Aug. 27, 1963 I. HOENIG 3,101,905

SPRAY DEVICE

Filed May 14, 1962

FIG. 1

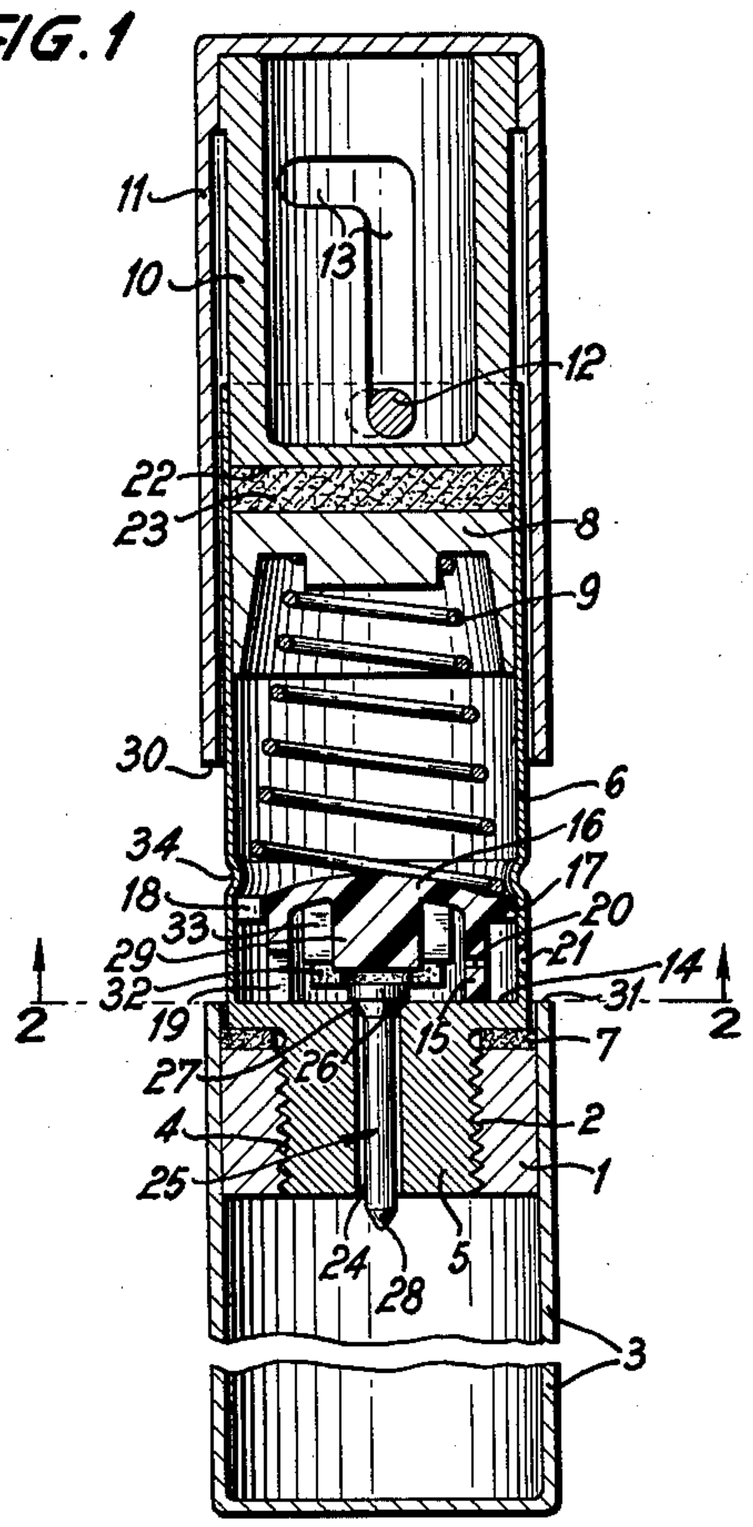
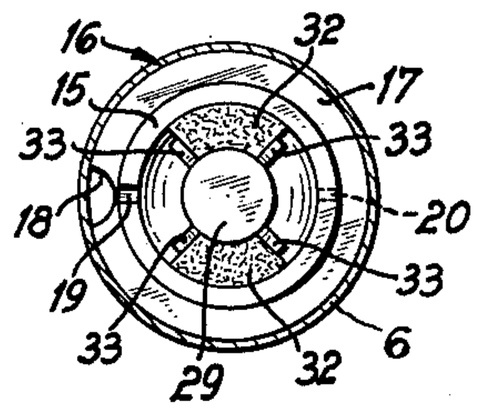


FIG. 2



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1

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SPRAY DEVICE

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The invention relates broadly to spray devices, and more particularly to a piston operated spray device.

One of the objects of the invention is to provide a construction of spray device having the dimensions of a lip stick case, but working just as exact and efficient as a larger type spray device such as used on toilet tables.

Another object of the invention is to provide a construction of small and compact spray device which can easily be carried in a woman's purse and which can be repeatedly refilled.

A further object of the invention is to provide a construction of compact spray device which is simple and economical to manufacture and which is applicable to mass production techniques.

Other and further objects of the invention reside in the arrangement and construction of the relatively few components making up the spray device of the invention, as set forth more fully in the specification hereinafter following by reference to the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional view of a spray device according to the invention in the open position, with parts thereof foreshortened; and

FIG. 2 is a cross-sectional view taken substantially along line 2—2 of FIG. 1, with one part omitted for purposes of simplicity.

Referring to the drawings in more detail, the spray device according to the invention includes a pumping cylinder 6 having an end piece 5, closing one end thereof, provided with external screw threads 4. The end piece 5 is screwed into a cooperating ring member 1 provided with a corresponding internal thread 2, and integrally connected to one end of a fluid chamber designated at 3. A gasket 7 positioned intermediate adjacent surfaces of parts 1 and 5 seals the screw threaded coupling to prevent leakage or evaporation of the fluid supply within the chamber 3.

A piston member 8 is mounted for reciprocatory movement in the opposite end of cylinder 6 in such a manner that it can be moved toward fluid chamber 3, against the pressure of a return spring 9, by pressure applied to the top of closure member 11 and transferred thereto by lug portion 10 depending from the interior top surface of the closure member 11, and disposed intermediate the closure member and piston. The lug portion 10 is spaced from the side walls of closure member 11 forming an annular space into which the top wall portion of cylinder 6 can be telescoped when the closure member is moved to its closed position. A felt disc 23, or the like, is provided on the underside 22 of lug portion 10 intermediate the lug portion and piston member 8 and is disposed to wipe the bore of the cylinder 6 as the piston is reciprocated.

A slot having two portions 13 at right angles to each other is provided through the side wall of lug portion 10, and is disposed to engage a retaining peg 12 disposed transversely to the axial length of closure member 11, and connected to the upper end of cylinder 6. The engagement of the retaining pin 12 by the slot is arranged to hold the closure member 11 in the closed position after the closure member has been moved toward the opposite end of the cylinder, by rotating the closure member 11 and lug portion 10 to locate the

2

retaining peg 12 in the shorter portion of groove 13 which is disposed transverse to the length of the lug portion.

A resilient cap 16, having an annular spacer flange or ledge 17, is disposed in the bottom of pumping cylinder 6, and is provided with a depending annular portion 15 which abuts the end wall 14 of cylinder 6. The side walls of annular portion 15 are equidistantly spaced from the inner walls of cylinder 6, since the perimeter of annular portion 15 is somewhat less than that of spacer flange 17 disposed in contact with the inner walls. Spacer flange 17 is provided with a notch 18 on the perimeter thereof and annular portion 15 is provided with a slot 19 located below the flange notch. Annular portion 15 is also provided with a tiny aperture 20 disposed approximately 180° from slot 19 and disposed in registration with a spray jet opening 21 in the adjacent wall of cylinder 6.

The fluid chamber 3, which has been shown foreshortened in the drawing for purposes of illustration, is connected with the pumping cylinder 6 by a central longitudinal bore 24, in end piece 5, in which the stem of a valve element 25 is so placed that its enlarged valve head portion 26 normally rests on a conical seat 27 at the upper end of the bore 24. The opposite terminating end 28 of the valve stem protrudes for a short distance into the fluid chamber 3.

Depending from the middle of the resilient cap 16 is a relatively wide central lug portion 29 whose free end is arranged to abut the valve head portion 26 of valve element 25 when the closure member 11 is in the closed position, and arranged to be spaced therefrom in the open position as shown in FIG. 1. In the closed position the open end 30 of closure member 11 telescopes over cylinder 6 and rests on the terminating edge of the open end of fluid chamber 3. Two short arcuately-shaped felt strips 32 are mounted on the underside of the resilient cap 16 between flanges 33 formed on the perimeter of central lug portion 29, and intermediate the lug portion and annular portion 15, in such a way that neither the slot 19 nor the tiny aperture 20 are covered by them.

The positioning of discharge aperture 20, which must be aligned with spray jet opening 21, is achieved by forming the discharge aperture 20 after assembly of the spray device, by pushing a needle or the like through spray jet opening 21, such that annular portion 15 is punctured to thus form the tiny discharge aperture 20. An annular groove 34 is formed in the side wall of cylinder 6, to retain the resilient cap 16 securely in the illustrated position at the bottom of the pumping or air cylinder 6. The beforementioned return spring 9 is positioned intermediate the cap 16, and the piston 8, such that a proportion of the pressure applied to the piston 8 is transferred to the top surface of the resilient cap 16 through the return spring.

Operation

In the illustrated position of the parts, the valve head portion 26 of the valve element does not completely shut off the fluid chamber 3 from cylinder 6 since there is not a tight seal between the head and slot 27. Fluid can, therefore, pass up into the resilient cap 16 through the annular space between the valve stem of valve element 25 and the bore 24 to be absorbed by the felt strips 32. The same applies to fluid which might pass between the inner wall of cylinder 6 and the outer wall of annular portion 15 of cap 16, since the fluid can flow freely through the slot 19 inwardly to be absorbed by the felt strips 32. When the closure member 11 is moved downwardly towards fluid container 3 the piston member 8 and return spring 9 are respectively moved downwardly and compressed by the lug portion 10 and felt disc 23 and the

increase pressure due to the compression of spring **9** is transmitted to the flange **17** of resilient cap **16** since the terminating end of spring **9** is seated thereon. The annular portion **15** of resilient cap **16** is disposed to give or flex under the compression pressure, and the central lug portion **29** of cap **16** moves into abutment with the top surface of valve head portion **26**. The air compressed in cylinder **6** by piston **8**, when closure member **11** is moved downwardly, will pass through the notch **18** in the spacer flange **17** of cap **16**, around the outside of annular portion **15**, and through slot **19** around the perimeter of lug **29** and out of the aperture **20**, and will respectively flow out through the spray jet opening **21**. At the same time excess fluid absorbed in the two felt strips **32** is caused by increased air pressure interior of the annular portion **15** to pass through the fine slot **19** into the air stream around the outside of annular portion **15** and fluid from the strips will enter the air stream around lug **29** and will pass through the tiny aperture **20** into the annular space between the cylinder wall **6** and the annular portion **15** of cap **16**, and thence will pass through the jet opening **21** in the form of a spray by the beforementioned air flow.

If the closure member **11**, when the two parts **11** and **3** and their edges **30** and **31**, are moved together into abutment, is slightly turned the retaining peg **12** moves into engagement with the horizontal arm portion of slot **13**, to cause the valve element **25** to be retained and sealed in its closed position. In this position no fluid can get up under cap **16** from the fluid chamber and no fluid can escape through the jet opening **21**. The end **28** of the valve stem which protrudes into the fluid chamber makes it possible to check the functioning of the valve for proper operation when the chamber **3** is removed for refilling with fluid. To check the valve element **25** for proper operation the free end **28** thereof is pressed slightly inward toward the resilient cap. This allows any small pieces of dirt which may become lodged between the valve stem and bore **24** to be removed.

The felt disc **23** intermediate the lug portion **10** and piston member **8** serves to absorb any small amounts of fluid which may tend to pass from the inside of cylinder **6** by leakage through notch **18**, thereby preventing leakage of fluid from the spray device. This small amount of liquid will usually evaporate from the disc **23** before the spray is next used.

To release the spray device from the closed position, the closure member **11** is rotated contra to the direction for locking the same in the closed position, to remove retaining peg **12** from engagement with the horizontal portion of slot **13** and move the same into engagement with the vertical portion thereof. Closure member **11** will then be moved to the open position, as illustrated, under the pressure of return spring **9** and the flexed annular portion **15** of resilient cap **16** will return to its normal position as illustrated, lifting the free end of central lug portion **29** from engagement with valve head portion **26**, thus allowing fluid from chamber **3** to pass through the annular space between the valve stem and bore **24**, between the valve head **26** and seat **27**, and out into the interior of annular portion **15** to be absorbed by felt strips **32**, when the spray device is tipped. It is also believed that a certain amount of fluid is drawn from the chamber **3** by the lifting power of the pressure differential between the air cylinder **6** and fluid chamber **3** as the closure member **11** is moved to the open position and the air in cylinder **6** is expanded. In use this small spray device is rarely held perfectly upright so the felt strips **32** may become somewhat saturated with fluid from a combination of the tipping action and suction action caused by the pressure differential. As the air expanded in cylinder **6** an air current is drawn in through jet opening **21**, etc., in a reverse manner to that described for expelling an atomized spray of fluid from the device.

It should further be pointed out that the small fluid chamber **3** illustrated herein can be substituted by a larger glass container or the like. However, with a larger container it is advisable to add to end piece **5** of the cylinder a tubular member to which is attached the normal suction tube which reaches to the bottom of the container.

While I have described my invention in one of the preferred embodiments, I realize that modifications may be made, and I desire that it be understood that no limitations upon my invention are intended other than may be imposed by the scope of the appended claims.

What is claimed is:

1. A spray device comprising air cylinder means, chamber means adapted to carry fluid connected to one end of said air cylinder means and in communication therewith through a communicating fluid passage, movable valve means connected in said air cylinder means to selectively close the communicating fluid passage, a spray orifice provided in the wall of said air cylinder means adjacent said one end, resilient means having passages therein connected in said one end of said air cylinder means adjacent said spray orifice, valve means and communicating fluid passage, piston means disposed for movement in the opposite end to said air cylinder means, second resilient means connecting said piston means and said resilient means, absorbent means connected in the passages of said resilient means and adapted to absorb fluid from said chamber means, and said resilient means having a portion adapted to be downwardly urged by said piston and second resilient means to move said movable valve means to close said communicating fluid passage as said piston means is moved downwardly in said air cylinder means to provide an atomized spray of fluid from said spray orifice by causing air flow through the passages of said resilient means and release of fluid from said absorbent means.

2. A spray device as set forth in claim 1 in which said movable valve means includes a tapered head portion, and a stem portion passing through the communicating fluid passage and arranged to protrude into said chamber means.

3. A spray device as set forth in claim 1 and said resilient means having a depending annular portion concentrically spaced to said portion adapted to engage said valve means.

4. A spray device as set forth in claim 3 in which said annular portion is adapted to be resiliently flexed when said piston means is moved downwardly in said air cylinder means.

5. A spray device as set forth in claim 1 in which said resilient means includes a depending annular portion and an annular spacer flange in contact with said cylinder wall maintaining said annular portion in spaced relation thereto.

6. A spray device as set forth in claim 5 in which said annular spacer flange is provided with pressure communicating means.

7. A spray device as set forth in claim 5 in which said depending annular portion is provided with an aperture in registration with said spray orifice.

8. A spray device as set forth in claim 1 in which said piston means includes a cover member disposed to telescope over said air cylinder means and enclose the same as said piston means is moved downwardly, and locking means for maintaining said piston means in the downward position.

9. A spray device as set forth in claim 1 in which said absorbent means comprise arcuate shaped absorbent strips disposed about the portion of said resilient means adapted to engage said movable valve means.

10. A spray device comprising air cylinder means, chamber means adapted to carry fluid connected to one end of said air cylinder means and in communication therewith through a central bore, freely movable return valve means connected in said air cylinder means, to selectively close the central bore, a spray orifice provided in

the side wall of said air cylinder means adjacent said one end, resilient means having passages therein connected in said one end of said air cylinder means adjacent said spray orifice and central bore, piston means disposed for movement in the opposite end of said air cylinder means, spring means connecting said piston means and said resilient means, absorbent means connected in the passages of said resilient means and adapted to absorb fluid from said chamber means, and said resilient means having a portion adapted to engage said movable return valve means and close said central bore with said valve as said piston means is moved downwardly in said air

cylinder means to provide an atomized spray of fluid from said spray orifice by causing air flow through the passages of said resilient means and release of fluid from said aborbent means.

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