Feb. 3, 1942. H. V. SAFFELL ET AL 2,271,715

ATOMIZER VALVE

Filed March 31, 1939

FIG. 1.

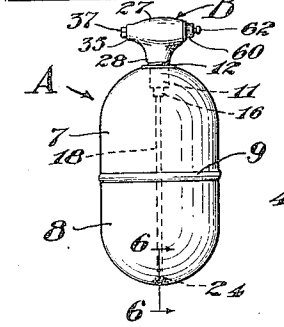


FIG. 2.

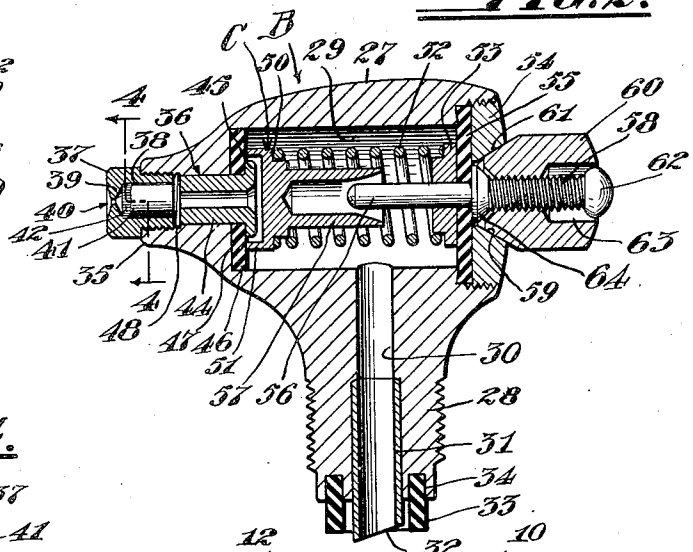


FIG. 4.

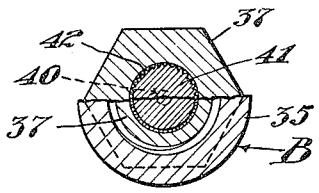


FIG. 3.

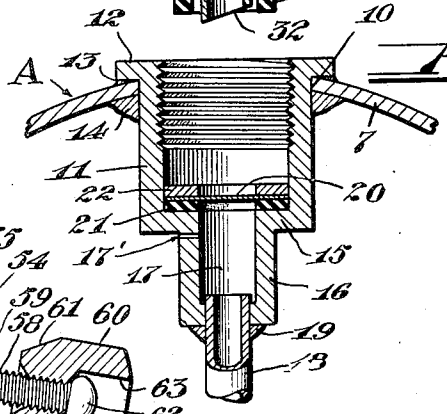


FIG. 5.

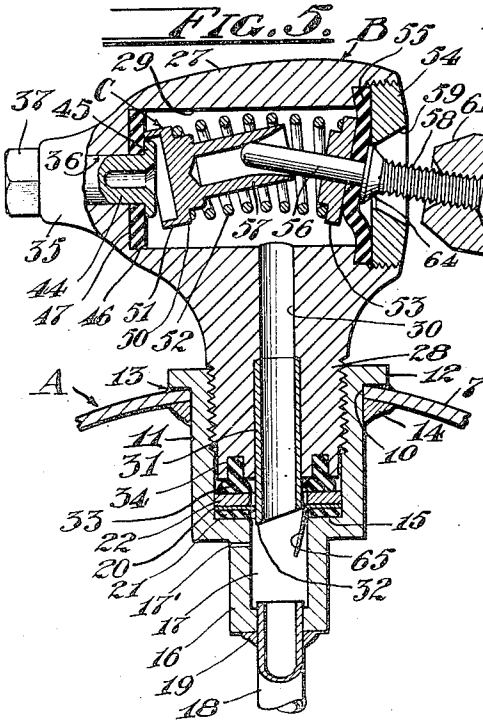
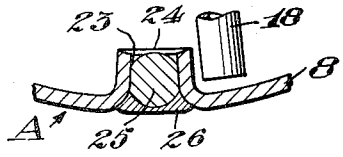


FIG. 6.



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ATOMIZER VALVE

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Application March 31, 1939, Serial No. 265,160

4 Claims. (Cl. 251—125)

This invention relates to a valve and more particularly pertains to a valve controlled atomizer attachment for containers of liquid under pressure.

An object of the invention is to provide an atomizer control valve embodying a nozzle and control valve assemblage which is especially applicable for use in effecting discharge of liquid from a container in the form of a spray as in dispensing insecticides, deodorants, perfumes, fire extinguishing compounds, and the like, and in general wherever delivery of a liquid in an atomized or vaporous form is desired.

Another object is to provide a spray dispensing device for containers of liquid under pressure, in which a manually operable control valve is provided for regulating the discharge of the liquid contents of the container at the will of an operator in which means are provided for locking the valve control against accidental operation.

Another object is to provide a valve structure for atomizers embodying a valve adapted to be tilted in effecting operation thereof and manually operable means for tilting the valve to its open position, in which means are provided for locking the manually operable valve tilting means against operation.

Another object is to provide a construction in an atomizer control valve whereby liquid delivered from the nozzle of the atomizer will be reduced to a spray irrespective of variation in the extent of opening of the valve and without formation of drip at the nozzle to any appreciable extent.

Another object is to provide a demountable valve head and discharge nozzle attachment for hermetically sealed containers of liquid under pressure adapted on application thereof to the container to effect breaking of the seal thereof, and in which the connection between the head and the container is so formed that the head may be successively applied to a multiple of containers so that empty containers may be discarded and the valve structure reserved for application to another sealed container.

A further object is to provide a means for effecting discharge of a liquid under gas pressure from a container of the liquid and gas in such fashion that a portion of the gas will pass to discharge with the liquid and act to effect thorough dispersion of the discharged liquid in the form of a spray.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention is carried into effect as illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a view in side elevation of a container fitted with the invention;

Fig. 2 is a view in vertical section of the nozzle and valve head as detached showing the valve in its closed and locked position;

Fig. 3 is a detail in section of the discharge end of the container as formed to receive the valve head shown in Fig. 2;

Fig. 4 is a detail in section taken on the line 4—4 of Fig. 2 as seen in the direction indicated by the arrows;

Fig. 5 is a view in section similar to Fig. 2 showing the valve in its open position;

Fig. 6 is a detail in section taken on the line 6—6 of Fig. 1, showing a manner of sealing the container.

Referring to the drawing more specifically, A indicates generally a container which may be of any suitable construction but which is here shown as embodying a pair of end sections 7 and 8 having cylindrical side wall portions and domed end walls and which side wall portions are united by a suitable seam 9. The domed end wall of the section 7 is formed with an opening 10 in which is seated an internally threaded socket 11 having an end flange 12 overlying the margin of the opening 10; the socket 11 being here shown as securely affixed in place by solder 13 uniting the outer face of the section with the flange 12 and by solder 14 uniting the inner face of the section 7 adjacent the margin of the opening 10 with the exterior side wall of the socket 7 as particularly shown in Fig. 3.

The socket 11 is formed with a bottom wall 15 from the under side of which extends a nipple 16 having a passage 17 which leads through the wall 15 and communicates with the open end of a tube 18 which extends into the outer end of the nipple 16 and is affixed thereto by a solder joint 19; the tube 18 extending to a point contiguous the inner face of the end wall of the container section 8 and opening to the container as particularly shown in Fig. 6.

A rupturable membrane 20 closes communication between the passage 17 and the interior of the socket 11; the membrane being in the form of a thin metallic disc capable of being readily punctured. As here shown the membrane 20 is seated on a resilient gasket 21 which in turn seats on the bottom wall 15 of the socket with the membrane securely held in place by a crowding ring 22 which bears on the marginal portion of the membrane and is retained in place in the

socket by frictional engagement therewith; the ring 22 having a pressed fit contact with the inner face of the side wall of the socket.

The membrane 20 is designed to be punctured to permit discharge of liquid from the container under the urge of gas confined under pressure in the container with the liquid; the liquid flowing to discharge through the tube 18. As a means for causing a portion of the gas content of the container to flow to discharge with the liquid a small aperture 17' is formed in the nipple 16 adjacent the socket end wall 15 to permit flow of gas from the upper portion of the container into the nipple to mingle with liquid in the passage 17 on opening the latter to discharge.

The domed end wall of the container section 8 constituting the bottom of the container is provided with a filler opening 23 the margin of which is formed with an inturned slightly converging flange 24, and which opening is closed, after filling the container, preferably by a plug 25 consisting of a lead pellet which is forced in place from the exterior of the container into wedge engagement with the flange 24; the pellet being held in place by a solder seal 26 uniting the outer marginal portion of the filler opening with the continuous portion of the pellet.

A demountable valve head B is provided which is here shown as including a body portion 27 fitted with an externally threaded stem 28 which latter is adapted to be screwed into engagement with the internally threaded socket 11; the body portion 27 being formed with a cylindrical valve chamber 29 and the stem 28 being formed with a passage 30 extending axially therethrough and communicating at its inner end with the valve chamber.

Mounted in the outer end portion of the passage 30 and projecting from the end of the stem 28 is a metallic tube 31 the outer end of which extends diagonal to the axis thereof to form a cutting edge 32; the outer end of the tube 31 constituting a punch adapted to effect rupture and penetration of the membrane 20 when the head B is screwed in place into the socket 11 as particularly shown in Fig. 5.

As a means for affording a fluid tight joint between the stem 28 and the socket 11 when the stem is screwed to its innermost position in the socket, the end of the stem 28 is fitted with a resilient cylindrical gasket 33 having an end portion thereof engaged in an annular channel 34 in the end of the stem and having a protruding end portion encircling the projecting end of the tube 31 in such fashion as to bear on the outer face of the crowding ring 22 and effect compression of the gasket 33 when the stem 28 is screwed in place as shown in Fig. 5.

The valve head B is formed with a reduced end portion 35 having a passage 36 leading therethrough axially of the cylindrical valve chamber 29 and communicating with the latter, and screwed into the outer end portion of the passage 36 is a nozzle 37 having a cylindrical bore 38 which opens at its inner end to the passage 36 and having a tapered end wall 39 formed with a needle discharge orifice 40 leading from the bore 38.

As here shown, a cylinder 41 is loosely supported in the bore 38, which cylinder 41 is formed with longitudinally extending fine flutes 42 on its periphery which slidably contact the surface of the bore 38 to form an annular arrangement of a multiplicity of passages throughout the perimeter of the bore 38 extending longitudinally thereof. However, in some instances the cylinder 41 may be dispensed with.

Mounted in the inner end portion of the passage 36 is a tube 44 which protrudes into the chamber 29 and is formed with an end flange 45 which seats upon a resilient valve seat 46 to hold the latter in place against an end wall 47 of the valve chamber 29. The outer end of the tube 44 terminates in spaced relation to the inner end of the nozzle 37 to form a chamber 48 having a diameter exceeding that of the nozzle bore 38, and the tube 44 is formed of an internal diameter less than that of the bore 38 so that the outer margin thereof will be offset inwardly relative to the perimeter of the bore 38 concentric therewith.

Mounted in the chamber 29 is a valve C which embodies a head 50 formed with an annular end flange 51 adapted to encircle the end flange 45 on the tube 44 and to abut the resilient seat 46 to close communication between the chamber 29 and the discharge nozzle; the valve being normally held in its closed position by a spring 52 which bears against an abutment ring 53 and exerts a thrust against the valve head 50.

A cap 54 is screwed into the head 27 at the end of the chamber 29 remote from the nozzle; the cap bearing against a resilient diaphragm 55 affording a closure for the outer end of the valve cylinder 29; and against which diaphragm 55 the abutment ring 53 abuts.

A stem 56 leads through the diaphragm 55 and ring 53 and projects loosely into a hollow stem 57 formed on the valve head 50 and projecting interiorly of the spring 52. The outer end of the stem 53 is formed with a threaded shank 58 which projects through an opening in the cap 54 formed with a beveled margin 59. A nut 60 is screwed on the threaded shank 58 which nut is formed with a tapered inner end portion 61 adapted to seat on the beveled margin 59 as shown in Fig. 2 so as to limit or inhibit movement of the stem 56 relative to the valve stem 57. The outer end of the threaded shank 58 is formed with a head 62 which rides in a socket 63 formed on the outer end of the nut 60 and serves to limit outward movement of the nut on the shank and to retain the nut thereon. A flange 64 is formed at the intersection of the stem 56 and shank 58 which bears against the outer face of the diaphragm 55 whereby the latter is clamped between said flange and the ring 53 under the urge of the spring 52.

In the application and operation of the invention the container A is filled with a liquid and a gas under pressure which fluids are delivered through the filler opening 24 into the container and sealed therein under pressure by closing the filler opening, which is here shown as effected by means of the pellet 25 and the soldered seal 26. The fluid content of the container is placed under any suitable pressure as will effect automatic discharge of the fluid from the container on opening the discharge tube 18 to atmosphere through the membrane 20.

Containers thus filled are subject to being marketed and distributed either with or without the valve head B applied thereto; the valve head B being designed to be attached to the container and utilized in effecting discharge of the contents of the container under the control of an operator, and to be detached from the container after its contents have been discharged and thereafter be successively applied to any number of containers as required. In this fash-

ion a single valve head may be utilized in effecting discharge of the contents of a large number of containers one at a time so that the filled containers may be marketed more cheaply than where the container would be equipped with the valve head or accompanied thereby.

When it is desired to equip a container with the valve head as here shown the threaded stem 28 of the head is screwed into the socket 11 so as to cause the beveled end 32 of the tube 31 to penetrate the membrane 20 at least in part; the diagonal formation of the end of the tube 31 serving to punch a tongue 65 from the membrane 20 and to bend the tongue downwardly into the passage 17 as shown in Fig. 5, whereby the open end of the tube 31 is placed in communication with the passage 17 without completely removing the material of the tongue 65 from the membrane 20 which removal might clog the passage 17 and interfere with discharge of the fluid from the container.

When attaching the valve head B to the container the parts of the head are preferably arranged as shown in Fig. 2, that is, with the valve in a closed position and with the nut 60 advanced on the threaded shank 58 to its seated position on the cap 54 to hold the operating stem 56 in a fixed position relative to the valve stem.

When it is desired to effect discharge of fluid from the container the nut 60 is retracted on the threaded shank 58 to a position with its tapered end clear of the opening in the cap 54 and spaced from the outer face of the latter, whereupon the nut 60 is utilized as a handle to effect rocking of the stem 56 in any direction such as to cause the free end of the stem 56 to engage the outer end portion of the hollow valve stem 57 and shift the latter side-ways so as to rock the valve head 50 as shown in Fig. 5 and thereby cause a portion of the margin of the flange 51 to move away from the valve seat 46 and thereby open the tube 44 to the valve chamber 29. When this occurs gas under pressure within the container A will act to cause liquid in the latter to flow through the tube 18 and passage 17 into the tube 31 and through the passage 30 into the valve chamber 29 to initially force atmosphere contained in the latter to discharge through the tube 44 and nozzle outlet 40 around the cylinder 41 and thereafter effect discharge of liquid from the container through the nozzle outlet 40 as long as the valve head 50 is in its tilted open position.

On thus opening the container to discharge, the container is to be held in an upright or near upright position so that gas contained therein and located above the liquid content of the container will encompass the nipple 16. A portion of the gas will then pass through the aperture 17' into the passage 17 in the nipple and will there intermingle with liquid being forced through the nipple and will flow to discharge therewith.

The liquid and gas mixture follows an irregular course in flowing from the passage 30 through the valve chamber 29 around the margin of the flange 51 into and through the tube 44 and into the chamber 48 where the liquid is directed outwardly from its point of discharge from the tube 44 to the entrance ends of the channels formed by the fluting 42 on the cylinder 41 which latter serves to convert the stream of liquid and gas leaving the tube 44 into a multiplicity of small jets that pass to discharge through the outlet opening 40 of the nozzle in a fine mist or spray. However, in small constructions the fluted cylinder 41 may be omitted without detracting from the atomization action of the nozzle.

The oscillating movement of the valve operating stem 56 as set forth is permitted by reason of the resilient character of the diaphragm 55 which flexes under stresses imposed thereon on imparting a swinging movement to the outer end portion of the threaded shank 58 and thus affords a fulcrum for the valve operating stem. On freeing the valve operating stem 56 from the manual operation just described in effecting opening of the valve, the diaphragm 55 will act by reason of its resiliency to restore the stem 56 to its normal position thereby allowing the spring 52 to move the valve head 50 to its closed position so as to cut off discharge of liquid from the container.

When it is desired to again lock the valve operating stem 56 against accidental movement such as might occasion unwanted opening of the valve C, the nut 60 is advanced on the threaded shank 58 to its engaged position with the cap 54, and by locking the valve against opening through the medium of the nut 60 accidental leakage of the contents of the container will be effectively prevented.

By manipulating the valve to effect opening and closing of the communication between the valve chamber and the nozzle as described, the contents of the container A may be discharged from the latter under the control of the operator in any desired fashion, that is, either continuously or intermittently with the magnitude of the spray delivered from the nozzle varying according to the extent of opening of the valve C.

By the provision of the irregular course for the flow of the liquid and gas to the nozzle orifice 40 little or no drip of the liquid from the nozzle will occur on closing of the valve.

The device as here set forth is preferably constructed of a size such that the container A may be readily grasped in the hand of the operator and the discharge of its contents controlled by manipulation of the valve operating stem 56 by a finger of the hand in which the container is held.

While I have shown and described a specific embodiment of the invention, it is not limited to the exact details of construction and arrangement shown, and accordingly the invention embraces such changes in the parts and in their construction and arrangement as come within the purview of the appended claims.

We claim:

1. In an atomizer valve for the attachment to a container of fluid under pressure, a head formed with a valve chamber having an outlet, a tiltable spring pressed valve normally closing said outlet, a stem on said valve, a diaphragm on said head at one end of said valve chamber, a stem carried by said diaphragm, one of said stems having a tubular portion into the bore of which the other stem extends, a shank extending exteriorly of said diaphragm for manual oscillation of said stems, and cooperating stock members on the head and said shank for releasably holding the stems against oscillation, one of said stock members being adjustable axially on said shank into and out of contact with the other stock member.

2. In an atomizer valve for attachment to a container for fluid under pressure, a head formed with a valve chamber having an outlet, a tiltable spring pressed valve normally closing

said outlet, a stem on said valve, a diaphragm on said head at one end of said valve chamber, a stem carried by said diaphragm, one of said stems having a tubular portion into the bore of which the other stem extends, a shank on said diaphragm carried stem extending exteriorly of said diaphragm for manual oscillation of said stems, said shanks being screw threaded, and a nut threaded on said shank and movable into position to hold said stems against accidental movement.

3. In an atomizer valve for attachment to a container for fluid under pressure, a head formed with a valve chamber having an outlet, a tiltable spring pressed valve normally closing said outlet, an open ended tubular stem on said valve, a diaphragm on said head at one end of said valve chamber, a stem carried by said diaphragm extending into the open end of said tubular stem, a shank on said stem extending exteriorly of said diaphragm for manual oscillation of said stem, said shank being threaded, a nut screwed on said shank, and means on said head engageable with said nut to hold said shank and stem against sufficient movement on said diaphragm to actuate said valve stem.

4. In an atomizer valve for controlling the discharge of fluid under pressure from a container therefor, a head having a valve chamber provided with an outlet, a tiltable valve, a spring in said chamber urging said valve into position closing said outlet, a stem on said valve, a flexible diaphragm closing one end of said chamber and fixed to said head, an oscillatory stem fixed to said diaphragm and extending into said chamber for cooperation with the valve and outwardly from the head to serve as a handle, means providing a lost motion connection between said stems, and means including a member axially adjustable on the outwardly extending portion of the diaphragm carried stem for contacting said head to releasably hold such stem against movement.

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