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DISPENSER FOR MATERIALS IN LIQUID AND SEMISOLID STATES

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FIG. 1.

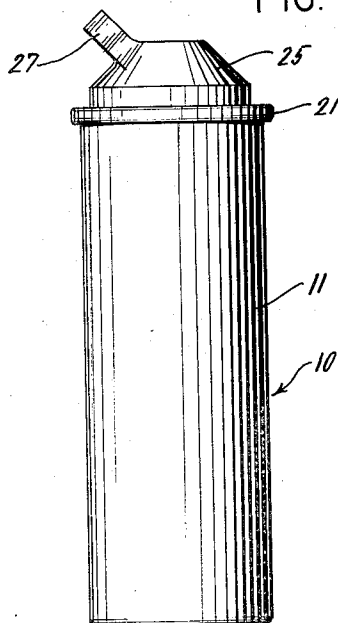


FIG. 2.

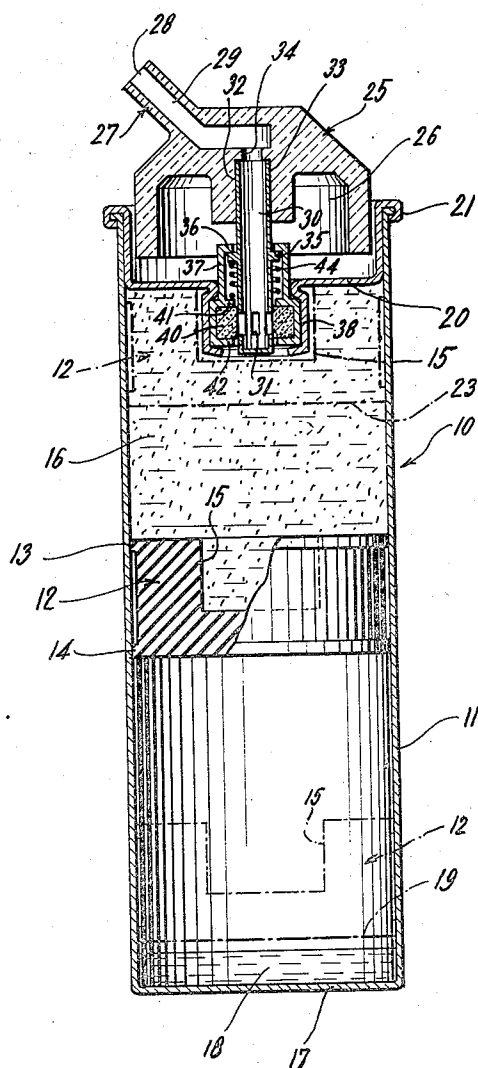


FIG. 3.

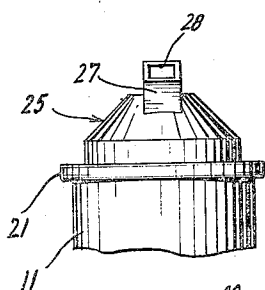


FIG. 4.

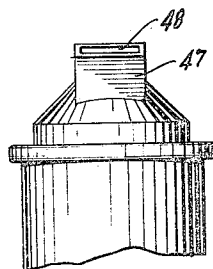
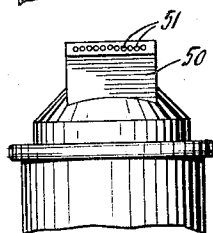


FIG. 5.



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DISPENSER FOR MATERIALS IN LIQUID AND SEMISOLID STATES

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1 Claim. (Cl. 222—387)

This invention relates in general to a dispenser for materials in liquid and semisolid states in particular to a dispenser containing a propellant for forcing out materials which range in consistency from the liquid state to that exemplified by paste, putty, ointments and the like.

A dispenser which is in wide use at the present time is one of the type which makes use of an inert, non-toxic, non-corrosive, non-irritating, non-inflammable liquid with a low boiling point as a propellant. An example of such a class of liquids is Freon. The Freon-type liquid is contained within the same chamber in the dispenser as the material to be dispensed and is mixed with that material. When a means of egress from the chamber has been provided, a stream of the substance to be dispensed is rapidly forced from the dispenser with and by means of the propellant.

The above-described type of dispenser or "bomb," as it is frequently called, is efficient only in dispensing gases or easily-flowing liquids. When used with materials which flow only with difficulty or do not flow at all, the dispenser in present use will either not eject the material or eject it unevenly and cause it to spatter. In the case of a medicinal ointment to be applied to the skin, this necessitates the spreading of the ointment with a finger to spread it evenly over the area to be covered. It has been shown that such spreading with a finger in the immediate vicinity of a large denuded skin area is a prime factor in the cause of infection.

Another class of materials—those which are edible—are not suitable at present for use in a conventional dispensing bomb. Science has not yet indisputably shown that the intimate intermingling of a food and a propellant of the Freon type over a long period of time will not be injurious to the food.

The invention hereinafter described overcomes both of these major objections to the conventional bomb-type of dispenser mentioned above. It is not only particularly adapted to spread liquid and semisolid materials of a pasty and viscous form, but is of such construction that the propellant never comes in direct contact with the material to be dispensed. This latter fact eliminates the health hazard and provides for the discharge of material at room temperature, not colder as when the volatile propellant is mixed with the material.

Basically, the present invention utilizes a "floating piston" to separate the propellant, which may also be epitomized by a Freon-type compound, from the material to be dispensed. A constant pressure is indirectly exerted by the propellant against the material to be dispensed, so that when a means of egress is provided for the material, the propellant, exerting pressure on the floating piston, will cause the piston to exert an equivalent pressure on the matter to be dispensed, which matter will then be forced smoothly from the container.

The greater the density of the material to be ejected,

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the greater the constant pressure exerted by the propellant must be. One of the Freon liquids, which satisfy the requirements of being inert, non-toxic, non-irritable, non-corrosive and non-inflammable, will probably prove ideal. Freon (F-12), for example, is dichlorodifluoromethane. It is a colorless, almost odorless gas which has a boiling point of -21.7° F. at atmospheric pressure. It may be produced commercially so that it will exert a constant pressure so long as there is any F-12 remaining in the liquid state. Other Freon compounds, all of which are fluorine and chlorine-substituted hydrocarbons, have different boiling points and so exert different constant pressures. Some other Freons are F-21, F-22, F-113 and F-114. While Freon compounds have thus far proved highly adaptable to the needs of the present device, the invention hereinafter described is not to be so limited, but may utilize any propellant which will perform in a satisfactory manner.

It is an object of the present invention to provide for a dispenser which will quickly and easily permit the forcing out of a liquid or semisolid material by a simple, mechanical movement.

It is another object of the present invention to provide for a dispenser which will permit the forcing out of a liquid or semisolid material under pressure when the outlet means for the material is in open position.

It is still another object of the present invention to provide for a dispenser which will permit the forcing out of a liquid or semisolid material by means of indirect pressure exerted on the material by a fluid having a boiling point substantially below room temperature.

It is a further object of the present invention to provide for a dispenser which will permit the smooth forcing out of a stream of medicinal ointment when the cap of a stream of medicinal ointment of the dispenser is depressed.

It is a still further object of the present invention to provide for a dispenser which will permit the forcing out of edible material under the pressure of a gas which is not in direct contact with the material.

These and other objects and features of advantages of the present invention will become more apparent when taken in connection with the illustration of the invention in the accompanying drawing, in which:

Fig. 1 is a side elevation of one form of the invention;

Fig. 2 is an enlarged, longitudinal section of the form of Fig. 1;

Fig. 3 is a partial, front elevation showing the nozzle of Figs. 1 and 2;

Fig. 4 is a partial, front elevation showing a modified nozzle, and

Fig. 5 is a partial, front elevation showing a second, modified nozzle.

Referring now to Figs. 1 and 2, the container 10 is bounded on its sides by a containing wall 11, which is cylindrical in shape, and by a base 17, which terminates the wall 11 at one end thereof. A piston 12 is reciprocally mounted within the wall 11. The piston 12 is also generally cylindrical in shape, and has a slightly smaller diameter than the wall 11. The piston 12 has flanges 13 and 14 on its upper and lower flat surfaces, respectively. As the piston 12 has no rod attached to it, it is known as a "floating piston." The flanges 13 and 14 contact the inner surface of the wall 11 and form a seal therewith. In the illustration in Fig. 2 the piston 12 has a recess, indicated generally at 15, the purpose of said recess being to provide additional space for the material 16, which is to be dispensed.

While the material 16 lies above the piston 12, the liquid propellant 18 and the gas is produced by the propellant 18, are contained beneath the piston 12. As outlined by the broken line 19, the piston 12 is initially inserted at a position near the bottom 17 of the container 10. As seen in Fig. 2, approximately one-half of the material 16 initially in the container 10 has already been dispensed. When the supply of material 16 has been exhausted, the piston 12 will be in the position indicated by the broken line 23.

The dispensing means for forcing out the material 16 is inserted at the top of the container 10. A trough 20 is crimped about the wall 11 at 21, and parallels the wall 11 for a moderate distance before extending inwardly.

The container cap 25 fits slidably within the trough 20. It may be formed from plastic, and is preferably molded to form a hollow portion, indicated at 26, so as to prevent cracking and lower the cost of production. Also formed in the cap 25 are the nozzle 27, the nozzle aperture 28 and the duct 29. The duct 29 extends within the nozzle 27 and is a connecting link between the aperture 28 and the cylinder 30. The cylinder 30 removably fits within the slot 32 in the cap 25 and forms an extension of the connecting duct 34. The cylinder 30 also extends vertically from the cap 25 toward the bottom of the container 10 and has a series of apertures 31 cut in it near its lower end. A relatively thick wall 33 bounds the cylinder 30 and contains a ridge 35, which is adapted to extend beneath the lip 36 of the collar 37.

The collar 37 is held by the extension 38 of the trough 20, which extension 38 is crimped about the collar 37. The collar 37 retains a gasket 40 by means of the flanges 41 and 42. When the container 10 is in the material-retaining position, the gasket 40, which may be composed of rubber or a like substance, surrounds the apertures 31 in the cylinder 30 and prevents the flow of material 16 through the apertures 31. A spring 44 is held between the lower surface of the ridge 35 and the upper surface of the flange 41. The spring 44 tends to exert pressure to hold the cylinder 30 and consequently the cap 25 in elevated position.

In Fig. 3 the nozzle aperture 28 is clearly seen. It is rectangular in shape and is suitable for general use. In Fig. 4 an elongated nozzle 47 is revealed having an elongated aperture 48, which will emit a thin, flat layer of dispensed material. In Fig. 5 the nozzle 50 is likewise elongated, but a series of small holes 51 form the means of egress of the material to be dispensed. The nozzle shown in Fig. 5 will produce a series of fine, thread-like ribbons of material, and may be preferred for special purposes.

In operation, a sufficient amount of liquid propellant 18 is first placed in the container 10. This may easily be done at a temperature below the boiling point of the propellant. The piston 12 is next inserted to a point immediately above the surface of the propellant 18. The remainder of the available space within the wall 11 of the container 10 is filled with the material 16 to be dispensed. Then the cap 25 is put in place within the trough 20. When it is desired to dispense some material 16, the cap 25 is manually depressed against the action of the spring 44 until the apertures 31 in the cylinder 30 extend beneath the gasket 40. In this material-dispensing position the piston 12, reacting to the pressure of the repellant 18, as that propellant makes the transition from a liquid to a gaseous state, moves upward to force a quantity of the material 16 through the apertures 31, the cylinder 30, the connecting duct 34, the nozzle duct 29 and the aperture 28 in the nozzle 27. When desired, the nozzles 47 and 50 with apertures 48 and 51, respectively, may be substituted for the nozzle 27.

As an alternate method of assembly, the loading may be accomplished starting with a container with both ends open. The piston 12 is first inserted through the top of the container, then the material 16 to be dispensed, and then trough 20, which is crimped about the container wall 11. The propellant 18 is inserted through the open bottom of the container and the bottom 17 sealed in place. Another alternative would be to have the propellant 18 inserted through a threaded aperture in the bottom 17, and a male plug cooperate with the aperture to effect complete closure. Insertion of the propellant from the bottom end of the container would eliminate the possibility of substantial evaporation of the liquid propellant at temperatures above the boiling point of the propellant.

Thus it will be seen that a dispenser has been provided which allows for the forcing out of material in a liquid or semisolid state by means of the simple manual operation of depressing the cap of the dispenser. In addition, the propellant never comes in direct contact with the material to be dispensed, eliminating all possibility of contamination of the material by the propellant. A large variety of substances may be forced from this type of dispenser, including medicinal preparations, pastes, waxes, building materials, foods and oil-base preparations. Neither the material to be dispensed nor the propellant need ever come in contact with the hands of the user. As there is no escape of the gasified propellant in this device, commercial liquified petroleum gases, such as propane or butane, might be substituted for Freon or used in combination with Freon. This would result in greater economy and no increase in danger because of the entrapment of the gas.

It will be apparent that various changes, substitutions and modifications may be made in the above description of the invention without enlarging the scope of the invention. For instance, any shape of nozzle aperture might be used. The above description and drawing, therefore, have been used for the purposes of illustration only, and the invention is to be limited only by the scope of the appended claim.

What is claimed is:

A dispenser comprising a generally cylindrical housing side wall, housing end walls at opposite ends of said housing side walls, one of said end walls being crimped about the periphery of the side wall and located longitudinally inward from the adjacent end of said housing side wall to define a trough and longitudinal extension into said housing, a reciprocable piston in said housing side wall forming a seal therewith combining with said housing side wall to define a dispensing material chamber and an expansion chamber, an elongate open-ended collar arranged longitudinally within said housing and fixedly carried within said longitudinal extension having one of its ends extending inward into said dispensing material chamber and the other end extending beyond said housing, an annular sealing gasket fixed within said collar adjacent to the inward end thereof and extending into said dispensing material chamber, a tubular valve member extending longitudinally through said collar into said dispensing material chamber and received in said sealing gasket for longitudinal movement, dispensing apertures in said valve member normally closed by said sealing gasket and radially covered thereby when said valve member is in its outward position to close the interior of said dispensing material chamber to the atmosphere and movable relative thereto to be selectively and progressively uncovered a predetermined amount by said sealing gasket when said valve member is moved progressively inward into said dispensing material chamber to vent said chamber a predetermined amount to the atmosphere, a coil compression spring located interiorly of said collar circumposed about said tubular valve member and resiliently urging the latter toward its outward closed position of movement, and

a selectively operable dispenser cap carried on the outer end of said tubular valve member for manually effecting the predetermined longitudinal movement of said valve member, said cap conforming in shape for receipt in the adjacent end portion of said housing side wall and engageable therewith to limit lateral movement of said valve member.

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529,221
1,934,225
2,479,570
2,615,597
2,742,197
2,781,950

References Cited in the file of this patent

UNITED STATES PATENTS

Wagner	Nov. 13, 1894
Candor	Nov. 7, 1933
Haynor et al.	Aug. 23, 1949
Tomasek et al.	Oct. 28, 1952
Walsh	Apr. 17, 1956
Prichard	Feb. 19, 1957