Oct. 10, 1933. W. A. DE HART 1,929,882

PAINT SPRAY

Filed Aug. 2, 1929 2 Sheets-Sheet 1

Fig. 1.

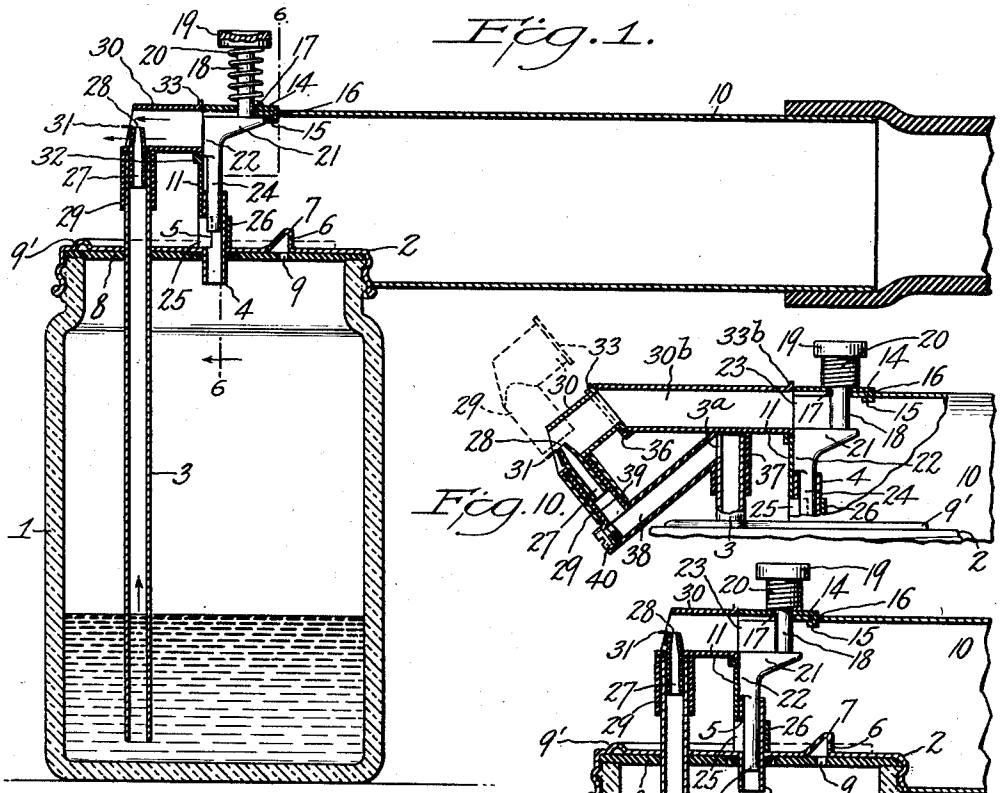

Fig. 10.

Fig. 3.

Fig. 2.

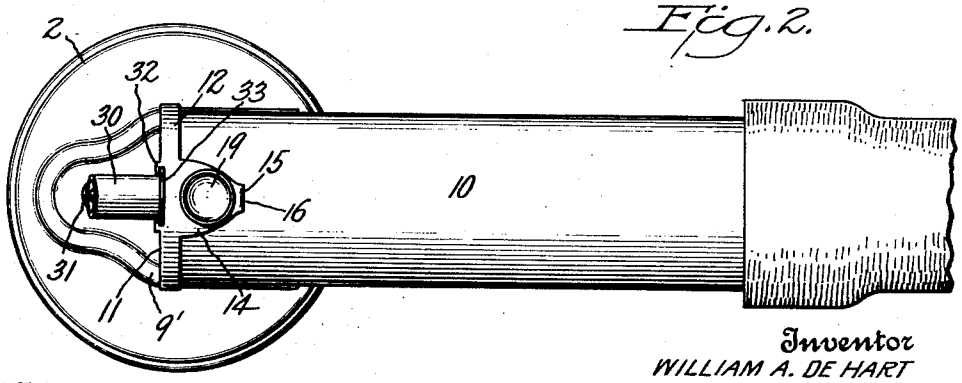

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Fig. 4.

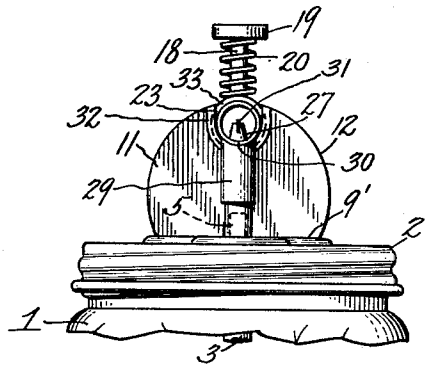


Fig. 5.

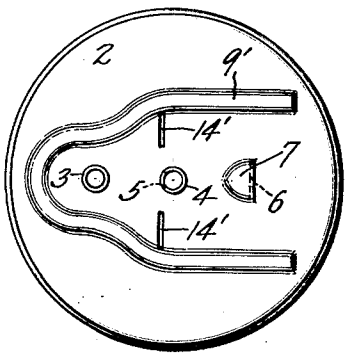


Fig. 9.

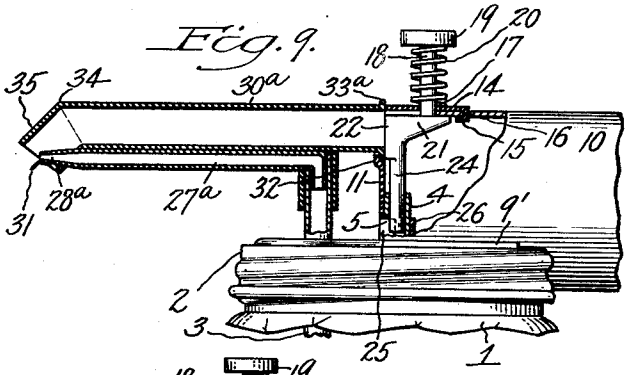
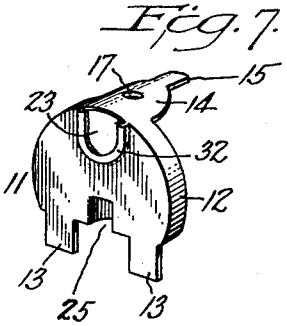


Fig. 7.



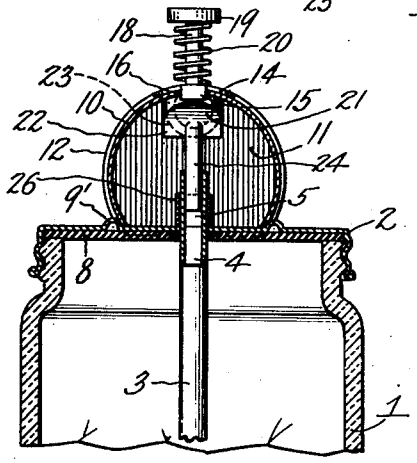
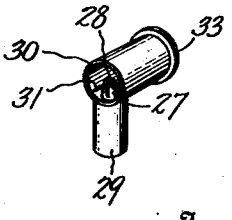


Fig. 6.

Fig. 8.



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UNITED STATES PATENT OFFICE

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PAINT SPRAY

William A. De Hart, Teaneck, N. J.

Application August 2, 1929. Serial No. 382,896

13 Claims. (Cl. 91—45)

The present invention relates to improvements in the form of spraying devices that is commonly employed in connection with the exhaust or blower end of a vacuum cleaner, a pipe connecting the vacuum cleaner with the air supply tube of the spraying device to afford sufficient air under pressure to actuate the spray. Various spraying devices of this type have been placed upon the market with more or less success, but their cost of manufacture has necessitated selling them at such a high retail price that they have not been as commonly used as might otherwise be. One of the purposes of the present invention is to produce a simple form of spray that can be cheaply manufactured and sold for a relatively small cost comparable with the price of a good paint brush, such spray devices being used largely for spraying on a coat of paint.

To this end, I have produced an improved spraying device in the form of an attachment for a jar-like container, the device being made up upon a removable metal container top. The top carries a fluid delivery tube which passes through the top and extends sufficiently below to reach nearly to the bottom of the container, the spray nozzle being mounted on the outer end of this fluid delivery tube. The top also carries a tubular air exhaust extending through the top and formed with a lateral outlet opening just above the top. An air supply port also extends through the top to supply air under pressure upon the fluid in the container. An air chamber of tubular form is mounted upon the top to enclose the tubular air exhaust and the air supply port, said tubular air chamber being adapted to be attached to some suitable supply of air under pressure, such as the exhaust or blower pipe of a vacuum cleaner above referred to, and the inner end of this tubular air chamber is closed by a head which is formed with an air spray supply port and a port that registers with the lateral outlet opening of the tubular air exhaust. A two-part valve is mounted upon the inner face of this air chamber head, one part of the valve being a valve plate that normally closes the air spray supply port, while the other part of the valve comprises the stem that fits and slides in the tubular exhaust and closes the lateral opening thereof when the air spray supply port is opened. This valve is manually operated. The air chamber not only supplies air under pressure for the spray nozzle, but air passes from the air chamber through the air supply port into the container for forcing the fluid up into the fluid delivery tube.

A feature of the present invention consists of a combined spray nozzle and air pipe which are secured together in the critical angular relation that has been found from practice to produce the best results. The spray nozzle projects into the delivery end of the air tube at approximately a right angle or less, the opening of the nozzle being preferably inclined slightly away from the direction of the air current. The nozzle tube telescopes or fits over the outer end of the fluid delivery tube, while the air pipe combined therewith is flanged to fit the correspondingly flanged delivery port in the head of the air chamber, the engaging flanges of the air pipe and fitting ends of the nozzle and delivery tube being arranged in parallel planes so that the combined nozzle and air pipe can be readily mounted and demounted. By arranging this removable combined nozzle and air spray pipe, it is possible to use different sized spray nozzles for different classes of work, a feature of great practical importance.

The spray nozzle is preferably provided with a wire or fin projecting from its delivery side approximately parallel with the line of blast through the air pipe. This fin or wire concentrates the discharge from the nozzle and prevents the objectionable spread of the spraying fluid to the nozzle surface below its opening. The air spray tube terminates approximately in the plane of intersection of the nozzle. It is important that this air tube extend up to the nozzle to properly concentrate the stream of air, but it should not project beyond the nozzle.

In addition to the device as described, I provide a modified form of spray nozzle in which the spray can be directed at a slight angle downwardly from the normal plane of the container top. This modified form also embodies means for removably mounting the spray nozzles to obtain the different sizes of spray for different work.

In order that the invention may be fully understood, it will first be described with reference to the accompanying drawings, and afterwards more particularly pointed out in the annexed claims.

In said drawings,

Figure 1 is a vertical, longitudinal, sectional view of the improved spraying device.

Figure 2 is a similar view showing the controlling valve open for the spraying operation.

Figure 3 is a plan view of the device.

Figure 4 is an end view of the device.

Figure 5 is a top plan view of the modified container top with the spray devices removed.

Figure 6 is a vertical, transverse, sectional view taken on the line 6—6 of Figure 1.

Figure 7 is a detail perspective view of the head for closing the tubular air chamber.

Figure 8 is a detail perspective view of a combined spray nozzle and air spray supply tube.

Figure 9 is a detail side elevation partly in longitudinal section of a modified form of spray nozzle; and

Figure 10 is a similar view showing a further modification of the improved spray nozzle.

The vessel or container indicated at 1 may be an ordinary glass jar of the proper size to contain the liquid substance that is to be sprayed. A suitable consistency of paint can be successfully sprayed in this type of device. The jar or container 1 has screwed, or otherwise detachably mounted upon it, a top or cover member 2, and upon this metal top 2 the improved spraying device is mounted.

The top 2 supports a fluid delivery tube 3 which extends through the top, is sealed thereto, and projects down into the container or jar 1, as shown particularly in Figure 1. This tube 3 also extends upwardly a short distance above the top 2 for the reception of the spray nozzle, presently to be described. The top 2 also carries an air exhaust tube 4 which projects slightly above and below the cover 2, this tube 4 having a lateral outlet opening 5 just above top 2. An air supply port 6 is formed in the raised portion 7 of struck-up cover 2, said air supply port being presented toward the stream of air under pressure carried by the air chamber, presently to be referred to.

It will be understood that the top 2 carries the usual packing or gasket 8 which is perforated to fit over the tubes 3 and 4, and also at 9 to register with the inlet air opening 6.

As shown particularly in Figure 5 of the drawings, the top 2 is reinforced by means of a rib 9' struck-up from the metal of the top, said reinforcing rib being of modified U-shape in plan view.

10 is a tubular air chamber having its bottom wall slightly cut away and flat near its inner end to fit upon the container top 2 between the two lugs of the reinforcing rib 9', said tube 10 being rigidly secured in place upon top 2 by soldering or brazing. The open end of the tubular air chamber 10 is closed by means of a semi-circular head 11 having a curved flange 12 fitting snugly upon the end of the tube 10, and with integral lugs 13 projecting downwardly in position to pass through the spaced slots 14' formed through the top 2 upon opposite sides of the tube 4. These lugs 13 are bent over against the inner face of the top 2 and flanged head 11 is tightly soldered to the tube 10 and top 2. Head 11 carries a rearwardly projecting curved bracket 14 having an integral lug 15 which is bent downwardly and passes through a transverse slot 16 in the top of the tubular member 10. This bracket 14 of head 11 and the wall of tube 10 are perforated, as indicated at 17, to receive the upwardly projecting rod 18 carrying at its outer end finger piece 19, and supporting between the finger piece 19 and bracket 14 an expansion spiral spring 20. Suitably secured to the inner end of rod 18 is an arm 21 projecting rearwardly from a slide valve plate 22 which slides upon the inner face of head 11 and normally closes the outlet port 23 through which passes the air to the spray nozzle. Extending downwardly from the slide valve plate 22 is a stem 24 which fits and slides in the tubular exhaust 4, and when the valve 22 is pressed down to open up the air spray outlet port 23, said valve stem 24 will extend over and close the lateral opening of tubular exhaust 4.

The flanged head 11 is also formed with an exhaust port 25 which registers with the lateral opening of exhaust tube 4, the metal of head 11 being cut out to form the port 25, the cut-out metal strip being bent around tube 4 to assist in holding the parts rigidly together as indicated at 26.

As stated above, an improved feature of the present invention is the provision of a combined nozzle and air pipe. In its simplest form this is shown in Figures 1, 2, 3, 4 and 8, in which figures, 27 is a nozzle tube having a contracted or conical upper end terminating in a restricted discharge opening 28. This nozzle tube 27 fits snugly the bore of the upper end of the fluid discharge tube 3, while a concentric short section of tubing 29 surrounding tube 27 fits over the upper end of the discharge tube 3. The conical end of nozzle tube 27 is inserted radially into a larger air conducting tube 30, a suitable opening being provided in the wall of tube 30 near its outer end to receive the nozzle tube. The discharge opening 28 of nozzle tube 27 is presented in the critical position, discovered by experiment and found to be approximately in the longitudinal axis of the air tube 30. It will be understood that the concentric tubes 27 and 29 are rigidly soldered or brazed to the air conducting tube 30. As shown in the drawings, the spray nozzle 27 and spray air supply tube 30 are rigidly secured together in approximately right angular relation. This angular relation may be altered slightly so long as the discharge opening of the spray nozzle is not directed toward the oncoming stream of air. It will further be observed with reference to Figures 1, 2 and 3 of the drawings, that the air spray conducting tube 30 is cut back a slight angle from the bottom so as not to project beyond the outlet opening of the spray nozzle. It is desirable to have this tube 30 extend up to the spray nozzle to concentrate the action of the air upon the nozzle.

Another feature of importance in the spray nozzle is the provision of a small wire or fin, indicated at 31, extending from the delivery side of the conical end of the nozzle tube adjacent to the discharge opening, and extending in the line of the longitudinal axis of the air supply tube 30. This member 31 concentrates the fluid delivered from the nozzle until broken up into the spray, and prevents the fluid creeping downwardly over the conical surface of the nozzle.

It will be observed that the air outlet port 23 through the head 11 is of approximate U-shape with the metal of the head 11 shaped into a coupling flange 32. The inner end of the air spray conducting tube 30 is formed with an annular flange 33 which fits snugly the coupling flange 32 and holds the tube 30 in registry with the port 23 so that air passes from the tubular chamber 10 through port 23 and is directed over and around the conical discharge end of the spray nozzle. The interlocking flanges 32 and 33 are arranged parallel with the telescoping nozzle tubes 27 and 29 so that in mounting or dismounting the combined nozzle and air tube, the movement required is a simple sliding movement parallel with tube 3 and the face of the head 11.

It is proposed to make nozzles of various sizes best suited for different kinds of work. This combination nozzle and air tube with its remov-

ability greatly facilitates the exchange of nozzles to suit the work to be performed.

In the form of nozzle described, it will be observed that the air spray supply tube 30 is directed horizontally or parallel with top 2. This is a convenient form for painting many objects, but is an inconvenient form for painting horizontal surfaces such as a floor or the top of a desk, in which case it is desirable to be able to play the spray in a downward direction without tipping over the container so far as to interfere with the operation. For this downward direction of the spray, I may use one of the modified forms shown in Figures 9 and 10 of the drawings.

In Figure 9, the air spray supply tube indicated as 30^a is somewhat longer than the tube heretofore referred to, but is mounted upon the head 11 of the air chamber 10 in the same manner as above described, the coupling flange being shown at 33^a. The discharge end of this air tube 30^a is provided with an elbow at 34, connecting with a short downwardly inclined pipe section 35, while the nozzle tube 27^a is of angular shape and extended parallel with air tube 30^a and having its discharge opening 28^a presented horizontally in the center of the angular discharge end 35 of the air tube. With this device, the spray is directed downwardly when the apparatus is held in normal position with the container 1 upright.

In Figure 10, the device is further modified to include the features of projecting the spray downwardly in combination with interchangeable spray nozzles. In this form the air spray delivery tube 30^b is supported by its annular coupling flange 33^b in the mounting hereinbefore explained. The delivery end of tube 30^b is cut back at an angle as shown, its angular end being formed with an approximately U-shaped coupling flange 36 of the same character as the coupling flange 32, above referred to. Secured to the under surface of the air spray conducting tube 30^b is a tubular thimble 37 projecting downwardly in position to snugly fit over the upper end of the fluid supply tube 3. This tubular thimble 37 carries an angular tubular extension 38 which communicates through the port 3^a with the fluid supply tube 3, and conducts fluid to be sprayed therefrom. At the outer end of this angular tubular extension 38 is an upwardly presented tubular nipple 39 in communication with 38, and of the proper size to receive the nozzle tube 27 and auxiliary concentric tube 29 of the nozzle attachment above described. 40 is a screw threaded into the end of the tube 38 to close the end and permit access when it is desired to clean the parts.

With this modification of Figure 10, it will be observed that the combined nozzle and air tube of the form shown in Figure 8 can be readily mounted by sliding the annular coupling flange 33 into engagement with the flange 36 of air tube 30^b, while the tubes 27 and 29 are telescoped with the fluid extension nipple 39. In this way, the combination nozzle attachment for producing a spray of the desired size may be readily mounted upon the device to afford a downwardly acting spray.

In operating the spray, a fluid paint for instance, it will be understood that after the paint is placed in the container, and the top screwed firmly in place, and the nozzle attachment of the desired size mounted, it is only necessary to start up the air pressure device of whatever form may be used which supplies air under pressure into the tubular chamber 10. In normal inoperative position, it will be understood that air will enter the container and above the fluid to be sprayed, but will readily pass out through the tubular exhaust for so long as the combination valve is in its normal position. When it is desired to cause the spray to act, the operator presses downward upon the finger piece 19, opening communication with the air spray supply tube and closing the outlet through air exhaust tube 4, with the result that air entering the container 1 will force the fluid up the pipe 3 to the spray nozzle from which it is sprayed by the passing of currents of air over the nozzle. As long as the valve is held in the described position, and fluid remains in the container, the spray will operate. In closing off the spraying operation, the parts are so arranged that the exhaust through tube 4 will start to open to relieve the container of the pressure of the air before the air spray supply pipe is closed. This is important so as to continue the blast of air across the spray nozzle until all possibility of fluid rising in the nozzle is passed.

I claim:—

1. A spraying attachment for containers comprising a removable metal container top, a fluid delivery tube projecting above and below the container top, a tubular air exhaust projecting through said top and having a lateral outlet opening, an air supply port through said top, a tubular chamber for air under pressure mounted upon the upper face of said container top and enclosing said tubular air exhaust and said air supply port, a head for said tubular air chamber having an air spray supply port and a port registering with the lateral outlet of said tubular air exhaust, a two part manually operated slide valve mounted upon said air chamber head, one part of said valve comprising a valve plate normally closing said air spray supply port and the other part of said valve comprising a stem projecting from said valve plate and sliding in the tubular air exhaust to close its lateral outlet opening when the air spray outlet port is opened, and a combined spray nozzle and air supply pipe in communication respectively with said fluid delivery pipe and said air spray outlet port.

2. In a device of the character described, the combination with a container having a fluid outlet and an air supply port, and a chamber for air under pressure having an air spray supply port, of a unit comprising the relatively fixed fluid spray nozzle and air delivery tube, the spray nozzle of said unit detachably communicating with said fluid outlet and the delivery tube of said unit detachably communicating with said air spray supply port.

3. In a device of the character described, the combination with a container having an air supply port, a fluid outlet for said container, and a chamber for air under pressure having a valved air delivery port, of the combined fluid spray nozzle and air delivery tube having fixed angular relation and said spray nozzle and delivery tube being detachably mounted in communication respectively with said fluid outlet and said air delivery port.

4. A detachable unit for a device of the character described comprising a combined fluid spray nozzle and air delivery tube permanently connected in fixed operative relation with the outlet of the spray nozzle ending in said air delivery tube approximately in the longitudinal axis thereof.

5. A detachable unit for a device of the character described comprising a combined fluid spray

nozzle and air delivery tube permanently connected in fixed operative angular relation with the outlet of the spray nozzle ending approximately in the longitudinal axis of the air delivery tube, and a fluid directing element projecting from the outlet of the spray nozzle.

6. A detachable unit for a device of the character described comprising a combined fluid spray nozzle and air delivery tube permanently connected in fixed operative angular relation with the outlet of the spray nozzle ending approximately in the longitudinal axis of the air delivery tube, and a fluid directing element projecting from the discharge side of the spray nozzle at the outlet thereof within the path of air from said delivery tube.

7. In a device of the character described, a combined fluid spray nozzle and air delivery tube permanently attached in fixed operative angular relation with the spray outlet of the nozzle ending within the delivery end of said air delivery tube approximately in the longitudinal axis thereof, said fluid spray nozzle having a fluid directing element projecting from its delivery side adjacent its outlet approximately parallel with the path of air from said air delivery tube.

8. In a device of the character described, the combination with a container having a fluid outlet and an air supply port, with a chamber for air under pressure in communication with said air supply port, and having an air spray delivery port, with the combined fluid spray nozzle and air delivery tube detachably mounted in communication respectively with said fluid outlet and said air spray delivery port, said fluid spray nozzle and said air delivery tube intersecting at approximately right angles and said air delivery spray tube terminating in approximately the plane of intersection of the fluid spray nozzle.

9. In a device of the character described, the combination with a container having a fluid outlet and an air supply port, with an air supply chamber in communication with said air supply port, a fluid spray nozzle leading from said fluid outlet, and an air delivery tube leading from said air chamber to and transversely of said fluid spray nozzle, said fluid spray nozzle having a fluid directing and spray concentrating member projecting laterally from its outlet and in line with the air delivery tube.

10. In a device of the character described, the combination with a removable metal top for a jar or container, said metal top carrying a fluid outlet tube, and a tubular air chamber cut away on its under side at its inner end to fit over and permanently attach to the container cover and project therefrom at one side, a head plate closing the inner end of said air chamber and having an air spray supply port, a valve mounted upon said head controlling said spray supply port, an air delivery tube leading from said air spray supply port, and a spray nozzle mounted upon said fluid delivery tube and supported in operative relation to said air delivery tube.

11. In a device of the character described, the combination with a removable metal top for a jar or container, said metal top carrying a fluid outlet tube projecting through it, a container air exhaust port, and an air chamber having a container air supply port and a spray air supply port, means controlling the spray air supply port, a removably mounted combined spray nozzle and air delivery tube in fixed angular relation, and interlocking flanges upon said spray air supply port and said air delivery tube, said spray nozzle coupling with said fluid delivery tube.

12. In a device of the character described, the combination with a container having a fluid outlet and an air supply port, and an air chamber having an air spray supply port, extension fluid and air tubes for supporting a combined spray nozzle and air spray supply pipe at a downward spraying inclination and having means for detachably mounting them in communication respectively with the fluid outlet of the container and the air spray supply port of said chamber, means for controlling said air spray supply port, a combined fluid spray nozzle and air delivery tube permanently connected in operative angular relation, and means for detachably mounting said connected spray nozzle and tube at a downward inclination upon said extension tubes or directly upon said fluid outlet and said air spray supply port.

13. In a device of the character described, the combination with a top for a jar or container, a fluid outlet tube mounted upon and extending through said top, an air chamber mounted upon said top having a container air supply port and a spray air supply port, means controlling said ports, a removably mounted unit comprising the angularly arranged spray nozzle and air delivery tube, and interlocking flanges upon said spray air supply port and the air delivery tube of said removably mounted unit, said flanges being parallel with said fluid outlet tube, and the spray nozzle of said unit having telescoping coupling engagement with said fluid outlet tube.

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