Jan. 26, 1937. S. MAJEWSKI 2,069,076

SPRAY DEVICE

Filed May 24, 1935

Fig. 1.

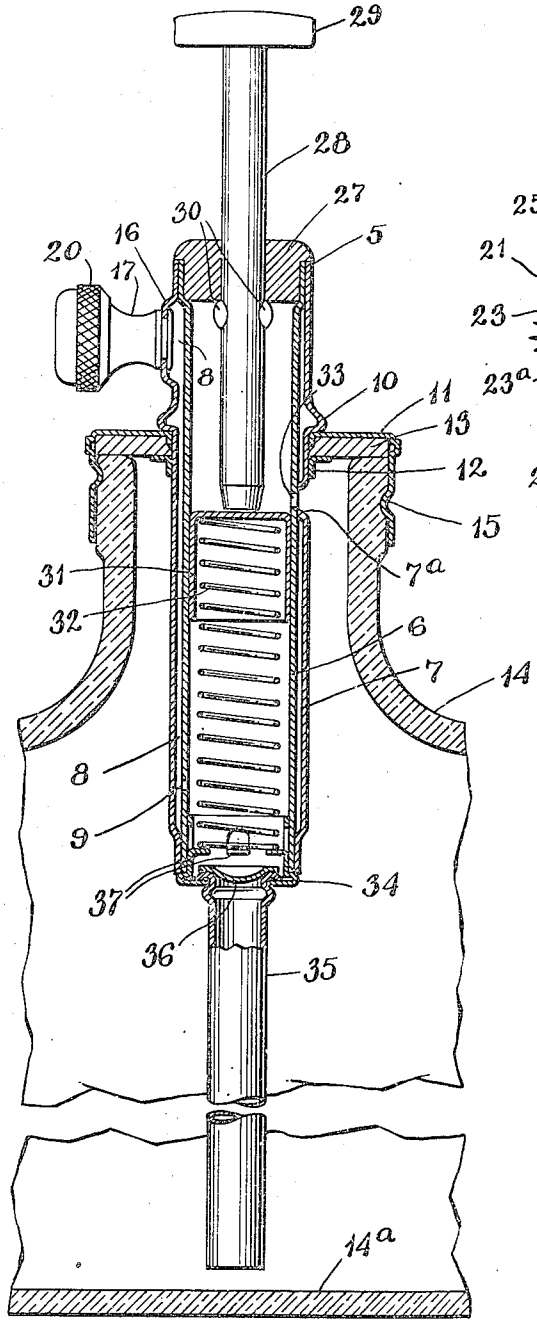


Fig. 2.

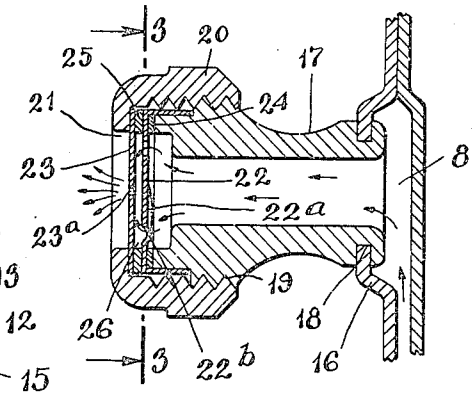
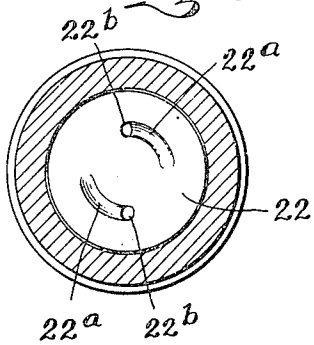


Fig. 3.



INVENTOR
STANLEY MAJEWSKI
BY
Howard C. Thompson
ATTORNEY

Patented Jan. 26, 1937 2,069,076

UNITED STATES PATENT OFFICE

2,069,076

SPRAY DEVICE

Stanley Majewski, Glendale, Long Island, N. Y.

Application May 24, 1935, Serial No. 23,140

10 Claims. (Cl. 103—211)

This invention relates to spray devices commonly referred to as atomizers; and the object of the invention is to provide a device of this class involving an elongated cylinder unit comprising a series of tubes disposed one within the other and constructed to form a central pump chamber and a circumferential discharge chamber encircling the pump chamber with means at one end of the discharge chamber for placing the same in communication with the pump chamber and with a discharge nozzle device communicating with the other end thereof through which a predetermined fluid may be sprayed in a substantially vapor-like fashion; a further object being to provide the cylindrical device with a cap or closure plate portion rotatable with respect to the cylinder and by means of which the unit may be attached to a suitable container; a further object being to provide a device of the class described composed of a plurality of economically formed parts which may be quickly and easily assembled and secured together, thus permitting the device to be manufactured and sold at a reasonable price, and at the same time, a very simple compact unit is provided which may be readily attached to containers of various kinds and classes; and with these and other objects in view, the invention consists in a device of the class and for the purpose specified, which is constructed as more fully hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:

Fig. 1 is a longitudinal sectional view through the device, shown attached to a container, with parts of the construction broken away.

Fig. 2 is an enlarged sectional view of a discharge nozzle which is shown in elevation in Fig. 1; and,

Fig. 3 is a detail section on the line 3—3 of Fig. 2.

In carrying my invention into effect, I provide a cylinder unit 5 consisting of an elongated inner tube 6 which forms the pump cylinder and an outer tube 7 forming the discharge cylinder. The tube 7 is spaced from the tube 6 throughout the major portion of the cylinder unit to form a discharge chamber 8, the lower end portion of which is in communication with the pump cylinder through a small port or passage 9. The upper end portion of the tube 7 has an annular bead 10 which forms a seat against which a cup-shaped closure cap 11 rests, the cap being free to rotate on the tube 7 but is held against longitudinal movement by a retaining ring 12 pressed onto the tube 7. This ring also serves to hold a packing ring 13 in the cap 11 to form a seal between the cap and the upper end portion of a bottle or other container 14 in connection with which the cap 11 is detachably coupled through the screw threaded engagement as indicated at 15 or in any other desired manner. Above the annular bead 10 the tube 7 is provided with an outwardly pressed portion 16 apertured to receive a nozzle tube 17 riveted or otherwise secured to the offset 16 as indicated at 18. The outer end portion of the nozzle tube 17 is threaded as seen at 19 to receive a cap 20 having a large discharge opening 21.

Disposed between the outer end of the nozzle tube 17 and the opposed wall of the cap 20 is a cup-shaped member 22 and disk 23, packing rings 24 and 25 being disposed between the tubes 17 and cup-shaped member 22 and between said member and the disk 23 respectively. The bottom wall of the member 22 is arranged adjacent the disk 23 and is provided with two or more circumferentially extending grooves 22a terminating in discharge passages 22b, note Fig. 3, whereby fluid from the discharge chamber 8 in passing through the tube 17 will be given a whirl or circumferential movement within the chamber 26 formed between the member 22 and plate 23 and prior to its discharge through a small opening 23a in the plate 23, which operation facilitates the vapor-like or mist-like discharge of the fluid from the nozzle 6, desirable in certain uses of the device as atomizers as well as in the use of spraying devices in beauty parlors and similar places. With the construction shown, the cap 20 may be detached from time to time and the member 22 and disk 23 removed and cleaned or a new element may be substituted to produce different spraying effects.

The upper and lower end portions of the tubes 6 and 7 are pressed, brazed or otherwise secured together, and mounted within the upper end of the tube 6 is a bearing plug 27 which forms a support and guide for a plunger rod 28 having a finger piece portion 29 at its outer free end and outwardly extending members 30 substantially centrally thereof to limit outward movement of the rod with respect to the plug 27. Within the tube 6 or pump cylinder is arranged a cup-shaped piston 31, which may be of any preferred construction. A spring 32 serves to support the piston at all times in engagement with

the inner end of the plunger rod 28 and serves to normally hold the rod in its outermost position.

The tubes 6 and 7 are provided at a point preferably above the piston 31 as shown in Fig. 1, with a small by-pass passage 33 opening into the container 14 to provide for the return of any fluid that may rise in the tube 6 above the piston 31 back into said container. At the point where the passage 33 is formed, the tube 7 is pressed inwardly and secured to the tube 6 as indicated at 7a so as to prevent any leak at this point from the chamber 8.

Secured within the lower portion of the tube 5 is a cup-shaped member 34 to the bottom wall of which is secured a tube 35 which extends to a point adjacent the bottom 14a of the container 14 as indicated in Fig. 1. Seating on the bottom of the member 34 or the attached end of the tube 35 is a check valve 36, the upward or inward movement of which is checked by inwardly extending lugs 37 formed from the walls of the cup-shaped member 34. These lugs also serve as seats for the lower end of the spring 32.

In the manufacture of the atomizer or spray devices, the particular type of closure cap 11 will be made to suit the size and structure of the container in connection with which the device is mounted. In like manner, the length of the tube 35 will be consistent with the container in order to at all times dispose the lower end of the tube 35 adjacent the bottom of the container.

In the operation of the device, the cylinder unit will be rotated in the cap 11 to direct the nozzle in the desired direction with respect to the container. The thumb or finger of a hand is placed upon the head 29 of the plunger rod 28 and this rod is forced downwardly against the spring 32 and then moved outwardly by the spring to move the piston 31 back and forth in the pump cylinder, and draw fluid from the container up into the cylinder below the piston and to force said fluid through the aperture 9 into the discharge chamber 8 and thus out through the nozzle in the manner heretofore stated. In initially starting the operation of the device, it will take a stroke or two of the piston to bring sufficient fluid into the respective chambers to provide the discharge of the fluid from the nozzle. In the operation of the pump, the valve 36 will rise in the upward stroke of the piston, permitting the fluid to enter the pump cylinder, and will return to its seated position in the downward stroke of the piston. The passage 33 operates as a vent facilitating the free action of the piston as well as providing the by-pass heretofore referred to.

I have found in practice that by providing a relatively restricted discharge chamber 8, more efficient atomizing or vapor-spraying may be accomplished and successful results assured in the continued operation of the device, and further, by reason of the simplicity of the construction and mode of operation of the several parts, long life and successful use of the device is assured. By reason of the compactness of the complete device, the same may be readily attached to containers of various kinds and classes, and the packing and shipment of the complete unit is also thereby simplified.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at oposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communicating with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, and a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tensional means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage.

2. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at opposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communicating with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a cup-shaped piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tension means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage, and a check valve seating in the lower end portion of the cylinder unit for closing the communication between the pump cylinder and said feed tube in the downward stroke of the piston and in the operation of transmitting fluid into the discharge chamber and outwardly through said discharge passage.

3. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at opposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communicating with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a cup-shaped piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tensional

means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage, a check valve seating in the lower end portion of the cylinder unit for closing the communication between the pump cylinder and said feed tube in the downward stroke of the piston and in the operation of transmitting fluid into the discharge chamber and outwardly through said discharge passage, and means in the lower portion of the pump cylinder for limiting upward or inward movement of said check valve and for forming a seat for said tensional means.

4. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at opposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communicating with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a cup-shaped piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tensional means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage, a check valve seating in the lower end portion of the cylinder unit for closing the communication between the pump cylinder and said feed tube in the downward stroke of the piston and in the operation of transmitting fluid into the discharge chamber and outwardly through said discharge passage, means in the lower portion of the pump cylinder for limiting upward or inward movement of said check valve and for forming a seat for said tensional means, and that part of the outer tube having the discharge passage being pressed outwardly.

5. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at opposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communicating with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a cup-shaped piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tensional means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage, a check valve seating in the lower end portion of the cylinder unit for closing the communication between the pump cylinder and said feed tube in the downward stroke of the piston and in the operation of transmitting fluid into the discharge chamber and outwardly through said discharge passage, means in the lower portion of the pump cylinder for limiting upward or inward movement of said check valve and for forming a seat for said tensional means, that part of the outer tube having the discharge passage being pressed outwardly, and the outer tube adjacent the upper end thereof having an outwardly extending annular beaded portion.

6. A spray device of the class described comprising an elongated cylinder unit consisting of inner and outer tubes arranged one directly within the other to seal said tubes at opposite end portions thereof, a restricted discharge chamber extending longitudinally of and between adjacent walls of the tubes intermediate the sealed ends thereof, the inner tube forming a pump cylinder closed at one end by a cap or plug and a reduced feed tube communication with the other lower end of said cylinder, the wall of the inner tube having adjacent the lower end thereof a passage opening into said discharge chamber, the outer tube having a discharge passage adjacent the upper end thereof and communicating with the upper end of said discharge chamber, a cup-shaped piston in the pump cylinder, tensional means for moving the piston upwardly in said cylinder, a plunger rod slidably mounted in said cap and independent of and adapted to engage said piston to move the same downwardly in the cylinder against the action of said tensional means in the operation of forcing fluid from the cylinder and in discharging the same through said discharge chamber and passage, a check valve seating in the lower end portion of the cylinder unit for closing the communication between the pump cylinder and said feed tube in the downward stroke of the piston and in the operation of transmitting fluid into the discharge chamber and outwardly through said discharge passage, means in the lower portion of the pump cylinder for limiting upward or inward movement of said check valve and for forming a seat for said tensional means, that part of the outer tube having the discharge passage being pressed outwardly, the outer tube adjacent the upper end thereof having an outwardly extending annular beaded portion, and an opening formed in both tubes of said cylinder unit adjacent and inwardly of said annular beaded portion to place the upper end portion of the pump cylinder in communication with a container in connection with which the device is mounted.

7. In a spray device of the class described, an elongated tubular casing consisting of two elongated tubes arranged one within the other with the ends of said tubes fitting one directly within and secured and sealed to the other, the outer tube being pressed outwardly intermediate its ends to form a restricted discharge chamber, the outwardly pressed portion of the outer tube adjacent the upper end of said casing having a discharge passage communicating with the upper end of said discharge chamber, the inner tube of the casing having adjacent the lower end thereof a passage placing the lower end of the discharge chamber in communication with the bore of the inner tube, the bore of the inner tube forming a pump cylinder, a plug closing

the upper end of said cylinder, a feed tube coupled with the lower end of the casing and opening into said pump cylinder, and means involving a piston and a check valve controlling the communication between the feed tube and said pump cylinder for controlling the admission of a fluid into the pump cylinder and the discharge thereof through said discharge chamber and passage.

8. In a spray device of the class described, an elongated tubular casing consisting of two elongated tubes arranged one within the other with the ends of said tubes fitting one directly within and secured and sealed to the other, the outer tube being pressed outwardly intermediate its ends to form a restricted discharge chamber, the outwardly pressed portion of the outer tube adjacent the upper end of said casing having a discharge passage communicating with the upper end of said discharge chamber, the inner tube of the casing having adjacent the lower end thereof a passage placing the lower end of the discharge chamber in communication with the bore of the inner tube, the bore of the inner tube forming a pump cylinder, a plug closing the upper end of said cylinder, a feed tube coupled with the lower end of the casing and opening into said pump cylinder, and means involving a piston and a check valve controlling the communication between the feed tube and said pump cylinder for controlling the admission of a fluid into the pump cylinder and the discharge thereof through said discharge chamber and passage, and the outer tube of the casing having an outwardly pressed annular bead adjacent the upper end thereof.

9. In a spray device of the class described, an elongated tubular casing consisting of two elongated tubes arranged one within the other with the ends of said tubes fitting one directly within and secured and sealed to the other, the outer tube being pressed outwardly intermediate its ends to form a restricted discharge chamber, the outwardly pressed portion of the outer tube adjacent the upper end of said casing having a discharge passage communicating with the upper end of said discharge chamber, the inner tube of the casing having adjacent the lower end thereof a passage placing the lower end of the discharge chamber in communication with the bore of the inner tube, the bore of the inner tube forming a pump cylinder, a plug closing the upper end of said cylinder, a feed tube coupled with the lower end of the casing and opening into said pump cylinder, means involving a piston and a check valve controlling the communication between the feed tube and said pump cylinder for controlling the admission of a fluid into the pump cylinder and the discharge thereof through said discharge chamber and passage, the outer tube of the casing having an outwardly pressed annular bead adjacent the upper end thereof, and the tubes of said casing having a passage adjacent and below said annular bead and opening into the pump cylinder of said casing.

10. In a spray device of the class described, an elongated tubular casing consisting of two elongated tubes arranged one within the other with the ends of said tubes fitting one directly within and secured and sealed to the other, the outer tube being pressed outwardly intermediate its ends to form a restricted discharge chamber, the outwardly pressed portion of the outer tube adjacent the upper end of said casing having a discharge passage communicating with the upper end of said discharge chamber, the inner tube of the casing having adjacent the lower end thereof a passage placing the lower end of the discharge chamber in communication with the bore of the inner tube, the bore of the inner tube forming a pump cylinder, a plug closing the upper end of said cylinder, a feed tube coupled with the lower end of the casing and opening into said pump cylinder, means involving a piston and a check valve controlling the communication between the feed tube and said pump cylinder for controlling the admission of a fluid into the pump cylinder and the discharge thereof through said discharge chamber and passage, the outer tube of the casing having an outwardly pressed annular bead adjacent the upper end thereof, the tubes of said casing having a passage adjacent and below said annular bead and opening into the pump cylinder of said casing, a plunger rod for actuating the piston in one direction, a coil spring for moving the piston and rod in the opposite direction, and means in the lower portion of the pump cylinder forming a seat for said spring and a stop limiting inward movement of said check valve.

STANLEY MAJEWSKI.