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(54) Title: A COLLAPSIBLE TOWER

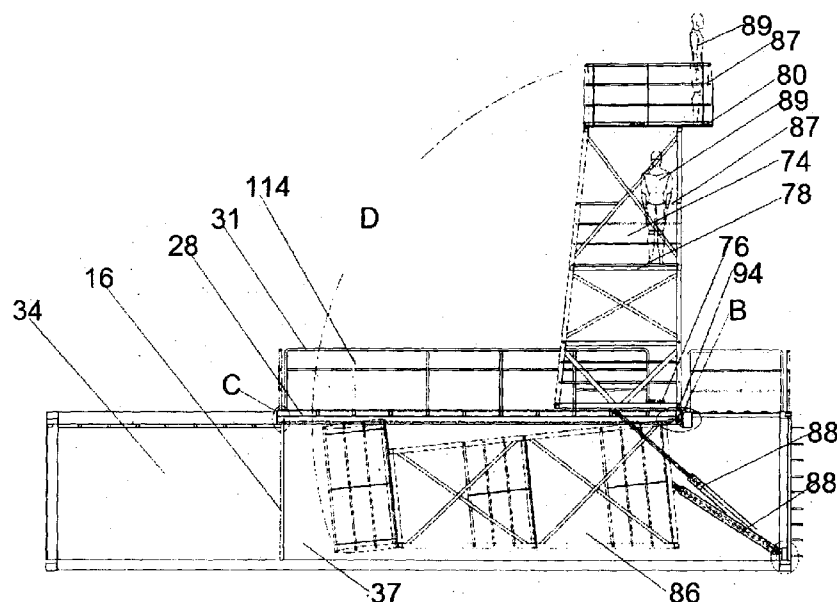


**FIGURE 5**

(57) Abstract: The invention relates to a collapsible tower for emergency response training, the collapsible tower including a tower and a collapsing means connected to the tower. The collapsing means is configured to change or move the tower between a substantially erect state and a lowered state. In use the collapsible tower can be used for emergency response training in the erect state and the collapsible tower is more readily stored and or transported in the lowered state. The invention also relates to a method of use of a collapsible tower for emergency response training.

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## A COLLAPSIBLE TOWER

### FIELD OF THE INVENTION

The present invention relates to a collapsible tower, and in particular to a collapsible tower for heights emergency response training.

### 5 BACKGROUND OF THE INVENTION

Throughout the specification and claims the term "collapsible" is intended to include any means of moving or changing from an erect state to a lowered state.

The collapsible tower is described used as an emergency response simulator used with a multipurpose simulator installation. However, there are many  
10 applications of the collapsible tower and it is not intended that use of the collapsible tower be limited to use with a multipurpose simulator installation.

At mine sites, marine and other dangerous working environments it is often desirable to train workers in safety procedures. New mining recruits may need to pass safety training to start work and existing staff need ongoing training to  
15 maintain safety skills. One very effective method of providing safety training is emergency response training, using emergency response simulators to create emergency scenarios.

One of the very important types of emergency response simulator is with respect to heights training. Workers need to experience climbing to heights, working at  
20 heights and in the event of an emergency being rescued at height, for example. It is not unknown for trainees to react adversely to being at height which could be a danger to themselves and others in a real emergency. Practice working at heights can help to try to minimise dangers during emergency situations.

It is desirable to be able to transport an emergency response training installation  
25 to where trainees need training, such as to a remote mine site or community. To be mobile the installation needs to be able to pack up for transportation, perhaps on the back of a prime mover or rail carriage. If a tower of a suitable height for effective heights training were to be included on a mobile installation the mobile installation would be made very difficult to move. The tower would project high in  
30 air and so would not be able to travel under low bridges or powerlines. The whole

installation would be made unwieldy and as such difficult to move, when compared to a standard container, for example, which is configured to travel down roads. If heights training were omitted from a mobile simulator installation, this would be a significant deficiency.

- 5 It is desirable to have a tower that can be used for heights training that can be collapsed when not in use. It would be highly desirable to have a heights training simulator tower than can be readily transported.

For clarity, any prior art referred to herein, does not constitute an admission that the prior art forms part of the common general knowledge, in Australia or  
10 elsewhere.

It is an object of the present invention to provide a collapsible tower that at least ameliorates one or more of the aforementioned problems of the prior art.

#### **DISCLOSURE OF THE INVENTION**

- Accordingly the present invention provides a collapsible tower for emergency  
15 response training, the collapsible tower including:

a tower; and

a collapsing means connected to the tower, and the collapsing means is configured to change or move the tower between a substantially erect state and a lowered state,

- 20 wherein, the collapsible tower can be used for emergency response training in the erect state and the collapsible tower is more readily stored and or transported in the lowered state.

- In one form of the invention the collapsible tower may be installed on a surface, proximal to a hollow area, below the level of the surface, and the collapsible tower  
25 can be used for emergency response training in the erect state and the collapsible tower can be substantially stored in the hollow area in the lowered state.

Preferably, the collapsible tower is associated with an installation, and when the tower is in the erect state at least part of the tower projects above an upper part of the installation and when the tower is in the lowered state at least part of the tower

is substantially stored below the upper part of the installation. Preferably, the collapsible tower is attached or attachable to the installation. Preferably, the installation is a multipurpose simulator installation.

Preferably, the emergency response training is heights emergency response training. Preferably, the emergency response training includes training chosen  
5 from the group: rigging training; climbing; working at heights; training useful in the field of mining; or training useful in marine environments. The emergency response training may be any type of emergency response training, and is not limited to use in heights training. In an alternative form of the invention, the tower  
10 may be used for recreational purposes, for example, climbing.

The tower may take any suitable form. Preferably, the cross-sectional area of the tower is greater at a base than at the top. The tower, preferably, includes a base and a top and one or more stages between the base and the top. The base of the tower may be any suitable shape. The shape of the base of the tower in cross-  
15 section may be chosen from the group: circular; irregular; rectangular including square; rhomboid; or triangular. Preferably, the tower is square in cross-section and includes 4 legs, one at each corner of the square. Preferably, the base of the tower is reinforced to strengthen the tower against the action of wind when in the erect state.

Preferably, the tower includes at least two stages above the base. Any suitable number of stages may be included. Preferably, each stage includes a platform on which trainees can stand. Preferably, a platform is included at the first and any other stages and a further platform is included above the final stage forming a roof platform substantially at the top of the tower. Preferably, the roof platform is  
25 configured for heights rescue training or similar. The or each platform is preferably made of reinforced steel. Other suitable materials may be used, as appropriate including other metals, wood or plastic or a combination thereof. Preferably, safety rails are included around at least part of one or more platform. Preferably, each platform, including the roof platform, includes safety rails substantially around the  
30 perimeter of the platforms. The safety rails may take any suitable form. Preferably, the safety rails include a plurality of vertical supports. Preferably, the safety rails include one or more horizontal support. The horizontal support may be one or

more wire threaded through the supports. The horizontal support may include a guard rail along the top of the safety rail. The safety rail may be of any suitable height to assist to prevent trainees from accidentally falling over the rail.

Preferably, each stage includes an access means to enable ready access  
5 between stages. The access means may take any suitable form. Preferably, the access means may include stairs from the base to a first stage. Preferably, the access means includes stairs from the first stage to a second stage. Any number of stairs may be included from one stage to another stage. The stairs may include safety rails. Preferably, the stairs all include safety rails along their length. The  
10 stairs may take any suitable form. Preferably, the stairs are made of reinforced steel. Other suitable materials include other metals, wood or plastic or combinations thereof.

Alternatively, ladders, ropes, steps or other means may be used to ascend the tower. The tower may include rigging training whereby the tower can be ascended  
15 by climbing up rigging on one or more side of the tower. The tower may include a number of different means of ascending or descending the tower to provide a variety of heights training.

Preferably, the collapsible means is connected to the tower at the base. In other forms of the invention the collapsible means may be connected to the tower  
20 above the base.

The collapsible means may include a moving part and means to cause the motion to change or move the tower between an erect state and a lowered state and vice versa. Preferably, the collapsible means includes a hinge or the like. The hinge or the like may take any suitable form. Any suitable number of hinges may be  
25 included. Preferably, the tower includes a base including 4 legs and two legs include a hinge attached towards the end. Preferably, the or each hinge allows the tower to move between a lowered state and an erect state and back again. Preferably, the hinges are configured so that in the lowered state the tower is substantially inside the installation and in the erect state the tower is substantially  
30 outside the installation. The hinges may be moved between the lowered and the erect state by any suitable means. The hinges may be moved by hand, such as through use of pulleys or by mechanical or automatic means. Preferably, the

hinges are moved automatically through operation of a remote control or other control.

Preferably, the collapsible means includes one or more hydraulic rams. Any number of hydraulic rams may be included. Preferably, two hinges are included  
5 and two hydraulic rams are included, and each hydraulic ram is associated with one of the two hinges for moving the tower between the erect state and the lowered state. Preferably, in use, a control is operated which activates the hydraulic rams so they change between a first position and a second position. In  
10 the first position the tower is in the lowered state and when the hydraulic ram is in the second position the tower is in the erect state. Other suitable means of moving the hinges may be included.

Preferably, the change or move of the tower may be manually or automatically caused. The change or move may occur in a smooth, single movement, or in several movements. The change or move of the tower may include  
15 reconfiguration of the tower between the erect state and the lowered state or between the lowered state and the erect state. The reconfiguration may include concertina collapsing, folding, telescopic action or any form of change in the arrangement, shape, or size of the tower. For example, one or more parts of the tower may be removed in the erect state in order that the tower be changed or  
20 moved into the lowered state. Some parts of tower may be secured or stowed for ease of changing or moving into the lowered state. The reverse may then occur when moving the tower from the lowered state to the erect state, some parts may need to be packed or installed for use. The overall size of the tower may be reduced between the erect state and the lowered state. Preferably, the tower is  
25 not significantly altered in configuration between the lowered state and the erect state so that once erected the tower can quickly be utilised for emergency response training or otherwise. Preferably, the tower is ready for use almost immediately after erection.

Preferably, the tower can be used for heights training in the substantially erect  
30 state. Preferably, the tower in the erect state projects several metres above a roof of the installation. Preferably, the tower in the erect state projects approximately 8

metres above the roof of the installation. Preferably, the top of the tower stands at least 8 to 12 metres above the ground in the erect state.

Preferably, in the lowered state most of the tower is contained within the installation. Preferably, in the lowered state substantially all the tower is contained within the installation. Preferably, in the lowered state the tower is stored, until  
5 next required. Most preferably, the installation is a mobile installation and the tower can be transported in the lowered state and used for heights training in the erect state.

Preferably, the installation includes a roof surrounded by one or more walls.  
10 Preferably, within the installation is an area suitable for receipt of the tower, in the lowered state. The area may take any suitable form. Preferably, the area suitable for receipt of the tower in the lowered state is adapted for use in emergency response training when the tower is in the erect state. The emergency response training may be any suitable type of training. The emergency response training  
15 conducted in the area suitable for receipt of the tower in the lowered state may be chosen from the group: confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; flood simulator; gas training simulator; hazard identification; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR  
20 (cardiopulmonary resuscitation); parts washer simulator; rubbish bin fire simulator; switchboard simulator; and workshop simulator. Preferably, the area suitable for receipt of the tower in the lowered state is used for confined space training when the tower is not in the lowered state. Preferably, one or more panels within the installation can be used when the tower is in the erect state to create a confined  
25 space training arrangement. The panels may be adapted to remain flat to the walls while the tower is in the lowered state and the panels are free to fold or otherwise extend out when the tower is in the erect state so a confined space training area can be set up. In this way during transit the lowered tower and the panels are carried in the same area, and on arrival the heights training tower and  
30 confined space training area can be set up, separately.

Most preferably, the installation includes a roof with at least one section which opens. Preferably, the installation includes a substantially removable roof section.

The roof may be removed in its entirety or only part of the roof may be removed. Preferably, the roof of the installation includes a mechanism to enable at least part of the roof to be opened. Preferably, the roof can slide open to at least some extent. Preferably, the roof can slide open sufficiently to enable the tower to pass  
5 through the gap in the roof when changing or moving between the erect state and the lowered state. Preferably, the roof is a slideable roof between a first stop point and a second stop point. The first stop point may be when the roof is fully closed. The second point may be when the roof is open sufficiently to allow the tower to change or move through the gap into the lowered state. The first stop point may  
10 be any suitable position. Preferably, the first stop point and the second stop point are at least 10 metres apart from one another. There may be other stop points included. Preferably, the roof includes a mechanism, attached to the wall of the installation, which draws the roof with it as it moves from the first stop point to the second point or from the second stop point to the first stop point. The mechanism  
15 may be powered in any suitable way. The mechanism may be powered by electric, hydraulically or manually, for example. The mechanism may include rollers attached to the sides of the installation that roll in channels formed on either side of the roof. Any suitable sliding mechanism may be used. The roof in the fully open position may overhang part of the installation. Preferably, the roof is  
20 constructed of a single large panel. Alternatively, the roof may be constructed of a plurality of panels that stack one on top of the other, when the roof is retracted open. Any number of panels may be used.

The roof may be opened and or closed by remote control. Preferably, the roof can be opened and or closed from a control room of the installation. The roof may be  
25 opened from the control room by remote control or by activation of an electrical circuit or hydraulics system, for example, which cause the roof to slide open or closed. Alternatively, the roof may be opened manually. The roof in this form of the invention may be opened and or closed by use of turning a handle or pulley system. A manual system may be included as well as a mechanised means of  
30 opening and closing the roof, for safety reasons.

Preferably, the roof can be opened and the tower changed or moved from a lowered state to an erect state for use. Preferably, the roof can then be closed,

with the tower in the erect state. Preferably, the roof, when closed can be used as a training area. Preferably, the roof when closed can provide access to the tower.

Preferably, the roof includes securing means wherein the tower in the erect state can be secured by closing the roof. The securing means may take any suitable form. Preferably, the roof includes one or more securing means at the free edge. Preferably, as the roof is closed towards the tower in the erect state securing means slide about part of the base of the tower. Alternatively, the securing means may slide about part of legs of the tower. Preferably, the sliding means includes a part which slides under the base and or legs of the tower to allow securing. Preferably, a bolt or the like can be used to fix the base or leg of the tower to the roof. Preferably, the fixing is readily removed for disassembly, storage or transport. Any suitable fixing means may be used. Preferably, the tower includes legs including one or more base plate and the securing means is secured to the base plate. Each leg may include a base plate and two or more of the base plates of the legs of the tower may be used to secure to the securing means. Alternative securing means may be used to assist to maintain the tower in the erect state.

Preferably, collapsible rails are included around at least part of the perimeter of the roof of the installation. Collapsible rails may be included elsewhere on the installation or tower, alternatively. Preferably, the collapsible rails can act as safety rails. Preferably, the collapsible rails are included substantially around three sides of the installation. Alternatively, collapsible rails may be included substantially around the entire perimeter of the roof. Or collapsible rails may be included around some or all of the perimeter of the installation. Collapsible rails may be included substantially around the perimeter of the roof of the installation exclude those parts where the tower is in the erect state. Preferably, the base of the tower includes rails, and at least part of the perimeter of the roof of the installation includes collapsible rails and together the rails and collapsible rails substantially surround the perimeter of the roof when the tower is in the erect state.

The collapsible rails may take any suitable form. Preferably, the safety rails include a plurality of vertical members, which are substantially vertical in an erect position. Preferably, one or more of the vertical members is moveable between

the erect position and a lowered position. Preferably, the erect position is substantially vertical and the lowered position is substantially horizontal. In one form of the invention one vertical member is moved between an erect position and a lowered position and other vertical members are attach to the first vertical member in such a way so that movement of the first vertical member also moves the other vertical members. In another preferred form of the invention, each of the vertical members are moved between an erect position and a lowered position. Preferably, the or each vertical member is hinged to the roof and or installation such as to be able to move between an erect position and a lowered position. Preferably, each hinge is adapted to move the or each vertical member through approximately 90 degrees. Preferably, each hinge includes a bolt about which the vertical member pivots.

The vertical members may be braced with one or more horizontal members. Preferably, wire is used with the vertical members to brace the vertical members and create a safety rail. One or more tension pulley may be included to tension the wire. Supports may be included to support the safety rails in the erect position.

The roof may include one or more hatch to enable ready access from the installation. The hatch may enable access from the area where the tower is stored or stowed in the lowered state.

Any or all of the safety rails of the installation or tower may be removed or collapsed. It may be useful to collapse or remove the safety rails during transit.

Preferably, the installation is a multipurpose simulator used for emergency response training. The emergency response training may include training useful in the field of mining, marine or other dangerous environments. Recreational simulators may be included within or about the installation.

Preferably, the installation includes one or more wall. The or each wall may surround a floor. Preferably, the installation includes four walls. In alternative forms of the invention less than four walls may be included. The installation may take any suitable form or shape. Preferably, the installation is a rectangular cuboid shape. Preferably, the installation is substantially 2.4 metres high and substantially 2.4 metres wide. Preferably, in one form of the invention the

installation is a shipping container or similar. Preferably, the container is a 12 metre or 6 metre shipping container. Alternatively, the container may have any suitable dimensions.

Preferably, the installation includes a floor surround by walls to substantially  
5 contain any trainees inside, and or transport equipment safely. The floor and or the or each wall may be made of any suitable material. The suitable material may include metal and strong recycled plastic. Preferably, the floor and or walls are made of a suitable strong metal. Preferably, the strong metal is reinforced steel. The floor may include a bunded area to retain water therein. The floor may include  
10 a protective covering. The floor may be or include a hardstand. Preferably, the floor is fire retardant. Safety rails may be included on the inside of one or more walls of the installation.

Preferably, one or more windows are included in the installation. Preferably, the or each window is included in one or more wall. The or each window may be used to  
15 provide light to the inside of the installation. Preferably, a window may be used to observe trainees.

Preferably, one or more doors and included in the installation. Preferably, a plurality of doors is included in one or more wall of the installation to enable access to different areas of the installation. The doors may be doors for access  
20 and or doors for training purposes. Where the doors are for training purposes the doors may simulate doors, hatches or the like as found at a mine site, heavy industry site or on a ship, or submarine or the like.

Preferably, the installation includes more than one type of simulator to simulate more than one type of situation. Simulator props., may be included in the  
25 installation. The props., may be with respect to any of the types of simulator. Obstacles may be included in the installation around which trainees must navigate in the simulated situations.

Preferably, the installation includes more than one area. Preferably, each area is adapted for training in a different type of simulator. Each area may include  
30 different types of simulators, to any other area. A particular area may include different types of simulator within that particular area. Preferably, the installation

- includes a first area including at least one simulator of a first type, and a second area including at least one simulator of a second type and a third area than includes a plurality of simulators of different types, one to another. Preferably, the third area is adjacent the first and or second area. Preferably, the installation also
- 5 includes a fourth area including at least one fourth type of simulator. There may be any number of areas, each including at least one of a type of simulator. Any of the areas may include at least one simulator of a type different to other simulators found therein. Preferably, there are a plurality of areas within the installation and at least one area about the installation. There may be an area around the outside
- 10 of the installation. There may be an area to one side of the installation. Preferably, there are at least 4 areas. The areas may be defined by being enclosed by one or more walls. Alternatively, the area may be defined by coloured areas of floor or other markings. The areas may be enclosed from one another. Preferably, some areas are enclosed from one another and other areas are open to one another.
- 15 Preferably, the installation includes a storage area. The storage area may be used to store any one or more of the following: breathing apparatus; electrical equipment; gas cylinders; obstacles for putting into the training areas; props., for putting into the training areas; safety equipment; tools; air compressors; carbon dioxide drench cylinders; a generator; small training props.; general storage items;
- 20 and work benches. Preferably, the installation includes a control area. The control area may be used to house computer equipment and or monitoring equipment for control and monitoring of the simulators. Cameras may be included in the installation and the information viewed on monitors.
- Preferably, the first simulator is chosen from the group: confined space simulator;
- 25 equipment handling simulator; fire training simulator; digital fire training simulator; flood simulator; gas training simulator; hazard identification; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation); parts washer simulator; rubbish bin fire simulator; switchboard simulator; and workshop
- 30 simulator.

Preferably, the first type of simulator is chosen from the group: confined space; equipment handling; fire; flood; gas; hazard identification; hazardous substance; medical; rescue and switchboard.

Preferably, the second simulator is chosen from the group: confined space  
5 simulator; fire training simulator; digital fire training simulator; equipment handling simulator; flood simulator; gas training simulator; hazard identification; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation); parts  
10 washer simulator; rubbish bin fire simulator; switchboard simulator; and workshop simulator, the second simulator being different to the first simulator.

Preferably, the second type of simulator is chosen from the group: confined space; equipment handling; fire; flood; gas; hazard identification; hazardous substance; medical; rescue and switchboard, the second type of simulator being different from the first type of simulator.

15 There may be any number of different types of simulators. Preferably, other types of simulators are included. Preferably, any of the other types of simulator is chosen from the group: confined space; equipment handling; fire; flood; gas; hazardous substance; medical; rescue; and switchboard, the other types of simulator being different from the first type and second type of simulator.  
20 Preferably, there are third, fourth and fifth types of simulators, different one from another and from the first and second types of simulators. Preferably, the first type of simulator is for fire training, the second type of simulator is for confined space training, the third type of simulator is for gas training, the fourth type of simulator is for equipment handling training, and the fifth type of simulator is for switchboard  
25 training.

Preferably, a plurality of simulators is included for training within or about the installation.

Preferably, the installation includes one or more fire training area. Preferably, the fire training area includes simulators chosen from the group: digital fire simulator;  
30 engine fire simulator; small fire simulator fire; switchboard fire simulator; and rubbish bin fire simulator. The fire training area may include non-fire related

simulators. The digital fire simulator may include use of fire representative graphics and lasers used to simulate putting out the fire.

Preferably, a confined space training area is included, including one or more small areas through which a trainee needs to navigate to find an exit. One or more exits  
5 may be included in the confined space training.

Preferably, the installation includes one or more multipurpose training area. The multipurpose training area may include a plurality of different simulators of one or more types. The multipurpose training area may be a workshop simulator including different types of simulators as could be found in a workshop. Simulators  
10 may be present inside, outside above, below or around the installation.

Preferably, installation of the multipurpose simulator installation includes stabilising of the installation so as to be level and secure for use. Installation may also include unpacking of some simulator or other equipment, props., or obstacles that may have been secured for transit. Installation may also include opening of  
15 doors, windows and hatches if present. Preferably, a ladder is installed to enable additional access to the roof of the installation. Installation also includes erecting the tower as described elsewhere.

Preferably, the installation can be mounted or loaded on a trailer for transportation. Preferably, the installation remains on the trailer in use. Preferably,  
20 stabilising legs may be included to stabilise and level the installation for use on the trailer. Alternatively, the installation may be removed from the trailer for use. The trailer may be pulled by a truck or similar vehicle. Alternatively, the installation may be transported on the back of a prime mover, truck, ship or rail carriage. Preferably, the installation can be transported by road, rail or sea. The installation  
25 may be transportable by air. Preferably, the installation only requires a minimum amount of packing up before it can be transported. Preferably, the installation can be ready to transport within a few hours. Most preferably, the installation can be ready to transport within less than an hour. Most preferably, the installation is a temporary installation. Preferably, no preparations are required at the site before  
30 installation. For example, no foundations need to be dug or concrete used.

Preferably, the installation can be transported to a desired location. The desired location may be any suitable location where there are numerous people in need of emergency response training. Preferably, the desired location is a mine site. Alternatively, the desired location is a site for marine training. The marine training  
5 may occur at a port or naval base, for example.

Emergency response trainees can use the installation and tower for training. Trainees may be anyone who requires or wants emergency response training. The trainees may be mine site workers. The trainees may be workers in the marine industry.

10 Most preferably, the installation is self-sufficient. Preferably, the installation does not require any outside assistance for the simulators to be used. Preferably, the installation does not require an outside power source or water source.

Preferably, a power source is included in the installation. The power source may be a generator. The power source may be generated by solar, wind or otherwise  
15 powered. Preferably, the power source can provide power for any or all of the following within the installation: cameras; cooling, computers; controls; doors; equipment and tools; heating; lights; opening and closing of the roof; raising and lowering of the tower; safety shutoffs; security; simulators; and windows. In an alternative form of the invention each item that requires power in the installation  
20 can include its own power source. In this case the power source may be a plurality of suitable batteries. In an alternative form of the invention the installation may be plugged into a mains supply.

Preferably, the installation includes its own water source. Preferably, one or more water tank is included. The or each water tank may be carried on the outside or  
25 inside of the installation. A water pump may be included to pump water from a water tank for use in the installation. A water control unit may be included to assist with control of the flow of water. Water may be provided for use in flood simulations or in simulated fire emergencies. Preferably, the installation includes a bunded area and water is used within the bunded area and waste water can be  
30 captured and recycled. A water tank may be included for treatment and storage of the recycled water. Water may be provided to simulators such as a parts washer prop., or hazardous substances, for example. Most preferably, the water supply of

the installation is totally self-sufficient. In an alternative form of the invention, the installation may be connected to a mains water supply.

The installation is particularly applicable to the mining industry and as such it is extremely beneficial to be self-sufficient. The reason being, that mine sites are usually remote areas and water and electricity are valuable commodities which may not be readily available. A number of difficulties have been overcome in order that not only power and water can be included in the embodiment but that more than one type of simulator can be provided, all within a compact transportable unit.

10 In one form of the invention the installation, preferably, includes more than one module. Preferably, the installation is one module of a multipurpose simulator, including more than one module. The modules may be used for emergency response training of a single type or for different types. Or the modules may be used for multipurpose emergency response training. Modules may be included  
15 that can be used for emergency response training, or as a control room, storage area or otherwise.

Preferably, the installation includes a first module, a second module and at least one other module. Preferably, the tower is associated with one of the modules. Preferably, the tower is associated with the second module. The tower may be  
20 associated with any one or more modules. The modules may equally be areas or the like, instead. The first module, second module and the or each other module may take any suitable form or shape. Preferably, the first, second and other modules have a floor surrounded by one or more wall. The first module, second module and the or each other module may have the same or different  
25 configuration to one another. Preferably, the first module is a rectangular cuboid shape. Preferably, the second module is a rectangular cuboid shape. Preferably, the or each other module is a rectangular cuboid shape. Preferably, in one form of the invention any of the first module, second module or the or each other module is a shipping container or similar. Preferably, the container is a 12 metre or 6  
30 metre shipping container. Alternatively, the container may have any suitable dimensions. In one preferred form of the invention the first module and second

module are substantially 12 metre containers and two other modules are present both of which are substantially 6 metre containers.

Preferably, the first, second or the or each other module includes a floor surround by walls. The walls are useful to protect the contents of the first, second or other  
5 modules during transportation or use. In an alternative form of the invention, the modules may pack substantially flat and the walls may be installed once in position.

The floor and or the or each wall of the first, second or other modules may be made of any suitable material including metal and strong recycled plastic, or a  
10 combination thereof. Preferably, the floor and or walls are made of a suitable strong metal. Preferably, the strong metal is reinforced steel. The floor may be or include a hardstand. Preferably, the floor is fire retardant. Safety rails may be included on the inside of one or more walls of the first, second or the or each other module.

15 Preferably, one or more windows are included in the first, second or the or each other module. Preferably, the or each window are included in one or more wall. The or each window may be used to provide light to the inside of the first, second or the or each other module. Preferably, a window is used to observe trainees.

Preferably, one or more doors are included in the first, second or the or each  
20 other module. Preferably, a plurality of doors is included in one or more wall of the first, second or the or each other module to enable access to different areas of the module. The doors may in themselves be part of the training simulation.

Simulator props., may be included in the first, second or the or each other module. The props., may be with respect to any of the types of simulator. Obstacles may  
25 be included in the first, second or the or each other module around which trainees must navigate in the simulated situations.

Preferably, one or more of the first, second or the or each other module is a multipurpose module. The multipurpose module preferably includes a plurality of simulators to test a plurality of types of simulated situation. Preferably, the or each  
30 multipurpose module includes more than one area. Preferably, each area is adapted to train in a different type of simulator. Each area may include different

types of simulators to any other area. A particular area may include different types of simulator within that particular area. Preferably, the multipurpose module includes a first area including at least one simulator of a first type, and a second area including at least one simulator of a second type and a third area than  
5 includes a plurality of simulators of different types, one to another. Preferably, the third area is adjacent the first and or second area. Preferably, the multipurpose module also includes a fourth area including at least one fourth type of simulator. There may be any number of areas, each including at least one of a type of simulator. Any of the areas may include at least one simulator of a type different  
10 to other simulators found therein. Preferably, there are a plurality of areas within the multipurpose module and at least one area about the multipurpose module. There may be an area on the roof of the multipurpose module. There may be an area around the outside of the multipurpose module. There may be an area to one side of the multipurpose module. Preferably, there are at least 4 areas. The areas  
15 may be defined by being enclosed by one or more walls. Alternatively, the area may be defined by coloured areas of floor or other markings. The areas may be enclosed from one another. Preferably, some areas are enclosed from one another and other areas are open to one another.

Preferably, one or more of the first, second or the or each other module is a  
20 storage module. Preferably, one or more of the first, second or the or each other module includes a storage area. The storage module and or storage area may be used to store any one or more of the following: breathing apparatus; electrical equipment; gas cylinders; general supplies; generator; obstacles for putting into the training areas; maintenance equipment and tools; props., for putting into the  
25 training areas; and safety equipment.

Preferably, one or more of the first, second or the or each other module is a control installation. Preferably, one or more of the first, second or the or each other module includes a control area. The control module and or control area may be used to be control and monitor the training. Preferably, the tower can be  
30 moved between an erect state and a lowered state from the control module or area. A supervisor may stay in the control area while training is undertaken. All or some of the simulators may be controlled from the control module or control area.

The opening and closing of the roof and the raising and lowering of the tower may be controlled from the control module or control area. The control module or control area may be used to house computer equipment and or monitoring equipment for control and monitoring of the simulators. There may be more than  
5 one control area, module or room.

One or more cameras may be included in one or more modules. Preferably, a plurality of cameras is included at suitable points throughout the modules. Preferably, pictures from the or each camera are relayed to the one or more monitors in the control modules or control area. The film taken by the cameras  
10 can be used for real time safety monitoring, assessment purposes or future training purposes, for example.

Preferably, a plurality of simulators is included for training within or about the first, second or the or each other module. The simulators may be a first simulator, second simulator or other simulator. The simulators may be of a first type, second  
15 type or other type of simulator.

Preferably, the first simulator is chosen from the group: 44 gallon drum fire simulator; confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; dump truck tyre fire simulator; flood simulator; gas training simulator; hazard identification simulator; hazardous  
20 substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation); mine rescue; parts washer simulator; rubbish bin fire simulator; switchboard simulator; vehicle emergency, including 4 wheel drive; and workshop simulator.

Preferably, the first type of simulator is chosen from the group: confined space;  
25 equipment handling; fire; flood; gas; hazard identification; hazardous substance; helicopter rescue; medical; mine rescue; and switchboard.

Preferably, the second simulator is chosen from the group: 44 gallon drum fire simulator; confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; dump truck tyre fire simulator; flood  
30 simulator; gas training simulator; hazard identification simulator; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator

including breathing apparatus and CPR (cardiopulmonary resuscitation); mine rescue; parts washer simulator; rubbish bin fire simulator; switchboard simulator; vehicle emergency, including 4 wheel drive; and workshop simulator, the second simulator being different to the first simulator.

- 5 Preferably, the second type of simulator is chosen from the group: confined space; equipment handling; fire; flood; gas; hazard identification; hazardous substance; helicopter rescue; medical; mine rescue and switchboard, the second type of simulator being different from the first type of simulator.

- 10 Preferably, the or each other modules contains one or more simulator chosen from the group: 44 gallon drum fire simulator; confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; dump truck tyre fire simulator; flood simulator; gas training simulator; hazard identification simulator; hazardous substance simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation);
- 15 mine rescue; parts washer simulator; rubbish bin fire simulator; switchboard simulator; vehicle emergency, including 4 wheel drive; and workshop simulator.

- 20 There may be any number of different types of simulators. Preferably, other types of simulators are included in any of the first, second or other modules different to the first or second types of simulator. Preferably, any of the other types of simulator is chosen from the group: 44 gallon drum fire simulator; confined space; equipment handling; fire; flood; gas; hazard identification; hazardous substance; heights; medical; mine rescue; and switchboard. Preferably, there are third, fourth, fifth and sixth types of simulators, different one from another and from the first and second types of simulators. Preferably, the first type of simulator is for fire
- 25 training, the second type of simulator is for confined space training. Preferably, two other modules are included one for mine rescue training and one for multipurpose training. Any of the first, second or other modules may contain multipurpose simulators different to the other simulators of the installation for multipurpose training.

- 30 Preferably, the first module is used as a fire training module. Alternatively, the second module or the or one of the other modules may be a fire training module.

Preferably, the first module is configured to be particularly suitable for fire emergency response training.

Preferably, a bunded area is included in one or more of the modules. Preferably, water is supplied from water tanks associated with one of the modules. The water tanks may be controlled by a pump system for pumping water to one or more modules. Preferably, water can be pumped to the fire training module for use in live fire training. Preferably, water is pumped to any of the modules where water may be required for fire training, flood training or otherwise. A water recycling system may be included. The water recycling system may pump, for example, waste water captured in the bunded area to a storage tank. A water treatment system may be included, to treat the water for reuse. Alternatively, captured water may be discharged to a sewer system.

Preferably, a hardstand is included in one or more modules. The floor of the hardstand may be reinforced to be suitable to park a vehicle or withstand fire, for example. Preferably, a bunded hardstand is included for use for fire training simulators. Preferably, a bunded hardstand is included in the fire training module.

Preferably, the fire training module includes simulators chosen from the group: 44 gallon drum fire; digital fire simulator; engine fire simulator; service truck fire simulator; small fire simulator fire; switchboard fire simulator; rubbish bin fire simulator; truck tyre fire simulator; vehicle fire and rescue simulator. The fire training module may include non-fire related simulators. The digital fire simulator may include use of fire representative graphics and lasers used to simulate putting out the fire.

Preferably, a service truck simulator is included for high risk fire training. Preferably, a vehicle prop., is included. The vehicle prop., may be included in the fire training module. The vehicle prop., may be modelled on a 4 wheel drive truck or ute as are frequently used in the mining industry. The vehicle prop., may be used for any of the following simulations: brake fire, emergency rescue, high risk fire training, passenger extraction tyre fire, and vehicle fire. Preferably, a truck tyre simulator is included.

The service truck simulator, vehicle simulator, truck tyre simulator may be used in any of the modules and is not limited to use within the fire training module.

Preferably, the fire training module contains at least one of each of the following simulators: 44 gallon drum fire simulator; digital fire simulator; service truck fire simulator; truck tyre fire simulator; and vehicle fire simulator.

Any of the fire simulators may be real fire simulators or may utilise artificial fire representations. Any of the simulators may utilise digital fire representation and respond to lasers, to represent dealing with the fire emergency. Monitoring may be possible of the success of trainees in handling the fire emergency. Preferably, the control room includes monitoring equipment.

Preferably, the second module is a confined space training module. Preferably, the tower can be stored or stowed in the confined space module in the lowered state. Alternatively, the first module or the or one of the other modules may be a confined space training modules. Preferably, the second module is configured to be particularly suitable for confined space training.

The confined space training module may include a hatch through which trainees can climb to access the roof and the tower. A ladder may be included inside the confined space training area. Preferably, the confined space training module includes one or more small areas through which a trainee needs to navigate to find an exit. One or more exits may be included in the confined space training module. The confined space training module may also contain one or more other type of simulator.

Preferably, at least one of the other modules is a multipurpose training module. The multipurpose training module may include a plurality of different simulators of more than one type. The multipurpose training installation may be a workshop simulator including different types of workshop simulators. Simulators may be present inside, outside above, below or around the module.

Preferably, the multipurpose training module contains types of simulator chosen from the group: confined space; equipment handling; fire; flood; gas; hazard identification; hazardous substance; helicopter rescue; medical; mine rescue and switchboard.

Preferably, the multipurpose training module contains a plurality of simulators chosen from the group: 44 gallon drum fire simulator; confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; dump truck tyre fire simulator; flood simulator; gas training simulator; hazard  
5 identification simulator; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation); mine rescue; parts washer simulator; rubbish bin fire simulator; switchboard simulator; vehicle emergency, including 4 wheel drive; and workshop simulator.

10 Preferably, there are at least two other modules configured as multipurpose modules.

Preferably, the multipurpose module includes more than one area. Preferably, each area is adapted to train in a different type of simulator. Each area may include different types of simulators to any other area. A particular area may  
15 include different types of simulator within that particular area. Preferably, the multipurpose module includes a first area including at least one simulator of a first type, and a second area including at least one simulator of a second type and a third area than includes a plurality of simulators of different types, one to another. Preferably, the third area is adjacent the first and or second area. Preferably, the  
20 multipurpose module also includes a fourth area including at least one fourth type of simulator. There may be any number of areas, each including at least one of a type of simulator. Any of the areas may include at least one simulator of a type different to other simulators found therein. Preferably, there are a plurality of areas within the multipurpose module and at least one area about the multipurpose  
25 module. There may be an area on the roof of the multipurpose module. There may be an area around the outside of the multipurpose module. There may be an area to one side of the multipurpose module. Preferably, there are at least 4 areas. The areas may be defined by being enclosed by one or more walls. Alternatively, the area may be defined by coloured areas of floor or other  
30 markings. The areas may be enclosed from one another. Preferably, some areas are enclosed from one another and other areas are open to one another.

Preferably, to set up the installation including any modules includes positioning of each module together at a desired site. In one form of the invention each of the modules is positioned side by side or end to end. Each of the modules may include legs or other means of stabilising of the installation on arrival so as to be level and secure for use. Modules may also include unpacking of some simulators or other equipment, props., or obstacles that may have been secured for transit. Installation may also include opening of doors, windows and hatches if present. Most preferably, connections are made between one module and another. The connections may be doors leading from one installation to another. The connections may include channels, tunnels, archways, ladders, stairs or other means of stepping from one installation to another. Ladders or stairs may be included to enable access from one part of the modules to another, for example the roof. Any suitable connection may be made between one or more installations to enable movement from one module to another. Preferably, all the modules are connected to at least one other module enabling a trainee to move through the various modules during training. The connections between modules are very important as they enable multipurpose training to occur. Trainees may be trained through a series of different types of simulations in different rooms as could occur in a real emergency. For example, a trainee may start dealing with a fire in the fire training installation, the fire spreads and the trainee escapes the installation by use of a hatch from the confined space training installation to the heights tower on the roof for a heights rescue simulation. Clearly, the training in the different types of simulation within a single mobile installation is a great improvement over the prior art.

The installation, including the tower, may be transported by road, rail or sea. Preferably, the installation can be mounted on one or more prime mover for transportation. Preferably, two prime movers are used to transport the installation to a desired location. Where modules are present the modules are arranged together. Preferably, the part of the installation associated with the tower remains on the prime mover during use. Where the tower is associated with a module, the module remains on the prime mover during use. Stabilising legs may be included to stabilise and level the installation and or modules for use. Alternatively, all of the installation or modules may be removed from the prime mover for installation.

Preferably, the installation only requires a minimum amount of packing up before it can be transported. Preferably, the installation can be ready to transport within a few hours. Most preferably, the installation can be ready to transport within less than an hour.

- 5 Preferably, in one form of the invention the first module and the second module are installed in close association one with another. Preferably, any or each of the modules may include a downstairs and upstairs part. The installation or modules may be on three or more floors. Preferably, the first, second or the or each other modules includes a downstairs and upstairs part.
- 10 Preferably, the first, second or the or each other module includes a plurality of rooms. Each room may be accessed individually. The rooms may be connected one to another. The rooms may be on a plurality of floors or storeys. The rooms may be connected by a door, ladder, stairs or similar. Several rooms may be connected together. Use of several rooms connected together is extremely
- 15 beneficial as scenarios can be set up for trainees to experience different types of emergency situation as would occur in a real life situation and not limited to being in one room but a trainee can move from room to room dealing with the developing emergency situation.

- Most preferably, in use, the installation is transported to a desired location and the
- 20 or each module arranged together for use. Installation occurs as described above and the roof of the installation is opened to enable the tower to be changed or moved to an erect state, and the roof is closed to secure the tower in place, with the addition of bolt between the edge of the roof and the base plates of one or more legs. Collapsible rails and other safety rails may then be erected and
- 25 secured in place so that the tower can be used for heights and rescue training and the roof can also be used as a training area. Below the roof the confined space training area can be set up using panels that fold or otherwise extend out and can be arranged into a maze like arrangement for confined space training.

- The invention also provides a method installing a tower, including a collapsible
- 30 means for emergency heights training including the following steps:

- a) changing or moving the tower between a lowered state and an erect state by operation of the collapsible means;
- b) using the tower for heights training;
- c) changing or moving the tower between the erect state and the lowered state by operation of the collapsible means.

The invention also provides a method installing a tower, including a collapsible means for emergency heights training, and associated installation, including the following steps:

- a) transporting the installation to a desired location;
  - 10 b) changing or moving the tower between a lowered state where the tower is substantially contained within the installation and an erect state where the tower projects above the installation, by operation of the collapsible means;
  - c) setting up the tower for heights training;
  - 15 d) conducting heights training;
  - e) packing up the tower;
  - f) changing or moving the tower between the erect state and the lowered state by operation of the collapsible means; and
  - g) transporting the tower and installation to another location for use.
- 20 The method may include the further step of opening the roof of the installation before changing or moving the tower into the erect state and on packing up before changing or moving the tower into the lowered state. Preferably, the roof is used to secure the tower.

#### **INDUSTRIAL APPLICABILITY**

- 25 The tower can be manufactured or build industrially and supplied to customers for use for emergency response training in the fields of mining, for example.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will now be described in connection with a non-limiting preferred embodiment with reference to the accompanying drawings, in which:

Figure 1 is a plan view from above of a simulator installation according to the invention, with the tower collapsed;

Figure 2 is a rear view from above of the simulator installation of Figure 1, with the tower collapsed and the safety rails raised;

- 5    Figure 3 is the rear view of the installation for the tower (the remainder of the simulator installation is omitted) of Figure 2 with the protective cover removed to show the door;

Figure 4 is a detailed view of area A of Figure 3 illustrating the sliding mechanism;

- 10    Figure 5 is a side view of installation for the tower of Figures 3 or 4 showing the tower in both the erected position and in the lowered position;

Figure 6 is a detailed side view of area B of Figure 5 illustrating the end of the sliding roof;

Figure 7 is a detailed side view of area C of Figure 5 illustrating the hinge mechanism in the lowered position;

- 15    Figure 8 is a side view of the installation for the tower of Figures 3 to 7, with the sliding roof open and the tower and remainder of the installation omitted for ease of illustration;

Figure 9 is a side view of the simulator installation of Figure 8, with the sliding roof closing and the base of the tower shown;

- 20    Figure 10 is a side view of the simulator installation of Figures 8 and 9 with the sliding roof closed;

Figure 11 is a detailed side view of area E of Figure 10 illustrating the first stop point and stopper;

- 25    Figure 12 is a rear view of the tower of Figures 5 to 7 or 9 with the trainees omitted, illustrating the stairs; and

Figure 13 is a detailed rear view of the hinges of the tower of Figure 12.

**DETAILED DESCRIPTION OF THE INVENTION INCLUDING A BEST MODE**

Referring to Figures 1 to 13 a preferred embodiment of the invention will be described. Referring to Figures 1 and 2 in particular, simulator installation 1 is illustrated, as installed at a mine site. Simulator installation 1 as illustrated is  
5 designed to be used at a mine site as a self-sufficient, temporary, multipurpose emergency response training facility.

Prime mover 10, having wheels 12, is used to transport simulator installation 1 to the mine site and to support the structure during use. A further prime mover, including a side loader trailer, is required to transport simulator installation 1 to the  
10 site, and for installation, but is not illustrated here. Prime mover 10 is illustrated as a B double prime mover but any suitable truck arrangement may be used to transport simulator installation 1. In an alternative embodiment, simulator installation 1 may be transported to a mine or other site by rail or by ship. Local trucks can be used to transport installation 1 from the rail track or port to the  
15 desired position or other machines used to lift installation 1 into position. A combination of transportation means may be used to get installation 1 to a desired site, as determined by the remoteness of the site and available communication means.

Simulator installation 1, as illustrated includes four containers, fire training  
20 installation 14 and installation 16, both of which are 12 metre containers, and installation 18 and installation 20, both of which are 6 metre containers. Installations 14 and 16 are standard 12 metre containers, and installations 18 and 20 are standard 6 metre containers, as are regularly transported by road, rail or sea. Clearly, the specific dimensions of the containers can be varied to suit the  
25 needs of installation 1. Use of the standard container sizes of 12 and 6 metres is convenient as most transportation means, including a B double prime mover are set up for carrying standard container sizes.

In order to set up simulator installation 1, prime mover 10 and the second prime mover are driven to the mine site, transporting installations 14, 16, 18 and 20  
30 which contain all the components for simulator installation 1. Prime mover 10 is parked in the desired location for installation 16 which remains in place on prime mover 10. Hydraulic jacking legs (not shown) can be activated and adjusted to

stabilise and level container 16. Installation 18 is positioned on the ground next to and aligned with installation 16, which remains raised on prime mover 10. Installation 18 is positioned on the ground on the opposite side of installation 16 to installation 14 so that the rear part of installation 18 is line with the rear of installation 16. Finally, installation 20 is positioned on the ground in line with installation 18 extending behind installations 14 and 16, as can be seen in Figure 1.

Once each installation 14, 16, 18 and 20 is in position, further installation can occur. Installation 20 is interconnected to installation 18, and installation 18 through to installation 16 so that a person can move freely between these three installations through connections 22 and 24 respectively. Simulations can include simulators of more than one type and this is an important benefit of the invention. Staircase 26 also enables access between sliding roof 28 (including front 28a and back 28b) of installation 16 and roof 30 of installation 20. Sliding roof 28 and roof 30 each including collapsible safety rail 31 around part of the perimeter; further detail of sliding roof 28 and collapsible safety rail 31 is given below. Staircase 32 provides access from outside into simulator installation 1 and to control room 34 of installation 16 through door 35, doors 35 being found throughout the installation. Doors 35 allows access from outside to installation 18 and installation 20 either at the side or back or to simulator installation 1 generally from outside. In Figure 3 door 35 can be seen at the rear of installation 16, after a protective panel has been removed. The configuration of doors and staircases can be readily adjusted to suit the particular requirements of a customer and the arrangement of the simulators inside the installations. Simulator installation 1 is arranged to work as a complete facility that enables many different emergency response simulations to be undertaken by trainees in a common facility. The connections between the various installations mean that the installations act together as a multipurpose facility.

Fire training installation 14 utilises many different fire simulators (none illustrated) to enable emergency response training for many different fire situations that may occur on a mine site, for example. Installation 14 provides trainees an opportunity to experience simulated fire situations and practice their emergency responses to

many different types of fire scenarios. Installation 14 also includes a large bunded box (not shown) which acts as a portable fire training hardstand which folds open through use of hydraulics (neither shown).

Although the inside of installation 14 is not illustrated it contains four different  
5 kinds of live fire emergency response training simulators for use on the bunded hardstand. In use, various obstacles can also be positioned around the internal perimeter of the hardstand to increase the difficulty of the emergency simulation. A portable service truck installation high risk fire simulator, truck simulator for fire and rescue, haul truck fire simulator, 44 gallon drum fire simulator, are examples  
10 of fire simulators that can be included in installation 14 for fire emergency response training. All or any of these simulators can be included for use in installation 14 for emergency response training in fire situations, or other simulators could be included, including simulators for an emergency other than fire, if desired.

15 Installation 16, the installation for the tower, on prime mover 10, includes control room 34 and heights and confined space training room 37. Heights and confined space training room 37 includes simulators for heights (see further description below) and confined space training as well as breathing apparatus training.

Control room 34 is the hub of simulator installation 1 containing all the computers,  
20 controlling and monitoring equipment for all of the various simulators. Here live video feeds are received from cameras located through simulator installation 1 to assess the trainees and for safety monitoring. Emergency overrides and shutdown controls are located in control room 34 as well as local shut down points for each of the simulators. None of the computers, monitors, shutdown controls or  
25 cameras are illustrated.

Installation 18 is divided into a multipurpose installation 66 and storage area 68. Storage area 68 is illustrated containing gas storage 70 including cylinders 71 of LPG, and CO<sub>2</sub> drench and generator storage 72, for a diesel generator. Generator storage 72 is also used as storage for breathing apparatus equipment, breathing  
30 apparatus compressor and for general storage for personal protective gear, tools and workbench for maintenance. Installation 66 includes numerous simulators, including a gas detector training equipment, low voltage rescue, and CPR training,

a simulated switchboard, switchboard rescue, hazard identification training, lockout/tagout training and digital fire simulation training using for small fire training using the laser training systems. Other simulators can also be included in installation 18 as is required by the particular customer.

- 5 Installation 20 is a mine rescue training installation that has moveable internal walls, similar to the confined space training simulator to simulate a person trapped under rocks or rubble. The moveable walls and panels can be manipulated to create rooms, tunnels and other spaces. The panels can be assembled to simulate collapsed tunnels, for example, for simulated mine rescue situations.
- 10 In use, installations 4, 16, 18 and 20 are set up and connected together and the various door 35 unlocked or made available so that trainees can access the relevant simulators. Supervisors control the simulators from control room 34 and monitor progress by viewing live footage taken by the cameras. The footage can also be used for assessment purposes or further training and debriefing.
- 15 Monitoring and recording equipment may be included to monitor and record data such as time taken to deal with a simulation, heart rate, water usage, temperature etcetera. Trainees undertake the required simulations and then may exit simulator installation 1 in order that other trainees may commence their training. Simulator installation 1 may be used for a few days, weeks or months as required. Once
- 20 simulator installation 1 is no longer required, installations 14, 16, 18 and 20 can have the various simulators and equipment secured within, doors and connection parts removed and secured and containers reassembled as necessary. With use of the second prime mover simulator installation 1 can be reloaded to be transported away by prime mover 10 and the second prime mover. Simulator
- 25 installation 1 may be readily transported to another mine site or other location for use for other trainees.

Referring to Figures 3 to 12, the detailed mechanism of sliding roof 28, collapsible safety rails 31 and collapsible tower 74 is described, all of installation 16. The remainder of simulator installation 1 is omitted for ease of illustration. Installation

30 16 could be used alone without the other parts of installation 1. Tower 74 is a new and ingenious heights and rescue training simulator which is raised out of installation 16 after sliding roof 28 is opened and tower 74 secured in position for

use, extending far above roof 28 and the ground. Collapsible tower 74 includes base 76, first floor 78 and roof 80. . Stairs 82 provide access from base 76 to first floor 78, and stairs 84 provide access from first floor 78 to roof 80. Safety rails 85 are included for stairs 82 and 84. Hydraulic rams 88 are attached to base 76, which are used to raise and lower tower 74 from position 86 to an erect position for use. Hydraulic rams 88 may be replaced by hydraulic motors and gear mechanisms in another form of the invention. The movement of tower 74 is indicated by arc D of Figure 5. Tower 74 includes further safety rails 87 around first floor 78 and roof 80 of tower 74. Rails 85 and 87 are made of galvanised steel posts with wire balustrades (neither labelled). Tower 74 is shown made of reinforced steel, but other strong materials or combinations of materials may be used. Tower 74 is shown as square based tower but other base shapes or form of the invention may be used. In use trainees 89 can climb tower 74 by stairs 82 and 84 to reach roof 80 where much of the heights training takes place, including rescue situations. Various heights training props., obstacles or simulators could also be included on or about tower 74.

To raise tower 74, first sliding roof 28 must be retracted along part of the length of heights and confined space training room 37, sufficiently to allow for tower 74 to be moved into the erect position. Motorised mechanism 90 attached to installation 16 can be moved forward and back in channel 92 between first stop point 94 including stopper 95 and second stop point 96. On control from control room 34 motorised mechanism 90 moves from first stop 94, disengaging from stopper 95, as described further below, and sliding roof 28 moves towards second stop point 96. The movement of sliding roof is illustrated in particular in Figures 8, 9 and 10. Figure 8 illustrates sliding roof 28 being fully open, so that back 28b is at second stop point 96. Second stop point 96 is the point where sliding roof 28 is at its most open and overhanging the roof of control room 34. Figure 9 illustrates that mechanism 90 has been operated from control room 34 causing sliding roof 28 to move in channel 92 towards tower 74. Front 28a of sliding roof 28 passes under base 76 or tower 74 and safety rails 31 pass on either side of tower 74. As shown in Figure 10 sliding roof 28 has reached first stop point 94 and is in the closed state. Front 28a of sliding roof 28 is shaped to have an angled front with a projection (not labelled) and this projection on angled front 28a of sliding roof 28

engages with stopper 95 as shown in detail in Figure 11. Stopper 95 acts to prevent sliding roof 28 sliding further than intended once mechanism 90 is turned off. Bolts (not illustrated) are used through corresponding holes (not illustrated) in the projection and stopper 95 to secure sliding roof 28 in place. Sliding roof 28 is a  
5 single panel which slides between stop points 94 and 96 on instruction from control room 34. Alternatively, roof 28 could project over the end, or be formed of several stackable panels. In this way room 37 is opened to the sky and tower 74 in stowed position 86 can be seen below.

To raise tower 74, hydraulic rams 88 are activated whereby leg hinges 98, on two  
10 legs 100, hinge about pivot points 102, as illustrated in particular in Figures 7 and 13. Through use of hinges 98 tower 74 can be moved from the lowered, stowed position 86 through to the erect position.

The sliding of roof 28 and the raising and lowering of tower 74 is controlled from control room 34, accessed by climbing stairs 32 and entering through door 35.  
15 Alternatively, control of sliding roof 28 and tower 74 may be from outside, by remote control or from within installation 16, as appropriate.

Collapsible safety rails 31 around sliding roof 28 of installation 16 are important to create a suitable area for trainees 89, during use. Once sliding roof 28 is slide back into position after erection of tower 74 safety rails 31 can be raised to again  
20 create a working area.

Tower 74 has a permanently fixed safety rail 105 around the base on three sides, with the exception of the side open to sliding roof 28. Permanent safety rail and safety rail 31 around the remainder of the perimeter of roof of room 37 creates a secure working area above room 37. Collapsible safety rail 31 lies flat during  
25 transit or storage and can be raised during use. Again with respect to collapsible rail 31 can only be raised once sliding roof 28 is in place.

To raise collapsible safety rail 31 stanchions 114 must be raised so that hinges not shown move through 90 degrees to bring stanchions 114 to be substantially vertical. The raising of stanchions 114 are through hydraulically controlled pulleys  
30 (not shown) activated from control room 34. Alternatively, stanchions 114 can be raised using pulleys manually. Once in the vertical position collapsible safety rail

31 is secured in place. As illustrated rails 31 are about a metre high, but other suitable dimensions may be used.

A hatch, not shown, in the roof of room 37 enables access to sliding roof 28 during installation and during use. Once tower 74 is erected and sliding roof 28  
5 back in place folding panels (not shown) on the inside of room 37 fold out into the space left where tower 74 was. The panels can be folded out to create a maze arrangement for confined space training or for breathing apparatus training. Heights training in emergency response training are very important. It is difficult to provide heights training to sufficient height unless a permanent training tower is  
10 available. The described embodiment is a collapsible tower of a good height that can be folded down when not in use to enable transportation..

It will be apparent to a person skilled in the art that changes may be made to the embodiment disclosed herein without departing from the spirit and scope of the invention in its various aspects.

15 Dated this day 26 June 2012  
SEQR MANAGEMENT SERVICES PTY LTD  
By their Patent Attorney  
TJ IP Patents, Trade Marks & Designs

**THE CLAIMS:**

1. A collapsible tower for emergency response training, the collapsible tower including:

a tower; and

5 a collapsing means connected to the tower, and the collapsing means is configured to change or move the tower between a substantially erect state and a lowered state,

wherein, the collapsible tower can be used for emergency response training in the erect state and the collapsible tower is more readily stored and or transported in  
10 the lowered state.

2. The collapsible tower of claim 1, wherein the collapsible tower is installed on a surface, proximal to a hollow area, below the level of the surface, and the collapsible tower can be used for emergency response training in the erect state and the collapsible tower can be substantially stored in the hollow area in the  
15 lowered state.

3. The collapsible tower of claim 1 or 2, wherein the collapsible tower is associated with an installation, and when the tower is in the erect state at least part of the tower projects above an upper part of the installation and when the tower is in the lowered state at least part of the tower is substantially stored below  
20 the upper part of the installation.

4. The collapsible tower according to claim 3, wherein the collapsible tower is attached or attachable to the installation.

5. The collapsible tower according to claim 3 or 4, wherein the installation is a multipurpose simulator installation.

25 6. The collapsible tower according to any one of claims 1 to 5, wherein the emergency response training is heights emergency response training.

7. The collapsible tower according any one of claims 1 to 6, wherein the emergency response training includes training chosen from the group: rigging

training; climbing; working at heights; training useful in the field of mining; or training useful in marine environments.

8. The collapsible tower according to any one of claims 1 to 7, wherein the tower includes a base, a top and one or more stages between the base and the  
5 top.

9. The collapsible tower according to claim 8, wherein the cross-sectional area of the tower is greater at the base than at the top.

10. The collapsible tower according to claim 8 or 9, wherein the base of the tower is reinforced to strengthen the tower against the action of wind when in the  
10 erect state.

11. The collapsible tower according to any one of claims 8 to 10, wherein the tower includes at least two stages above the base.

12. The collapsible tower according to any one of claims 9 to 11, wherein each stage includes a platform on which trainees can stand.

13. The collapsible tower according to claim 12, wherein a platform is included at the first and any other stages and a further platform is included above the final stage, forming a roof platform substantially at the top of the tower.

14. The collapsible tower according to claim 13, wherein the roof platform is configured for heights rescue training or similar.

15. The collapsible tower according to any one of claims 8 to 14, wherein each stage includes an access means to enable ready access between stages.

16. The collapsible tower according to any one of claims 1 to 15, wherein the tower includes rigging training whereby the tower can be ascended by climbing up rigging on one or more side of the tower.

17. The collapsible tower according to any one of claims 1 to 16, wherein the tower includes a number of different means of ascending or descending the tower to provide a variety of heights training.

18. The collapsible tower according to any one of claims 8 to 17, wherein the collapsible means is connected to the tower at the base.

19. The collapsible tower according to any one of claims 1 to 18, wherein the collapsible means includes a moving part and means to cause the motion to  
5 change or move the tower between an erect state and a lowered state and vice versa.

20. The collapsible tower according to any one of claims 1 to 19, wherein the collapsible means includes a hinge or the like.

21. The collapsible tower according to claims 20, wherein the hinges are  
10 configured so that in the lowered state the tower is substantially inside an installation and in the erect state the tower is substantially outside the installation.

22. The collapsible tower according to claims 20 or 21, wherein the hinges are moved automatically through operation of a remote control or other control.

23. The collapsible tower according to any one of claims 1 to 22, wherein the  
15 collapsible means includes one or more hydraulic rams.

24. The collapsible tower according to any one of claims 20 to 23, wherein two hinges are included and two hydraulic rams are included, and each hydraulic ram is associated with one of the two hinges for moving the tower between the erect state and the lowered state.

20 25. The collapsible tower according to claims 23 or 24, wherein, in use, a control means is operated which activates the hydraulic rams so they change between a first position and a second position where in the first position the tower is in the lowered state and when the hydraulic ram is in the second position the tower is in the erect state.

25 26. The collapsible tower according to any one of claims 1 or 25, wherein the tower is not significantly altered in configuration between the lowered state and the erect state so that once erected the tower can quickly be utilised for emergency response training or otherwise.

27. The collapsible tower according to any one of claims 1 or 26, wherein the top of the tower stands at least 8 to 12 metres above the ground in the erect state.
28. The collapsible tower according to any one of claims 3 to 5, wherein in the lowered state substantially all the tower is contained within the installation.
- 5 29. The collapsible tower according to claim 28, wherein the installation is a mobile installation and the tower can be transported in the lowered state.
30. The collapsible tower according to any one of claims 3 to 5, 28 or 29, wherein the installation includes a roof surrounded by one or more walls and within the installation is an area suitable for receipt of the tower, in the lowered state.
- 10 31. The collapsible tower according to any one of claims 3 to 5, or 28 to 30, wherein the area suitable for receipt of the tower in the lowered state is adapted for use in emergency response training when the tower is in the erect state.
32. The collapsible tower according to claim 31, wherein the emergency response training conducted in the area suitable for receipt of the tower in the  
15 lowered state is chosen from the group: confined space simulator; equipment handling simulator; fire training simulator; digital fire training simulator; flood simulator; gas training simulator; hazard identification; hazardous substance simulator; lockout/tagout simulator; medical emergency simulator including breathing apparatus and CPR (cardiopulmonary resuscitation); parts washer  
20 simulator; rubbish bin fire simulator; switchboard simulator; and workshop simulator.
33. The collapsible tower according to claim 31 or 32, wherein the area suitable for receipt of the tower in the lowered state is used for confined space training when the tower is not in the lowered state.
- 25 34. The collapsible tower according to any one of claims 31 to 33, wherein one or more panels within the installation can be used when the tower is in the erect state to create a confined space training arrangement.
35. The collapsible tower according to claim 34, wherein the panels are adapted to remain flat to the walls while the tower is in the lowered state and the

panels are free to fold or otherwise extend out when the tower is in the erect state so a confined space training area can be set up.

36. The collapsible tower according to any one of claims 3 to 5, or 28 to 35 wherein the installation includes a roof with at least one section which opens.

5 37. The collapsible tower according to claim 36, wherein the roof of the installation includes a mechanism to enable at least part of the roof to be opened.

38. The collapsible tower according to claim 37, wherein the roof can slide open sufficiently to enable the tower to pass through the gap in the roof when changing or moving between the erect state and the lowered state.

10 39. The collapsible tower according to claim 37 or 38, wherein the roof is a slideable roof between a first stop point and a second stop point where the first stop point is when the roof is fully closed and the second point is when the roof is open sufficiently to allow the tower to change or move through the gap into the lowered state.

15 40. The collapsible tower according to claim 39, wherein the roof includes a mechanism, attached to a wall of the installation, which draws the roof with it as it moves from the first stop point to the second point or from the second stop point to the first stop point.

41. The collapsible tower according to any one of claims 37 to 40, wherein the  
20 mechanism includes rollers attached to the sides of the installation that roll in channels formed on either side of the roof.

42. The collapsible tower according to any one of claims 37 to 41, wherein the  
roof is opened from the control room by remote control or by activation of an  
electrical circuit or hydraulics system, which cause the roof to slide open or  
25 closed.

43. The collapsible tower according to any one of claims 37 to 42, wherein the  
roof includes securing means wherein the tower in the erect state can be secured  
by closing the roof.

44. The collapsible tower according to any one of claims 37 to 43, wherein as the roof is closed towards the tower in the erect state securing means slide about part of the base of the tower so that the closing of the roof substantially secures the tower.

5 45. The collapsible tower according to claim 44, wherein the tower includes legs including one or more base plate and the securing means is secured to the base plate.

46. The collapsible tower according to any one of claims 37 to 45, wherein collapsible rails are included around at least part of the perimeter of the roof of the  
10 installation.

47. The collapsible tower according to claim 46, wherein the base of the tower includes rails, and at least part of the perimeter of the roof of the installation includes collapsible rails and together the rails and collapsible rails substantially surround the perimeter of the roof when the tower is in the erect state.

15 48. The collapsible tower according to any one of claims 37 to 47, wherein the roof includes one or more hatch to enable ready access to the roof from the installation.

49. The collapsible tower according to any one of claims 3 to 5 or 28 to 48, wherein the installation is a multipurpose simulator used for emergency response  
20 training.

50. The collapsible tower according to any one of claims 3 to 5 or 28 to 49, wherein the installation, including the tower, is transportable by road, rail or sea.

51. The collapsible tower according to any one of claims 3 to 5 or 28 to 50, wherein the installation and tower can be ready to transport in less than an hour.

25 52. The collapsible tower according to any one of claims 3 to 5 or 28 to 51, wherein the installation is a mobile installation and the tower can be transported in the lowered state and used for heights training in the erect state.

53. The collapsible tower according to any one of claims 3 to 5 or 28 to 52, wherein the installation includes a first module, a second module and at least one other module and the tower is associated with one of the modules.

54. A method of installing a tower, including a collapsible means for emergency heights training including the following steps:

- a) changing or moving the tower between a lowered state and an erect state by operation of the collapsible means;
- b) using the tower for heights training;
- c) changing or moving the tower between the erect state and the lowered state by operation of the collapsible means.

55. A method of installing a tower, including a collapsible means for emergency heights training, and associated installation, including the following steps:

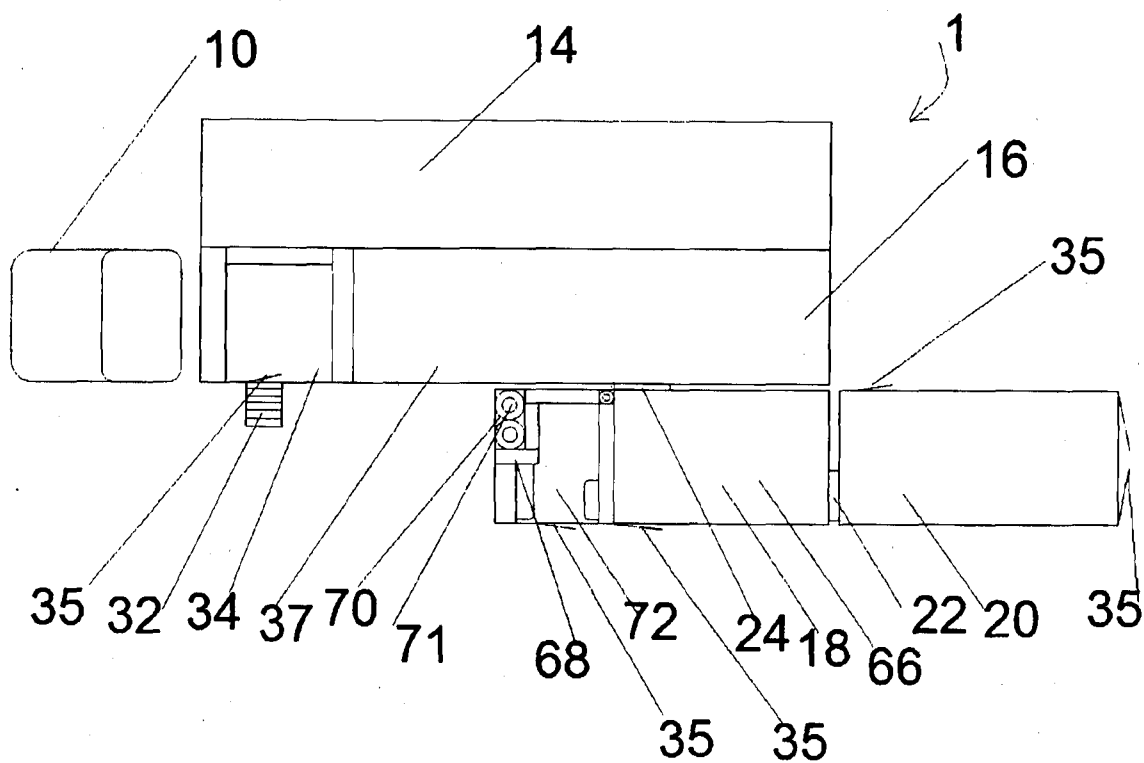
- a) transporting the installation to a desired location;
- b) changing or moving the tower between a lowered state where the tower is substantially contained within the installation and an erect state where the tower projects above the installation, by operation of the collapsible means;
- c) setting up the tower for heights training;
- d) conducting heights training;
- e) packing up the tower;
- f) changing or moving the tower between the erect state and the lowered state by operation of the collapsible means; and
- g) transporting the tower and installation to another location for use.

56. The method of claim 55 including the further step of opening a roof of the installation before changing or moving the tower into the erect state and on packing up before changing or moving the tower into the lowered state.

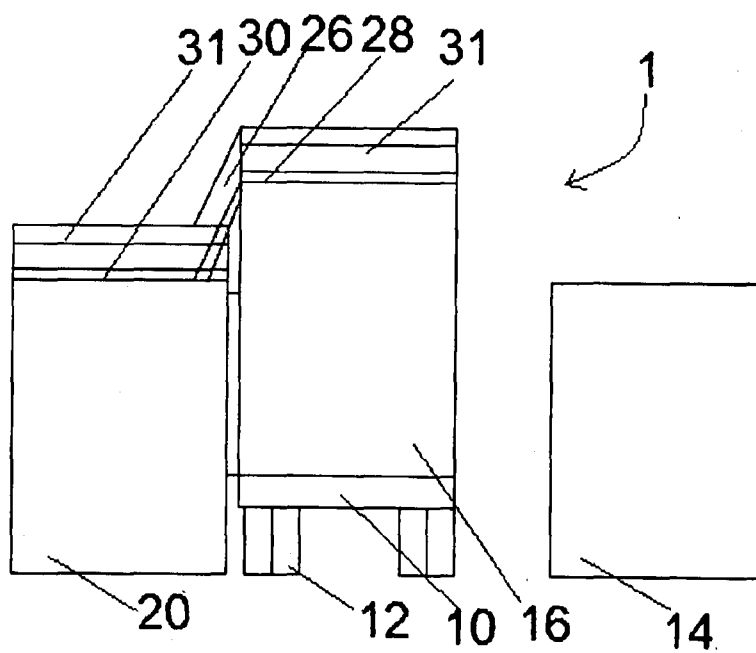
57. The method of claim 55 or 56 wherein the roof is used to secure the tower.

58. The method of installing a tower of any one of claims 54 to 57, wherein the tower is the collapsible tower of any one of claims 1 to 53.
59. A method of installing a tower substantially as hereinbefore described with reference to any one of Figures 1 to 13.
- 5 60. A collapsible tower substantially as hereinbefore described with reference to any one of Figures 1 to 13.

**1/10**



### FIGURE 1



## FIGURE 2

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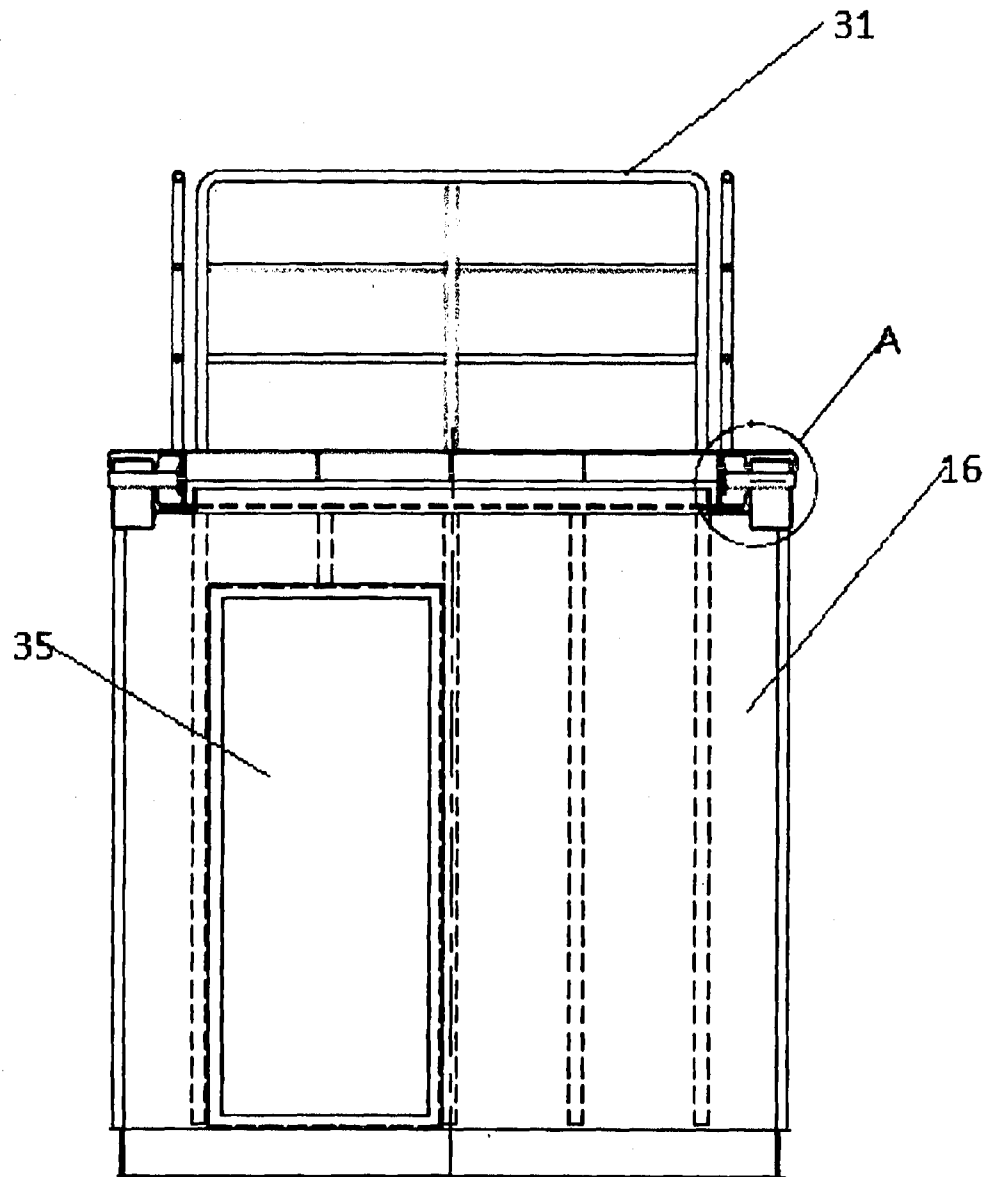


**FIGURE 3**

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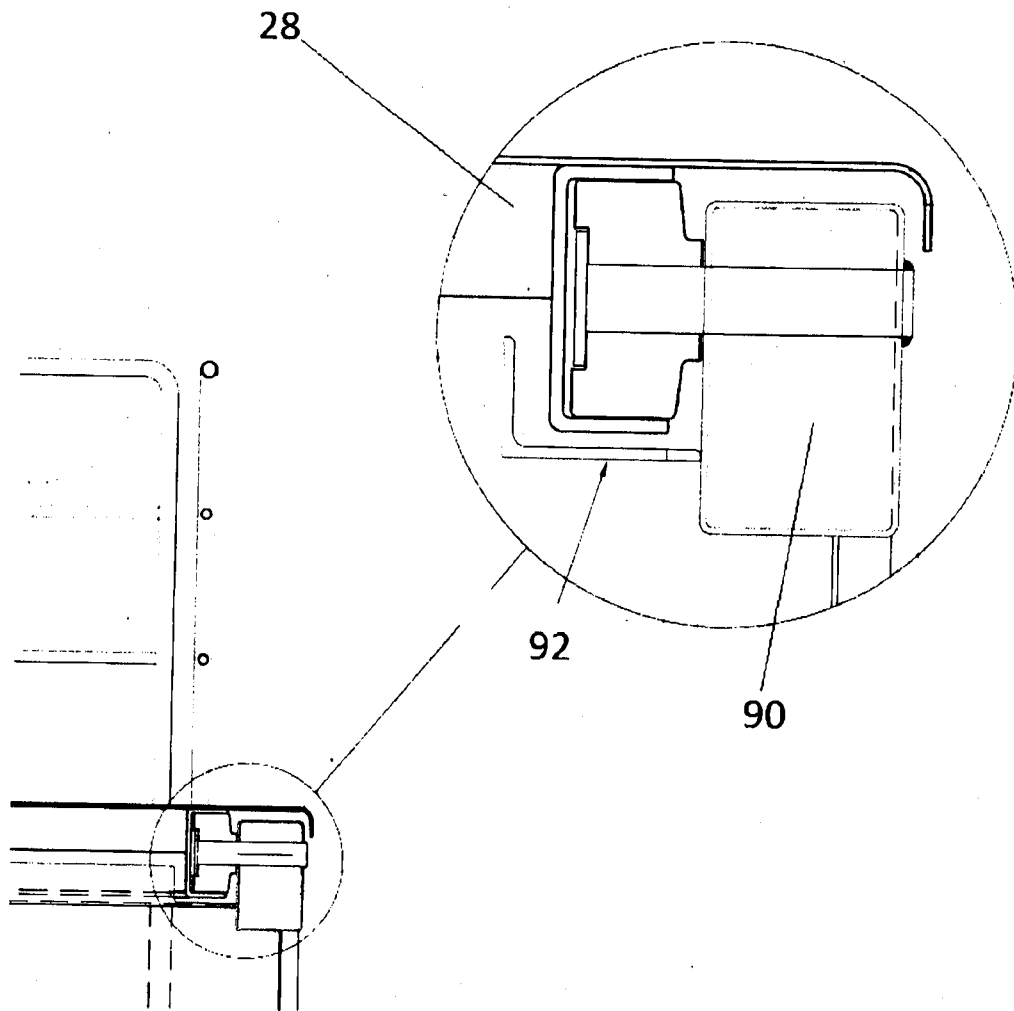


**FIGURE 4**



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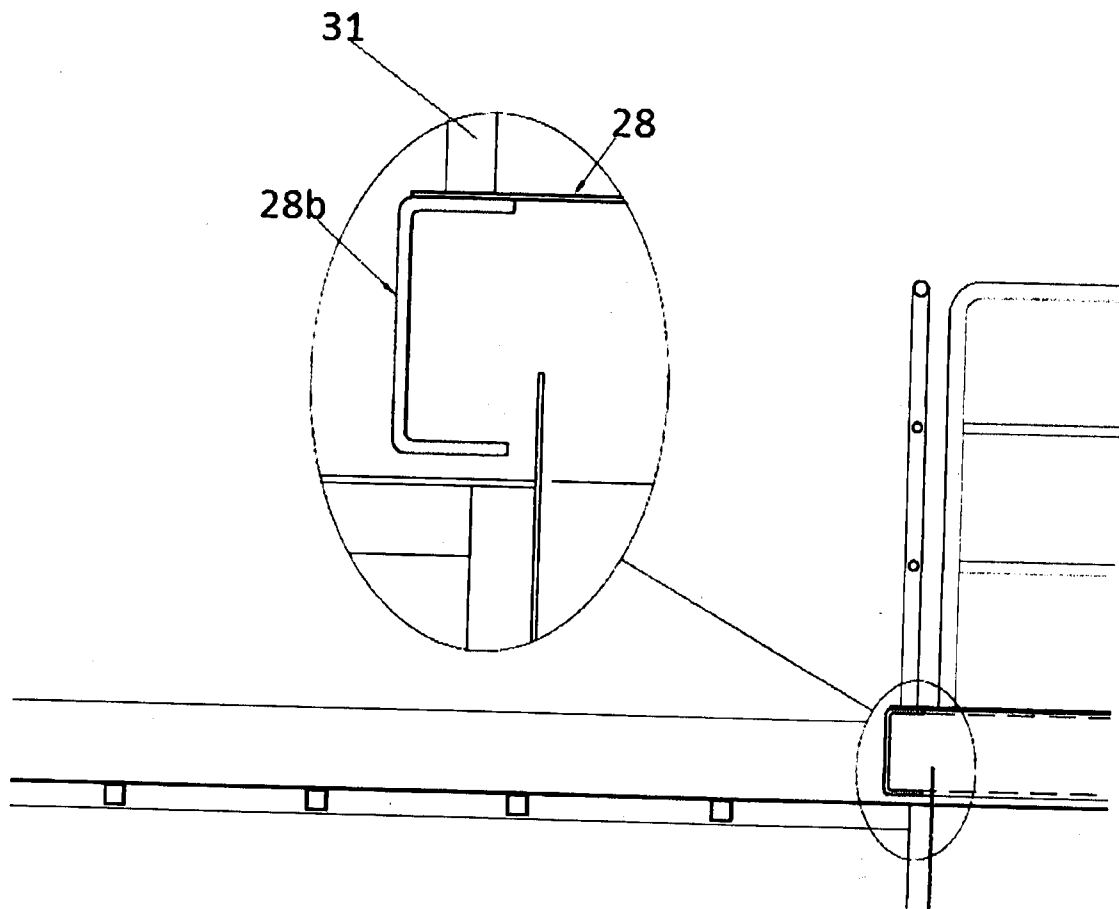


**FIGURE 6**

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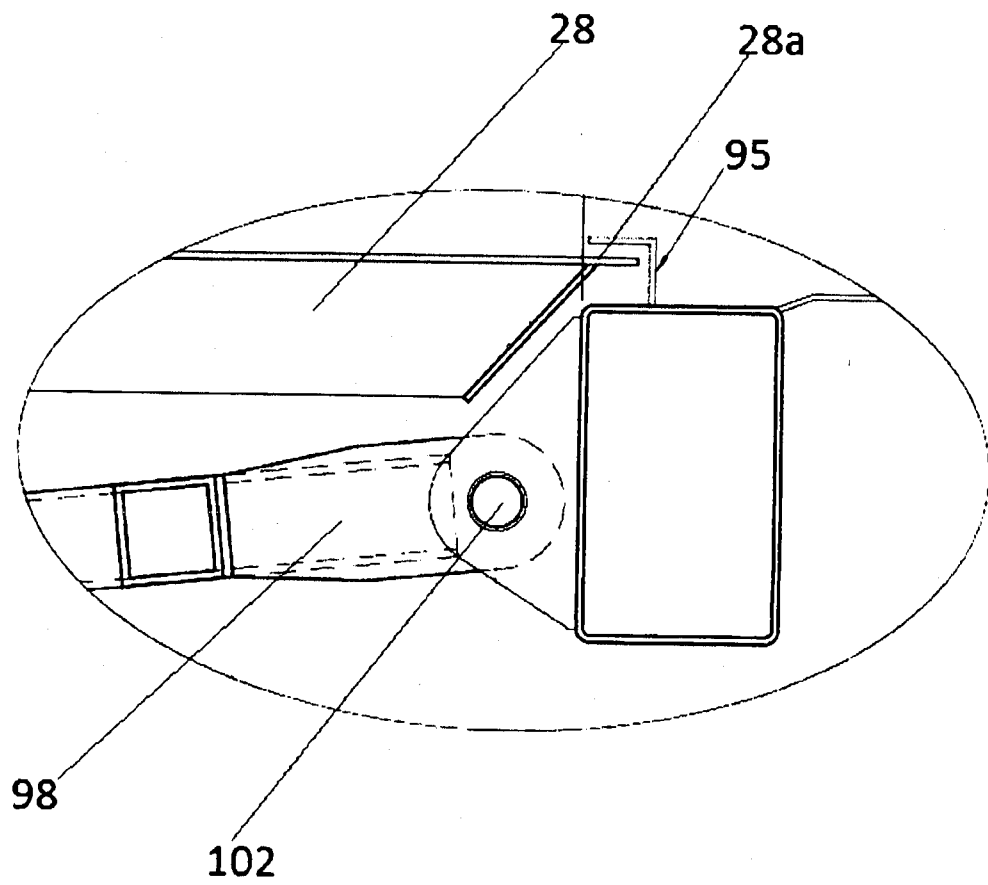


**FIGURE 7**

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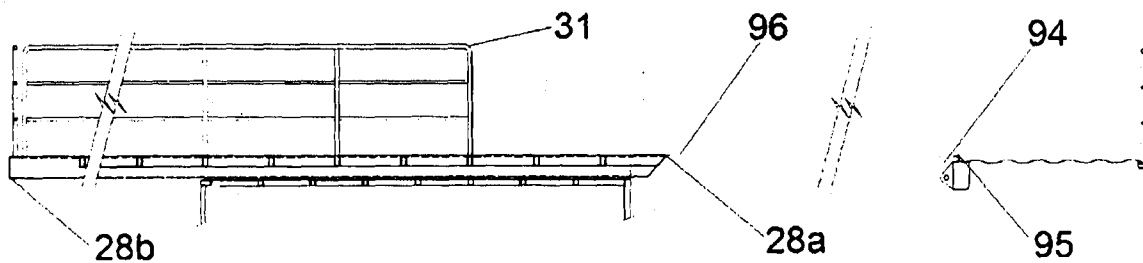


FIGURE 8

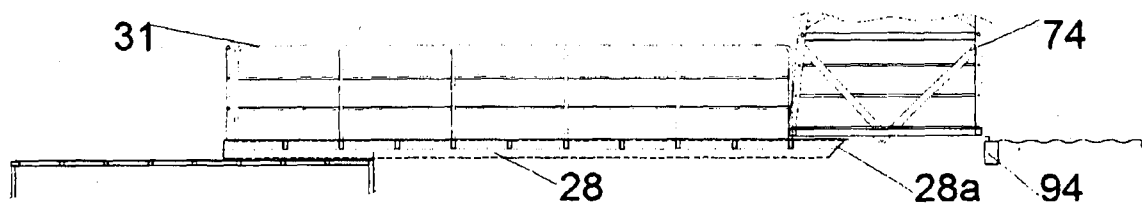


FIGURE 9

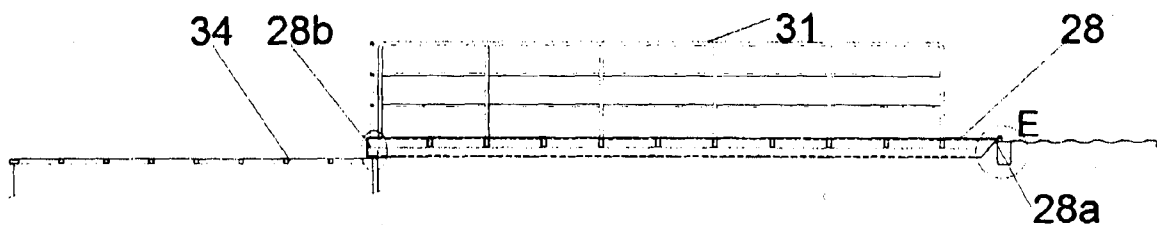


FIGURE 10

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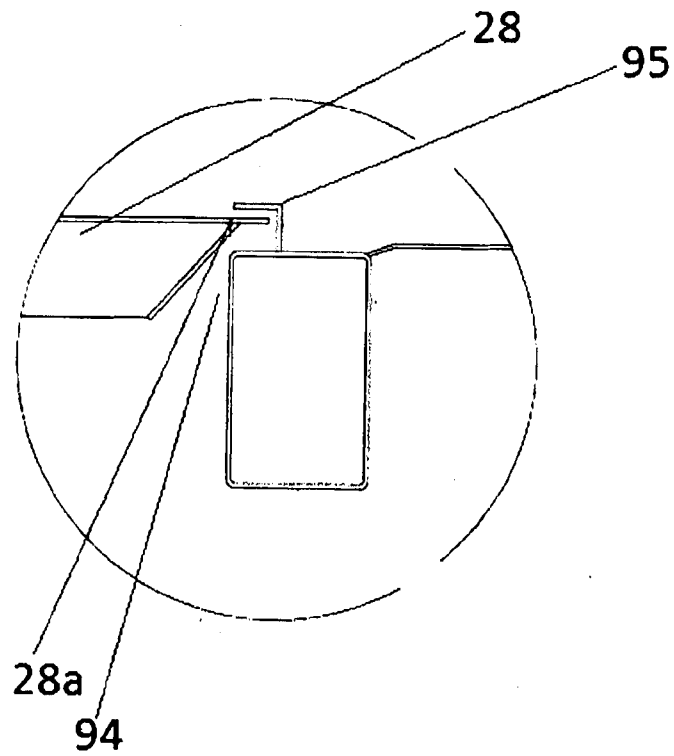


**FIGURE 11**

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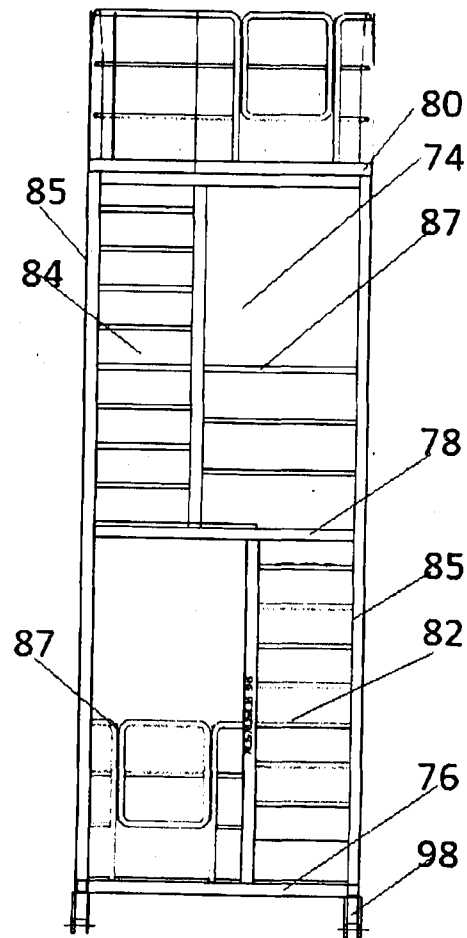


FIGURE 12

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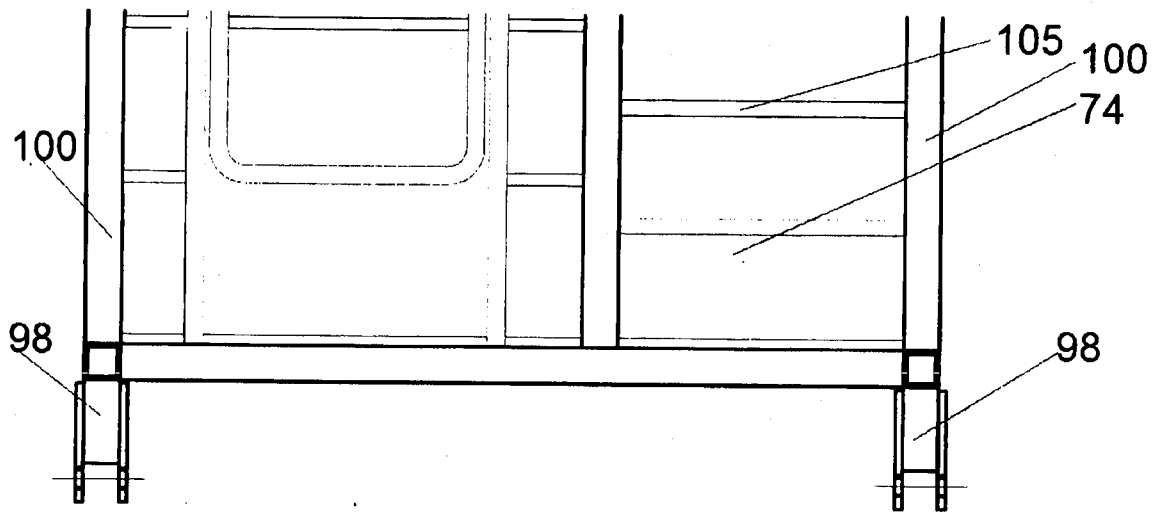


FIGURE 13

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2012/000755

## A. CLASSIFICATION OF SUBJECT MATTER

E04B 1/343 (2006.01) E04B 1/344 (2006.01) E04B 1/348 (2006.01) E04H 12/00 (2006.01) E04G 1/00 (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)

WPI, EPODOC: IPC, ECLA E04B 1/343, 1/344, 1/348 E04G 1 E04H 12 & Key words (tower?, pole?, mast?, pillar?, erect+, telescop+, stack+, retract+, collap+, adjust+, stowed+, expans[d,s]+, mobil+, portab+, +port  
 +, container+, vehicle+, shipp+, transport+stor[ag,ed]+, train+, fold+, simulat+, confin+, enclosur+) and similar terms & key words alone.

## 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                                  |                       |



Further documents are listed in the continuation of Box C



See patent family annex

|          |                                                                                                                                                                     |     |                                                                                                                                                                                                                                              |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *<br>"A" | Special categories of cited documents:<br>document defining the general state of the art which is not considered to be of particular relevance                      | "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                                              |
| "E"      | earlier application or patent but published on or after the international filing date                                                                               | "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                                                                     |
| "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) | "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 |
| "O"      | document referring to an oral disclosure, use, exhibition or other means                                                                                            | "&" | document member of the same patent family                                                                                                                                                                                                    |
| "P"      | document published prior to the international filing date but later than the priority date claimed                                                                  |     |                                                                                                                                                                                                                                              |

Date of the actual completion of the international search  
02 August 2012

Date of mailing of the international search report  
09 August 2012

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU2012/000755**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:
2. ☒ Claims Nos.: **59, 60**  
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:  
The claim/s do/does not comply with Rule 6.2(a) because it/they rely on references to the description and/or drawings.
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:

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                           |                                                                                                                       | International application No.         |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT |                                                                                                                       | PCT/AU2012/000755                     |
| Category*                                             | Citation of document, with indication, where appropriate, of the relevant passages                                    | Relevant to claim No.                 |
| X                                                     | GB 2463092 B (TECHNIP FRANCE) 28 July 2010<br>figs 1-6, page 1 line 29 -page 9 line 19,page 17 line7-page 18 line 10. | 1-58                                  |
| X                                                     | US 20110072737 A1 (WASTERVAL) 31 March 2011<br>Abstract & figs 1-10                                                   | 1, 6-15, 18-20, 23.                   |
| X                                                     | US 20050091941 A1 (BAIRD) 05 May 2005<br>Abstract, figs 1, 2 & Para 0015                                              | 1, 6-10,12-15, 20, 26, 54, 55,<br>58. |
|                                                       |                                                                                                                       |                                       |

| <b>INTERNATIONAL SEARCH REPORT</b><br>Information on patent family members                                                                                                                                                                                            |                  | International application No.<br><b>PCT/AU2012/000755</b> |                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------|------------------|
| 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 |
| GB 2463092 B                                                                                                                                                                                                                                                          | 28 Jul 2010      | AU 2009329309 A1                                          | 30 Jun 2011      |
|                                                                                                                                                                                                                                                                       |                  | CA 2746351 A1                                             | 24 Jun 2010      |
|                                                                                                                                                                                                                                                                       |                  | EP 2382610 A1                                             | 02 Nov 2011      |
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|                                                                                                                                                                                                                                                                       |                  | GB 2463092 B                                              | 28 Jul 2010      |
|                                                                                                                                                                                                                                                                       |                  | US 2012144762 A1                                          | 14 Jun 2012      |
|                                                                                                                                                                                                                                                                       |                  | WO 2010070307 A1                                          | 24 Jun 2010      |
| US 20110072737 A1                                                                                                                                                                                                                                                     | 31 Mar 2011      | US 2011072737 A1                                          | 31 Mar 2011      |
| US 20050091941 A1                                                                                                                                                                                                                                                     | 05 May 2005      | US 2005091941 A1                                          | 05 May 2005      |
|                                                                                                                                                                                                                                                                       |                  | US 7194842 B2                                             | 27 Mar 2007      |
|                                                                                                                                                                                                                                                                       |                  | US 2007151807 A1                                          | 05 Jul 2007      |
|                                                                                                                                                                                                                                                                       |                  | US 7523587 B2                                             | 28 Apr 2009      |
| <b>End of Annex</b>                                                                                                                                                                                                                                                   |                  |                                                           |                  |
|                                                                                                                                                                                                                                                                       |                  |                                                           |                  |
| Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.<br>Form PCT/ISA/210 (Family Annex)(July 2009)                                                                                               |                  |                                                           |                  |