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C. J. OBST

3,270,925

AEROSOL VALVE AND METHOD OF MANUFACTURE OF SAME

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FIG. 1

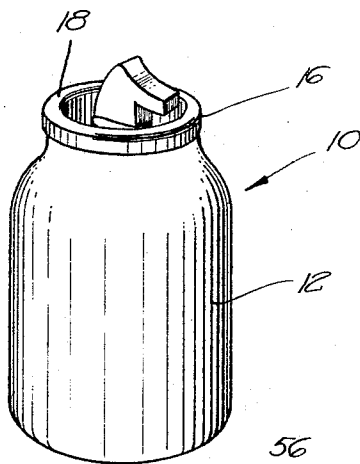


FIG. 2

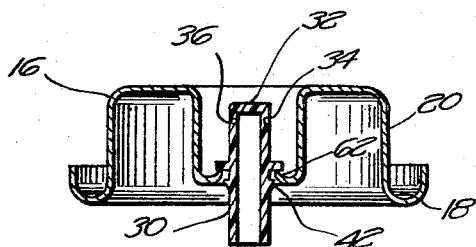


FIG. 4

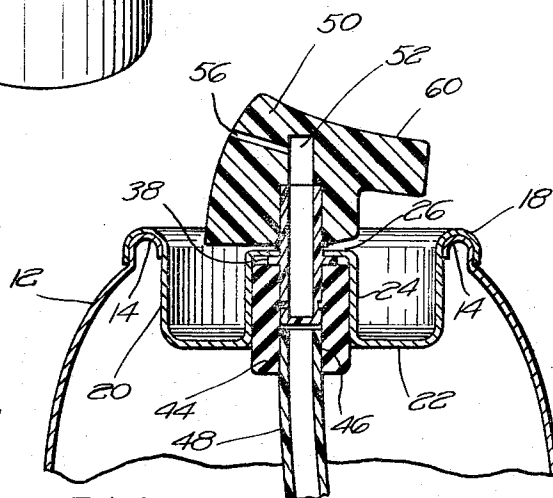


FIG. 3

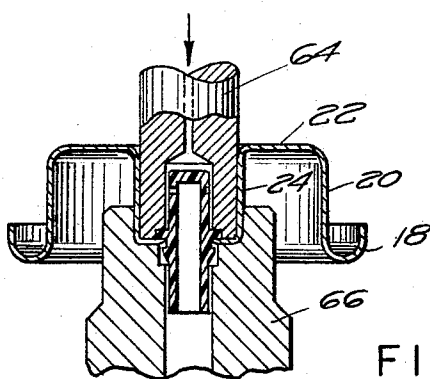
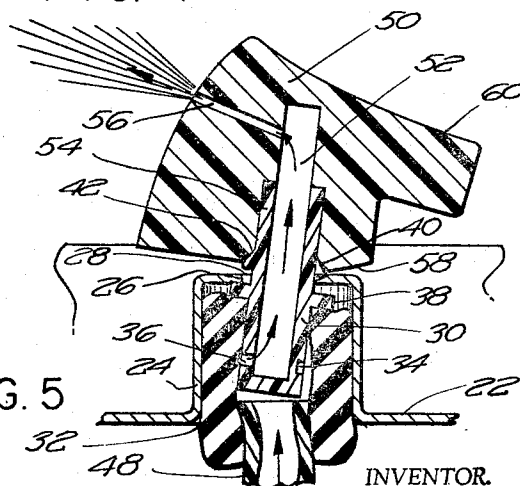


FIG. 5



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AEROSOL VALVE AND METHOD OF MANUFACTURE OF SAME

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The present invention relates generally to valves and is more particularly concerned with a novel and improved structure for an aerosol valve and a novel and improved method of making same.

A primary object of this invention is the provision of an aerosol valve having a minimum number of separate parts but which nevertheless is highly efficient and durable in operation.

Another important object of this invention is the provision of an aerosol valve that is maintained against separation from the container lid, thus eliminating the possibility of the valve being blown off the top of the container, no matter what the relative rotary position of the valve is with respect to the container.

A further object is the provision of a simple but yet effective method of assembling an aerosol valve to the lid of a container.

Another object of the instant invention is the provision of an aerosol valve so constructed as to permit loading of the valve container after the valve and lid have been sealed in position on the container.

Another object is the provision of an aerosol valve of the character described that is economically feasible to manufacture, simple to assemble, and easy and effective to use.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

In the drawings which illustrate the best mode presently contemplated for carrying out the present invention:

FIG. 1 is a perspective view of a container having an aerosol valve embodying the instant invention;

FIG. 2 is a sectional elevation, on an enlarged scale, showing the container lid and valve tube at an intermediate stage of manufacture and assembly;

FIG. 3 is a sectional elevation, on an enlarged scale, showing the parts of FIG. 2 at an advanced stage of manufacture and assembly.

FIG. 4 is a fragmentary sectional elevation of the instant valve assembly with the valve in closed position;

FIG. 5 is a fragmentary sectional elevation, on an enlarged scale, showing the valve assembly in open or operative position.

Referring now to the drawings, there is shown generally at 10 a container and valve assembly comprising an open mouthed container 12 terminating in a beaded circular shoulder 14. The assembly 10 further comprises a lid 16 having a circular flange portion 18 adapted to sealingly engage the shoulder 14, all in a manner well-known in the art. The lid 16 further comprises a circular outer wall 20 and a base 22 having an upstanding cup portion 24 the top surface 26 of which has an opening 28 extending therethrough.

The container 12 and lid 16 are preferably made of any suitable structurally strong material, preferably metallic. It will also be understood that although the lid 16 is shown as being circular, and although the cup portion 24 is illustrated as being centrally disposed with respect to the lid, neither this configuration nor this relationship are essential to successful operation of the instant invention.

Mounted on lid 16 by means hereinafter to be described in detail is a valve tube 30 preferably constructed

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of molded rigid plastic. As will be seen most clearly in FIGS. 4 and 5, the valve tube 30 is closed at its bottom as at 32 and has a circular groove extending around its outer surface adjacent the bottom 32 as shown at 34. A relatively small aperture 36 extends from the groove 34 to the interior of the tube 30, it being noted that the tube is open at its top. Valve tube 30 is further provided with a pair of spaced outwardly extending circular flanges 38 and 40. For reasons hereinafter to be made apparent, the flange 38 has a somewhat larger diameter than the flange 40. Also for reasons hereinafter to be made apparent, the upper edge of flange 40 is beveled as at 42.

As will be seen most clearly in FIGS. 4 and 5, the valve tube 30 is assembled to upper wall 26 of cup portion 24 with the flange 38 located inside the cup 24 and with flange 40 located above the wall 26. Since the diameter of opening 28 is less than the diameter of flanges 38 and 40, it follows that the tube 30 is securely maintained on lid 16 it being apparent that flange 38 will limit upward movement of tube 30 with respect to the lid 16 while flange 40 will limit downward movement thereof.

A resilient plug 44 having a bore 46 extending vertically therethrough is constructed of any suitable chemically-impervious rubber-like material, such as neoprene. The plug 44 is dimensioned so as to make a tight press fit within cup portion 24 it being noted that the plug is forced upwardly in the cup portion until it engages the bottom surface of flange 38. At the same time, the bore 46 is dimensioned so as to tightly receive the lower end of valve tube 30 and also to tightly receive the usual stand pipe 48 at the lower end portion of the plug. It will be understood that plug 44 functions as a seal to prevent egress of the pressurized contents of container 12 through lid 16 exteriorly of valve tube 30. By the same token, the plug 44 acts as a seal to block the aperture 36 and hence prevent flow of the pressurized contents of container 12 into the tube 30 when the parts are in the relative position illustrated in FIG. 4.

Secured to the upper end of valve tube 30 is an actuator cap 50 it being understood that said cap is secured to the tube 30 by any suitable means, such as being a press fit thereon. The cap 50 is provided with an internal bore 52 having an enlarged lower portion 54 for snugly receiving the tube 30 as clearly shown in FIGS. 4 and 5. Communicating with the bore 52 adjacent its upper portion is a reduced orifice 56. The cap 50 is further characterized by a bevel surface 58, said bevel surface functioning to facilitate tilting of the cap with respect to the container lid. It will be understood that the spacing between the flanges 38 and 40 is sufficient to enable the tube 30 to be tilted with respect to surface 26 when actuator cap 50 is depressed, such as by pressing against the end portion 60 of said cap. When the cap 50 is so depressed causing tilting of the tube 30 as illustrated in FIG. 5 of the drawings, the lower end of the tube will deform the rubber plug 44 sufficiently to permit flow of the pressurized contents of the container 12 to stand pipe 48 into communication with groove 34 and then through aperture 36 to the interior of valve tube 30. The pressurized contents will then flow upwardly through the tube 30 to bore 52 and then outwardly through reduced orifice 56 in an atomized state. As soon as the cap 60 is released, the rubber plug 44 will automatically cause the parts to return to the relative positioning illustrated in FIG. 4 whereupon the valve is once again closed to block outwardly flow of the pressurized contents of the container.

Since the cap 60 is detachable from tube 30, it is possible to introduce the propellant to the container 12 even after the lid and valve assembly has been mounted thereon. More specifically, the propellant is simply in-

roduced into the top of the tube 30 it having been found that application of sufficient pressure will cause the propellant to pass through aperture 36 into the interior of the container, it being understood that the valve will be maintained in its open position as illustrated in FIG. 5 during such a top filling procedure. The ability to top fill containers embodying the instant invention is highly advantageous since it eliminates the necessity of introducing the propellant at sub-freezing temperatures which is the normal procedure where the propellant is introduced before the lid of the container has been mounted.

Since the valve tube 30 is preferably an integrally molded part, and since both flanges 38 and 40 are larger in diameter than the opening 28, it follows that a problem exists in assembling the valve tube to the lid 16. This problem has been neatly overcome in the following manner. Referring now to FIGS. 2 and 3, it is pointed out that the lid and valve tube in these figures are shown inverted from their normal operating positions as shown in FIGS. 4 and 5. Referring specifically to FIG. 2, it will be seen that the edge of opening 28 has been dished or drawn as illustrated at 62 in order to enlarge said opening. More specifically, the edges of the opening are drawn so as to enlarge the diameter of the opening just enough to enable the flange 40 to pass therethrough but not enough to enable the flange 38 to pass therethrough. It will be understood that in the manufacture of the lid 16, the opening 28 will have its edge drawn as illustrated in FIG. 2 whereupon the tube 30 may be dropped through the opening until the flange 38 rests on top of the curled or drawn edge 62, as clearly shown in FIG. 2. At this point a suitable punch and die 64, 66 is employed it being understood that the die 66 receives wall 26 thereon whereupon when punch 64 moves downwardly to engage flange 38, the curled or dished edge 62 will be flattened out, as illustrated in FIG. 3, to restrict the opening 28 to its operating size. As heretofore described, when the wall 26 has been flattened, the diameter of the opening 28 is smaller than the diameter of flange 40 and hence it is no longer possible for the latter to pass therethrough. The assembly is then completed by forcing plug 44 into cup portion 24 with the lower end of tube 30 being received in bore 46 as illustrated in FIG. 4. Stand pipe 48 is then threaded into the lower end of bore 46 and the entire unit is sealed to the container 12. The actuator cap 50 is then assembled to the upper end of tube 30, it being understood that if the container is to be top filled, then the cap 50 is not assembled until after the filling operation.

It will be understood that the beveled surface 42 on flange 40 facilitates entry and passage of the flange through enlarged opening 28 during the aforescribed manufacturing process.

While there is shown and described herein certain specific structure and method steps embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements may be made without departing from the spirit and scope of the underlying inventive concept, and that the same is not limited to the particular forms herein shown and described, except, insofar as indicated by the scope of the appended claims.

What is claimed is:

1. An aerosol valve for an open mouthed container comprising a lid adapted to sealingly engage the container

at the open mouth thereof, said lid having an opening extending therethrough, a hollow valve tube extending through said opening, said tube being tiltable with respect to said lid, abutments on said tube on both sides of said lid for limiting movement of said tube in either direction with respect to said lid, an aperture in said valve tube beneath said lid, and a resilient body fixed to said lid and surrounding said valve tube, said resilient body sealing said lid opening to prevent passage therethrough outside of said tube and at the same time normally sealing said aperture in said valve tube, said resilient body being compressible upon tilting of said tube to unblock said aperture, whereupon pressurized contents of the container automatically pass out through said tube.

2. The valve of claim 1 further characterized in that an actuator cap is connected to said valve tube at its upper end, said cap having a passage therethrough communicating with the interior of said tube, said cap further having a bevel at a lower edge thereof to facilitate tilting of the cap and tube.

3. The valve of claim 1 further characterized in that said abutments on said tube are integral circular flanges extending outwardly from the outer surface of said tube, the flange located below said lid being of larger diameter than the upper flange.

4. The valve of claim 3 further characterized in that said upper flange is beveled at its upper edge.

5. The method of making an aerosol valve comprising the following steps:

- (1) forming a circular lid with an intermediate cylindrical cup portion;
- (2) forming an opening in the top wall of said cup portion;
- (3) dishing the edge of said opening so as to enlarge same;
- (4) forming a rigid valve tube with a closed bottom except for a small aperture adjacent said bottom and with an open top;
- (5) providing a pair of spaced circular flanges on the outside of said tube, the upper of which is just slightly smaller than the enlarged opening in the lid and the lower of which is larger than the said enlarged opening;
- (6) passing the aforesaid tube upwardly through said enlarged lid opening until the lower flange engages the dished edge of the enlarged opening;
- (7) straightening the dished edge of the opening in order to decrease the size of same and to capture the lid between the flanges of the valve tube; and
- (8) forcing a cored rubber plug up into said cup portion so that the lower end of the valve tube is received in the core of the plug with its said aperture normally sealed by said plug.

6. The method of claim 5 further characterized in that step 7 is accomplished by forcing the said lower flange against the said dished edge of said opening.

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