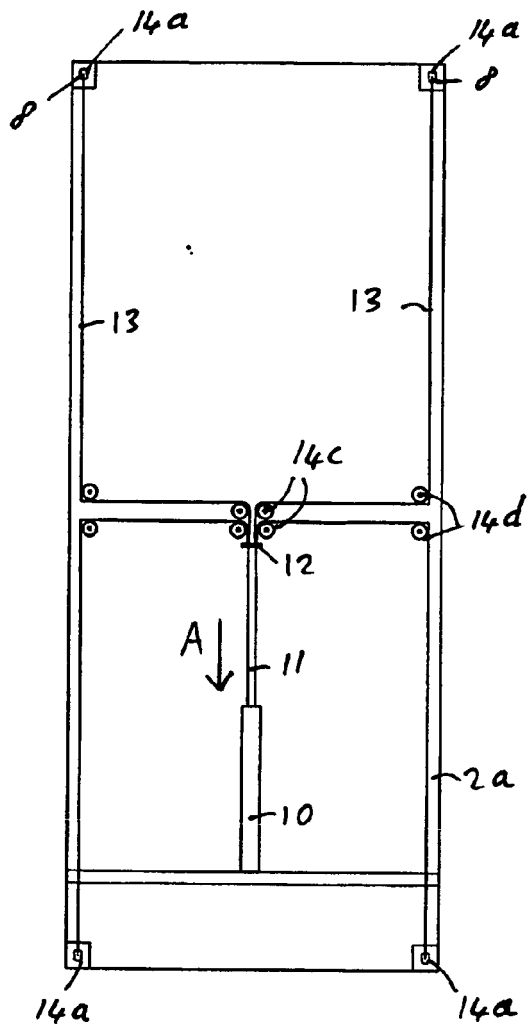


Fig 2E

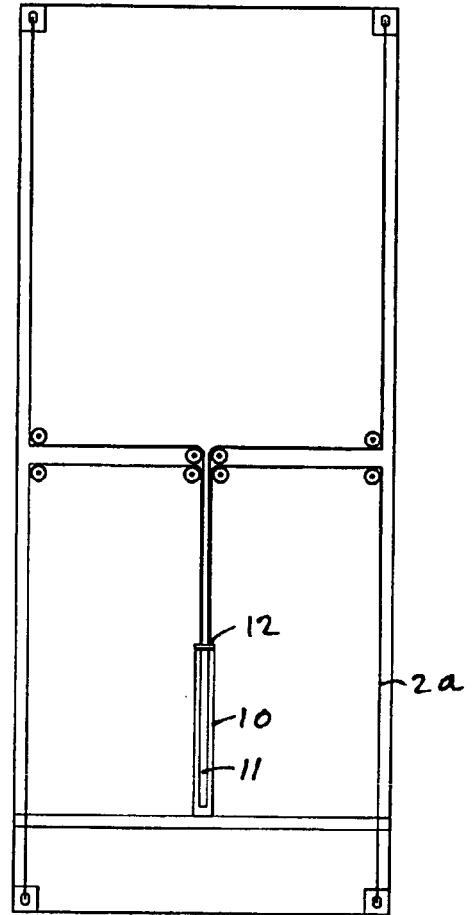
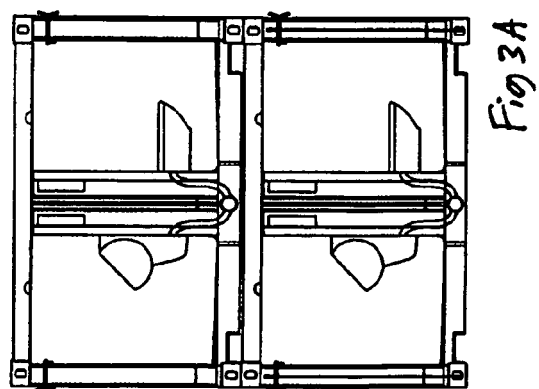
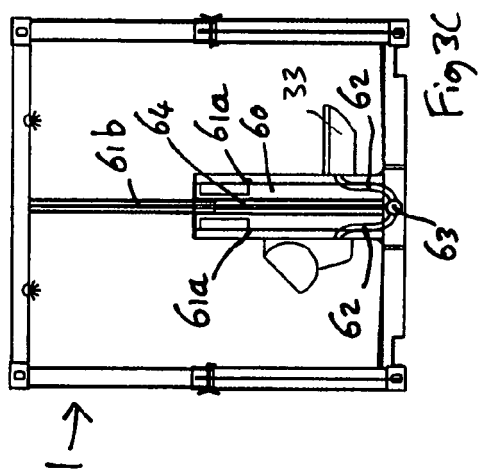
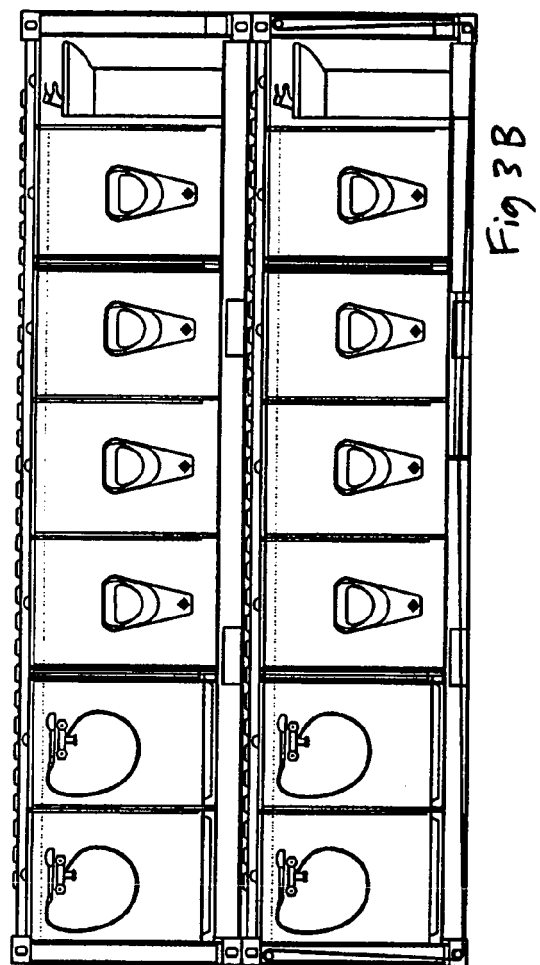
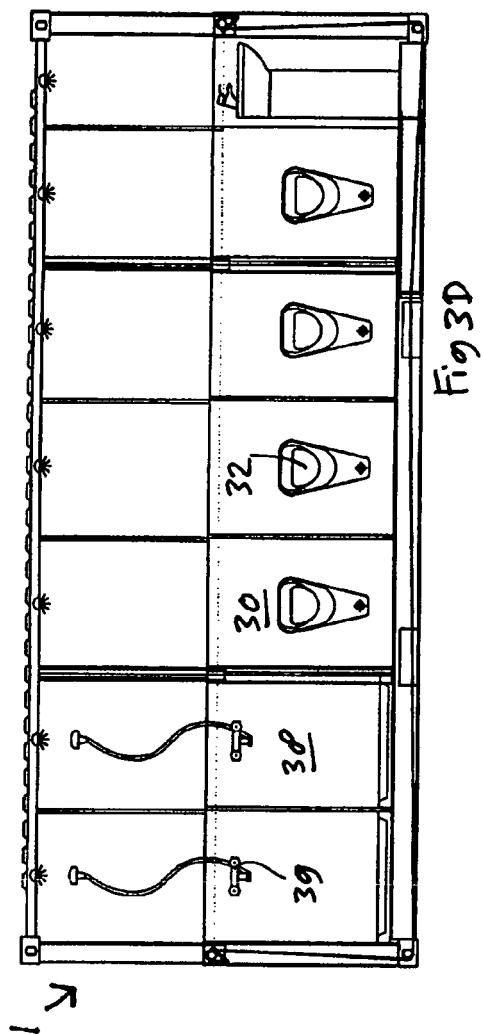


Fig 2F



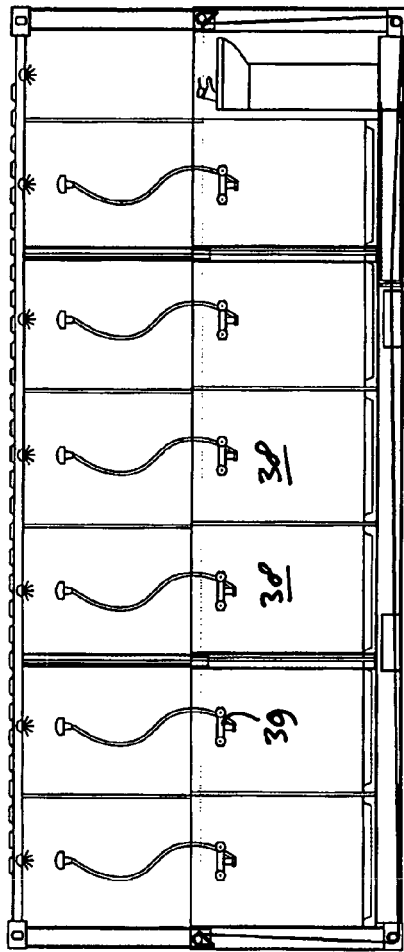


Fig 4D

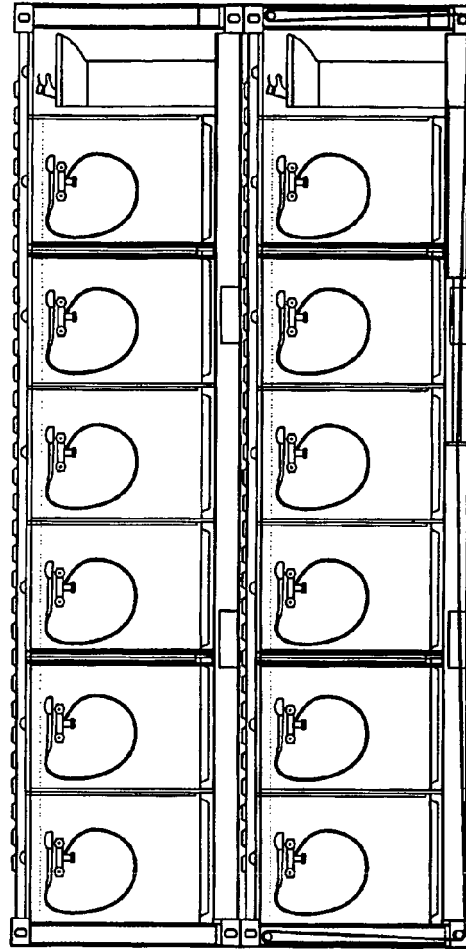


Fig 4B

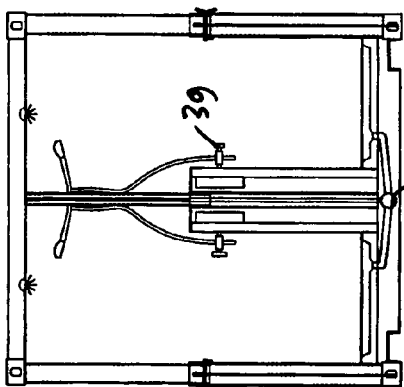


Fig 4C

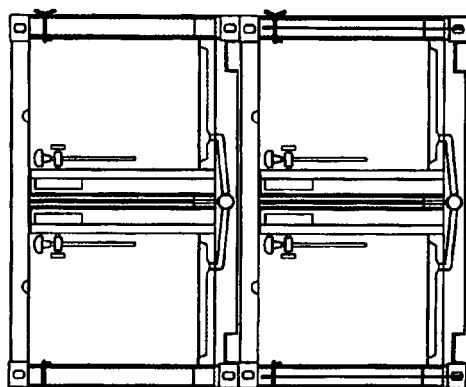


Fig 4A

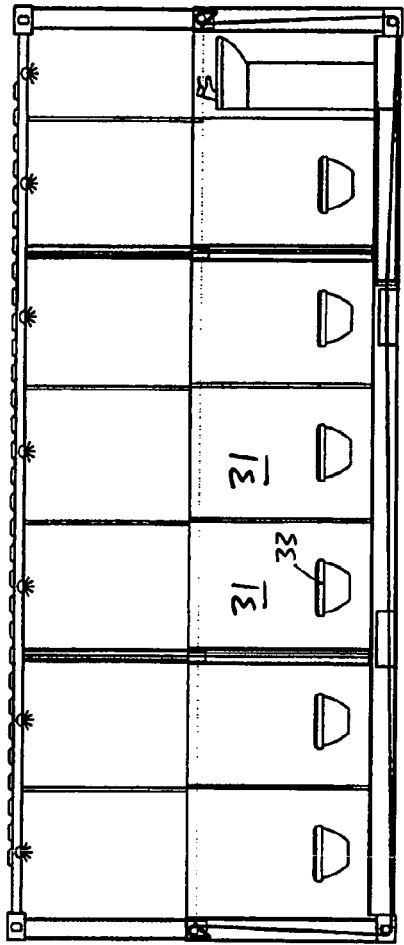


Fig 5D

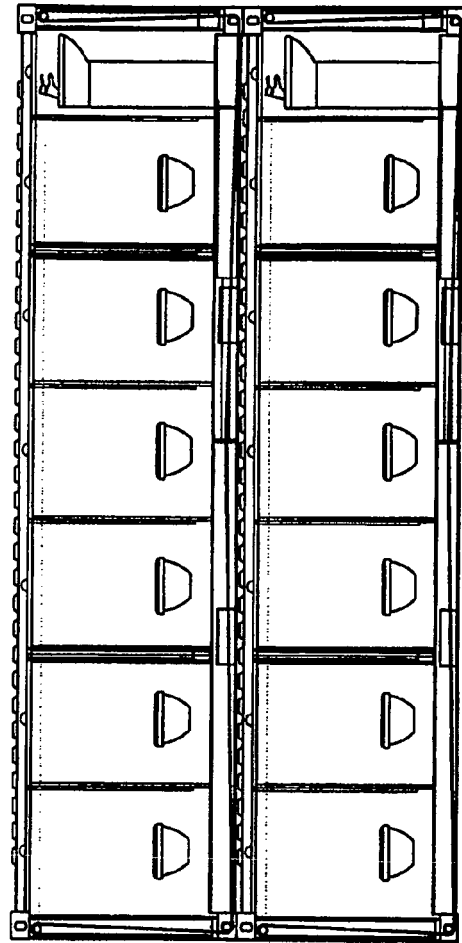


Fig 5B

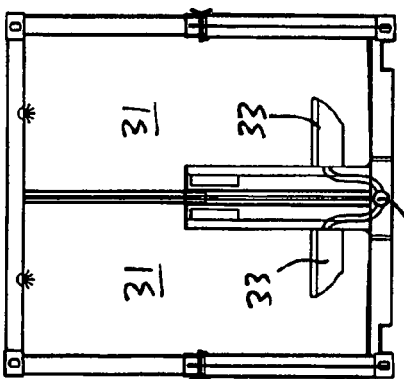


Fig 5C

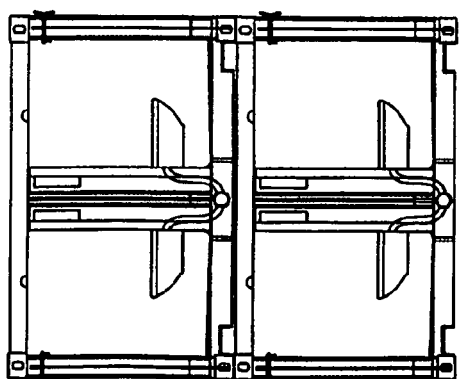


Fig 5A



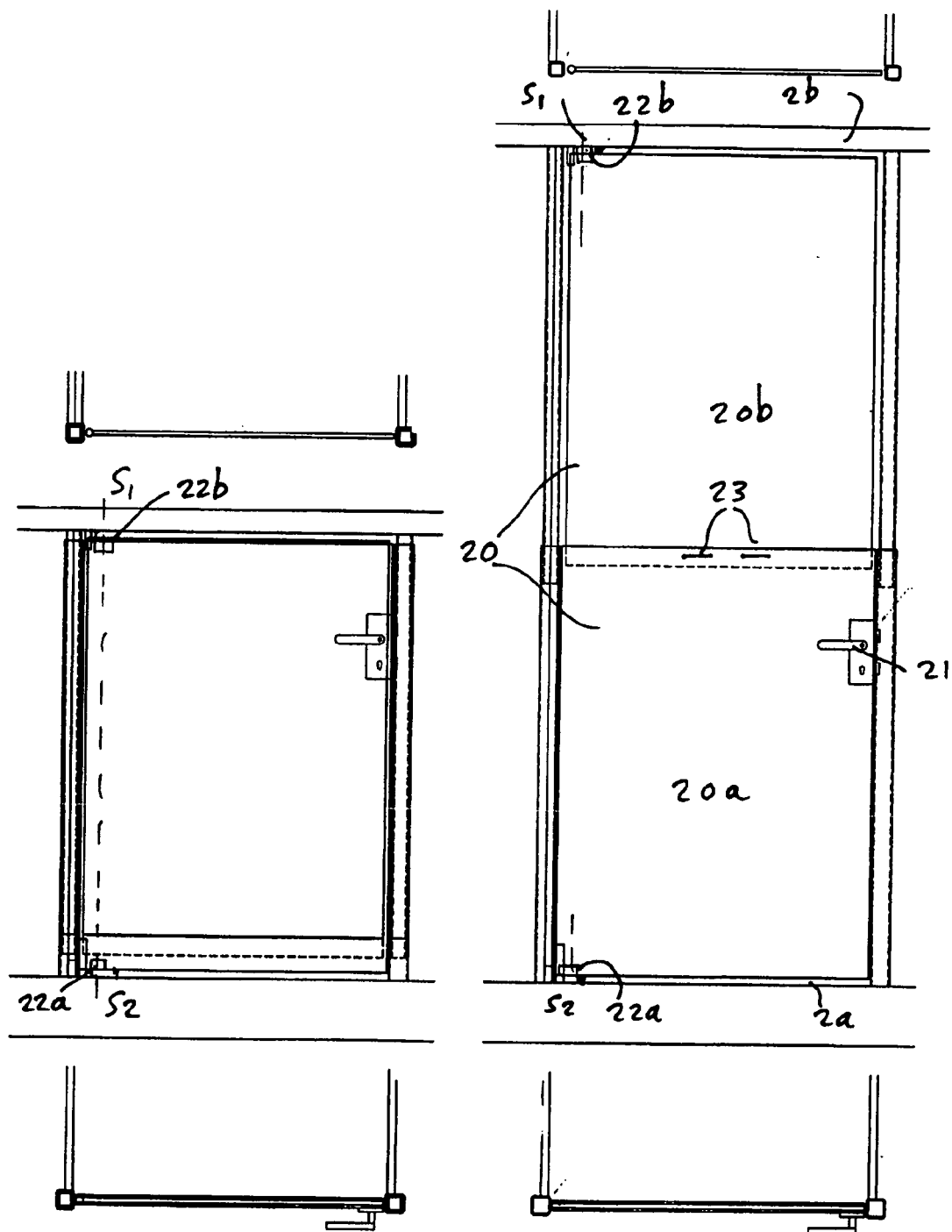


Fig 6A

Fig 6B

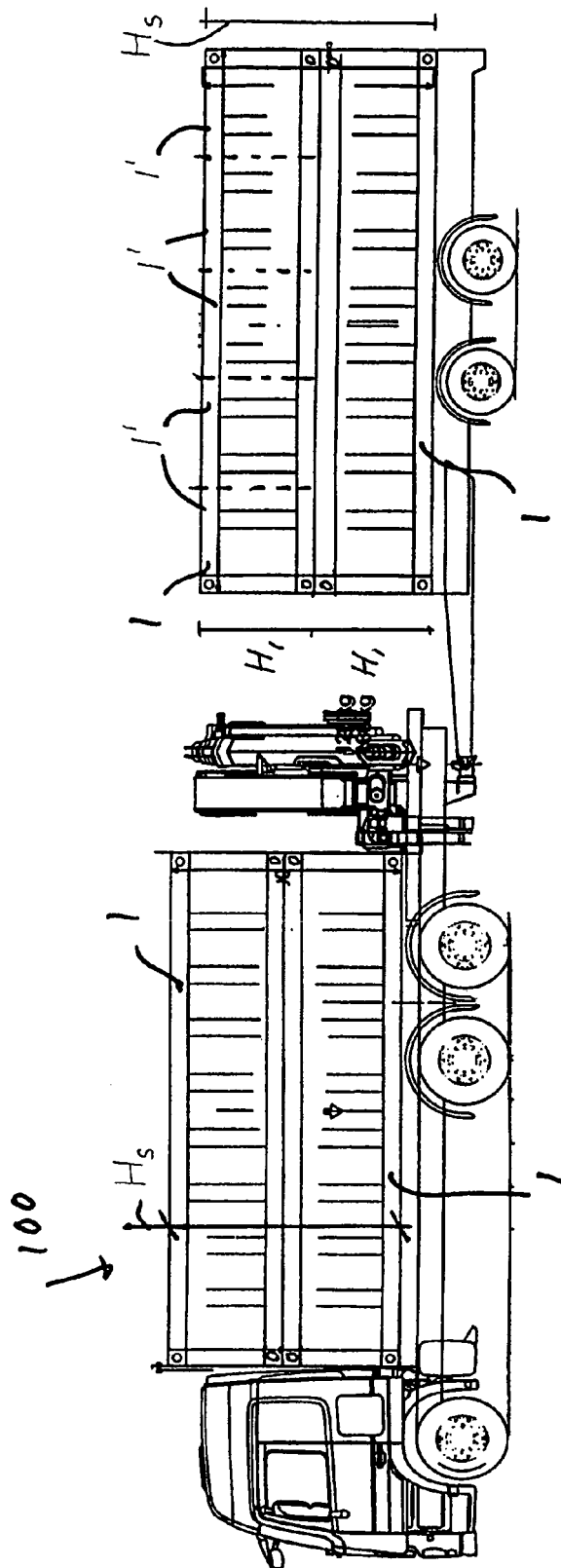
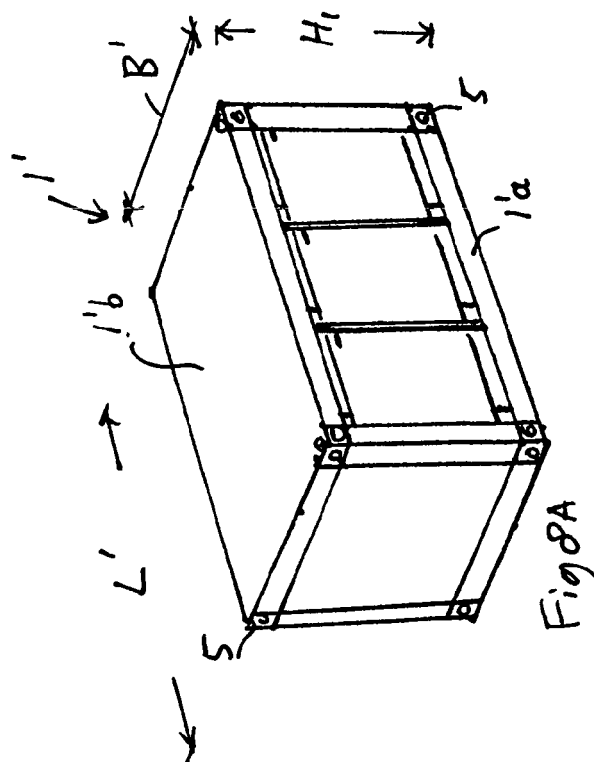
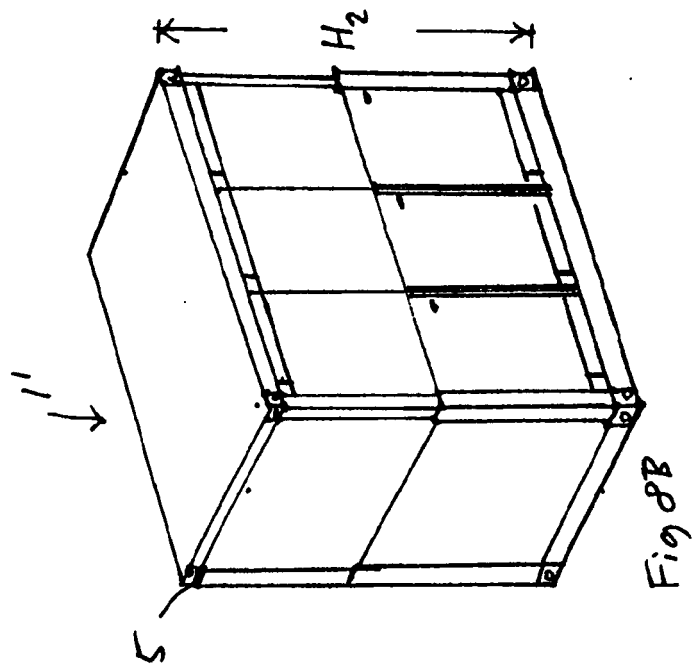


Fig 7



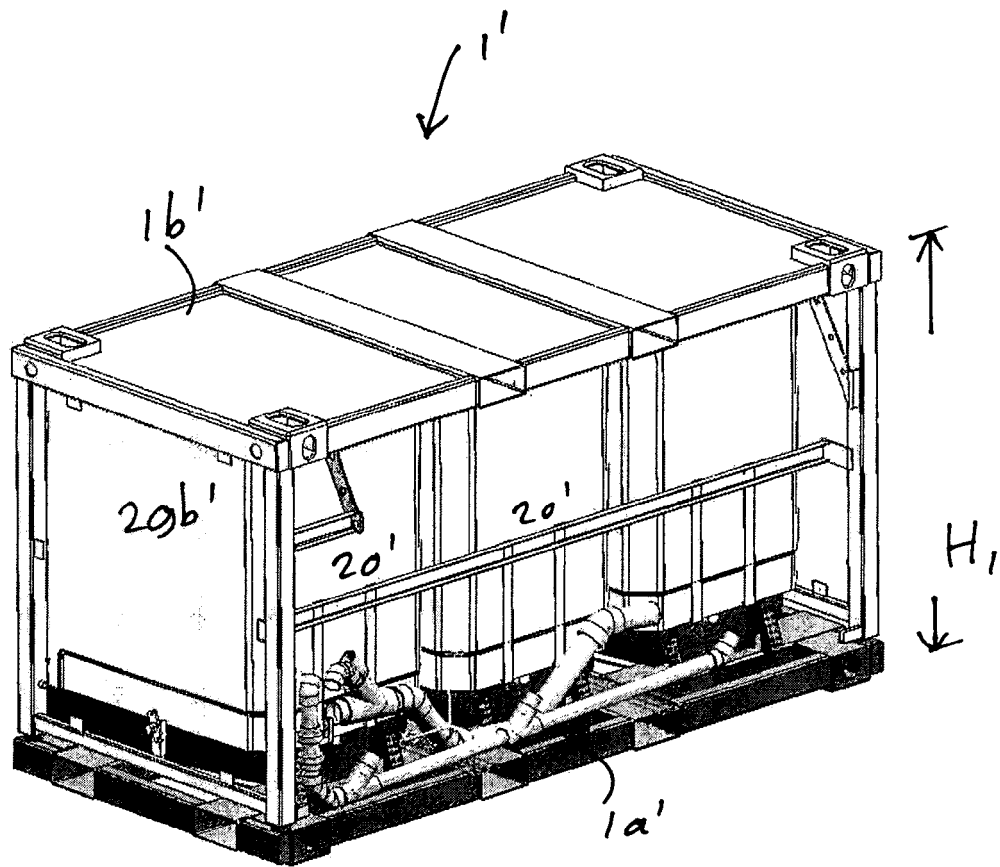


Fig 1c

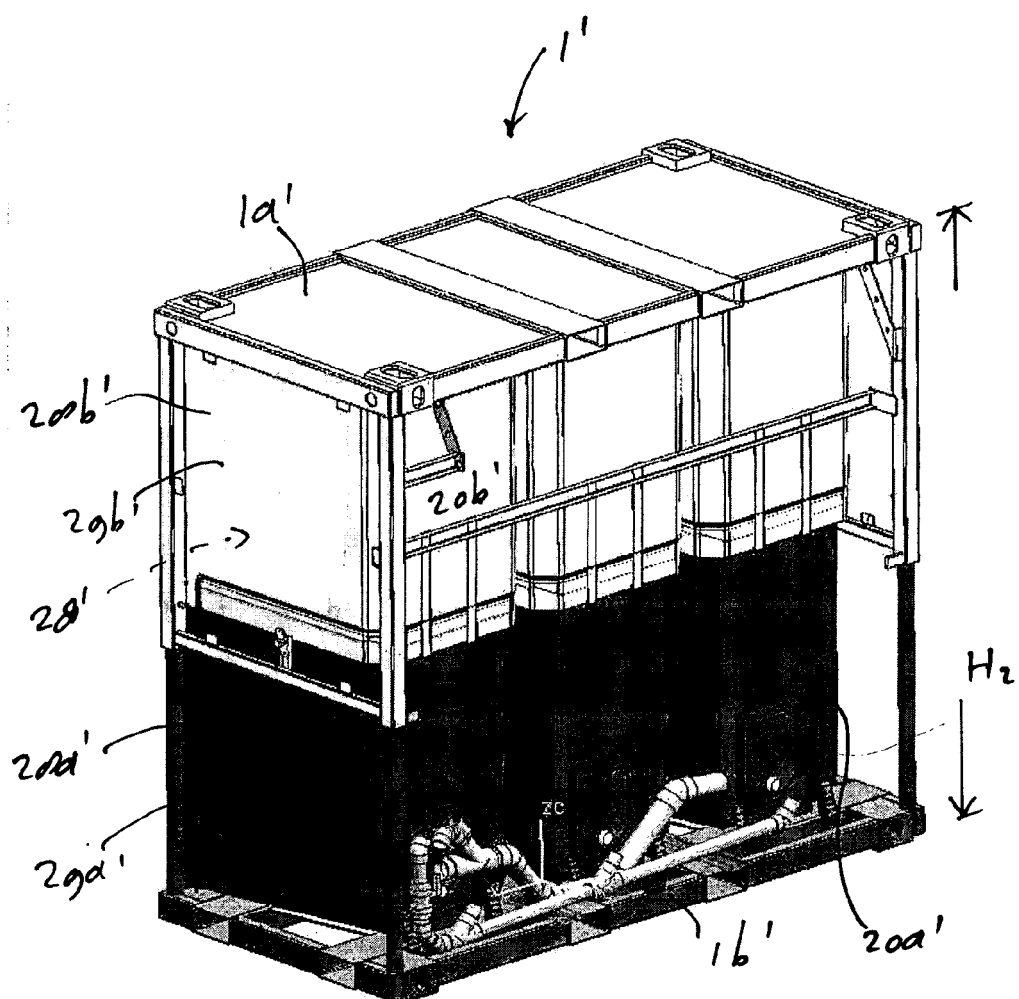


Fig 8D