

Sept. 6, 1966

C. G. NESSLER

3,270,920

APPARATUS FOR PRESSURE DISPENSING LIQUIDS

Filed Dec. 3, 1964

2 Sheets-Sheet 1

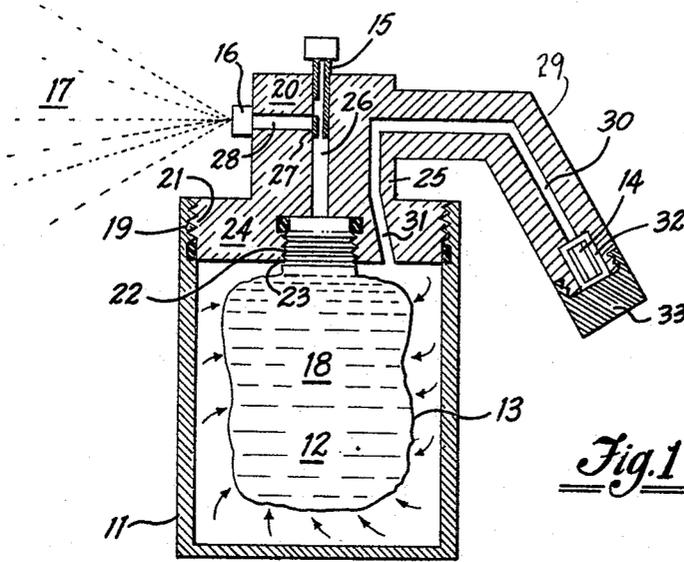


Fig. 1

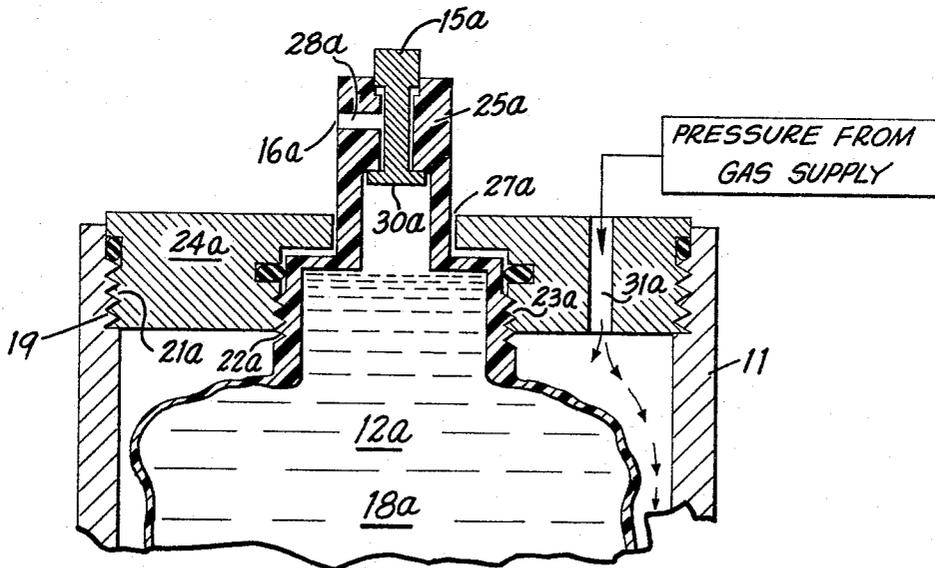


Fig. 2

CHARLES G. NESSLER  
INVENTOR.

BY *George B. Cujerolk*

ATTORNEY

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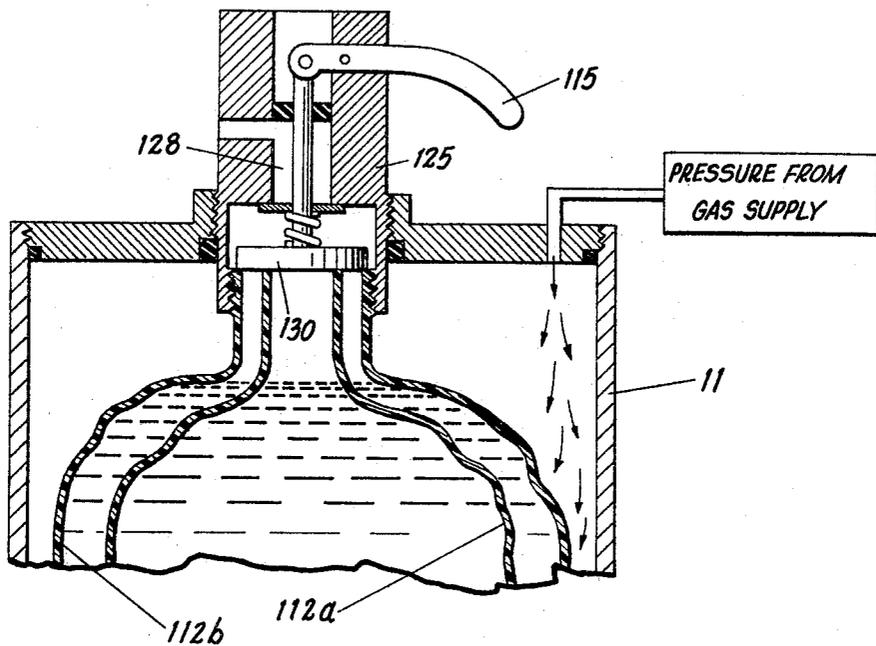


Fig. 3

CHARLES G. NESSLER  
INVENTOR

BY *George B. Cujerolk*

ATTORNEY

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**APPARATUS FOR PRESSURE DISPENSING LIQUIDS**

Charles G. Nessler, Bokum Road, Chester, Conn.

Filed Dec. 3, 1964, Ser. No. 415,670

1 Claim. (Cl. 222-95)

The present invention relates to a method and apparatus for producing a pressure propelled fluid stream or spray and more particularly to an arrangement for producing such a condition for corrosive liquids and other liquid substances which cannot or normally are not kept in a pressure container.

In the conventional pressurized device, often referred to as a bomb, or aerosol bomb in the case of aerosol generation, a compressed gas is in admixture with the liquid in a metal container. The item sold is usually merchandised through drug stores, supermarkets, etc. Very often, the pressure container is worth more than the contents thereof, but the average American seems perfectly willing to bear this added expense. However, since these goods often remain on shelves for weeks or months, corrosive substances cannot be packaged in this way. In addition, there are many other liquids which, due to chemical or physical incompatibility, cannot be in contact with the commonly used container materials, propellants; or each other as in the case of an epoxy resin and its curing agent. Thus, in conventional pressurized gas devices the liquid is placed in a metal or plastic container into which a withdrawal tube extends. The liquid is either forced through by the application of gas pressure to the liquid surface, or drawn by the generation of a lower pressure in the nozzle, as by a venturi action of a high velocity gas stream.

Although attempts may have been made to provide a pressure dispensing arrangement wherein almost any kind of liquid could be dispensed, none, as far as I am aware has ever been successfully carried out into practice while being practically and economically feasible.

The present invention relates to a simplified method of handling the liquid to be propelled or dispensed. The liquid is supplied or placed in a flexible film or otherwise collapsible bladder or bag, or other container which will transmit the pressure external to its walls to its contents.

Thus, an object of the present invention is to provide a refillable pressurized container.

Another object of the present invention is to provide an arrangement whereby corrosive and perishable liquids can be dispensed by pressurized containers.

Still another object of the present invention is to provide a method for discharging liquids by a pressurized container.

The invention also contemplates providing a simple and convenient way of spraying or dispensing substances.

It is also the purpose of the invention to provide an apparatus for the aforesaid purpose which is inexpensive to manufacture, of simple construction, and which can be operated by untrained or unskilled personnel.

With the foregoing and other objects in view, the invention resides in the novel arrangement and combination of parts, in the details of construction, and in the process steps hereinafter and claimed, it being understood that changes in the precise embodiments of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

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The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, showing by way of example, a preferred embodiment of the inventive idea.

FIGURE 1 illustrates a cross-sectional and schematic explanation of the apparatus contemplated herein;

FIGURE 2 shows a cross-sectional and schematic explanation of the top portion of a modified version of the apparatus illustrated in FIGURE 1; and,

FIGURE 3 shows another modification of the invention herein contemplated.

In the embodiment shown in FIGURE 1, a flexible container is attached to the atomising head or nozzle by a rigid or semi-rigid outlet. A rigid or pressure vessel 11 is placed around the bladder 12. If the atomising is to be of the pressure type (single fluid), the exterior 13 will then be subjected to pressure from the gas supply cartridge 14. This pressure is transmitted to that fluid in the bag. Upon actuating the valve 15 atomising action takes place at the nozzle 16. As fluid 17 is expelled, the bladder 12 gradually collapses until the liquid contents 18 are exhausted, whereupon the container is unscrewed, releasing the pressure, allowing the bladder 12 to be replaced with a new filled bladder.

The apparatus essentially comprises a cylindrical pressure vessel 11 designed to hold a collapsible bladder 12 which contains a liquid 18 which is to be dispensed as a spray 17 by pressure exerted on the exterior 13 of the bag 12. Cylindrical pressure vessel 11 has internal threads 19 at the top thereof which is open and designed to receive a spray means 20 having a corresponding outwardly threaded portion 21 to engage internal threads 19 forming an airtight seal. Bladder 12 likewise has a solid externally threaded open top section 22 designed to engage an internally threaded section 23 of the spray means 20.

Spray means 20 include a shoulder 24 containing external threads 21; a neck 25 over internally threaded section 23. A first vertical passage 26 through neck 25 communicates with the open top section 22 of bag 12, terminating in an elbow 27 connecting first passage 26 with a horizontal outlet passage 28 discharging the liquid 18 in bag 12 through a nozzle 16 as a fine spray 17. Attached to the spray means 20 is a handle 29 having a handle internal passage 30 extending therethrough communicating with a second neck vertical passage 31 which opens into container 11 outside of bag 12. Handle 29 has a supply chamber 32 at the outer end thereof communicating with handle internal passage 30. This supply chamber 32 can house a gas supply cartridge 14. The gas supply cartridge 14 is inserted into supply chamber 32 by unscrewing a handle cap 33 on the outer end of the handle. Screwing the handle cap 33 back onto the handle will engage a valve in the gas supply cartridge 14 by means known in the art so as to open the cartridge and discharge the gas into the container 11.

As is well known, if the outward pressure of the liquid contents 18 inside bladder 12 are equal to the inward pressure of the gas from the supply chamber 14, nothing happens. Valve 15 engages elbow 27 and closes outlet passage 28. By depressing valve 15, outlet passage 28 is opened so that the contents of the bladder 12 are expelled through nozzle 16 as an aerosol spray 17. Valve 15 may be rather simple consisting of a button over a hollow cylinder with a hole therein. The cylinder is spring biased so that the hole is over the elbow effectively

sealing off the vertical and horizontal passages. Pressing on the button, lowers the hole to the level of the horizontal passage allowing the liquid to pass therethrough.

If two fluid atomising is used, the material in the bladder may be optionally withdrawn by an aspirating or suction action. No suction pipe is required, which is a simplification. Under the suction type of withdrawal, a pressure vessel is not needed, and a simpler enclosure, or none, may be used.

The more common case expected has been used as illustration namely, the atomization of a liquid through the application of a gas pressure. However, both liquid or gases, or solids in powder forms, or suspensions, slurries, etc., may be sprayed and atomised by this method. Additionally, these pressure responsive systems may be discharged as foams, fluid streams, dust clouds, gas envelops, viscous semi-fluid masses, etc. The pressure supply may be any suitable pressure range, be it gas as from a high pressure or liquefied gas charge compressor, etc., or, liquid, as from a pump or household water supply, or; mechanically supplied as through a piston or other volumetrically changing force, or; from an electrical or chemical reaction or force, such as gas reaction-formation, magnetic field, etc.

In the embodiment shown in FIGURE 2, the valve is an integral part of the neck of the plastic bladder. In this case the valve, cheaply made, is replaced with the bladder, ensuring reliable atomizing, and eliminating the need for cleaning operation.

In this embodiment the cylindrical pressure vessel 11 is identical with that of FIGURE 1. Internal threads 19 engage external threads 21a of a cover 24a having a passage 31a disposed to feed a gas to the plastic bladder inserted into the cylindrical pressure vessel 11. The cover 24a has a wide aperture 27a over an internally threaded closure 23a for receiving the corresponding externally threaded top section of the plastic bag 12a. The gas supply arrangement has been purposely omitted since as already pointed out other arrangements are possible besides the handle arrangement shown in FIGURE 1. The bottom portion of the collapsible bladder 12a is as in FIGURE 1. There is an externally threaded top section 22a. Over the top section 22a is a valve assembly 25a. This valve assembly includes an internal passage 28a leading from a horizontally disposed nozzle 16a to the inside of bladder 12a. This passage 28a is normally blocked by a valve 30a biased by spring means (not shown) against the inlet passage 28a preventing fluid from the bladder 12a from entering this inlet. By depressing the valve assembly button 15a, valve 30a is forced open and liquid 18a in bag 12a is forced through passage 28a to nozzle 16a and discharged as an atomized spray. In both embodiments it may be advantageous to use an O-ring between the cover and pressure vessel and between the plastic bag and the cover.

A variation of the embodiment shown in FIGURE 2 is shown in FIGURE 3. Here, two or more bladders are mounted in a single pressure vessel 11. This embodiment is especially useful when two liquids are to be sprayed which must be kept separated until used, e.g., an epoxy resin and its curing agent. In this embodiment, one bladder is shown within the other, e.g., 112a and 112b are nested one within the other and both mounted in pressure vessel 11. It is naturally possible to so dispose the bladders that they are alongside each other, but this is too simple a modification of FIGURE 3 to warrant being shown in the drawing. Both bladders lead to a common neck 125 kept shut by a single valve 130. Thus, both bladders are controlled by valve 130, and both are kept separated by valve 130 unless the valve is depressed. Then, both liquids are forced into an internal passage 128 and sprayed out together. Valve 130 is of the type used on seltzer bottles, i.e., it is spring biased against the outlets of both bladders 112a and 112b until raised by the action of a lever arm 115.

The advantages of these arrangements are the ease of handling the liquid to be dispensed sprayed, whether they be common, or toxic, corrosive, reactive, etc.; the simplification of the dispenser or atomizer components; the ability to greatly increase the quantity of material (volume) propelled by a given gas supply quantity (versus everyday Freon filled devices); the elimination of the sources of contaminants and foreign particles that cause clogging of nozzles in common refillable devices for atomizing, the provision for the separation of the material to be atomised from the pressure supply, eliminating gas-liquid interaction and dissolution, facilitating the handling of reactive materials, eliminating dilution by foreign liquids, lessening if not elimination of foaming at the nozzle due to the liberation of dissolved gases in the material being atomised, etc.

It is to be observed therefore that the present invention provides for a method of dispensing a fluid stream or spraying a liquid as an atomized spray and comprises the steps of placing said liquid in a collapsible container; placing said container in a solid pressure vessel; sealing said pressure vessel; introducing a fluid under pressure into said sealed pressure vessel; and, opening a small portion of said collapsible container to a nozzle leading out to the atmosphere so that the liquid therein contained is forced out by the fluid under pressure acting on the collapsible container. Preferably the fluid under pressure is a gas. Also, the present invention provides for an apparatus for dispensing a liquid as a stream or spray which apparatus comprises in combination, a hollow cylindrical pressure vessel for holding at least one collapsible open-ended bladder therein which bladder in turn will contain a liquid to be dispensed, said hollow vessel having an open end; sealing means for sealing off said vessel and bladder; means for introducing a fluid under pressure to said vessel on the outside of said bladder; and, valve means and nozzle means coupled to said bladder open end to deliver the liquid contained therein to the atmosphere as a spray when said valve means is actuated. Said sealing means may be a top including a shoulder with external coupling means for firm coupling to said vessel open end with internal coupling means for coupling to said bag so as to seal off said vessel. The liquid is delivered through a neck extending out from said shoulder, the nozzle means being in the neck. The top further has a first passage communicating between said bladder open end and said nozzle as well as a second passage communicating between said hollow vessel and a supply of compressed gas, the valve means controlling the flow through the first passage. The neck can be either integral with said shoulder or with said bladder open end.

Furthermore, it is possible to spray a plurality of liquids by having a plurality of bladders, preferably, one nested within the other, all leading to a common neck and controlled by a common valve.

Although the present invention has been described in conjunction with preferred embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and appended claim.

I claim:

An apparatus for dispensing liquids as spray, comprising in combination;

- (a) a solid open-ended pressure vessel for holding a collapsible bladder therein;
- (b) a collapsible bladder including a spout integral therewith which bladder in turn will contain a liquid therein which is to be dispensed as an aerosol spray from said spout, said spout having an external shoulder;
- (c) a top to seal off said bladder within said vessel, said top including external coupling means for coupling to

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said vessel open-end, internal coupling means for coupling to said spout, an internal shoulder on said top to engage the external shoulder of said spout;

(d) an outlet section in said spout extending out through said top internal shoulder;

(e) an elongated narrow passage in said outlet section, the inner and outer terminals of said narrow passage acting as valve seats;

(f) a valve in said spout outlet section slidable along the main axis thereof normally sealed against said inner terminal by fluid pressure against said valve, a valve projection on said valve extending through said narrow passage, exterior valve depressing means integral with said valve projection which when depressed will move said valve longitudinally in said outlet section, said exterior depressing means moving only until it strikes the outer terminal of said narrow passage;

(g) a dispensing passage extending from said narrow passage to the exterior, at right angles to said narrow

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passage so that the depressing of said depressing means moves the valve and permits fluid from said bladder to enter said narrow passage and be sprayed under pressure from said dispensing passage.

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ROBERT B. REEVES, *Primary Examiner.*

RAPHAEL M. LUPO, *Examiner.*

N. L. STACK, *Assistant Examiner.*