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(56) Documents Cited:
GB 2434163 A **WO 2007/144490 A**
DE 003612129 A **US 5010907 A**
US 20050053533 A

(58) Field of Search:
Other: **ONLINE: WPI, EPODOC**

(54) Title of the Invention: **Decontamination units**
Abstract Title: **DECONTAMINATION UNITS**

(57) A decontamination unit (10, figure 1), which may be containerised and/or which may comprise internal compartments (48, 50, 52) for undressing, showering and dressing in sequence. The unit (10, figure 1) is preferably adapted for intermodal transportation, may have external dimensions substantially corresponding to those of ISO shipping containers and preferably comprises twist-lock connectors (28).

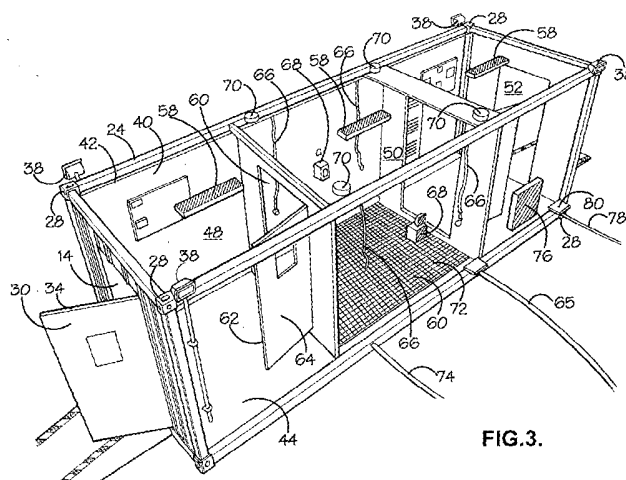


FIG.3.

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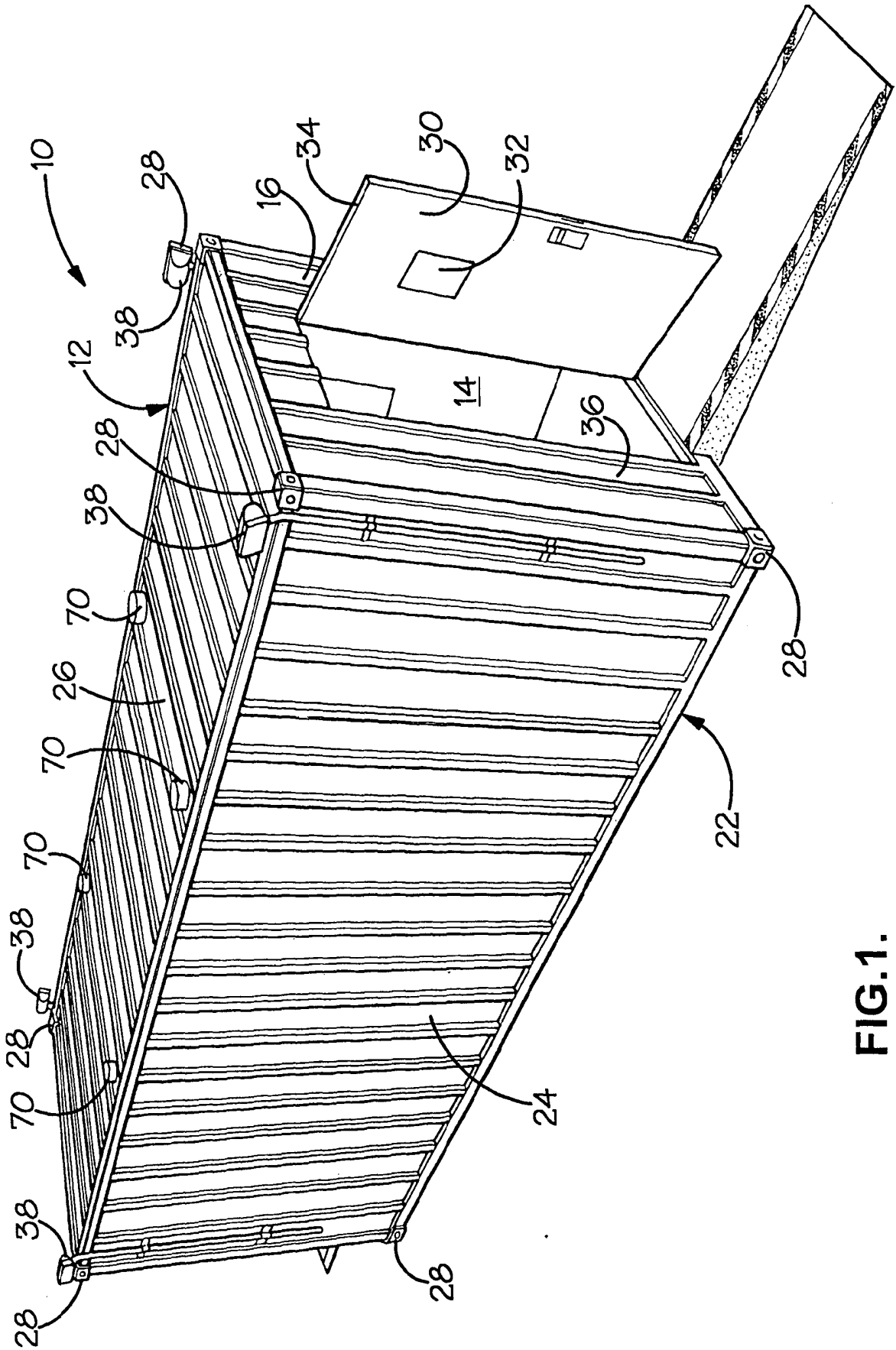


FIG.1.

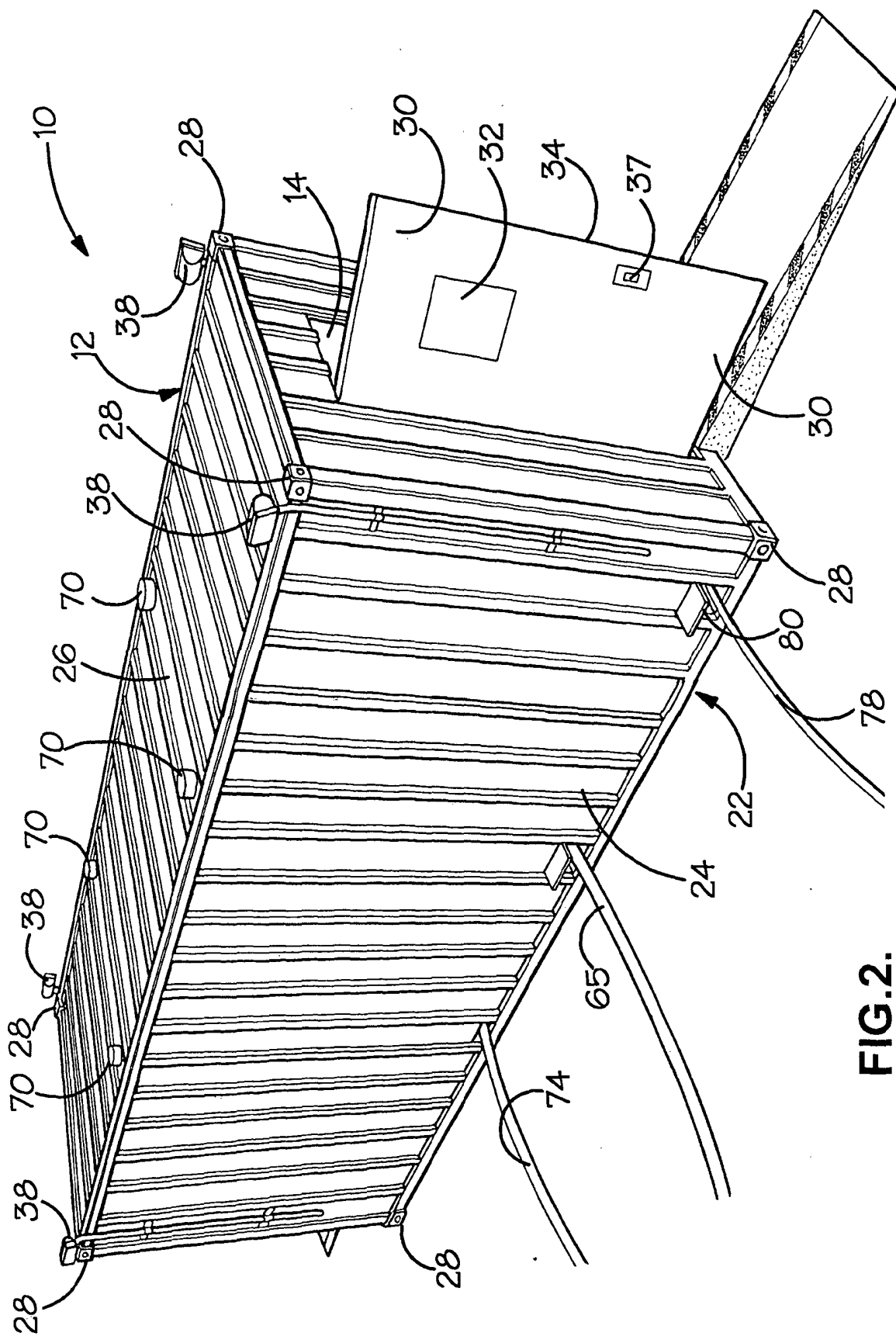


FIG. 2.

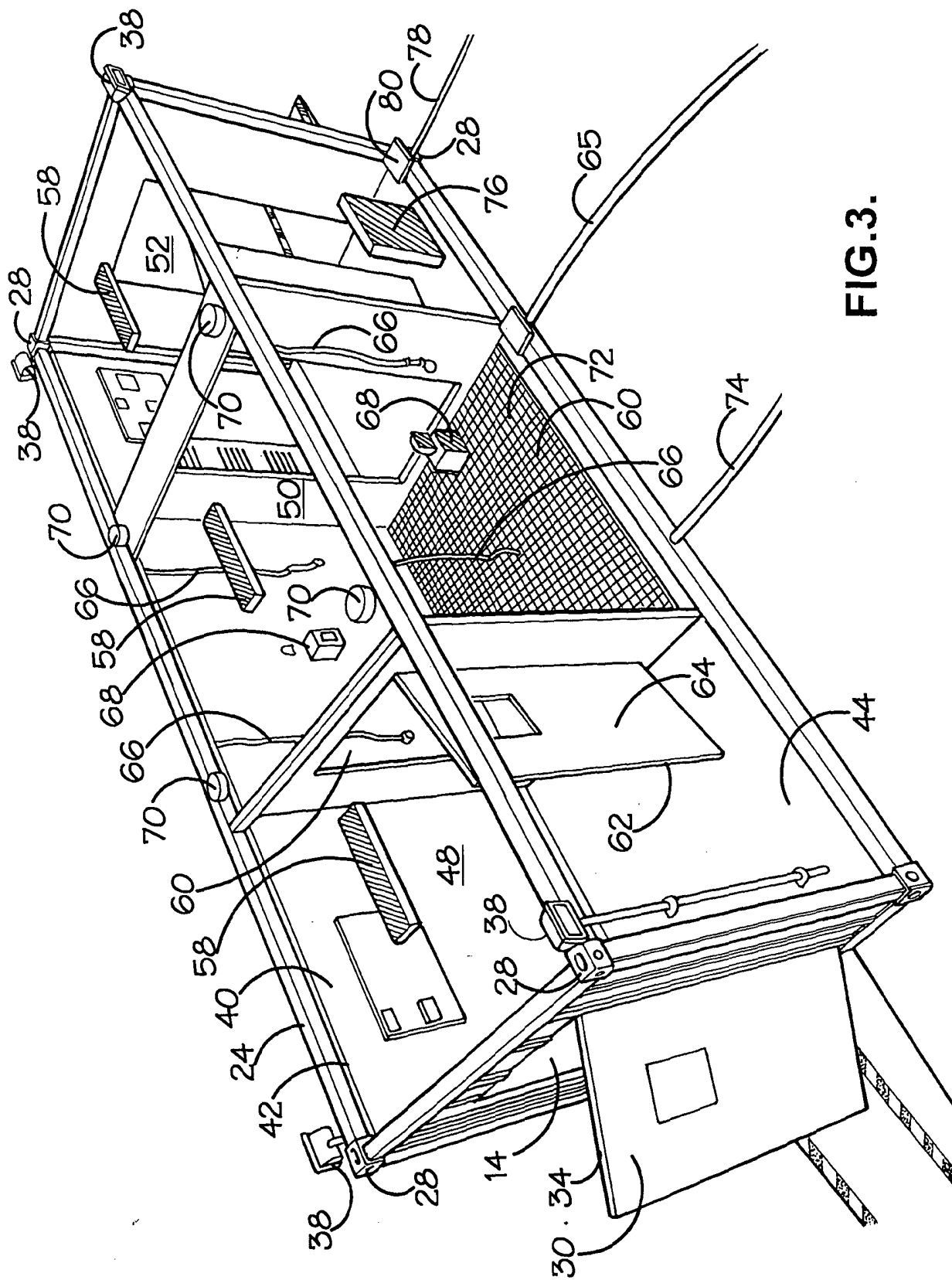


FIG. 3.

Title: Decontamination units

Description:

5 This invention relates to decontamination units and in particular, but without limitation, to decontamination units for decontaminating personnel.

 A decontamination unit is a building, either temporary or permanent, which can be used for decontaminating people. A decontamination unit often comprises an enclosure in which people who have been exposed to harmful,
10 or potentially harmful, substances for example, nuclear, biological or chemical contaminants, can remove and safely dispose of contaminated clothing, clean themselves, and then get re-dressed in clean clothing. Because the decontamination procedure involves undressing and the handling of potentially harmful clothing and equipment, decontamination is optimally
15 carried out inside a suitably designed enclosure.

 To preserve the privacy of users and to limit the transfer of contaminants, a decontamination unit will often comprise a number of areas, rooms, or partitions, each dedicated to one of the above procedures. Normally, users enter the decontamination unit and pass through each room
20 in a sequence that limits the transfer of contaminants.

 Decontamination units are often used by emergency services or armed forces when attending an incident, such as an industrial accident site, or by workers who routinely risk coming into contact with potentially harmful substances, such as factory workers. Where the risks of contamination are
25 deemed to be ever-present, it is common for there to be a permanently-

installed decontamination building. However, where the risk of contamination is deemed to be intermittent or less likely, a mobile decontamination unit may be preferred as it can be transported to an incident site as and when required and subsequently removed to save space. Mobile decontamination units can also be shared resources, thereby reducing capital outlay as the cost can be shared between the various participants in a sharing scheme.

Mobile decontamination units often take the form of tents, which can be easily transported and quickly erected on-site. However, tent-based decontamination units are generally unsuited to medium- to long-term use owing to their tendency to become damaged and/or moved during use. Moreover, any tent-based system is inherently inferior to a permanently-installed building because it does not readily lend itself to the attachment of certain services, such as water supply pipes, electrical outlets, pressurised air systems and /or other equipment that may be necessary.

A need therefore arises for a decontamination unit that combines the benefits of a permanently-installed building and a mobile decontamination unit.

A known solution is to provide a portable building, which has been fitted out as a decontamination unit. However, such buildings have proven to be difficult to transport, and are susceptible to transit damage. The reason for this is partially attributable to the known building's size and weight, which imposes restrictions on the roads that it can be transported on, and partly due to its mode of construction.

This invention aims to provide a solution to one or more of the above problems.

According to a first aspect of the invention there is provided a containerised decontamination unit.

According to a second aspect of the invention there is provided a decontamination unit comprising a plurality of interconnected internal compartments and external connection means for releasably connecting the
5 decontamination unit to a lifting means.

According to a third aspect of the invention there is provided a decontamination unit comprising: a housing having a plurality of internal compartments; one or more internal doorways providing communication
10 between adjacent compartments, the compartments being interconnected to enable users to pass from one compartment to the next, via a doorway, in a predetermined sequence; a first external doorway communicating with the exterior and the interior of the first of the compartments in the sequence; and a second external doorway communicating with the exterior and the interior of
15 the last of the compartments in the sequence.

The physical structure of a containerised decontamination unit according to the invention is based on an intermodal shipping container, also known as an "ISO container". Advantageously, such containers have standardised dimensions, are self-supporting and are provided with fixtures
20 that enable them to be crane-lifted, transported by road, rail, sea or air. Thus, by providing a containerised decontamination unit, the problems associated with the known mobile decontamination units, i.e. a lack of durability and transportation problems can be greatly alleviated. In addition, a containerised decontamination unit can take advantage of existing infrastructure, and/or
25 may be transportable using existing lorries, ships, aircraft or trains. All of

these factors may enable it to be deployed virtually anywhere in the world without undue difficulty.

The containerised decontamination unit of the invention preferably comprises a rigid, durable outer casing which may be manufactured of pressed sheet steel. The external dimensions of the containerised decontamination unit correspond to those of an ISO container. The international standard for multi-modal containers permits various different sizes of container, such as:

- 6.096m (20') x 2.438m (8') x 2.591m (8'6")
- 10 12.192m (40') x 2.438m (8') x 2.591m (8'6")
- 12.192m (40') x 2.438m (8') x 2.869m (9'6")
- 13.716m (45') x 2.438m (8') x 2.869m (9'6")

Other sizes may also be/become available. The preferred dimensions of a decontamination unit according to the invention are 6.096m (20') x 2.438m (8') x 2.591m (8'6").

A containerised decontamination unit according to the invention preferably comprises "twist-lock" connector points located at its corners to enable it to be detachably affixed to complementary connectors of a lorry, train, crane, ship, aircraft or other container.

The decontamination unit comprises at least one doorway in a side or end wall thereof to enable persons to enter and leave it. Two doorways are preferably provided: one for contaminated personnel to enter the unit and the other for decontaminated personnel to exit.

The interior of the decontamination unit is preferably lined with internal cladding. The space between the outer casing and the internal cladding can

be used for concealing wiring, pipe work etc., which advantageously makes the interior of the unit easier to clean. A layer of thermal and/or acoustic insulation may be provided in the space between the outer casing and the internal cladding, which insulation may also serve a structural function, i.e. to stiffen or strengthen the unit. The internal cladding may be manufactured of, or comprise, a waterproof material so that the interior of the unit can be cleaned after use by hosing-down using water hoses.

The interior of the decontamination unit is preferably divided into compartments, and most preferably into three compartments. Internal doorways are provided between the compartments, which internal doorways are preferably closeable using doors. The doors may comprise airtight and/or watertight seals to inhibit/reduce the transfer of contaminants between the compartments.

A first compartment may be fitted-out as an undressing room and may comprise seating, mirrors etc. to assist users in removing bulky and/or awkward clothing items, such as NBC suits, headgear, masks, gloves, boots, breathing apparatus etc. The undressing room preferably comprises means for disposing of contaminated clothing, which means may comprise a receptacle. The receptacle, where provided, preferably comprises a closeable opening to inhibit the egress of contaminants. The receptacle may comprise a bag or tank locatable on the exterior of the unit, into which items can be placed via an opening or chute communicating with the interior of the undressing compartment and the receptacle. The receptacle is preferably sealingly closeable and removable from the unit to enable contaminated clothing to be taken away for cleaning and/or disposal.

A second chamber may be fitted-out as a decontamination room and may comprise air and/or water showers that users can make use of to remove contaminants from their skin. The showers may comprise flexible hoses extending from an elevated position, and a shower head/sprinkler attachment.

- 5 A tap or faucet is preferably provided to control the rate and temperature of the water/air flow of the shower. The shower or showers are connected to and fed by an external water supply, which may comprise a water heater.

- The floor of the decontamination room preferably comprises a sump for collecting water from the shower or showers. The sump may be overlaid by a
10 grid or duckboard so that users' feet are not immersed in contaminated water. The level of the grid is preferably equal to the floor level of the other chambers of the unit to reduce tripping hazards. The sump may comprise an outlet conduit through which contaminated water can be removed to a waste water storage tank. The waste water storage tank may be located outside and/or
15 remote from the unit.

A third, re-dressing compartment may also be provided, which may fitted-out in a similar manner to the undressing compartment.

- The interior of the unit may be illuminated using electrical or other light fittings. External flood lighting may additionally provided, in particular for
20 illuminating the entrance and/or exit doorways of the unit.

- Various connection points may be provided on the exterior of the unit for connecting the unit to various utilities. These connection points may comprise any one or more of: an electrical power connection, a gas connection, a pressurised air connector, a cold water connection, a hot water
25 connection, and/or a waste water outlet connection.

A preferred embodiment of the invention shall now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a perspective view from above and a first side of the exterior of a containerised decontamination unit according to the invention;

5 Figure 2 is a perspective view from above and a second side of the exterior of a containerised decontamination unit of Figure 1; and

Figure 3 is a perspective, partially cut-away view from above and one side showing the interior of the containerised decontamination unit of Figures 1 and 2.

10 In Figures 1 and 2, a containerised decontamination unit 10 comprises a generally cuboid, metal container 12 with an entrance doorway 14 in one end wall 16 and an exit doorway 18 in a second end wall 20. Users (not shown) can enter and leave the interior of the decontamination unit 10 using the entrance 14 and exit doorways 18, respectively.

15 The container 12 comprises an outer casing manufactured of corrugated sheet metal. The corrugations of the outer casing help to reinforce the container and to improve its rigidity. The casing comprises a floor 22, sidewalls 24, end walls 16, 20 and a roof 26. The external dimensions of the unit 10 are 6.096m (20') long, by 2.438m (8') wide, by 2.591m (8'6") high. A
20 twist-lock connector 28 of conventional design is provided at each of the eight corners of the unit 10.

The entrance 14 and exit doorways 18 are closeable using hingedly connected doors 30 and each door has a window 32 therein. The periphery of each door 30 is provided with a resiliently deformable seal 34, which
25 compresses against the doorframe 36, when closed, to form an airtight and

watertight seal. A locking mechanism 37 is also provided for locking the door 30 in a closed position.

5 A detachable and pivotally moveable electric floodlight 38 is located at each upper corner of the unit 10 to provide illumination in the vicinity of the unit 10.

Referring now to Figure 3, the walls 24 of the unit 10 comprise a metal outer skin and an internal plastics cladding 40. Expanded plastics foam is injected into the space between the outer 24 and inner walls 40 to provide a thermal and acoustic insulation layer 42 and to stiffen the unit 10. The space
10 between the outer 24 and inner walls 40 is also used to conceal pipe work, wiring etc (not shown).

The inner skin 40 provides a flat walking surface 44, in the case of the floor, and/or a flat surface 46 for the affixing of fixtures in the case of the sidewalls and roof/ceiling. The insulating layer 42 helps to inhibit heat and
15 noise transfer from the interior of the unit 10 to the exterior and vice-versa, and also serves to stiffen the unit by anchoring the inner cladding 40 to the outer skin 24.

The decontamination unit 10 is internally divided into three discrete interconnecting or interconnectable rooms or areas 48, 50, 52 by way of two
20 partition walls 54, 56. The layout of the rooms and partition walls are such that a user can only pass between the rooms in a predetermined sequence. The functions of the three rooms are undressing 48, decontamination 50 and re-dressing 52. By placing the decontamination room 50 between the other two rooms 48, 52, user can enter the unit 10, de-robe, decontaminate and re-
25 robe sequentially.

The undressing room 48 is provided with a bench (not shown), mirror (not shown), a work surface (not shown) etc. to assist users in removing some or all of their contaminated clothing. It must be borne in mind that users entering the decontamination unit may be wearing bulky, heavy and/or soiled clothing, so it is important that the undressing room 48 is adequately sized and suitably laid out to facilitate undressing under such conditions.

The ceiling of the de-undressing room 48 is provided with strong artificial lighting 58 so that the room 48 can be well-lit, and corners, edges etc are clearly marked using a contrasting colour scheme to facilitate users who may be wearing dirty face masks or who may otherwise be visually impaired.

The undressing room is provided with a closeable receptacle (not shown) for disposal of contaminated clothing.

The partition walls 56, 56 each comprise a closeable doorway 60. In a similar manner to the external doors 30, seals 62 are fitted around the periphery of the door 64 so that it sealingly fits into the door frame. Such an arrangement helps to prevent contaminants from passing from one room 48, 50, 52 to the next when the door 64 is closed.

The re-dressing room 52 is fitted-out in a similar manner to the undressing room 48.

The central room 50 is a decontamination room and comprises shower units 66 connected to a supply of hot and cold water 65. Each shower unit 66 comprises a flexible hose and a shower head and is suspended from fittings located near to the ceiling. Refillable soap dispensers 68 are also provided.

Ventilation ducts 70 comprising conduits that communicate with the outside air and the interior of the decontamination room are provided to

enable steam and moist air to be ventilated to the exterior. A fan may be associated with one or more of the ventilation ducts to improve the air quality within the decontamination room 50.

5 The floor of the decontamination room 50 comprises a grid 72 that overlies a sump (not shown) for collecting waste water. The sump is connected to an external waste water collection tank (not shown) via a waste water pipe 74.

10 The interior of the unit 10 is clad in water resistant materials so that it can be hosed out for cleaning. The interior of the unit 10 is lit using ceiling-mounted electrical light fittings 58, which too are water resistant.

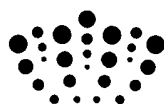
A wall-mounted electric heater 76 is provided in the dressing 52 and undressing rooms 48. Electricity used for heating and lighting the unit 10 comes from a power cable 78, which sealingly plugs into a socket 80 located on the exterior of the unit 10.

Claims:

1. A containerised decontamination unit.
2. A decontamination unit as claimed in claim 1 whose external dimensions
5 correspond to a permitted set of external dimensions of an intermodal shipping container.
3. A decontamination unit as claimed in claim 2, wherein the external dimensions of the unit are any one of the group comprising: substantially 6.096m long, by 2.438m wide, by 2.591m high; substantially 12.192m
10 long, by 2.438m wide, by 2.591m high; 12.192m long, by 2.438m wide, by 2.869m high; and 13.716m long, by 2.438m wide, by 2.869m high.
4. A decontamination unit comprising:
 - a housing having a plurality of internal compartments;
 - one or more internal doorways providing communication
15 between adjacent compartments, the compartments being interconnected to enable users to pass from one compartment to the next, via a doorway, in a predetermined sequence;
 - a first external doorway communicating with the exterior and the interior of the first of the compartments in the sequence; and
20 a second external doorway communicating with the exterior and the interior of the last of the compartments in the sequence.
5. A decontamination unit as claimed in any preceding claim, further comprising connection means to enable it to be crane-lifted and/or transported by road, rail, sea or air.

6. A decontamination unit comprising a plurality of interconnected internal compartments and external connection means for releasably connecting the decontamination unit to a lifting means.
7. A decontamination unit as claimed in claim 5 or claim 6, wherein the
5 connection means comprise twist-lock connectors.
8. A decontamination unit as claimed in any preceding claim, further comprising a rigid, durable outer casing manufactured of steel.
9. A decontamination unit as claimed in any preceding claim, further comprising two or more doorways in a side or end wall thereof.
- 10 10. A decontamination unit as claimed in any preceding claim, further comprising internal cladding.
11. A decontamination unit as claimed in claim 10, wherein the internal cladding is manufactured of, or comprises a waterproof material.
12. A decontamination unit as claimed in claim 10 or claim 11, wherein the
15 internal cladding is spaced apart from the outer casing and wherein the space between the outer casing and the internal cladding is at least partially filled with insulation.
13. A decontamination unit as claimed in any preceding claim, further comprising an internal partition wall.
- 20 14. A decontamination unit as claimed in claim 13, comprising two partition walls arranged to divide the interior of the unit into three compartments.
15. A decontamination unit as claimed in claim 13 or claim 14, wherein the or each partition wall comprises a doorway.
16. A decontamination unit as claimed in claim 9 or claim 15, wherein the or
25 each doorway is closeable using a door.

17. A decontamination unit as claimed in claim 16, wherein the or each door or doorway comprises an airtight and/or watertight sealing means.
18. A decontamination unit as claimed in any of claims 13 to 17, wherein at least one compartment comprises an air and/or water shower.
- 5 19. A decontamination unit as claimed in claim 18, wherein the shower is connected to an external water supply.
20. A decontamination unit as claimed in claim 19, wherein the external water supply comprises a water heater.
21. A decontamination unit as claimed in any of claims 18, 19 or 20, wherein
10 the compartment comprises a sump.
22. A decontamination unit as claimed in claim 21, further comprising a grid overlying the sump.
23. A decontamination unit as claimed in claim 21 or claim 22, wherein the sump comprises an outlet through which contaminated water can pass
15 to the exterior of the unit.
24. A decontamination unit as claimed in any preceding claim, further comprising internal and/or external lighting means.
25. A containerised decontamination unit as claimed in any preceding claim, further comprising internal heating means.
- 20 26. A containerised decontamination unit substantially as hereinbefore described, with reference to and as illustrated in the accompanying drawings.



Application No: GB0917624.9

Examiner: Mr Jason Scott

Claims searched: 1-26

Date of search: 2 August 2010

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-25	US 2005/053533 A BROWN See whole document and especially the discussion of figure 3 showing entrance 13, exit 13' and three internal compartments (undressing, showering, dressing), and paragraph [0005] stating it can be contained in a standard ISO shipping container.
X	1, 4-25	GB 2434163 A GRAY See whole document disclosing a portable decontamination unit having internal compartments and a shower compartment.
X	4, 8-25	US 5010907 A GEN DYNAMICS See whole document and especially the description of the layout in figures 1 and 9 showing a portable decontamination unit having an inlet, a shower compartment and an exit to a third internal compartment, or to the exterior.
X	1-25	DE 3612129 A MATRA See whole document and especially the English language abstract disclosing a portable decontamination unit having undressing, shower and dressing compartments. The unit is intended to be lifted off a lorry for use.
X	1-25	WO 2007/144490 A GRCEVIC See whole document and especially figure 3 showing a mobile decontamination unit having internal compartments for undressing, showering and dressing.

Categories:

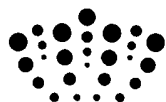
X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

The following online and other databases have been used in the preparation of this search report



WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
G21F	0009/00	01/01/2006
A47K	0017/00	01/01/2006
E04H	0001/12	01/01/2006