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JET STREAM DISPENSER
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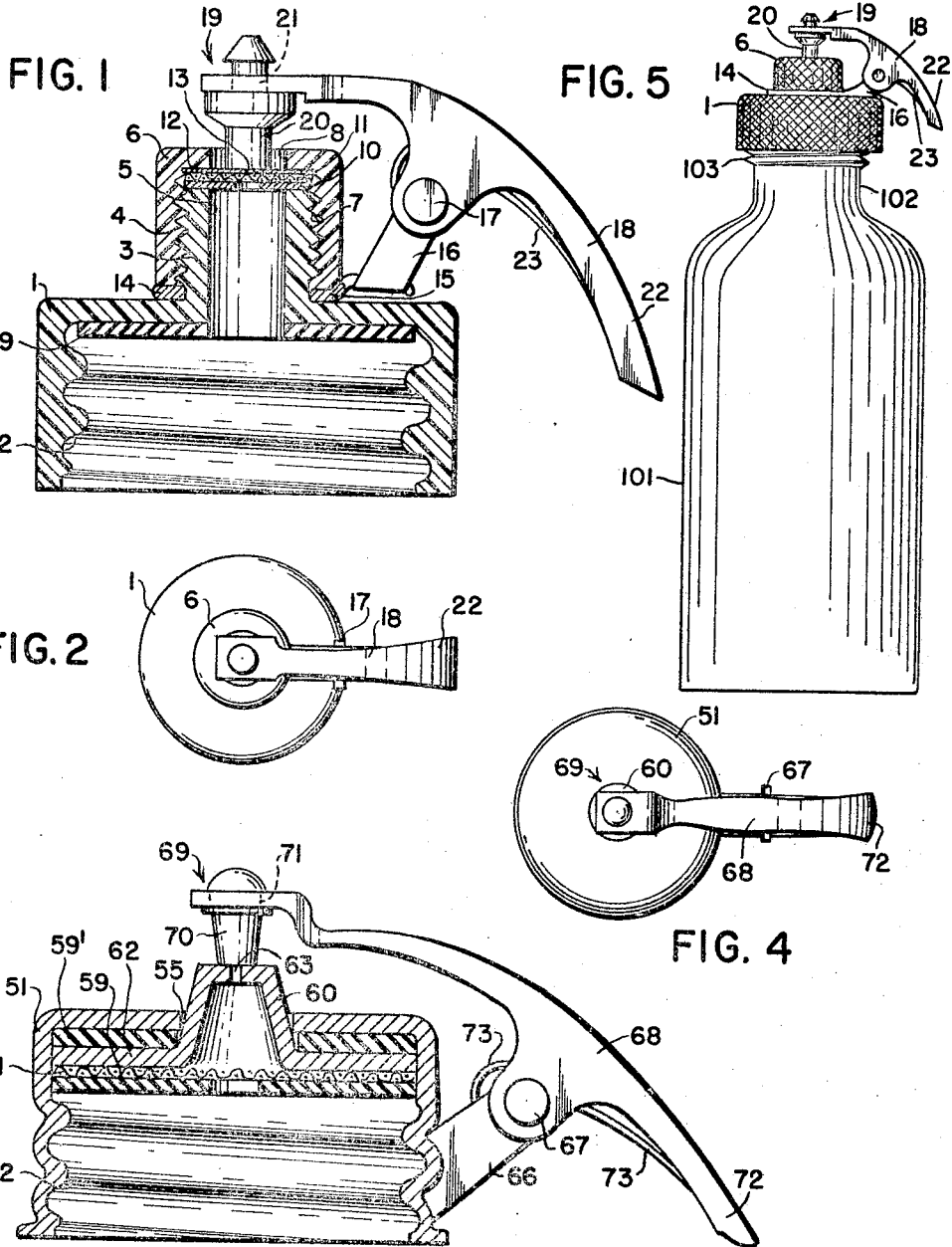


FIG. 2

FIG. 5

FIG. 4

FIG. 3

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JET STREAM DISPENSER

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This invention relates to a jet stream dispenser which may serve as a closure for a container of volatile refrigerant used for inducing local anesthesia or analgesia in minor surgery.

It has long been the practice in minor surgical procedures to project a fine stream of a volatile refrigerant, such for example as ethyl chloride, on the operative area, where the evaporation of the refrigerant sufficiently cools the tissues to produce a desired degree of local anesthesia or analgesia.

The refrigerant, which has a vapor pressure slightly higher than atmospheric at room temperature, is ordinarily sold in small glass bottles of, say, four ounce capacity, closed by a valved cap. In use, the bottle is tipped so that the liquid contents fill the neck and the valve is opened, permitting a jet of refrigerant to be projected through a fine orifice in the cap closure.

One type of closure widely used for this purpose comprises a cork stopper in which is centrally mounted a short length of glass tube, the upper protruding portion of which is drawn out to a taper to provide a fine orifice. The tube contains a small wad of cotton wool to serve as a filter. Stopper and tube are secured in the bottle by an adhesive and are covered by a molded two-part screwcap through a hole in which the glass tube projects. A pivoted spring-biased finger lever is mounted on the screwcap in such a position that one end is pressed on the glass tube orifice and the other extends away from the bottle neck. A small piece of rubber tubing is slipped over the lever end bearing on the orifice and makes a tight seal with it. Finger pressure on the outer lever end frees the orifice and permits a jet of refrigerant to issue.

Another type of closure in use comprises a die-cast screwcap mounted on the bottle with a suitable gasket. The top of the cap is prolonged upwards as a vertical spout in the tip of which a small hole is drilled centrally. A spring-biased finger lever pivotally mounted on the cap serves to control delivery of refrigerant as in the previously described case.

The closures described, while effective for their purpose, have several disadvantages. The use of a cork stopper under the screwcap of the first closure makes refilling and reuse of the dispensing bottle difficult because the adhesive has to be destroyed in order to remove the cork stopper; the fine orifice in the glass tube cannot readily be made with a standard diameter; the number of parts and their assembly on a filled bottle are relatively costly. In the second closure no adequate provision is made for a filter or screen, and the difficulty of drilling a small orifice, say 0.008" in diameter, on a mass production basis in the thick die-cast metal is considerable.

It is an object of my invention to provide a cap closure for a volatile refrigerant container having a jet stream dispensing valve, which is simple and economical to make and assemble, which permits easy refilling of the bottle with refrigerant, which has an accurately reproducible orifice, and which has an interchangeable orifice plate and screen.

For the understanding of my invention, two embodiments are shown in the accompanying drawing and description, but these are intended to be illustrative only,

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the scope of my invention being defined in the appended claims.

In the drawing, FIG. 1 is a vertical axis section of one form of my valved closure;

FIG. 2 is a plan view as seen from above;

FIG. 3 is a vertical axial section of another form of my valved closure;

FIG. 4 is a plan view of this closure as seen from above, and

FIG. 5 illustrates the valved closure of FIG. 1 secured on a bottle having an externally threaded neck.

In the embodiment illustrated in FIGS. 1 and 2 a molded plastic cap 1 is provided with an interior female thread 2 adapted to mate with a conventional male thread on a bottle neck. The cap is extended upward axially in a boss 3 provided with an exterior male thread 4 and a central bore 5. Screwed on boss 3 is a smaller molded cap 6 provided with an interior female thread 7, mating with thread 4, and a central bore 8. An annular rubber or similar gasket 9 forms a tight seal between cap 1 and bottle neck.

Between the top of boss 3 and the lower surface of the top of small cap 6 are located an annular rubber or similar washer 10, a disc 11 of bronze screening, and a solid brass disc 12 pierced by a minute central hole 13. The bronze screen 11 may advantageously be of 100 mesh, and the solid disc 12 may be made of 0.010-0.015" thick stock with a central hole 0.008" in diameter. These dimensions, however, may be varied to suit varying conditions of use.

A flat annular metal disc 14 surrounds boss 3 and is secured by cap 6. At one side it has a radial lobe 15 which is struck up in two vertical arms 16, forming a U-shaped support for pivot 17 of finger lever 18. At end 19 of the finger lever a small rubber or similar stopper 20 is inserted friction-tight through hole 21 in a position to bear on and close hole 13. The other end of lever 18 is extended to form a finger piece 22. Spring 23 biases lever 18 in a counterclockwise direction to seal hole 13 unless end 22 of the lever is depressed.

As shown in FIG. 1, the central bore 5 and the central opening in annular washer 10 are of large diameter in comparison with the diameter of "minute central hole" 13 so that the velocity of liquid and vapor passing through the cap is not increased at these points and turbulence is avoided.

In the embodiment illustrated in FIGS. 3 and 4, a sheet metal bottle cap 51 having an internal thread 52 mating with a conventional male thread on a bottle neck (not shown) is provided with a central top opening 55. An annular rubber or similar gasket 59 is located inside cap 51 to form a tight seal with the bottle. Above this is a disc of bronze screening 61 and a solid disc of bronze 62. A second annular washer 59' is located between disc 62 and the under surface of the bottle cap to complete the seal.

As shown in FIG. 3, and as is the case in the previously described embodiment, the central opening in annular washer 59 is of large diameter in comparison with the diameter of "minute hole" 63, so that the velocity of liquid and vapor passing through the cap is not increased at this point, turbulence is avoided and there is no sudden expansion into the protrusion in disc 60.

In both cases, therefore, an unobstructed passage is provided from the interior of the container to and through the foraminous disc and to the delivery hole.

In the center, disc 62 is struck up into a frusto-conical protrusion 60, pierced by a minute hole 63. Thickness of disc 62 and diameter of hole 63 may be in the same range as the corresponding dimensions of disc 12 and hole 13 (FIG. 1).

Secured to the side of cap 51, as by soldering or braz-

ing, is a bracket 66 forming a support for pivot 67 for finger lever 68. The inner end of this lever 69 carries a small rubber stopper 70, mounted friction-tight in hole 71 in a position to bear on and close hole 63. The other end of the lever 68 is extended to form a finger piece 72. Spring 73 biases lever 68 in a counterclockwise direction to seal hole 63 unless end 72 of lever 68 is depressed.

As indicated above, my closure is adapted to serve as a jet stream dispenser when mounted on a conventional bottle of volatile refrigerant used for inducing local anesthesia or analgesia in minor surgical operations. In FIG. 5 one of my closures, as illustrated in section in FIG. 1, is shown mounted on a conventional bottle 101, having a neck 102 provided with an external screw thread 103. Internal screw thread 2 of closure 1 (FIG. 1) mates with thread 103 and serves, on rotation of closure 1 with respect to bottle 101, to seat gasket 9 firmly on upper edge of neck 102. The technique of use is the same as with conventional bottles and refrigerants: the bottle is tipped sufficiently to bring liquid into contact with the closure and the finger piece 22 or 72 is depressed, thus raising stopper 20 or 70 from hole 13 or 63 and permitting a fine stream of refrigerant to issue from the hole; release of the lever closes the hole and shuts off the stream.

My closure has numerous advantages over prior closures. It is readily removed and replaced, thus permitting easy refilling and reuse of the container to which it is attached. It is readily disassembled and reassembled for cleaning and replacement of parts. The pierced disc with minute delivery hole is readily interchangeable so that discs with holes of varying diameters may be used to suit the requirements of the user. Since it is much easier and cheaper to form small holes of a desired diameter to a small tolerance in a thin metal disc than in glass tubing or in relatively thick die cast metal, my closure has the advantages of economy and dimensional constancy. The fine screen used in my closure is superior to the wad of cotton wool hitherto used to remove foreign particles.

It will be clear to those skilled in the art that certain changes can be made in the embodiments of my closure described above without departing from the scope of my invention. For example, the cap material may be of any dimensionably stable plastic or metallic material inert to the volatile refrigerant used; the screen, instead of being of bronze, may be of stainless steel or other inert metal or alloy or of inert synthetic plastic and may be woven or perforated or porous so long as it permits passage of liquid refrigerant and retains solid foreign particles; the disc having the dispensing hole may also be of other inert material than brass or bronze, such as stainless steel, synthetic plastic or the like.

This application is a continuation-in-part of my copending application for Analgesic Composition and Method, Serial No. 568,140, filed February 27, 1956.

I claim:

1. In a valved closure for a volatile refrigerant comprising a screw-threaded container cap, a member provided with a fine delivery hole affixed to the cap and a

spring-biased finger-operated valve mounted on the cap and adapted to open or close the delivery hole, the improvement for producing a controlled jet stream from the delivery hole which comprises: a central bore in the cap, a foraminous disc fixed in the cap transverse to the central bore, a thin solid disc in the cap transverse to the central bore fixedly retained between and in contact with the foraminous disc and the interior top surface of the cap, the thin solid disc being provided in a flat portion thereof with a fine delivery hole alined with the central bore of the cap and adapted to be closed by the spring-biased valve, the parts being so arranged as to provide unobstructed passage from the interior of the container to and through the foraminous disc and to the delivery hole, whereby on opening the spring-biased valve fluid may pass through the cap in substantially non-turbulent flow.

2. A closure as defined in claim 1, in which the foraminous screen is a woven wire mesh of inert metal, the disc is of inert metal, and the resilient member is a wire spring.

3. As an article of commerce the combination comprising: a container having an externally threaded neck on which is secured a closure as defined in claim 1.

4. As an article of commerce the combination comprising: a container and closure as defined in claim 3, said container containing a volatile liquid refrigerant adapted for use in inducing local anesthesia or analgesia in minor surgical procedures.

5. In a valved closure for a volatile refrigerant comprising a screw-threaded container cap, a member provided with a fine delivery hole affixed to the cap and a spring-biased finger-operated valve mounted on the cap and adapted to open or close the delivery hole, the improvement for producing a controlled jet stream from the delivery hole which comprises: a molded plastic cap provided with a central bore and an interior screw thread, a boss extending upward from the cap and provided with a central bore and an exterior screw thread, a smaller cap mounted on the boss and provided with a central bore and an interior thread mating with the exterior thread of the boss, an annular washer, a foraminous disc and a thin solid disc provided with a minute central hole retained on top of the boss and within the smaller cap, the washer resting on the boss, the foraminous disc on the washer and the thin solid disc on the foraminous disc, the minute hole in the thin solid disc being accessible to the closing action of the spring-biased valve through the central bore in the smaller cap, whereby an unobstructed passage is provided from the interior of the container to and through the foraminous disc and to the minute hole.

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