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AEROSOL BOMB VALVE

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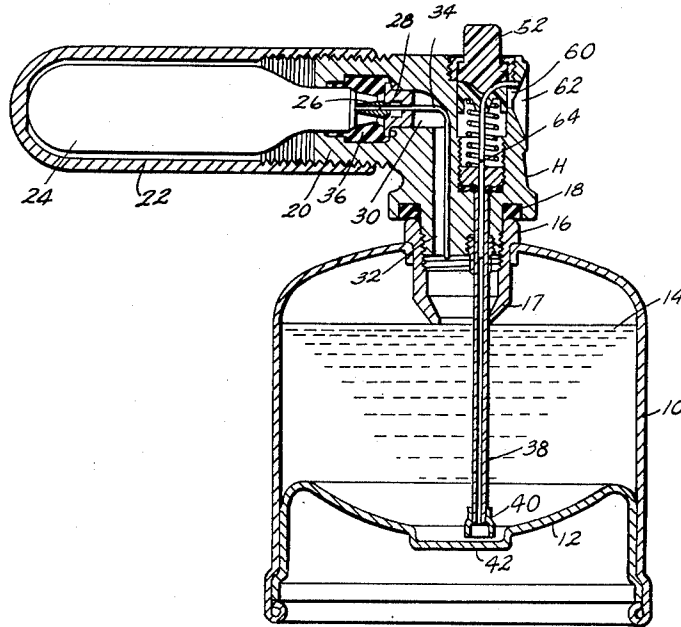


FIG. 1

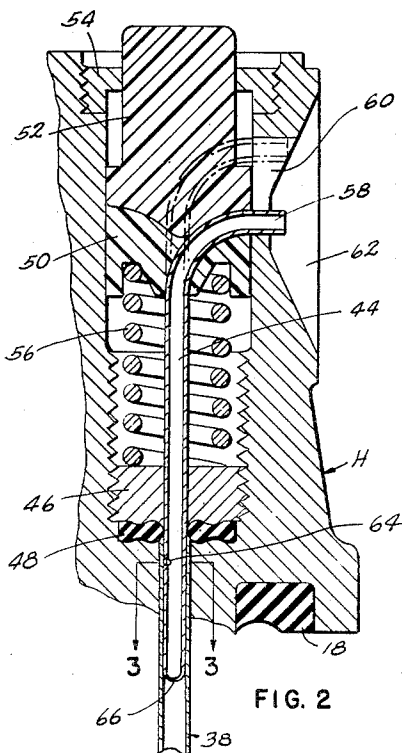


FIG. 2

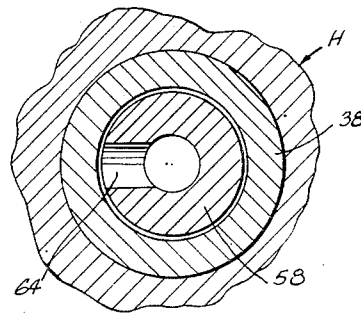


FIG. 3

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AEROSOL BOMB VALVE

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My present invention relates to an aerosol bomb or similar type of spraying device in which a container of liquid is charged with gas from a CO₂ bulb or the like and thereafter the gas displaces the liquid through a discharge opening whenever a valve for the opening is moved to open position.

One object of the invention is to provide a valve of this general character which eliminates the usual valve seat and valve plug, petcock or other type of valve usually provided for controlling the flow of liquid under pressure.

Another object is to provide an aerosol bomb which is readily renewable as to liquid contents, and as to gas pressure for dispensing the liquid contents.

Still another object is to provide an assembly of container, discharge valve, and bulb holder and piercing unit, in which the bulb holder serves conveniently as a handle for the aerosol bomb.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical sectional view through an aerosol bomb embodying my invention.

Figure 2 is an enlarged sectional view of the valve structure of the bomb showing the valve in open position as distinguished from the closed position of Figure 1, and

Figure 3 is a more greatly enlarged sectional view on the line 3—3 of Figure 2 showing details of the valve.

On the accompanying drawing I have used the reference character 10 to indicate a container, which container is provided with a bottom member 12 and is adapted to contain liquid 14 such as insecticide or the like. The container 10 has a threaded boss 16 into which a head H is screwed with a gasket 18 interposed between the head and the upper end of the boss.

The head has a boss 20 on which a bulb holder 22 is threaded for containing a bulb 24 of CO₂ gas or air under high compression, and for propelling the bulb toward a hollow piercing pin 26 in a well known manner. The piercing pin 26 is carried by a flanged fitting 28 located in a bore 30 of the head H and this bore is connected by a passageway 32 to the interior of the boss 16. A capillary tube 34 extends from the fitting 28 through the passageway 32 for discharging gas into the boss 16 and into the container 10. A

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sealing sleeve 36 of rubber or the like is contained in an enlarged part of the bore 30 to seal against the neck of the bulb 24 during the piercing operation.

A syphon tube 38 has its upper end secured in the head H and terminates in a bell shaped reception fitting 40 at its lower end. The fitting 40 is located in a sump 42 of the container bottom 12. A capillary tube 44 of slightly less diameter than the internal diameter of the syphon tube 38 is slidably mounted in the upper end of the syphon tube and is also slidable through a plug 46 screwed into the head H to compress a gasket 48 surrounding the capillary tube.

The upper end of the capillary tube passes through a slidable plug 50 and is confined between it and a slidable push button element 52. The elements 50 and 52 are normally held upwardly against a flanged closure plug 54 by a spring 56 as shown in Figure 1 and may be depressed as in Figure 2 by thumb pressure on the push button element 52.

The capillary tube 44 has a right angle bend at its upper end that provides a discharge nozzle 58. The head H has a vertical slot 60 in which the discharge nozzle 58 may move from the upper position of Figure 1 to the lower position of Figure 2 wherein it is centered relative to a depression 62 in the front of the head H.

The capillary tube 44 has an opening 64 in one side thereof and its lower end is closed as indicated at 66. In the upper position of Figure 1, the opening 64 is above the packing 48 thus preventing fluid flow from the discharge nozzle 58. In the position of Figure 2 the opening 64 is below the packing 48 thus permitting fluid flow under the pressure of the gas introduced from the bulb 24 into the container 10. This arrangement provides a very simple valve and one which will give long life and trouble-free operation.

It will be noted that the boss 16 has a downwardly extending end 17 which precludes filling the container 10 above the level of liquid shown in Figure 1. This is in order to leave the necessary space for introduction of gas under pressure from the bulb 24. The capillary tube 34 throttles the flow of gas so that it isn't discharged too violently into the container 10 after the bulb is pierced.

The slot 60 in cooperation with the depression 62 in the front of the head H protects the relatively small nozzle 58 from damage when the aerosol bomb is not in use. At that time the nozzle 58 is in the upper part of the slot as shown in

Figure 1 and by dot and dash lines in Figure 2. The upper part of the slot is wider than the length of the projecting part of the nozzle to give the protection desired.

When the nozzle is lowered to the full line position of Figure 2 the nozzle projects from the surface of the depression 62 so that the portion of the head surrounding the nozzle does not interfere with the atomizing action produced by discharge of liquid under high pressure from a minute opening as represented by the internal diameter of the capillary tube 44.

The external diameter of the capillary tube 44 is but slightly smaller than the internal diameter of the syphon tube 38 as shown in Figure 3. In a valve of the size shown in Figure 1, for instance, the outer diameter of the capillary tube 44 may be approximately .028" and the internal diameter of the tube 18 about .006" to .008" larger. This will give a space all around the capillary tube that is .003" to .004" wide. This results in a maximum area in the space between the two tubes of approximately .0008 which is only two twenty-fifths of one percent of one square inch and this is the area that the pressure in the syphon tube 38 exerts against the packing 48. This area being very small will produce only approximately .12 lbs. per sq. in. pressure on the packing when the container 10 is charged with gas at 150 pounds per square inch. The pressure on the packing is accordingly substantially negligent.

From the foregoing specification it will be obvious that I have provided a simple type of refillable aerosol bomb which can be conveniently charged with the required pressure for discharge of liquid in aerosol form by association of a compressed gas bulb with the bomb. It will be noted that the bulb holder 22 when associated with the head H and when the head is mounted on the container 10 projects in such a position with relation to the container that it serves conveniently as a handle for supporting the aerosol bomb and the push button 52 can be readily depressed by the thumb of the hand holding the bomb.

After the desired spraying operation the push button is released and the valve returns to closed position, the construction of the valve being such that there is positive closing against any leakage whatsoever and the bomb can therefore be used intermittently with long periods of non-use yet it is always ready to use when needed. At the same time when the bomb is emptied of liquid this fact is denoted by the discharge of gas when the valve is opened and the bomb is made so that the head H can be unscrewed from the container 10 to recharge the bomb with liquid. The user can then unscrew the holder 22, insert a fresh gas bulb 24 therein and screw the holder back into position (about two or three threads farther to the right of the position shown in Figure 1) whereupon the neck of the bulb is pierced and the bomb is ready for use.

Some changes may be made in the construction and arrangement of the parts of my aerosol bomb without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim as my invention:

1. In a valve structure of the character disclosed, a capillary tube, a head, a syphon tube carried by said head in which said capillary tube is slidably mounted, said syphon tube being adapted to extend from within a container, packing means between said syphon tube and said capillary tube, said capillary tube having a closed inner end, an opening adapted to be selectively positioned outside or inside said packing means and a curved outer end, means for sliding said capillary tube outwardly relative to said syphon tube with said opening outside of said packing means, and a push button for sliding the capillary tube inwardly to a position with said opening inside said packing means by manual pressure, said head having a shallow cone-shaped depression provided with a slot in which said curved end travels from an outer deep end of the slot to a shallow inner end thereof when moved from valve closed to valve open position and being countersunk in said slot in the valve closed position.

2. In a liquid discharge control valve for controlling the flow of liquid, a liquid delivery tube, a capillary tube slidable therein and closed at its inner end, said capillary tube having an opening above said inner end, a head on said liquid delivery tube, packing in said head around said capillary tube, said opening being selectively positionable either inside or outside said packing, said head having a depression and a slot through which the outer end of said capillary tube moves to be protected by the sides of the slot when the valve is closed and to project into said depression for spraying purposes when the valve is open.

3. In a valve structure of the character disclosed, a head, and a valve for controlling the discharge of liquid through said head comprising a first tube, a second tube in which said first tube is slidably mounted, the packing means at the outer end of said second tube and surrounding said first tube, said first tube having an opening adapted to be selectively positioned outside or inside said packing means, said head having a depression, and a slot through which the discharge end of said first tube moves to be protected by the sides of the slot when the valve is closed and to project into said depression for spraying purposes when the valve is open.

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