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PORTABLE SHOWER UNIT
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Fig. 1.

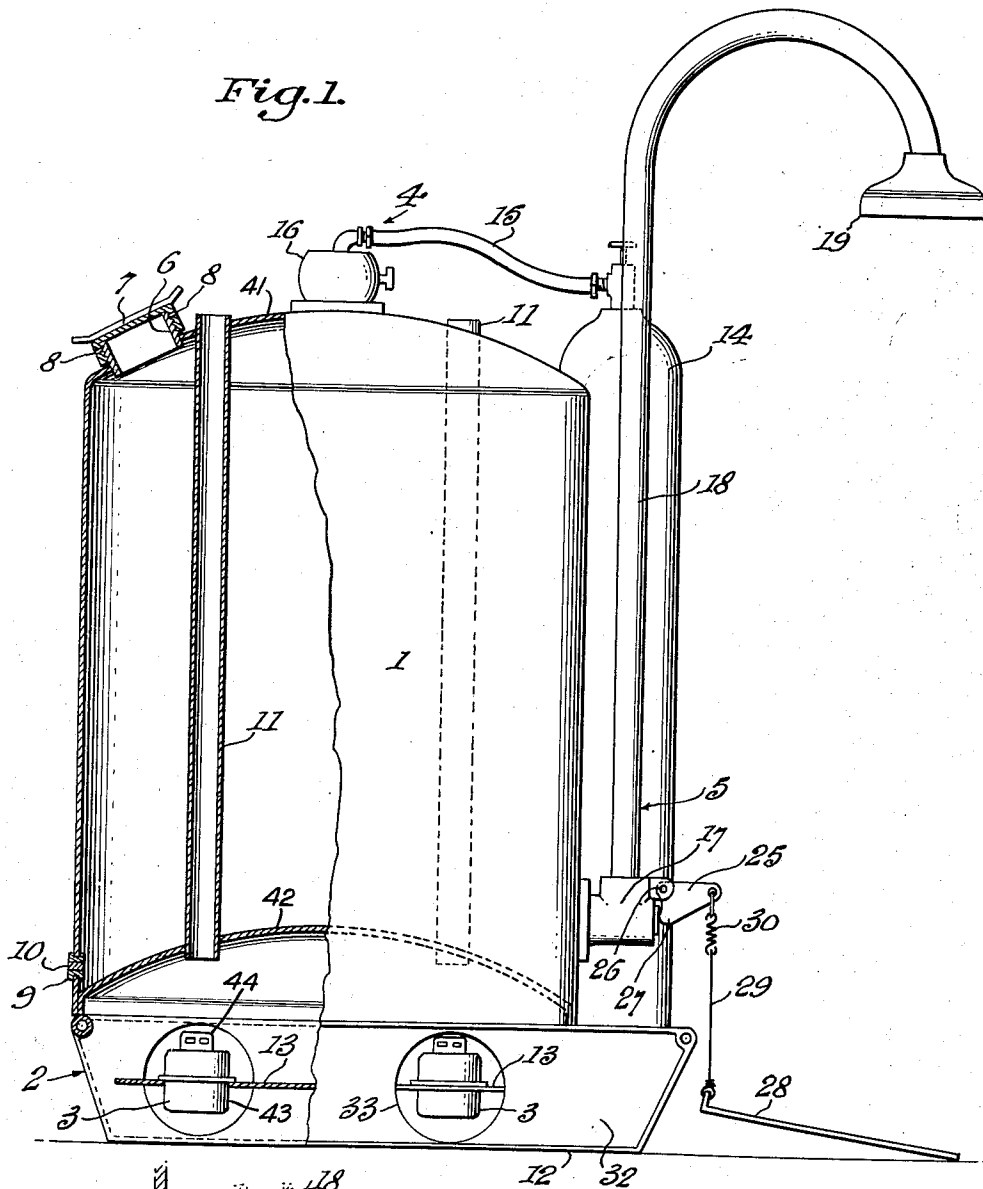
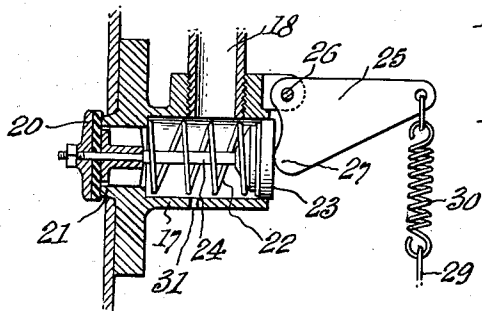


Fig. 2.



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PORTABLE SHOWER UNIT

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4 Claims. (Cl. 239—139)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalties thereon.

The present invention relates to an improved portable unitary shower structure having particular utility in the decontamination of personnel or equipment by means of high concentration or deluge of water or other rinsing, neutralizing or decontaminating liquid.

This invention is particularly adapted as field equipment for Army or other military service units using hazardous or toxic substances as fuels or propellants, as for example, toxic liquid fuels for missiles, although it has utility in industries using toxics such as strong acids or alkalis.

Decontamination shower units previously used have generally been modifications of portable personal hygiene showers or portable spray units similar to those used for the distribution or dispersion of insecticides or other sprays. Shower units of this type are usually too heavy and bulky for the instant purpose because they are comprised of several shower heads, water heating and storage facilities, tentage and other equipment. Portable sprayers lack capacity and rate of flow.

The primary object of this invention is to provide a mobile, portable, compact shower of unitary structure capable of delivering a deluge of rinsing liquid.

Another object of this invention is to provide a portable decontamination shower unit that is constantly ready for emergency use.

Another object of this invention is to provide a decontamination unit of this type that is easily and quickly actuated by a single individual.

Another object of this invention is to provide a portable shower unit containing integral heating and pressure systems.

Still another object of this invention is to provide a self-closing quick acting valve and actuator adapted to an integral shower unit.

Other objects and advantages of the invention will be apparent as the description proceeds and the features of novelty will be pointed out more particularly in the appended claims.

Briefly, in accordance with this invention there is provided an integral unitary decontamination shower including a liquid reservoir, heater, pressure system and distribution system capable of delivering a heated liquid under pressure at a constant high rate of flow for a short period of time. The unit is compact and without extra weight so as to be readily movable from one location to another, either by dragging it or by hauling it as cargo. Simple operation is provided so that an individual in need of decontamination may receive a deluge of rinsing liquid without loss of time by merely stepping on a treadle to initiate release of the rinsing liquid while dressed in cumbersome protective clothing that may include large, cumbersome gloves or other materials handling equipment.

In the accompanying drawings forming a part of this

specification and illustrating a preferred embodiment of the improvements comprising the invention:

Fig. 1 is an elevation, partly in vertical section, of a complete shower unit; and

Fig. 2 is a vertical section of the actuating valve of the unit of Fig. 1.

As illustrated in Fig. 1 of the drawings, the preferred embodiment of the invention includes a reservoir in the form of tank 1 resting on skid mount 2, heaters 3, pressure system 4 and fluid distribution system 5. The insulated tank 1 of any reasonable capacity secured upright on the skid mount is generally cylindrical with a convex top 41 and a concave bottom 42 and is provided with a plurality of vents, taps and pipe connections. The tank is provided with an inlet port 6 and cap 7 for filling the tank. Cap 7 is provided with a plurality of vents 8 for the automatic relief of pressures in the tank on partial removal of the cap. Drain plug 9 with fusible core 10 is provided both for routine draining and as a safety feature which will automatically drain the tank in the event of overheating. The tank is also provided with a concave bottom to facilitate draining and to facilitate transfer of heat by radiation from heating units 3 beneath the tank to the liquid content of the tank and is provided with through pipes or vents 11 for the purpose of carrying hot gases through the body of the tank constituting heat exchangers and flues for the heating units.

Skid mount 2 constitutes the frame of the unit supporting all of the elements of the shower to provide short range mobility, and is constructed with skids 12 tapered front and rear to permit the unit to be dragged in sled fashion. The skids have enclosing panels 32 on two sides with ports or hand holes 33 for inspection and servicing of the heaters 3. Skid mount 2 is also provided with bracket 13 supporting removable heaters 3 which are, in the embodiment illustrated, ordinary liquid fuel fired truck flares or highway torches, commercially available with self-contained fuel reservoir bottom 43 and burner top 44. Alternatively, gas or electric type heaters may be used when expedient. For example, immersion type electric heaters permit use of the shower in hazardous area where an open flame is prohibited. The electric immersion heater, when used, is provided with an explosion proof junction box, not shown, and is screwed into a boss on the side of the tank. Ignition of heaters 3 applies heat to the under surface of the tank and the inner surfaces of pipes 11. Although the embodiment of Fig. 1 indicates two heaters and two through pipes, this number may be varied according to the heating demands of any particular use. For example, it has been found that four kerosene fueled truck flares centered beneath four vertical flues can maintain a 100 gallon tank of water at 150° F. when the outside temperature is -25° F. A thermometer, not shown, indicating the water temperature may be mounted on the tank to permit periodic inspection to insure that the water in the tank does not become too uncomfortably hot.

Pressure system 4 is provided as a means for driving liquid from the tank at a constant high rate of flow. The source of pressure is compressed air or other gas such as nitrogen contained in compressed gas cylinder 14 which is conveyed through hose 15 to a pressure regulator valve 16 in communication with the interior of the tank. Regulator 16 controls the delivery of compressed air to the interior of the tank maintaining the pressure inside the tank at any predetermined amount as, for example, 50 pounds per square inch which in a particular adaptation of a unit having a 100 gallon liquid tank will deliver a flow of approximately 100 gallons per minute.

Delivery of the liquid is through valve body 17, pipe 18 and shower head 19, constituting the portions of distribution system 5 principally visible in Fig. 1. Shower

heads providing various horizontal angles of spread of the discharged fluid may be used but a head providing unimpeded access to the shower within a horizontal angle of at least 180° is desirable. As illustrated in Fig. 2, valve body 17 includes valve 20 seated against valve seat 21 by the action of valve spring 22 acting against piston 23 which is connected to the valve by valve stem 24. Actuation of the valve is by movement of valve piston 23 with the valve stem and valve toward the interior of the tank against opposition of spring 22. This movement of the valve piston is accomplished by rotation of plate or lever 25 about pivot 26 forcing cam surface 27 against the valve piston. Plate 25 is operated by means of treadle 28 which is connected to the plate by means of linkage 29 and overrun spring 30 that adjusts the system to compensate for travel of the treadle through a greater distance than the lever arm of plate 25. The valve body 17 is provided with a drain hole 31 to drain water in pipe 18 which prevents freezing.

Although, as pointed out above, the instant shower unit is particularly adapted to the decontamination of personnel or equipment, the portability, compactness, unitary structure and independence from outside power supply are such that the shower would have utility as a personal hygiene shower bath for locations having only a few persons. Similarly, in spite of the fact that the subject structure was devised to fulfill the peculiar demands of the military service for compactness, portability, and independence from source connections and at the same time to fulfill the peculiar demands of toxic materials handling techniques of instant high sustained flow, the invention has obvious utility in industry as decontamination equipment and is very adaptable to use as a personal hygiene shower for hunting lodges, seashore cabins, and similar locations.

Therefore, although the embodiment illustrated and described is directed toward decontamination use with other utility as stated, it must be understood that modifications to meet those other uses are considered to be within the scope of this invention. Exemplary of modifications that may be made within the spirit of the invention are the use of a plurality of gas cylinders or shower heads, changes of capacity or rates of flow, change of number or size of heating elements, the installation of automatic, thermostatically controlled heating units, the increasing of mobility by the addition of wheels, and the addition of other attachments for carrying out decontamination procedures such as an eye wash fountain.

I claim:

1. An integral, portable shower unit comprising a mobile base supporting a liquid reservoir, a self-drained, valved liquid conduit means attached to the liquid reservoir in liquid carrying communication with the lower portion thereof and extending upwards along said liquid reservoir terminating in an elevated, downwardly directed shower head, a pressure reservoir also mounted on said base proximate said liquid reservoir, a fluid pressure regulator valve mounted on and in communication with said liquid reservoir, a fluid conduit interconnecting said pressure reservoir and said fluid pressure regulator valve, at least one self-contained heater mounted on said base below said liquid reservoir and a heat exchanger pipe mounted in, and running completely through, said liquid reservoir from directly above each said heater to the atmosphere above said liquid reservoir.

2. An integral, portable shower unit comprising a mobile base supporting a liquid reservoir, a pressure reservoir, a plurality of self-sufficient heaters spaced beneath said liquid reservoir, a heat exchanger pipe extending through said liquid reservoir from the space between the liquid reservoir and heater upwards to the atmosphere above the liquid reservoir, a fluid pressure conveying tube interrupted by a fluid pressure regulating valve

interconnecting said reservoirs and a liquid distribution system including a self-draining valve housing let into a lower side of said liquid reservoir, a liquid conduit extending upwardly from said valve housing and terminating in an elevated, downwardly directed shower head, a spring biased valve in said housing controlling liquid flow from said liquid reservoir to said liquid conduit, valve actuating means for operating said valve attached to the exterior of said housing, and a treadle located alongside said base beneath said shower head and connected to said valve actuating means, whereby a person may be deluged by heated liquid by stepping on said treadle.

3. An integral, mobile portable shower unit comprising a base supporting a reservoir having at least one through pipe extending vertically through the reservoir in liquid tight relation therewith and communicating with the interior of the base and the atmosphere above the reservoir; an inlet port for said reservoir having a pressure tight inlet cap; an integral fuel containing combustion type heating unit supported by the base beneath said reservoir; said pipe being in alignment with said heating unit for venting said heating unit and simultaneously heating liquid in said reservoir; a compressed gas cylinder supported on the base; a pressure regulator valve on the reservoir in communication with the interior of the reservoir; a gas conduit interconnecting the gas cylinder and the pressure regulator valve for admitting gas at predetermined pressure into the reservoir; a shower head and pipe connected to the reservoir by a self-draining valve housing for fluid communication between the lower part of the reservoir and the pipe; and valving means in the valve housing, said valving means including a valve seat on that portion of the valve housing communicating with the interior of the reservoir, a stemmed valve in the valve housing seated against the valve seat with its stem protruding through the interior of the valve housing, terminating in an enlarged valve piston-fitted for reciprocal motion in the wall of the housing and thereby constituting a moving portion of the wall of the valve housing, a lever pivotally secured to the valve housing having a cam portion bearing against the valve piston, a foot operated treadle and mechanical linkage means interconnecting said treadle and lever whereby actuation of the treadle will move the valve piston, valve stem and valve to initiate flow from the reservoir to the shower head of any liquid in the reservoir.

4. A portable shower unit as recited in claim 3 wherein said self-draining valve housing includes a drain opening in said housing remote from the opening receiving said pipe, said drain opening being of substantially smaller diameter than said pipe opening whereby liquid in said pipe may be drained when said valve stops the flow of liquid from said reservoir to prevent freezing of said valve.

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