April 29, 1958 A. JACOBS 2,832,425

PORTABLE FIRE EXTINGUISHER

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FIG. 1.

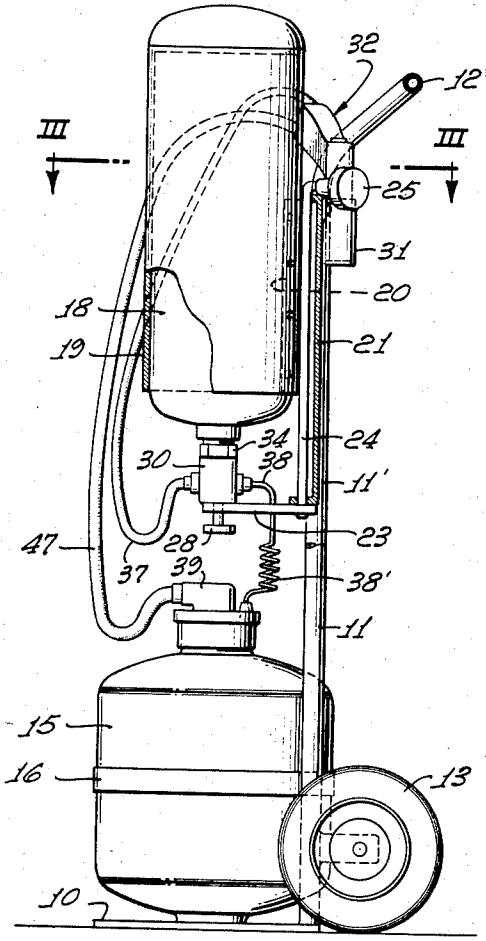


FIG. 2.

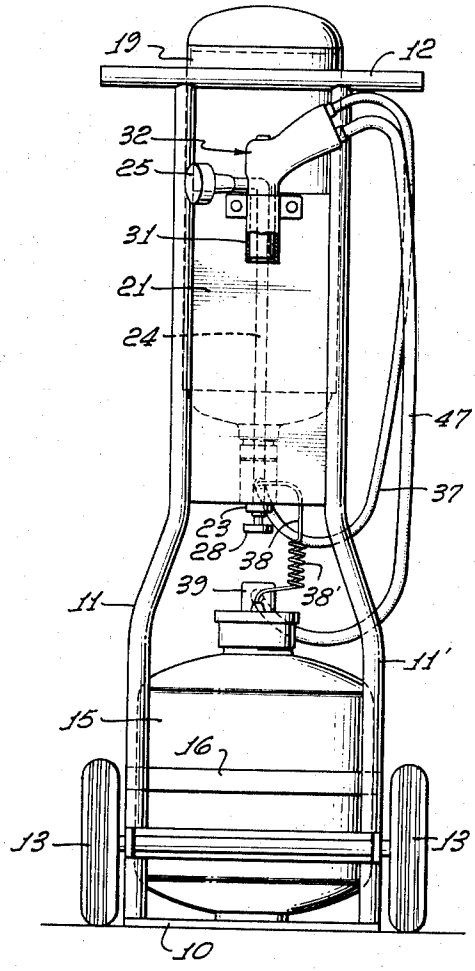
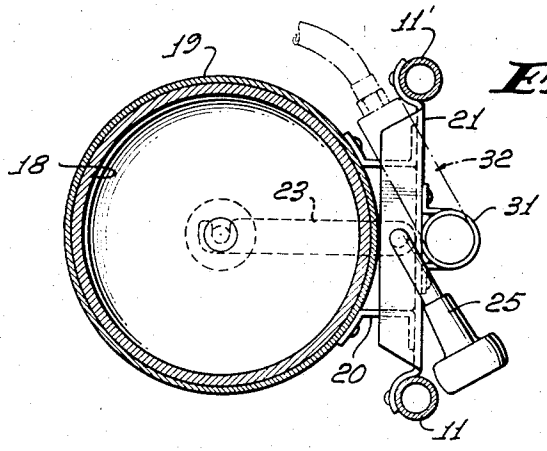


FIG. 3.



ALAN JACOBS
INVENTOR.

BY

ATTORNEY.

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PORTABLE FIRE EXTINGUISHER

Filed June 1, 1956 2 Sheets-Sheet 2

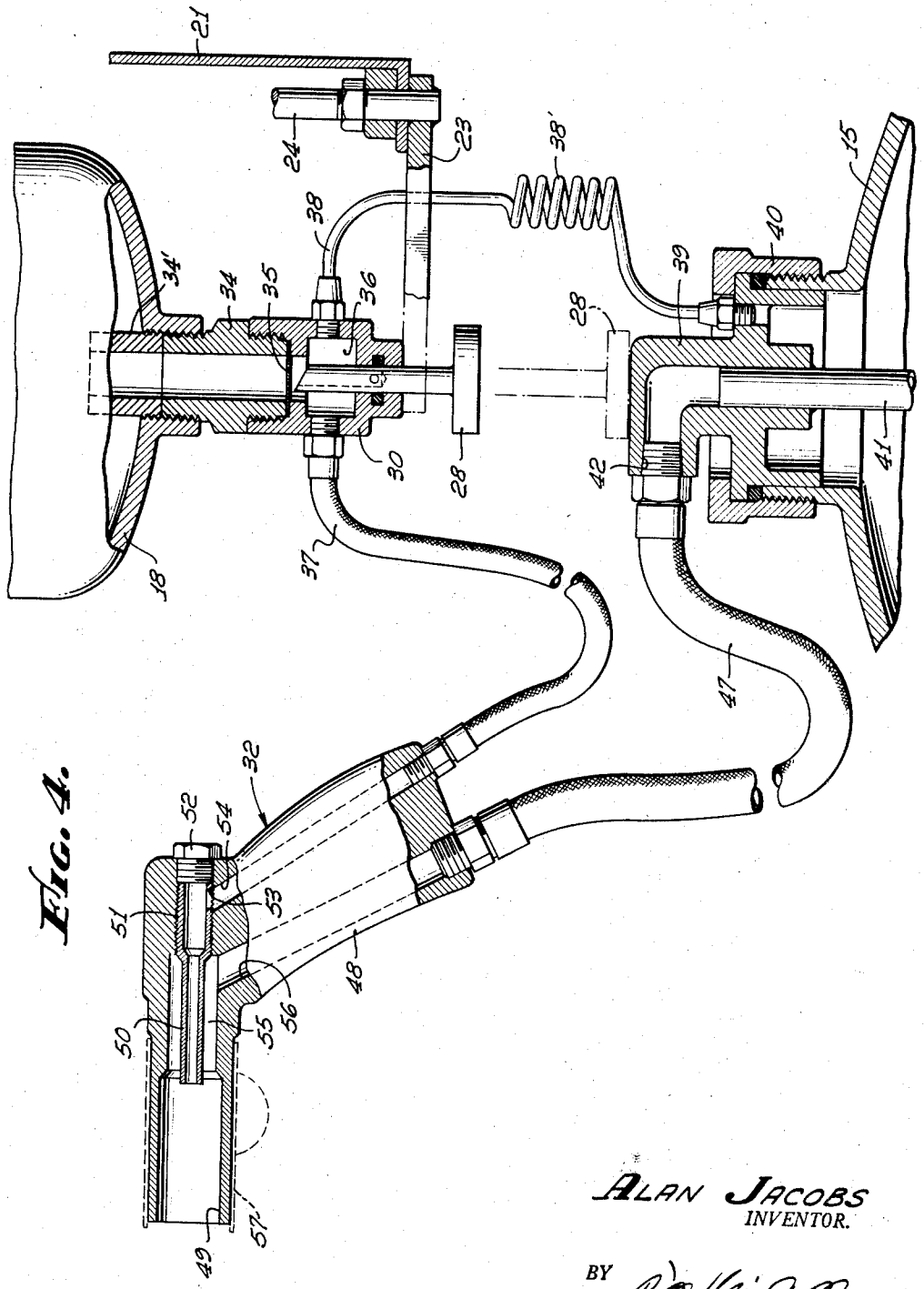

Fig. 4.

ALAN JACOBS
INVENTOR.

BY C. C. Wiedeke

ATTORNEY.

United States Patent Office 2,832,425
Patented Apr. 29, 1958

2,832,425

PORTABLE FIRE EXTINGUISHER

Alan Jacobs, Los Angeles, Calif., assignor of one-half to Wilbur A. Nelson, Los Angeles, Calif.

Application June 1, 1956, Serial No. 588,752

7 Claims. (Cl. 169—31)

This invention relates to a self-contained portable fire fighting unit or apparatus capable of producing a finely divided mist or fog of any desired noninflammable liquid. The apparatus is adapted for use with any compressed noninflammable gas and a noninflammable liquid, the compressed gas being utilized as a source of pressure for the liquid and as a component of the mist or fog generated with the liquid. By reason of the numerous materials, both gaseous and liquid which may be employed in the fire fighting unit, the apparatus may be employed in fighting various classes of fires such as those involving electrical systems, chemical or solvents, wood, paper, rubber etc.

The construction described in detail hereinafter contemplates a portable unit including a wheeled frame, such frame carrying two containers or receptacles, one for liquid and a separate sealed reservoir for a compressed or liquefied gas such as carbon dioxide. These two containers are preferably mounted in spaced relation, one above the other, each of the containers being connected to a fog nozzle by separate flexible conduits. The wheeled frame is provided with suitable release means whereby the sealed reservoir of liquid carbon dioxide is unsealed, the gas being then supplied simultaneously both to the fog nozzle and to the liquid container, thereby placing the liquid in such container under pressure and discharging the liquid through a conduit to the fog nozzle. The fog nozzle therefore receives and simultaneously discharges carbon dioxide and a liquid such as water, the mixture being discharged in the form of a finely divided fog or mist having great effectiveness in smothering and extinguishing fires. Novel means are provided whereby a substantially constant pressure is imparted by the liquefied gas to the water without the necessity of using pressure reducing valves or the like.

It is an object of the present invention therefore to disclose and provide a fire-fighting self-contained portable unit adapted to produce a fire fighting fog from any desired noninflammable liquid and noninflammable compressed or liquefied gas.

Another object of the invention is to disclose and provide a self-contained portable unit which is free from pumps, pressure reducing valves and other complicated or expensive elements.

A still further object of the invention is to disclose and provide a compact self-contained portable fire fighting unit including a pressure resisting container for liquid, a separate sealed reservior of liquid carbon dioxide and means for releasing gas from said reservoir to supply gas and liquid to a fog nozzle, said means being actuatable upon removal of the fog nozzle from a locking position on such unit.

A still further object of the invention is to disclose and provide simple and flexible means for regulating the pressure applied to the liquid from a reservoir of liquid carbon dioxide.

These and other objects of the invention will become

apparent from the following description of an exemplary form of fire fighting unit illustrated in the appended drawings in which:

Fig. 1 is a side elevation, portions being broken away.

Fig. 2 is a rear view of the unit illustrated in Fig. 1.

Fig. 3 is a horizontal section taken along the plane III—III in Fig. 1.

Fig. 4 is an enlarged view of a portion of both container and reservoir showing interconnections with the fog nozzle.

Although it is known that carbon dioxide is an efficient material in fighting fires, it is not completely effective in extinguishing all classes of fires. Water or vaporizable liquid of similar boiling point is extremely effective in fighting many fires. The device of the present invention effectively utilizes the characteristics and properties of both a fire fighting liquid and a gas, combining these materials in the form of a fine mist or fog capable of being used to best advantage.

The exemplary form of device illustrated in the drawings comprises: a wheeled frame including a base portion 10 and an upright or upstanding portion which may be made of tubular stock 11 and 11' joined at the top to form a handle 12; a suitable wheel 13 may be journaled on a bracket adjacent the base portion 10 so as to permit the entire frame to assume a stable vertical position as illustrated in Figs. 1 and 2, the entire unit being capable of being readily moved upon its wheels by simply tilting the frame so as to rest the entire weight upon the wheels.

The base 10 may carry a pressure resisting container 15 for a suitable liquid such as water, such container being normally held in place by its weight and an encircling strap 16 attached to the upright portion of the frame. The upper portion of the frame preferably carries a separate sealed reservoir 18 of compressed gas such as for example, liquid carbon dioxide. This reservoir may be encircled and prevented from laterally shifting by means of an open ended sleeve 19 connected to the frame as by means of bracket 20 (Fig. 3), said bracket being a part of a web 21 joining the upstanding tubular members 11 and 11' of the frame.

Means are provided for releasably supporting the reservoir 18 in position above the container 15. Such means may comprise: a supporting lever 23 attached to the lower end of rod 24, the upper end of such rod being provided with an operating or release lever 25. The rod 24 is journaled in suitable upper and lower flanges of the web 21. The end of release lever 23 is provided with an opening in its side so as to partially encircle a perforating plunger 28 carried by a combined sealed puncturing and gas distributing means or fitting 30 removably connected to the sealed reservoir 18 (see Fig. 4).

The web 21 is also provided with a holster 31 adapted to removably hold a fog nozzle 32. When the fog nozzle 32 is in its holster 31, as illustrated in Figs. 1, 2 and 3, the release lever 25 is virtually immobilized so as to preclude accidental or other movement of such release lever rod 24 and supporting lever 23. It is therefore necessary to remove the fog nozzle from its holster and have it in position for immediate use before the release lever 25 can be moved to actuate the unit.

The combined seal puncturing and gas distributing means 30 is removably connected to a fitting 34 carried by the reservoir 18, a pressure resisting but puncturable seal 35 being provided between the fitting 34 and means 30. The seal perforating plunger 28 is slidably mounted in the means 30 and suitably gasketed. The gas distributing means 30 includes a chamber 36 provided with two ports, one being connected to a flexible conduit 37 leading to the fog nozzle 32, the other being connected

by means of a length of fine-bore resilient metallic tubing 38 in communication with the upper portion of liquid container 15. This fine-bore or capillary tubing is preferably in the form of a coil such as is indicated at 38'. The lower end of such coil may either be connected directly to the liquid container 15 or to a suitable cap 39 removably connected to the upper part of container 15 by means of a threaded flange element 40. The cap 39 may be provided with a downwardly extending pipe 41 terminating near the bottom of container 15, such pipe being in communication with a port 42 formed in the cap 39, such port being connected to flexible conduit 47 leading and connected to the fog nozzle 32.

The fog nozzle may be embodied in a handpiece resembling a signal gun and including a pistol grip 48, as well as a barrel having an outer opening end at bore 49. The rear end of this barrel is provided with a coaxial jet 50 threadedly mounted within the body of the gun as indicated at 51, the rear end of such jet 50 being closed by a plug 52. A side port or ports 53 communicate the jet 50 with a passage way 54 connected to flexible tube 37.

The end of jet 50 terminates within bore 49 and is spaced from the discharge end of such bore. An annular passage 55 encircling such jet is in communication with flexible conduit 47 by means of passage way 56. It has been found that this arrangement permits carbon dioxide gas, supplied through conduit 37 to the jet 50, to effectively disperse water or other liquid supplied to the nozzle by flexible conduit 47 and discharge a fine fog or mist of such liquid within an envelope of carbon dioxide. The actual throw of such fog or mist may be varied somewhat by adjusting the length of the bore 49 and as indicated by dash lines, a tubular extension 57 may be slidably carried upon the barrel of the fog nozzle so as to increase the throw when desired.

As previously stated, the reservoir 18 is supported upon arm 23. When it is desired to place the entire unit in operation, the fog nozzle is removed from its holdster 31 and lever 25 is moved to thereby cause supporting lever 23 to be moved out of contact with the head of means 30. The entire reservoir 18 will then drop by gravity on to the fitting or cap 39 of container 15. The tubular stem of plunger 28 pierces seal 35 and immediately releases carbon dioxide through its side orifices into the chamber 36. The carbon dioxide is then distributed from said chamber to the fog nozzle by flexible conduit 37 and to the top of the container 15 through the fine bore resilient tubing 38. It has been determined that the pressure to which the body of water in container 15 is subjected may be readily controlled by varying the length of the resilient tubing 38. For example, in the event reservoir 18 contains liquefied carbon dioxide and container 15 is filled with water, 30 pounds per square inch gauge can be maintained on the water by the use of approximately 3 feet of tubing 38, the tubing being an internal diameter of 1/32 of an inch. A 10 pound tank of liquid CO_2 will discharge approximately 5 gallons of water from container 15 and be combined with such water in the form of a fine mist or fog through the nozzle illustrated, the pressure on the water during the entire cycle being maintained within 5 pounds of the desired 30 pounds starting pressure. It is to be understood that the figures here given are illustrative: higher pressures can be maintained on the water by using a shorter length of tubing, while lower pressures can be maintained on the water by the use of a longer piece of tubing. The resiliency of such metallic tubing permits relative movement between the reservoir 18 and the container 15 and the length of the tubing precludes icing or blocking because of the large radiating surface. No pressure reducing valves are required.

It is to be understood that although the illustrated embodiment employs gravity in releasing the gas and making it available both as a fire-fighting ingredient and a pressure producing agent, other means may be used

for unsealing the gas reservoir as, for example, by moving plunger 28 or its equivalent while reservoir 18 is held stationary, handle 25 and rod 24 operating a suitable cam arm or linkage to effect forcible movement of plunger 28. It is to be understood that any means of rapidly opening the gas reservoir may be used instead of a metal seal and puncturing needle or tube. For example, the gas reservoir 18 may be sealed with a poppet or other valve capable of being opened, as by plunger 28, movement of the valve releasing the compressed, noninflammable gas into distributor chamber 36, part of such gas applying pressure to liquid in container 15 and the rest going directly to nozzle 32. Instead of CO_2, other normally gaseous, noninflammable materials such as nitrogen, chlorinated organics, methyl bromide etc. may be used.

It may be noted that whenever the reservoir of compressed gas is used in the inverted position shown, there is the possibility that foreign matter, such as grease used around the fitting or foreign material within reservoir 18 may become lodged in the orifices of the hollow stem of plunger 28 and prevent proper supply of gas to chamber 36, or such objects may clog fine-bore tubing 38 and prevent proper pressure to be transmitted to liquid container 15. Such difficulties are overcome by providing fitting 34 with a tubular open-ended extension 34' which extends into tank 18 a short distance, say 3/4" to 1 1/2", beyond the inner wall surface of the tank, thereby permitting solids to gather around such discharge tube instead of passing into the fitting.

All changes coming within the scope of the claims are embraced thereby.

I claim:

1. A fire-fighting, self-contained, portable unit comprising: a pressure resisting container for liquid and a separate sealed reservoir of liquid carbon dioxide, said reservoir being spaced from said container; a combined seal-puncturing and gas-distributing means removably connected to said sealed reservoir; a gas outlet from said gas-distributing means; a liquid outlet in communication with the lower portion of the liquid container; and a length of fine bore resilient tubing in coil form, connecting said gas-distributing means with the upper portion of the liquid container, the length and bore of said tubing being adapted to transmit a desired reduced pressure to said liquid container when said reservoir is unsealed by the seal-puncturing means.

2. As stated in claim 1, said reservoir being releasably positioned above said container, and means for releasing said reservoir for gravational movement toward said container, said seal-puncturing means being actuated by contact with said container.

3. A fire-fighting, self-contained, portable unit comprising: a pressure resisting container for liquid and a separate sealed reservoir of liquid carbon dioxide, said reservoir being spaced from said container; a combined seal-puncturing and gas-distributing means removably connected to said sealed reservoir; a gas outlet from said gas-distributing means; a liquid outlet in communication with the lower portion of the liquid container; and a length of fine bore resilient, metallic tubing in coil form, connecting said gas-distributing means with the upper portion of the liquid container, the length and bore of said tubing being adapted to transmit a desired reduced pressure to said liquid container when said reservoir is unsealed by the seal-puncturing means; a manually movable directional fog nozzle including a substantially tubular discharge having an open end and an axially disposed gas discharge jet, flexible conduit means connecting the gas outlet from the gas distributing means with said discharge jet and the liquid outlet with an annular space surrounding said discharge jet; whereby carbon dioxide gas and liquid may be concurrently supplied from said reservoir and container thru said respective flexible conduit to said fog nozzle.

4. As stated in claim 3, said reservoir being releasably positioned above said container, and means for releasing

said reservoir for gravitational movement toward said container, said seal-puncturing means being actuated by contact with said container.

5. A fire-fighting unit as stated in claim 3, the tubular discharge of said fog nozzle being provided with a tubular extension member slidably mounted thereon, whereby the throw of the nozzle may be varied.

6. In a portable fire-fighting unit the combination of: a pressure resisting container for non-inflammable liquid and a separate reservoir for compressed non-inflammable gas; means for releasing and distributing gas from said reservoir including a primary gas outlet and a secondary gas outlet; a length of fine bore resilient tubing connected to said secondary gas outlet and to the upper portion of the liquid container, the length and bore of said tubing being adapted to transmit a desired pressure to said liquid container when gas is released from said reservoir; and a liquid outlet in connection with the liquid in said container, said liquid outlet and primary gas outlet being each adapted to be connected to flexible conduits both associated with a common discharge outlet for simultaneous discharge of liquid and gas therethrough.

7. A portable, self-contained fire-fighting unit comprising: a frame including a bore portion and an upstanding portion, said frame being provided with a pair of wheels;

a pressure resisting container for a noninflammable liquid and a separate reservoir for compressed noninflammable gas carried by said frame; means for releasing and distributing gas from said reservoir, including a gas outlet adapted to be connected to a flexible conduit and a secondary outlet; a length of fine-bore resilient tubing connected to said secondary outlet and to the upper portion of the liquid container; a liquid outlet in connection with the lower portion of the liquid container; means including a release lever pivotally mounted on said frame for releasing gas from said reservoir; a holster carried by the frame adjacent said release lever for holding a fog nozzle; a fog nozzle removably held by said holster to limit movement of the release lever until such fog nozzle is removed; separate flexible conduits connecting said gas outlet and said liquid outlet with said fog nozzle.

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