

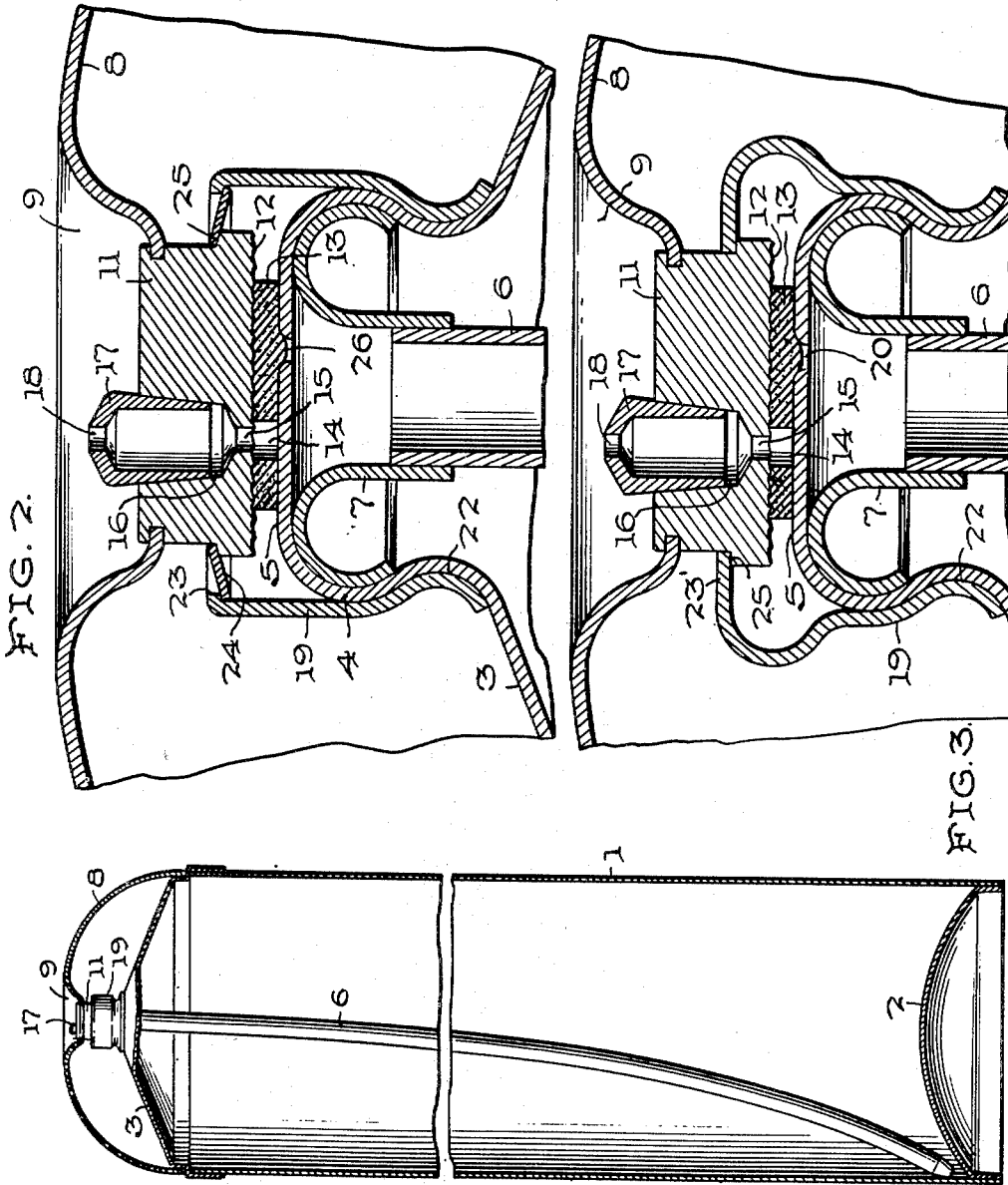
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VALVE MEANS FOR SPRAYING DEVICES

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VALVE MEANS FOR SPRAYING DEVICES

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The present invention relates to the art of dispensing liquids, and particularly to an improved apparatus for atomizing and spraying liquids from containers in which they are maintained under gaseous pressure. The liquids to be sprayed may be of the general nature of insecticides, waxes, oils, perfumes, polishing liquids, glues, lacquers and paints, or liquid masses or finely ground solids in suspension in liquid, such as talc, pigments and the like. The gaseous pressure within the container for discharging the contents thereof may be obtained in any way. For example, the container may be filled under pressure, or the pressure may result from evaporation of a portion of the contents of the container, by the reaction of gas produced chemically or from the discharge of a compressed gas cartridge.

It is usual to provide atomizers or sprayers for discharging liquids under pressure with a gas-tight valve closure so that after the desired amount of the contents of the atomizer have been used the spraying may be discontinued and the atomizer re-sealed for subsequent use. Two types of valves have been proposed for forming a gas-tight seal at the discharge end of the atomizer. One is a pivoted type valve in which a sealing pad is held in contact with the outside of the nozzle through which the liquid is sprayed by the pressure of a spring against a pivoted arm which carries the pad. The sealing power of such valves depends on the force exerted by the spring on the pivoted arm; and since such arms normally are exposed, there is constant danger of accidental discharge by contact with the pivoted arm. The other type of valve is of the internal type in which the seal is effected by the pressure of the contents, sometimes assisted by a spring which forces the valve against a valve seat usually consisting of some soft sealing material. This type of valve, because of its construction, requires a change of direction in the flow of the discharging liquid after it has passed through the valve aperture, thereby decreasing the nozzle velocity or reducing the possible effective atomization of the liquid. Moreover, this type of valve, being composed of many parts, is comparatively expensive to manufacture. Locking devices for this type of valve generally necessitate either additional machining of the parts or separate locking means. Both types of valves require an essentially soft sealing material which in time tends to decompose and "freeze" or adhere parts of the valve, thereby limiting the useful period of the sprayer.

It has been proposed to provide atomizers or sprayers with cooperating rotative parts, the

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parts being so constructed and arranged that in one position apertures in the parts are brought into alignment to provide a discharge passage, while in other positions the apertures are out of alignment so that discharge through them cannot take place. However, as far as I am aware, valves of this type which heretofore have been proposed have not been entirely satisfactory from a commercial standpoint because they were expensive and difficult to manufacture, did not provide a sufficiently gas-tight seal, or otherwise did not properly perform their intended function.

The present invention relates to a valve of the last-mentioned type which is sufficiently inexpensive to manufacture that it may be used on containers for spraying insecticides or other relatively inexpensive materials, but which will at all times maintain a gas-tight seal so that loss of pressure within the container does not result.

More specifically, the present invention comprises an atomizer or spraying container having a non-corrosive, gas-tight valve which is inexpensive to manufacture, simple to operate and which, when in open position, provides an uninterrupted passage for the discharge of the contents of the container. To that end, a rotatable cap is mounted on the discharge end of the container and carries the discharge nozzle and a valve member having a passage therethrough in alignment with such nozzle. The end of the container on which the rotatable cap is mounted is provided with a discharge opening. The passage in the valve member and the discharge opening in the end of the container are eccentrically positioned relative to the axis of the container and the cap to the same extent, so that rotation of the cap relative to the container will cause such passage and discharge opening to be brought into or out of alignment, as desired. A sealing layer of cellulose material having cell walls which collapse and crumble when under pressure, giving practically no expansion sideways, and having good elasticity and ability to regain its original volume, such as cork, is interposed between the valve member mounted on the cap and the portion of the container having the discharge opening with which the aperture in that valve member is adapted to register.

In order that the seal between the rotatable valve member carried by the cap and the portion of the container having the discharge opening, which serves as a cooperating valve member, may be maintained gas-tight at all times, those parts constantly are urged towards each other, against the intervening layer of cork, by an annular leaf

spring, the outer edge of which is supported in any appropriate manner from the container.

The invention will be further described in connection with the accompanying drawings, but it is to be understood that such further amplification is by way of exemplification and the invention is not limited thereto, except to the extent set forth in the appended claims.

In the drawings

Fig. 1 is a vertical sectional view of an atomizing container embodying the invention;

Fig. 2 is an enlarged sectional view of the upper end of the atomizing container showing the improved valve structure; and

Fig. 3 is a sectional view similar to Fig. 2 but showing a modified form of valve structure.

Referring to the drawings, the atomizing or spraying container comprises a cylindrical body 1, a bottom 2, and top 3 which tapers upwardly to an upstanding neck portion 4 having a planar top 5. The atomizing or spraying container preferably is formed of sheet material of any kind, such as iron, which is tinned or otherwise treated to cause it to resist corrosion.

A feed tube 6 has its upper end secured within the neck portion 4 by means of a ferrule 7 attached thereto and spun or otherwise secured within the neck portion. The feed tube 6 is of such length as to extend to the bottom of the container so that all of the contents of the container may be discharged therethrough.

A combined operating cap and guard member 8 of substantially hemispherical shape is rotatably mounted on the upper end of the container. The central part of the cap 8 is formed with a depressed portion as shown at 9. The bottom of the depressed portion 9 carries a valve block or body 11 which is rotatable with the cap. The lower face of the valve body 11 is roughened as at 12 and has glued, cemented or otherwise secured thereto a gasket or cork or other resilient material 13 which gives no expansion sideways. The gasket 13 bears against the planar top surface 5 of the neck 4 to form a gas-tight seal therewith. The valve body 11 and the gasket 13 are provided with aligned passages 14 and 15, located eccentrically with respect to the axis of rotation of the cap upon the upper end of the container. The passage 15 communicates with an expansion chamber 16 in the valve body 11. The outer end of the expansion chamber 16 is closed by a discharge nozzle 17 having a discharge orifice 18. The discharge nozzle 17 protrudes only slightly beyond the outer surface of the valve body 11 so that it lies horizontally within the depression 9. Thus the portion of the cap surrounding the depression serves to protect the nozzle against contact with objects and protects the nozzle against damage.

A ferrule 19 has its lower end rounded into a groove 22 formed exteriorly in the neck 4 so that the ferrule is rotatively mounted on the neck 4, but held against axial movement with respect thereto. The outer end 23 of the ferrule is flanged over slightly and overlies the outer periphery of an annular leaf spring 24. The inner periphery of the leaf spring 24 bears against a shoulder 25 formed on the outer peripheral portion of the valve body 11, near the bottom thereof. Thus, the spring 24 constantly is constrained to exert a down force on the valve body 11 which causes the gasket 13 to bear against and form a gas-tight joint with the planar top portion 5 of the neck 4.

The planar top portion 5 of the neck 4 is pro-

vided with an aperture 26. The aperture 26 is eccentrically positioned, relative to the axis of rotation of the cap 8, to the same extent as are the passages 14 and 15. Thus, rotative movement of the cap in the container will cause the passages 14 and 15 to be brought into alignment with the aperture 26 to permit discharge of the contents of the container, or cause the passages 14 and 15 to be moved to a non-aligning position relative to the aperture 26 to prevent discharge of such contents.

The edge defining the aperture at the outer face of the planar top 5, where it contacts the cork gasket, is rounded to prevent cutting of the gasket upon rotation of the parts. Such rounding of the outer edge defining the aperture also facilitates expansion of the cork in an axial direction into the outer portion of the aperture and assists in maintaining a gas-tight joint or seal between the gasket and the top 5.

Instead of providing a separate annular leaf spring 24, as shown in Fig. 2, a ferrule 19, shown in Fig. 3, may be formed of spring material and have its outer flanged end 23' extend inwardly a distance sufficient to bear against the shoulder 25 formed on the valve body 11 and thereby exert sufficient pressure on the valve body 11 to maintain the cork gasket 13 in gas-tight relationship with the top 5.

The chamber 16 and the space within the nozzle 17 provide ample space within which initial atomization of the contents of the container may take place prior to ejection through discharge orifice 18.

To operate the apparatus above described, it is only necessary to rotate the cap 8 and valve body 11 mounted thereon sufficiently to bring the passages 15 and 16 into alignment with the aperture 26. The liquid within the container then is forced by the gas pressure within the container upwardly through the feed tube 6, through the aligned aperture 26 and passages 14 and 15 into the expansion chamber 16, where initial atomization takes place. The partially atomized liquid then is discharged through the discharge orifice 18 with resultant further expansion and still greater atomization of the contents. When it is desired to discontinue the spraying of the liquid from the container, it is only necessary to rotate the cap 8 and valve body 11 so that the passages 15 and 16 are in a non-aligning position with respect to the aperture 26, whereupon the gasket 13 forms a gas-tight seal until it is again desired to spray liquid from the container.

I claim:

1. A dispensing device comprising a container for liquids, one wall of said container having a discharge aperture therein, a valve member rotatively mounted on said wall of the container, said valve member having a passage therethrough, said aperture and said passage being so positioned, relatively, in said wall and said valve member that they may be brought into and out of alignment by rotative movement of the valve member relative to said wall, a ferrule connected to the container and extending therefrom and surrounding the wall having the discharge aperture therein and said valve member, and an annular leaf spring between the outer portion of said ferrule and said valve member, said spring exerting a force against the valve member in a direction to urge it toward said wall of the container.

2. A dispensing device comprising a container for liquids, one wall of said container having a

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discharge aperture therein, a valve member rotatively mounted on said wall of the container and having a shoulder formed on a peripheral portion thereof, said valve member having a passage therethrough, said aperture and said passage being so positioned, relatively, in said wall and said valve member that they may be brought into and out of alignment by rotative movement of the valve member relative to said wall, a ferrule connected to the container and extending therefrom and surrounding the wall having the discharge aperture therein and said valve member, said ferrule having an inwardly-extending flange at the outer end thereof, an annular leaf spring interposed between said flange and the shoulder on the peripheral portion of the valve member, said spring urging said valve member toward said wall of the container.

3. A dispensing device comprising a container for liquids, said container having a neck portion extending from one end thereof, the outer end of said neck portion being closed except for a discharge aperture, a valve member rotatively mounted relative to said neck portion, said valve member having a passage therethrough, said aperture and said passage being so positioned, relatively, that they may be brought into and out of alignment by rotative movement of the valve member relative to said neck portion, and a ferrule of resilient spring material connected to said neck portion and extending coaxially therewith and outwardly therebeyond in the direction of said valve member, the outer end of said ferrule being bent inwardly over a portion of the valve member and bearing against the latter to urge it in a direction to cause it to bear against the closed end of said neck portion.

4. A dispensing device comprising a container for liquids, a neck portion extending from one end of said container, the outer end of said neck portion being closed except for a discharge aperture, a valve member rotatively mounted relative to said neck portion, said valve member having a shoulder formed on the peripheral portion thereof, said valve member having a passage therethrough, said aperture and said passage being so positioned, relatively, in the closed end of the neck portion and in said valve member that they may be brought into and out of alignment by rotative movement of the valve member relative to said neck portion, a ferrule of resilient spring material connected to said neck portion and extending coaxially therewith and outwardly therebeyond in the direction of said valve member, the outer end of said ferrule having an inwardly-extending flange bearing upon said shoulder of the valve member and urging said valve member toward the closed end of said neck portion.

5. A dispensing device comprising a container for liquids, a neck portion extending from said

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container and having a wall thereof formed with a discharge aperture, said wall having a smooth outer surface, and the edge portion of the aperture therein which joins the smooth outer surface being rounded, a valve member rotatively mounted on said smooth outer surface of the wall of the neck, a gasket interposed between the adjacent faces of said wall and the valve member and rotative with the valve member, and spring means operative on the valve member to urge the gasket against the outer wall of the neck portion adjacent the opening therein, said valve member and said gasket having aligned passages through them, said aperture in said wall of the neck and the passages in the valve member and the gasket being so positioned, relatively, that they may be brought into and out of alignment by rotative movement of the valve member and gasket relative to said wall.

6. A dispensing device comprising a container for liquids, a neck portion extending from said container and having a wall thereof formed with a discharge aperture, said wall having a smooth outer surface, and the edge portion of the aperture therein which joins the smooth outer surface being rounded, a valve member rotatively mounted on said smooth outer surface of the wall of the neck, a gasket interposed between the adjacent faces of said wall and the valve member and rotative with the valve member, said valve member and said gasket having aligned passages through them, said aperture in said wall of the neck and the passages in the valve member and the gasket being so positioned, relatively, that they may be brought into and out of alignment by rotative movement of the valve member and gasket relative to said wall, a ferrule connected to said neck portion and extending coaxially therewith outwardly therebeyond in the direction of said valve member, and spring means interposed between the outwardly-extending portion of said ferrule and the valve member and exerting its force against the valve member in a direction to urge said valve member towards said wall of the neck portion.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
886,632	Perkins	May 5, 1908
1,320,932	Schmidt	Nov. 4, 1919
1,387,612	Peppers	Aug. 16, 1921
1,956,764	Johnston	May 1, 1934
2,055,076	Grant	Sept. 22, 1936
2,092,137	Punte	Sept. 7, 1937
2,206,209	Thorn	July 2, 1940
2,376,404	Thoms	May 22, 1945