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SPRAYING DEVICES
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Fig. 1

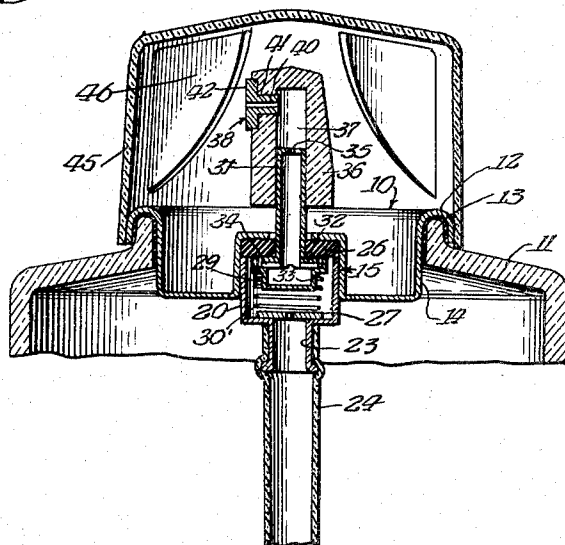
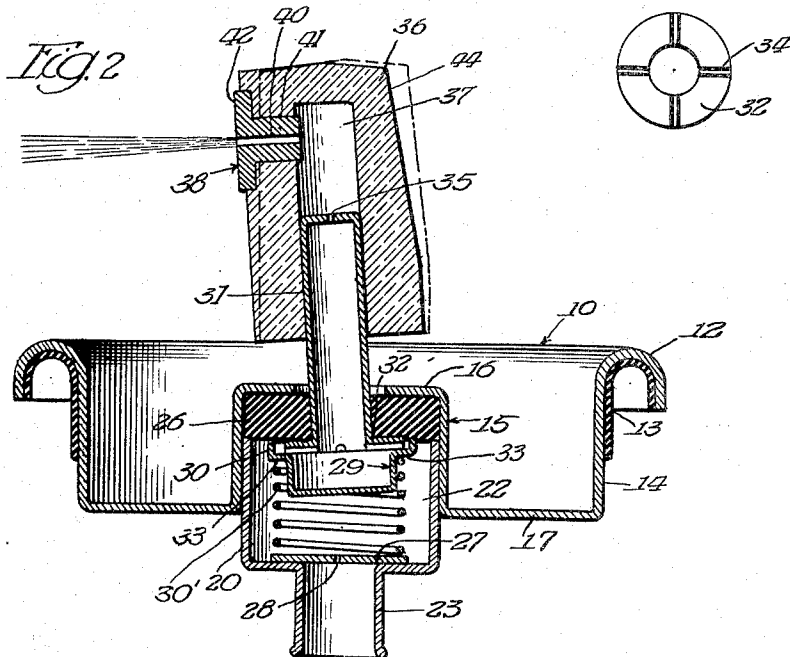


Fig. 3



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SPRAYING DEVICES

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The invention relates to spraying devices, and more particularly to the type which is adapted to be used with a receptacle which contains material which is adapted to be expelled from the receptacle by a gas propellant in the form of a spray or mist.

One object of the invention is to provide a spraying device with a manually controlled discharge valve which is adapted for very fine vaporization or atomization which is simple in construction and efficient in operation.

Another object of the invention is to provide a spraying device which includes a discharge nozzle which is flexibly mounted for manual directional control of the spray.

Other objects will appear from the detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a vertical section of a device embodying the invention, the discharge valve being closed;

Fig. 2 is a section on an enlarged scale, the discharge valve being open; and

Fig. 3 is an inverted plan view of the disk on the manually shiftable stem for shifting the discharge valve.

The invention is exemplified in a spraying device which includes a head or cap 10 which is adapted to be sealed to a receptacle 11 containing the material to be sprayed and the gas propellant. The head 10 is usually formed of sheet metal and includes a marginal bead or flange 12, the inner surface of which is lined with a suitable sealing compound 13 to form an air-tight connection between the neck of the receptacle and the head 10. The entire spraying device is supported by the head 10. Said head comprises an annular depending wall 14 which fits in the neck of the receptacle, an upstanding central tubular wall 15, a top wall 16 and a bottom wall 17 between walls 14 and 15. A cup shaped member 20 has a press fit with the inner periphery of annular wall 15. The walls 15 and 16 form an inverted cup-shaped member which with the member 20 form a housing for the discharge valve and its seat and an expansion chamber 22. A depending hollow stem 23 on member 20 has connected thereto a tube 24 which communicates with the receptacle near its bottom for conducting the material to be discharged to the chamber 22.

An elastic disk 26, usually of rubber, is confined between the top wall 16 and upper end of cup-shaped member 20 and its lower face functions as a valve seat. A disk diaphragm 27 is seated on the bottom of chamber 22 and is provided with an orifice 28 for restricting and metering the flow into said chamber from the receptacle, so that the material will expand in said chamber. An inverted cup-shaped valve 29 has an upstanding flange 30 which is adapted to engage the under face of elastic disk 26. A coil spring 30' between valve 29 and disk 27 is adapted to press valve 29 to close against elastic disk 26 to cut off the discharge of fluid from chamber 22 and

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to press the disk 27 against its seat on the bottom of member 20.

The device for controlling the valve 29 to control the outflow of material comprises a hollow stem 31 which extends through and is supported by the elastic disk 26. Stem 31 is provided at its lower end with an integral flange or disk 32 between the underface of disk 26 and an annular shoulder 33 on valve 29. The elastic disk 26 resiliently holds the stem 31 in its vertical position and permits it to be depressed axially or deflected angularly. The elastic disk 26 has a tight fit with the member 15 and the stem 31 to form an air-tight seal between the head 10 and stem 31, to prevent escape of fluid from chamber 22. The stem 31 has clearance in the top wall 16 of head 10 and the elastic disk 26 supports said stem for angular or axial movement for opening valve 29. Flange 32 has radial grooves 34 which restrict the flow from chamber 22 into stem 31 when valve 29 is open. When the flange 32 is angularly or axially shifted, it will open valve 29 for the flow of fluid between the underside or a portion of the under face of elastic disk 26 and the contiguous portion of valve 29 into the grooves 34 thence into the hollow stem 31. The upper end of hollow stem 31 is provided with a metering or restricted orifice 35 so that the chamber in said stem will function as an expansion chamber for the fluid from valve 29.

A finger piece or button 36, preferably formed of molded plastic material, is provided for shifting the stem 31 to open valve 29. A socket 37 is formed in button 36 and the stem 31 has a drive fit in the lower portion of said socket to form a third expansion chamber for the vapor from orifice 35 in stem 31. A nozzle 38 of molded plastic material has a shank 39 provided with a radial discharge orifice 40 and a flange 42 on the outside of button 36. The shank has a drive fit in a radial bore 41 in the button. The side of button 36 opposite the side where the outer end of nozzle 38 terminates is flattened as at 44 for engagement by the thumb of the user for conveniently deflecting the stem 31 angularly to directionally vary the stream of vapor from nozzle 38. The button may also be conveniently depressed by finger pressure against its upper end. The button 36 may be conveniently manipulated by the thumb of a hand in which the receptacle is grasped. This permits the user to move the receptacle as desired and also to directionally control the stream from the nozzle 38. A cover 45 of molded plastic with reinforcing ribs 46 is adapted to removably fit over and around the flange 12 of head 10 for protecting the button 36 from impact when the device is not in use.

The operation will be as follows: Assuming the receptacle is loaded with a material, such as paint, insecticide, deodorant, lacquer, or flock in solution or other vaporizable material, and a propellant gas, the material will be sealed in the receptacle 11 while valve 29 is closed. The valve will be held seated or closed against the underface of elastic disk 26 by spring 30'. The stem 31 being supported by the elastic disk 26 will be angularly deflectable or depressible by the button 36 to unseat valve 29 against the force of spring 30'. Angular movement of button 36 will directionally control the angle of the discharged stream, as shown in Fig. 2. When the valve is held open by the user, the gas in the receptacle 11 will force the material upwardly from the bottom of the receptacle through tube 24 and stem 23 to the diaphragm 27 and through orifice 28 in said diaphragm which restricts the flow into expansion chamber 22. From chamber 22 the fluid will pass between the valve 29 and the underside of elastic disk 26 to the grooves 34 into the expansion chamber in valve 29 and stem 31. From said chamber, the material will pass through

orifice 35 in the top of stem 31 into the third expansion chamber 37 from which the vaporized material will pass through the discharge orifice 40 in nozzle 38. The angular movement of button 36 may be varied for the desired direction of the stream of vapor discharged from the nozzle.

The fluid from restricted or metering orifice 27 in diaphragm 28 expands and is vaporized in chamber 22, successively expands and is vaporized from the restriction of flow through grooves 34 in flange 32, into the chamber in stem 31 and valve 29, and successively expands and vaporizes in chamber 37 by the metered or restricted flow through orifice 35 in stem 31. This repeated expansion results in discharging from nozzle 38 an extremely fine mist or atomized vapor. In operation, the diaphragm disk 27 is responsive to fluctuations of pressure in chamber 22, produced by variation in the opening of the valve 29.

During shipment of the spraying devices, the button 36 can be removed. If desired, the gas propellant may be added to the contents of the receptacle while the button 36 is removed through the orifice 35 in stem 31, since the valve 29 will then act as a check valve against the outflow of the gas.

The invention provides a spraying device which is adapted to discharge an extremely fine mist, is simple in construction and efficient in operation.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention which I claim as new and desire to secure by Letters Patent is:

1. A spraying device for material with a gas propellant, comprising: a head having means for sealing it on the mouth of a receptacle; an elastic disk secured in said head; means forming an expansion chamber in

said head under said disk; means for conducting fluid from the receptacle to said chamber; a diaphragm-valve movably seated in the chamber, provided with a metering orifice for the flow of fluid from the receptacle to said chamber; spring-means for holding the diaphragm seated; an upwardly facing valve in said chamber and seating on the underface of the elastic disk; an upstanding hollow stem extending through and movably supported by the elastic disk, and provided with means for unseating the valve for the flow of fluid from the chamber into the stem; and means for discharging the fluid from the stem.

2. A spraying device for material with a gas propellant, comprising: a head having means for sealing it on the mouth of a receptacle; an electric disk secured in said head; means forming an expansion chamber in said head under said disk; means for conducting fluid from the receptacle to said chamber; a diaphragm-valve movably seated in the chamber provided with a metering orifice for the flow of fluid from the receptacle to said chamber; an upwardly facing valve in said chamber and seating on the underface of the elastic disk; a spring between the diaphragm and the valve for holding the diaphragm movably seated in the chamber and the valve seated on the disk; an upstanding hollow stem extending through and movably supported by the elastic disk; and provided with means for unseating the valve for the flow from the chamber into the stem; and means for discharging fluid from the stem.

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