

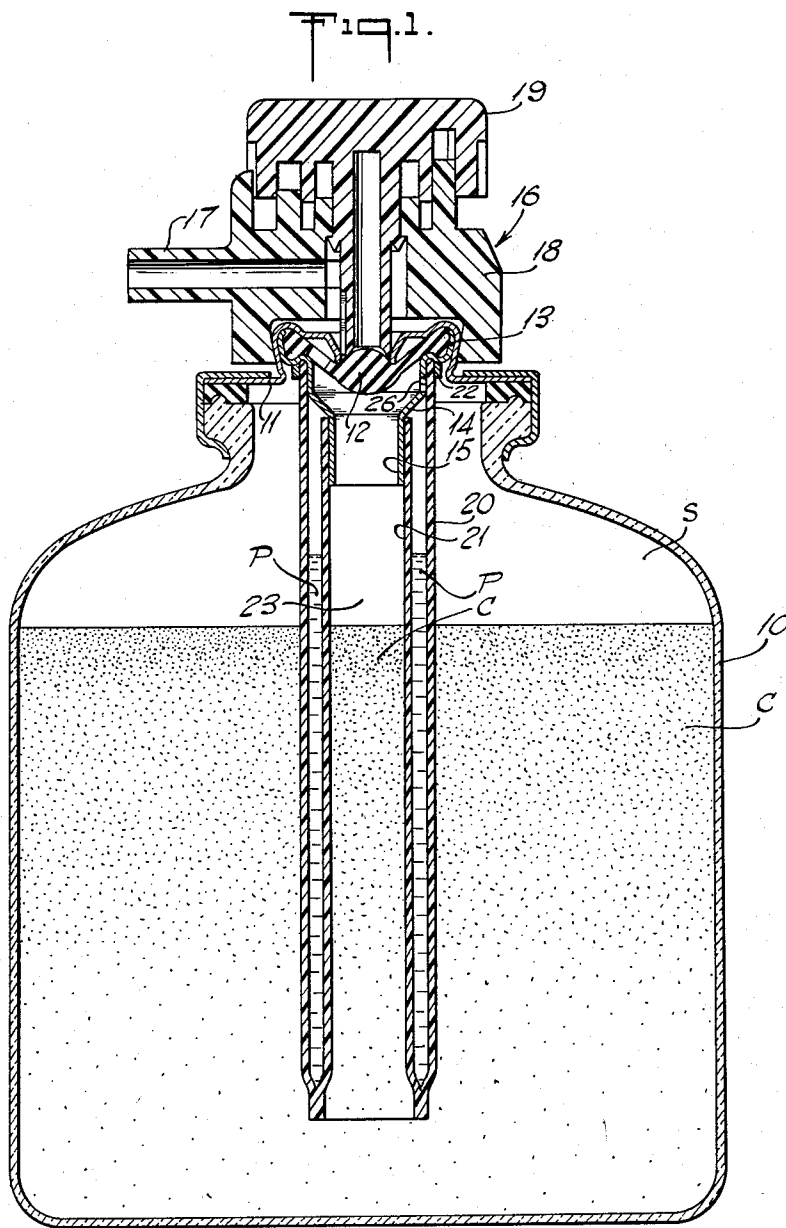
Nov. 29, 1960

J. E. AYRES
PRESSURIZED PACKAGE

2,962,196

Filed May 28, 1957

2 Sheets-Sheet 1



INVENTOR
JOHN E. AYRES
BY
Burgess, Ryan, & Hicks
ATTORNEYS

Nov. 29, 1960

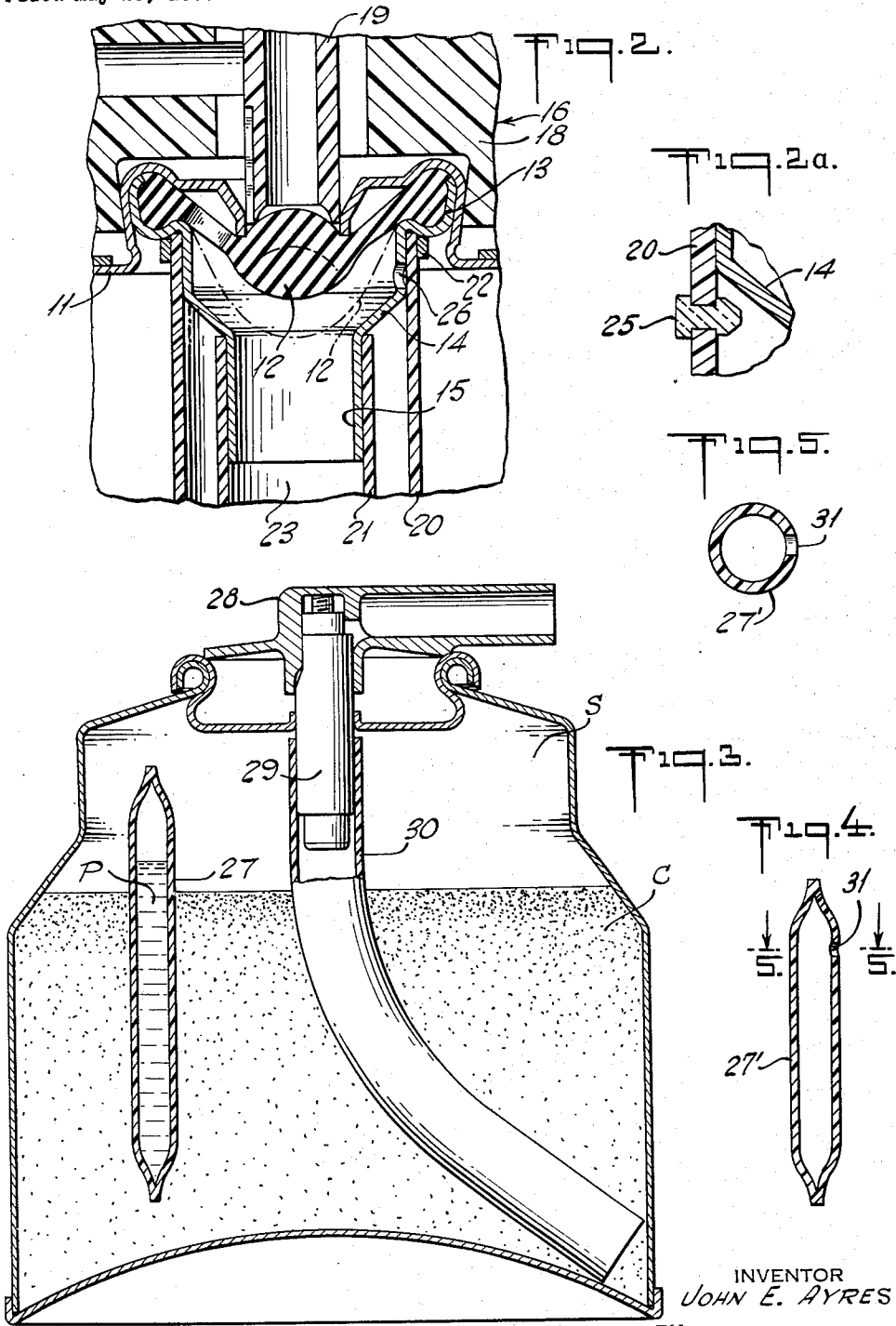
J. E. AYRES

2,962,196

PRESSURIZED PACKAGE

Filed May 28, 1957

2 Sheets-Sheet 2



INVENTOR

JOHN E. AYRES

BY

Burgess, Ryan, & Hicks
ATTORNEYS

1

2,962,196

PRESSURIZED PACKAGE

John E. Ayres, Mountainside, N.J., assignor to Oil Equipment Laboratories, Incorporated, Elizabeth, N.J., a corporation of New Jersey

Filed May 28, 1957, Ser. No. 662,117

6 Claims. (Cl. 222—399)

The present invention relates to a pressurized package and method of dispensing a commodity from a container by pressure. More particularly, the present invention relates to a pressurized package and method of dispensing a commodity from a container by pressure of vapor from a propellant of the liquid-vapor type.

At the present time many commodities, such as shaving soap, cosmetic preparations of various kinds, paints, insecticides, and the like, are widely sold in containers from which the commodities are discharged by the pressure from a propellant of the liquid-vapor type. Among the propellants used for this purpose are the fluorochloromethanes and ethanes or mixtures thereof which are known commercially as "Freon," which are maintained in liquid form at normal temperature (70° F.) by the pressure within the container, usually in the range of from 30 to 80 pounds per square inch gauge. In such packages, the propellant in liquid form is in intimate contact with the commodity to be dispensed and as a result, the propellant becomes admixed with the supply of the commodity in the container. Due to the mixture of the propellant and the commodity, a certain amount of the propellant in liquid form is discharged from the container with the commodity and expands to a vapor upon being discharged. For example, in dispensing soap from a pressurized package, some of the propellant in liquid form is discharged with the soap and upon discharge, the expansion of the propellant causes the foaming action.

The pressure within the container will depend upon the characteristics of the particular propellant. However, to maintain the amount of propellant required for proper operation of the container in liquid form, the pressure in a loaded container is generally in the neighborhood of 40 to 50 lbs. per square inch gauge and because a substantial amount of the propellant in the container is in liquid form, it is considered dangerous to use a container made from a material which will shatter, such as glass, in a pressurized package of this character. The reason for this is that if a loaded container made of shatterable material is dropped accidentally, the container is likely to explode with pieces of the shatterable material being driven with considerable velocity in all directions because of the tremendous amount of force stored in even a small quantity of the propellant in liquid form.

According to the present invention, mixing of the propellant with the commodity being dispensed is kept to a minimum and the container may be made of glass or other frangible material with relatively little danger to the user.

Among the objects of the present invention is the provision of a pressurized package and a method of dispensing a commodity under pressure by which the danger of explosion is greatly reduced, thus making it possible to use a container of glass or other shatterable material. Another object of the invention is to provide a pressurized package and a method of dispensing a commodity under

2

pressure from a propellant of the liquid-vapor type in which the propellant in liquid form does not come into intimate contact with the commodity to be dispensed and hence does not become admixed with the commodity in the container so that changes in the consistency or other physical characteristics of the commodity caused by the propellant are kept to a minimum which is desirable in the dispensing of commodities such as toothpaste, hand creams, lotions, water based products and the like. In such cases, the mixture of the propellant in liquid form with the commodity would tend to diminish desired properties of the commodity. In addition, it is possible in accordance with the present invention to reduce the amount of propellant required for the proper discharge of a commodity from a pressurized package and thus, realize a substantial saving in the packaging costs.

Other objects and advantages of the present invention will be apparent and best understood from the following description and the accompanying drawing in which:

Fig. 1 is a vertical section view of a pressurized package embodying the invention;

Fig. 2 is a vertical section view of portions of the pressurized package shown in Fig. 1, but is on an enlarged scale;

Fig. 2a is a fragmentary section view illustrating a modification in the package shown in Figs. 1 and 2;

Fig. 3 is a vertical section view of a modified form of pressurized package embodying the invention;

Fig. 4 is a vertical section view illustrating a modification in the package shown in Fig. 3; and

Fig. 5 is a section view taken along the line 5—5 of Fig. 4.

Referring to the drawings in detail, the package shown in Fig. 1 illustrates a pressurized package which includes a container 10 with a supply C of a commodity to be dispensed therein. The container may be made of glass or other shatterable material, but if desired, it may be made of metal or other suitable material.

The container has an opening in the top thereof which is closed by a cover or closure member 11 which is secured to the container in the usual manner. The closure member has a central discharge opening therein which communicates with the interior of the container and a valve carried by the closure member controls the discharge of the contents of the container through said opening. The valve includes a valve member 12 in the form of a diaphragm of a resilient and stretchable material which has a solid central portion and an offset opening therein. The solid central portion normally engages with flanges on the closure member and closes the opening therein.

The valve member is held in place by a rim 13 of a cup-shaped coupling member 14 which engages with the outer edges of the diaphragm and the sides of a recess in the closure member so that the solid portion of the diaphragm is held in engagement with the opening in the closure member under tension. When the diaphragm is depressed, the contents of the container pass through the opening in the diaphragm to the opening in the closure member. The coupling member 14 extends downwardly from the rim and has an annular collar 15 formed at the bottom thereof below the valve member.

A valve operating and dispensing unit 16 is mounted on the outside of the closure member. A discharge spout 17 formed as part of a base portion 18 of the dispensing unit communicates with the valve-controlled opening through a bore in the base portion. In addition, a manually operable plunger 19 is movably mounted in the bore in the base portion with its lower end in a position to engage with the valve member when the plunger is depressed.

Such a valve and dispensing unit are more fully de-

scribed and claimed in my copending application Serial No. 315,052, filed October 16, 1952, entitled "Valve Mechanism," now Patent No. 2,805,003, dated September 3, 1957, and in my Patent No. 2,752,066, dated June 26, 1956, for "Combined Dispenser and Valve Operating Mechanism," respectively. Hence, a description of these parts need not be repeated in detail here. It will also be understood that other types of valves and dispenser caps may be used to control the discharge of the contents of the container in accordance with the present invention.

As shown in Figs. 1 and 2, a pair of spaced tubular members 20 and 21 are concentrically arranged with respect to each other and are fitted at their upper ends over the side walls of the coupling member and the collar at the bottom thereof, respectively. The tubular members 20 and 21 are made of a flexible plastic material which is permeable to a propellant in the form of a gas or vapor under pressure. Films made from materials such as polyethylene, nylon, tetrafluoroethylene ("Teflon") and vinyl polymers or copolymers are suitable for this purpose as such materials are permeable to gas or vapor, but have relatively low permeability to the propellant in liquid form.

The lower ends of the spaced tubular members are joined together by heat sealing, molding or other suitable means. Thus, the space between the tubular members form a chamber in which a supply P of a suitable propellant of the liquid-vapor type, such as the fluorochloromethanes and ethanes, known commercially as "Freon," may be confined and maintained in liquid form within the container without contacting or mixing with the commodity to be dispensed. A retaining band 22 surrounds the outer tubular member at the top thereof and holds the outer tubular member seated against the sides of the coupling member despite pressure from the propellant in the chamber.

It will be noted that the interior of the inner tubular member 21 also forms a central passageway 23 communicating at its top end with the valve in the valve-controlled opening of the closure member through the collar on the coupling member and with the interior of the container at the bottom thereof. In this aspect, the inner tubular member functions as a siphon tube through which the commodity in the container may be discharged.

Vapor or gas from the supply of liquid propellant confined in the chamber formed by the tubular members will pass through the plastic material from which the tubular members are formed and into the space S above the commodity in the container until the vapor pressure in the container and in the chamber equalizes. When pressure in the container falls below the pressure required to maintain the supply of propellant in the chamber in liquid form, some of the liquid propellant in the chamber will vaporize and the propellant in the form of a vapor will again pass through the plastic material from which the tubular members are formed into the space S in the container above the commodity. Such a drop in pressure will ordinarily occur when the valve has been opened and part of the commodity is discharged from the container. However, when the pressure of the vapor in the container and in the chamber equalizes, vaporization of the supply of propellant in liquid form ceases until there is another drop of pressure in the container.

Polyethylene has been found to be particularly suitable for forming the chamber in which the supply of propellant in liquid form is confined since it is permeable to the gas or vapor from the propellant, but is not permeable to any extent to the liquid propellant. To obtain the proper transmission of the vapor, the tubular members may be from .010 to .020 inch in thickness. If the desired permeability is not obtained from the plastic material alone, a small insert 25 of a suitable material, such as a ceramic which will permit the passage of vapor

more readily than a liquid, may be placed in an opening in one of the tubular members, as shown in Fig. 2a.

In assembly, the tubular members 20 and 21 may be attached to the coupling member 14 after the valve member and the coupling member have been put in place on the closure member. This assembly may then be secured to a container which has been filled with the desired amount of the commodity to be dispensed.

As shown in Figs. 1 and 2, one or more openings 26 are provided in the side of the coupling member opposite a portion of the outer tubular member which is seated on the coupling member for the purpose of loading the chamber between the tubular members with the propellant in liquid form after the container has been assembled. The outer tubular member normally closes the openings 26 in the side of the coupling member. However, the resilient valve member 12 may be depressed by an adapter on a filling machine (not shown) to a position where the valve member blocks the opening in the bottom of the coupling member so that when propellant in liquid form is forced through the valve controlled opening under pressure, the outer tubular member is forced away from the openings in the side of the coupling member and thus, the propellant can pass into the supply chamber through the openings. When the valve member returns to its initial position, the outer tubular member again closes the openings in the side of the coupling member. Apparatus suitable for filling the chamber with liquid propellant in this manner is shown in my copending application S.N. 428,449, filed May 10, 1954, for Method and Apparatus for Loading Pressurized Containers, now Patent No. 2,857,937, dated October 28, 1958. However, it will be understood that the chamber may be filled with propellant in liquid form in any suitable manner.

When the container has been filled with the commodity to be dispensed and the chamber formed by the tubular members contains a supply of propellant in liquid form, the package is ready for use. Under these conditions, vapor from the supply of liquid propellant in the chamber fills the space S in the container above the commodity and when the valve member is depressed, the pressure of the vapor forces the commodity through the passageway formed by the inner tubular member to the valve-controlled opening and through the discharge spout when the valve is opened. The discharge of the commodity will cause a drop of pressure in the container and as a result, vapor from the supply of liquid propellant in the chamber will pass into the container until the pressure in the container and the pressure in the chamber equalize. When this occurs, further vaporization of the supply of propellant in liquid form ceases and the remainder of the supply is maintained as a liquid.

Since the supply of propellant in liquid form is confined in the chamber between the tubular members, it does not come in contact with the commodity in the container or become mixed therewith. Hence, the liquid propellant does not dilute the commodity or change the characteristics of the commodity as it is discharged from the container. In addition, the fact that propellant in liquid form is not discharged from the container with the commodity makes it possible to obtain satisfactory operation of the package with less propellant than would otherwise be the case.

If the container is shaken by the user so that some of the propellant in the form of vapor becomes mixed with the commodity in the container, the small amount of the propellant in the form of vapor which might be discharged with the commodity, does not materially affect or change the physical properties of the commodity. Even if the container should be turned upside down and the valve opened, the supply of liquid propellant will not be discharged from the container and render the package inoperative as is often the case when the propellant in the container is in liquid form.

5

By confining the supply of propellant in liquid form within the chamber formed by the tubular members, the energy stored in the liquid propellant will have no appreciable effect in case a container made of shatterable material is dropped accidentally. In such event, vapor or gas from the propellant in the chamber will gradually pass out of the chamber until the supply of the propellant has vaporized. This makes it reasonably safe to use glass or other shatterable material in a container for a pressurized package.

In the embodiment of the invention shown in Fig. 3, the supply of liquid propellant is confined in a separate pellet or receptacle 27. Such a pellet may be placed inside of the container at the time the container is filled with the commodity and in general, the operation will be the same as previously described. In this case, the pellet 27 may be made from a tube of plastic material, such as polyethylene, which is permeable to the vapor from the propellant. The ends of the tube are closed by heat sealing or other suitable means. If desired, a ceramic insert may be placed in the side of the pellet, as previously described.

The container shown in Fig. 3 is made of metal. In this package, a dispenser cap 28 is mounted on the top of a plunger operated valve 29 which controls the discharge of a commodity from the container and a siphon tube 30 is connected to the bottom of the valve. These are conventional components and need not be described in detail here.

Satisfactory operation may also be obtained by providing a small outlet 31 in the sides of the member 27' forming the chamber in which the liquid propellant is confined. Such an outlet should be very small, say, from .015 to .025 inch in diameter and the container should not be placed in an inverted position for any length of time to avoid bleeding of the liquid propellant into the commodity in the container.

It will also be understood that various modifications may be made in practicing the invention and in the embodiments of the invention shown and described herein without departing from the scope of the invention as defined by the following claims.

I claim:

1. In a package for dispensing a commodity from a container under pressure from a vapor through a valve-controlled opening in the container, which comprises, a container having an opening therein and a valve controlling said opening, said container having a supply of a commodity therein, a pair of spaced members located in said container, said members being formed of a plastic material which is permeable to vapor from a propellant of the liquid-vapor type and comprising an outer member and an inner member having their ends joined together to form a chamber therebetween, a supply of the propellant

6

of the liquid-vapor type confined within said chamber, said propellant initially being under pressure sufficient to maintain a major portion thereof in liquid form at normal temperatures, said inner member having an opening extending therethrough and forming a passageway communicating with the valve-controlled opening in the container.

2. In a package for dispensing a commodity from a container under pressure from a vapor through a valve-controlled opening in the container, which comprises, a container having a valve-controlled opening therein and containing a supply of a commodity, a coupling member having an opening therein communicating with the valve-controlled opening in the container and a pair of tubular members connected to the coupling member at their upper end, said tubular members being arranged in spaced relation to each other with one member inside of the other member and being sealed together at their lower ends to form a separate chamber in the container for receiving a supply of a propellant of the liquid-vapor type in liquid form, at least one of said tubular members being formed from a material which is permeable to vapor from the supply of liquid propellant, said inner tubular member also forming a passageway communicating with the opening in the coupling member and the bottom of the container.

3. In a package for dispensing a commodity from a container as defined in claim 2 wherein the coupling member has an opening therein located opposite the outer tubular member and normally being closed thereby.

4. In a package for dispensing a commodity from a container as defined in claim 2 wherein the container is made of a shatterable material.

5. In a package for dispensing a commodity from a container as defined in claim 2 wherein the outer tubular member has an insert of a vapor-permeable material located in an opening therein.

6. In a package for dispensing a commodity as defined in claim 2 wherein one of the tubular members is made from a thin film of plastic material selected from the group comprising polyethylene, nylon, tetrafluoroethylene and vinyl polymers.

References Cited in the file of this patent

UNITED STATES PATENTS

20,382	Wheeler	May 25, 1858
695,323	Mittinger	Mar. 11, 1902
2,016,407	Wentzel	Oct. 8, 1935
2,246,594	Kinsella	June 24, 1941
2,643,791	Kollsman	June 30, 1953
2,719,628	Ivanoff	Oct. 4, 1955
2,752,036	Parkhurst	June 26, 1956
2,794,579	McKernan	June 4, 1957