May 27, 1941. G. MOTT, JR., ET AL 2,243,435

SPRAYER

Filed Aug. 31, 1938

Fig. 1.

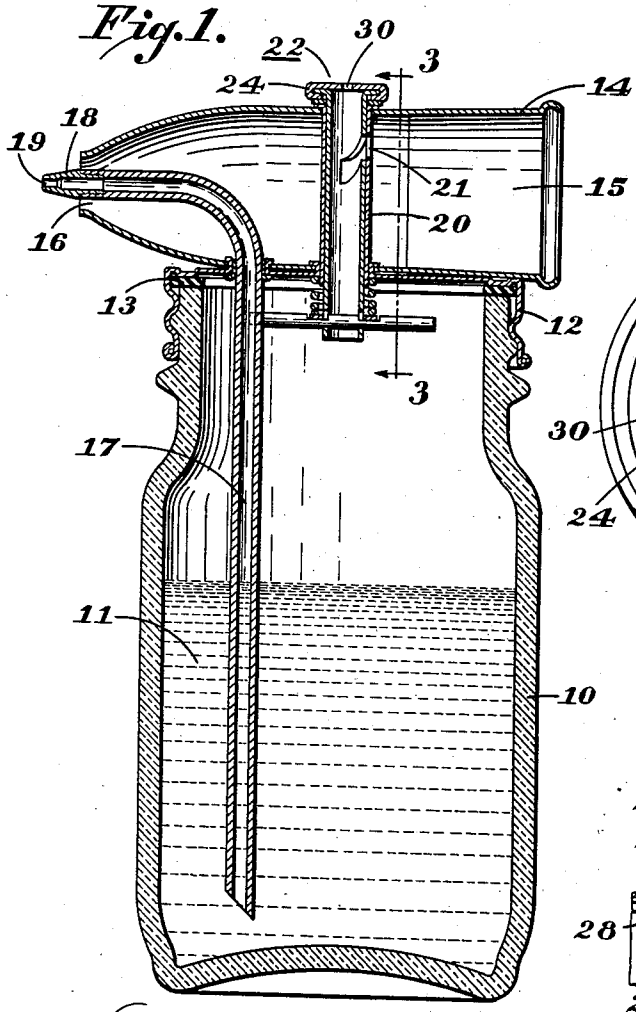


Fig. 2.

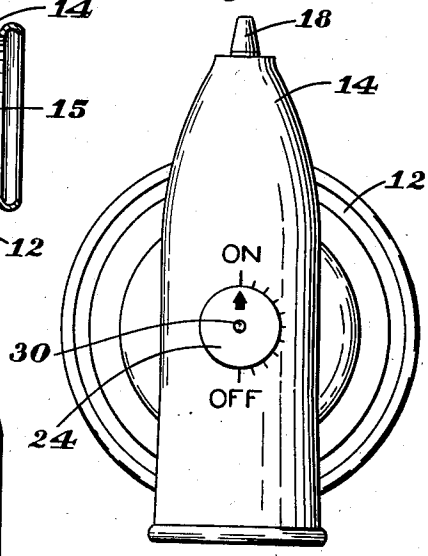


Fig. 3.

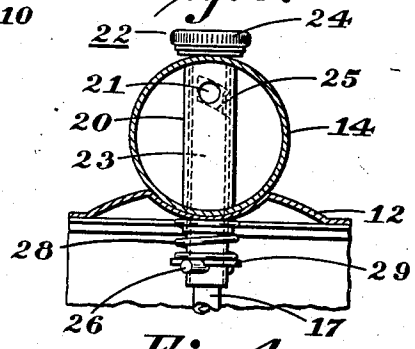


Fig. 4.

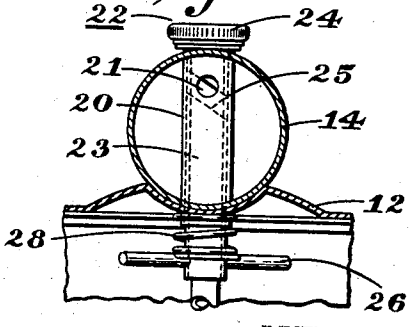
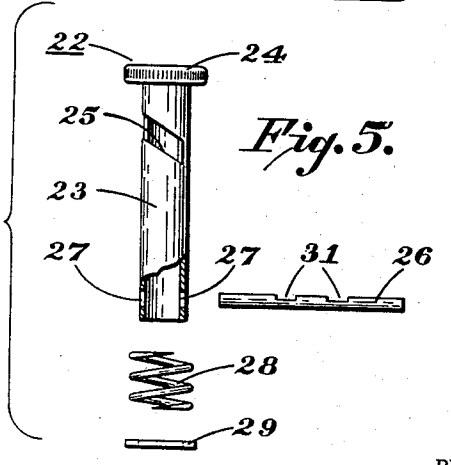


Fig. 5.



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UNITED STATES PATENT OFFICE

2,243,435

SPRAYER

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Application August 31, 1938, Serial No. 227,612

3 Claims. (Cl. 299—89)

This invention relates to sprayers and more particularly to sprayers designed for operation by air flow at a relatively low pressure.

An object of the invention is to provide an improved sprayer of the type operated by low air pressure with means for regulating the liquid spray.

What we consider to be novel and our invention may be better understood by reference to the following specification and appended claims when considered in connection with the accompanying drawing, in which

Fig. 1 is a cross-sectional view of the improved sprayer;

Fig. 2 is a top view;

Fig. 3 is a detailed sectional view taken along the line 3—3 of Fig. 1 of a portion of the sprayer with the regulating valve in a fully opened position;

Fig. 4 is a view similar to Fig. 3 with the regulating valve in an intermediate position; and

Fig. 5 is an exploded view of the regulating valve.

Referring to the drawing, 10 indicates a container in the form of a glass jar for a liquid 11 to be sprayed. In threaded engagement with the container 10 is a cover 12 with an interposed gasket 13 for effecting an air tight seal between the container 10 and cover 12. Secured to the top of cover 12 is an air tube 14 with an air inlet 15 and air outlet 16. Air tube 14 is tapered toward the outlet to produce a high velocity of air in the outlet opening 16 and to produce a pressure in the container 10 as will be explained below. Liquid riser 17 is secured to the cover 12 and extends from substantially the bottom of container 10 to the outlet opening 16 of air tube 14. Sprayer nozzle 18 is in threaded engagement with the end of liquid riser 17 with its opening 19 positioned beyond the end of air tube 14. The opening 19 of nozzle 18 is smaller than the inner bore of the liquid riser 17 to produce a concentrated spray of liquid.

An air admission tube 20 for the container 10 is secured to the cover 12 and extends traversely through the air tube 14. Tube 20 has a relatively small opening 21 communicating with the interior of the tube serving to admit air to the container 10 for the purpose of producing an air pressure above the liquid 11. Upon the passage of air through the air tube 14 from the large inlet opening 15 to the smaller outlet opening 16 a pressure head is produced within the air tube 14. This pressure is communicated through the admission tube 20 to the container 10 above liquid 11 and causes the liquid to flow up through the liquid riser 17 and out through the opening 19. The air flowing through the outlet opening 16 supplements the air pressure above the liquid 11 in producing a flow of liquid from the opening 19. The high-velocity air leaving the exit opening 16 also serves to direct and disperse the liquid spray.

The air pressure in the container 10 above liquid 11 is varied and the quantity of flow of liquid controlled by a regulating valve 22. Regulating valve 22 includes a tube 23 having a knurled cap 24 and an angular slot 25. Tube 23 extends through the admission tube 20. Tube 23 is secured in the admission tube 20 by means of a pin 26 extending traversely through apertures 27 in the bottom of tube 23. A spring 28 and washer 29 are located between the pin 26 and cover 12. A bleeder opening 30 is provided in cap 24 for a purpose which will be explained below. When the regulating valve 22 is in the fully opened position as shown in Fig. 2, the angular slot 25 completely uncovers the opening 21 as best indicated in Fig. 3. The pressure head produced by the flow of air through the air tube 14 is communicated to the container 10. This pressure drives the liquid 11 up the riser 17 and out the nozzle opening 19. Air flows into the container 10 through the opening 21 of admission tube 20 to replace the liquid leaving the container. Some air flows out through the bleeder opening 30, but due to its relatively small size as compared with opening 21, this does not appreciably reduce the pressure within the container 10. With the regulating valve 22 in this position a maximum flow of liquid through the liquid riser 17 and nozzle 18 is produced. If it is desired to reduce the flow of liquid, the tube 23 is rotated by means of a knurled cap 24 from the position indicated in Fig. 3 to an intermediate position as shown in Fig. 4. In the intermediate position of Fig. 4, the angular slot 25 only partially uncovers the opening 21. This reduces the effective size of opening 21, as compared with bleeder opening 30 and so reduces the air pressure above the liquid 11 of container 10.

In the fully-opened position, the pin 26 engages the riser 17 as a stop for the regulating valve 22. In the fully-closed position the opening 21 is completely covered and so no air is admitted to the container 10. This stops the flow of liquid through the riser 17 and nozzle 18. When the regulating valve is in the closed position the opposite end of pin 26 engages riser 17 to position and stop the regulating valve.

There is of necessity a clearance between the air admission tube 20 and tube 23 when the regulating valve 22 is in the fully closed position. This may produce a slight flow of liquid through the riser 17 with the valve in the closed position. A flow of liquid when the regulating valve 22 is closed is prevented by bleeder opening 30 which discharges the air flowing in this clearance space to atmosphere. The opening 30 is sufficiently large to relieve any pressure in the container 10 when the regulating valve 22 is in a closed position.

The regulating valve 22 is assembled to the cover 12 simply by inserting it through the admission tube 20, placing over its end the spring 28 and washer 29, after which pin 26 is inserted through openings 27. Subsequent accidental removal of the pin 26 is prevented by grooves 31 in pin 26 which receive washer 29. Spring 28 holds the washer 29 seated in the grooves 31. Spring 28 also produces sufficient friction to hold valve 22 in any selected position.

In the normal operation of the sprayer, it is contemplated that a source of air pressure will be connected to the air tube 14 as by inserting the end of a vacuum cleaner hose or other air conduit which may be connected to the blower side of a vacuum cleaner or other source of air pressure in opening 15. The sprayer will be grasped by the conduit connected to the air tube 14. The hand gripping the conduit will be in a position to control the regulating valve 22 by a forefinger or thumb simply rotating the valve tube 23 to a position to obtain the desired flow of liquid from the nozzle 18. To replenish the supply of liquid 11 in container 10, the cover 12 is removed from the container 10. The air tube 14, liquid riser 17, and regulating valve 22 are all mounted on the cover 12 which facilitates the manufacture and assembly of the sprayer.

What we claim is:

1. A sprayer including a liquid container; a cover for said container; an air tube secured to said cover having an inlet opening and an outlet opening; an open ended admission tube extending across said air tube, through said cover, and having an opening intermediate its ends communicating with the interior of said air tube; a liquid riser extending from adjacent the bottom of said container to the outlet opening of said air tube; a tube extending through said admission tube having a knurled cap with a bleeder opening; an angular slot adapted to partly or wholly uncover the opening in said admission tube; a pin passing through apertures in said last-named tube adapted to engage said riser to stop the rotation of said tube in an open or closed position; a washer seated in grooves in said pin; and a spring located between said washer and said cover; whereby the flow of liquid is controlled by rotating said last-named tube to vary the effective size of the admission tube opening, communicating with the interior of the air tube relative to the size of the bleeder opening and regulate the pressure in said container.

2. A sprayer including a liquid container; a cover for said container; an air tube having an inlet opening and a smaller outlet opening; an admission tube extending across said air tube having a first opening communicating with the interior of the air tube and a second opening communicating with the interior of the container; a liquid riser extending from the bottom of the container to the outlet opening of the air tube; and a valve adapted to partly or wholly uncover the opening in the admission tube communicating with the interior of the air tube and having an opening communicating with the atmosphere, whereby the flow of liquid is controlled by the relative size of the opening in the admission tube communicating with the interior of the air tube and the opening in the valve communicating with the atmosphere.

3. A sprayer including a liquid container; a cover for said container; an air tube secured to said cover having an inlet opening and a smaller outlet opening; an admission tube extending across said air tube having a first opening communicating with the interior of the air tube and a second opening communicating with the interior of the container; a liquid riser extending from the bottom of the container to the outlet opening of the air tube; and a valve adapted to cover or uncover the opening in the admission tube communicating with the interior of the air tube; said valve having an opening communicating with the atmosphere to relieve any pressure in the container due to leakage past the valve when the valve covers the opening in the admission tube communicating with the interior of the air tube.

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