March 20, 1951 L. M. COOPER 2,545,991

SPRAY HEAD FOR FLUID RECEPTACLES

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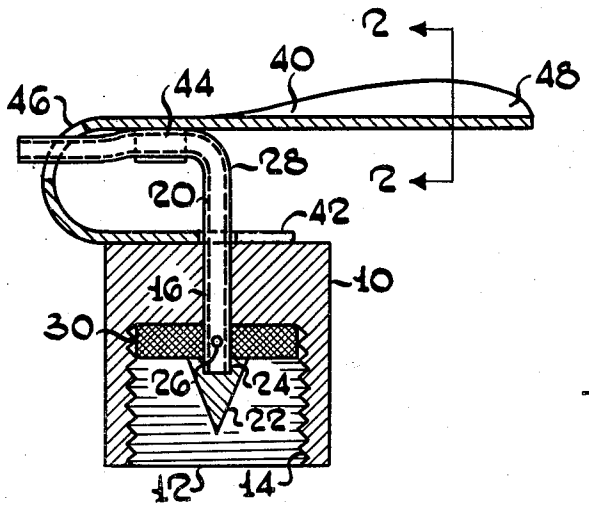


FIG.-1



FIG.-2

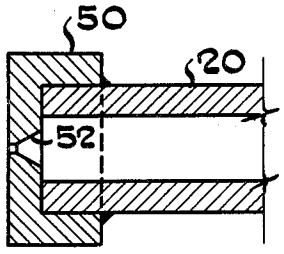


FIG.-3

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SPRAY HEAD FOR FLUID RECEPTACLES

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1 Claim. (Cl. 299—150)

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This invention relates to spray heads for fluid receptacles, and more particularly to a combination closure and spray device for receptacles such as metal flasks and bottles containing fluids under gaseous pressure.

Oftentimes it is necessary to have a combination closure and dispensing device for containers of fluids under gaseous pressure. Many such devices have been devised for siphon bottles, vials, kegs, and similar type receptacles for liquids such as aerated waters and spiritous liquids. A different form of closure and dispensing device is, however, necessary for use in the extensive field of insecticide fluids. In this field, the efficiency of the insecticide liquid is dependent upon the size of the droplets in the spray emitted from the dispensing device. The effectiveness of an insecticide spray when dispersed throughout the atmosphere depends to a considerable extent for its lethal effect on the size of the particles and the number present per unit volume of atmosphere treated as regards the effect upon insects. The device of the present invention is particularly concerned with a combination closure and spraying device for receptacles containing insecticide liquids which depend for their effectiveness upon a certain degree of mist development produced by spraying. The device, however, has also more general application.

The device of the present invention purposes to be a combination closure and spraying device for containers normally supplied in a sealed condition in which the portion of the duct member of the device is designed to penetrate the sealing member preparatory to discharging the contents through the nozzle, and after which the spraying can be interrupted at will without undue loss of fluid pressure, that is, with substantially mere operating loss of fluid pressure.

The device of this invention also purposes to facilitate the discharge of fluid under pressure as a mist or spray from a container with a minimum loss of container pressure by utilizing in combination with a closure means for the container a spraying device having a nozzle portion adapted to penetrate the normal sealing means for the container by means of an easily controllable external mechanism.

The design of the device of the present invention consists essentially of a valve comprised of a tubular stem having one end closed off by means of a penetrating element having a base larger than the tube element, attached basally thereto, and immediately before said attached element the tube is provided with side wall ports.

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These ports are located close enough to the penetrating element so that they will be within a somewhat elastic bushing or washer surrounding the tube, when at the same time the base of the penetrating element will be in contact with the end surface of the bushing, the relationships in general forming a double seal against passage of gas or liquid until the tubular element is moved axially so that the penetrating element is made to lose contact with the bushing and the ports will be exposed to the space below the bushing and thus permit exit or flow of the contents. The same bushing is utilized as a seal between the valve body or cap and the container nozzle. The apex or point of the penetrating element also is made sharp and hard enough so as to be the means of penetrating a thin sealing device in the container nozzle when the present device is attached thereto and the tube member is depressed by pressure applied to the top leg of the spring member. The penetrating element is commonly either an inverted metal cone or pin structure on a circular base. Also, the design may include an orifice fitting for the free end of the tubular member so as to determine the characteristics of the mist or spray effluent from the spray head.

In order that the invention may be more fully understood, the following description and illustration of a specific embodiment of a device according to the invention will be presented. Figure 1 presents a sectional drawing of the general form of a spray head designed according to the invention. Figure 2 is a section along the line 2—2 of Figure 1. Figure 3 is a sectional view of an orifice adapted to be fitted onto the free end of the essential tubular member of the device as illustrated in Figure 1.

Referring to Figure 1, 10 is the body of the valve and may be preferably of steel, although any other suitable material may be used. The body is circular and may be provided with "knurling" on its outer cylindrical surface to permit easy application to or removal from the container with which it will be used. A flat bottomed circular opening 12 is provided at one end of 10 and threads 14 are cut into the cylindrical surface formed by the opening for the purpose of attaching to the nozzle of a container.

A smaller opening or hole 16 is projected through the remaining portion of 10, on the cylindrical axis of same and serves as a bearing hole for the tubular plunger or valve stem 20, which may be formed from a heavy walled capillary tube of any suitable material, preferably metal. The tube 20 should be bent somewhat as

shown at a right angle to the cylindrical axis of the valve so that in normal use the end of the tube will discharge into a horizontal plane. At the bottom end of 20 a solid sharp-pointed conical piece of metal 22 is connected thereto by means of a small centrally disposed depression or hole 24 in same, into which tube 20 is inserted and permanently secured by sweating, brazing or by means of threads. The diameter of the base of the conical piece 22 should be somewhat greater than that of the tube 20. The point must be sharp enough and hard enough and the cone should be of suitable length to readily penetrate a thin metal diaphragm which is usually utilized as an hermetic seal in the nozzle duct of dispensing containers such as are contemplated being used in connection with the present device, when the latter is attached thereto and the stem or plunger 20 is depressed. Two holes or ports 26 are drilled through the wall of tube 20, slightly above the joint between the base of cone 22 and tube 20.

An elastic washer or packing ring 30, preferably of rubber, having a hole at its center of the proper size to form a snug sliding fit with tube 20, is assembled around the latter and into the bottom of the opening 12 as shown, so that it forms a liquid and gas tight seal in conjunction with the base of cone 22 and at the same time acts as a liquid and gas tight bushing to close off the ports 26 in tube 20, when the latter is held in the upward position shown. When the tube 20 is sufficiently depressed, in a downward direction, the sealing contact between 22 and 30 is broken and the ports 26 will be exposed to the lower interior part of the valve to permit flow of liquid therefrom.

A further function of washer 30 is to act as a seal or gasket against which the top edge of the dispensing container nozzle will project when the device is attached to the latter for operation, thus preventing leakage of the container contents.

As a means of operating the valve plunger or stem 20 and also to maintain the valve in a closed position when not in use, there is provided a generally flat strap of spring sheet metal 40 which is bent into the general form of horizontally elongated letter C, which is permanently attached preferably by welding or brazing to the body 10. A slot 42 large enough to clear tube 20, is provided in the end of the lower leg. In addition, tabs 44 in the upper leg are formed by punching from 40 in such a way that they may, in the valve assembly, be bent around the tube 20 to secure the latter to the former, not rigidly but sufficiently to impart without binding, a vertical motion to 20 when 40 is depressed and then allowed to return to its assembled position, the spring piece 40 being assembled so that it is in a state of tension tending to withdraw tube 20 from the body 10 but prevented from doing so by virtue of the compressive reaction of washer 30 against the conical piece 22. Also a slot or hole 46 is provided in the bent portion of 40 and through which the tube 20 is made to project, thus maintaining a fixed direction of spray discharge with respect to the valve operating spring lever 40.

The top leg of 40 is projected a sufficient distance from the vertical axis of the valve to be efficiently utilized as a lever for operating the valve when pressure as by the operator's finger, is applied thereto in a vertically downward direction. The top leg of 40 in cross section is curved concave upwards 48, toward the edges in order to impart rigidity for efficient use as a lever and to more or less conform to the shape of the operator's finger.

The general function of the spring piece 40 is to hold the component parts 20, 22, and 30 in a doubly sealing liquid and gas tight relationship until, when depressed as by the operator's finger, the relationship is changed, permitting liquid or gas to flow from an attached container, through the ports 26, thence through tube 20 to the atmosphere.

Another version of the device is shown in Figure 3 which is an enlarged cross-sectional view of the exit end of the discharge tube which, in this case, may if desired have a larger bore or duct than usual in the previous case and having attached at its discharge end an orifice fitting 50 attached thereto by soldering, welding, cementing or threads, as shown, which consists of a cup-shaped piece of metal, plastic or other suitable material having an opening 52 through the center point in its bottom. The edge of this opening is beveled or chamfered at an angle of 30° to 45° inclination to the axis of the opening and on the inside or upstream side of the cup. The diameter of the orifice opening should be .010 to .020 inch, and preferably .017±.003 inch, this having been found to produce the most desirable type of spray when utilized with the general type and proportions of fluid ingredients as specified in the preceding description of these devices.

What is claimed is:

A dispensing closure cap for a fluid container nozzle, and valve means therefor, comprising a cup-shaped, interiorly threaded cap body adapted for engagement over an exteriorly threaded container nozzle, a thickened top portion on said cap, a tubular passageway extended concentrically through said top portion opening at one end interiorly of said cap, a disc seal of a resilient compressible material interiorly of said cap seating against said top portion and adapted to provide a fluid and pressure tight seal between said cap and nozzle when the cap is applied thereto, a passageway through said disc seal concentric with that in said cap top portion, a dispensing tube, having an inner end portion slidably extended through the passageways in said cap top portion and disc seal, in closely fitted relation to the latter and terminating within said cap in spaced relation beyond said disc, and an outer end portion in substantially right angular relation to said inner end portion and extended radially beyond the cap, a closure element for the inner end of said tube, including a seal perforating extension thereof, said element extending radially beyond the tube end, forming a shouldered portion seatable against said disc peripherally of the passageway therethrough, at least one inlet port opening through the tube wall in spaced relation to said closure element and normally disposed within the passageway through said disc seal, and a J-shaped tension spring element affixed by its shorter leg portion to the outer surface of said cap top portion and by the longer leg portion attached to the outer end portion of said tube, the outer end portion extending outwardly through a slot in the base between said spring element end portions, said spring element being held under slight compression between said cap and tube outer end portion, whereby tension of the spring element tends to withdraw the tube inner end portion through

said passageways to engage the closure element shouldered portion against said disc, compressing the disc to seal the inlet ports in said tube and sealing the tube end therein, said spring element being compressible to extend the tube slidably through said cap and seal passageways, relieving the sealing relationship between said closure, seal, and tube, and exposing the inlet ports beyond said seal.

LYLE M. COOPER.

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