Feb. 24, 1953 F. R. WILLIAMS 2,629,631

ATOMIZER HEAD

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FIG. 1.

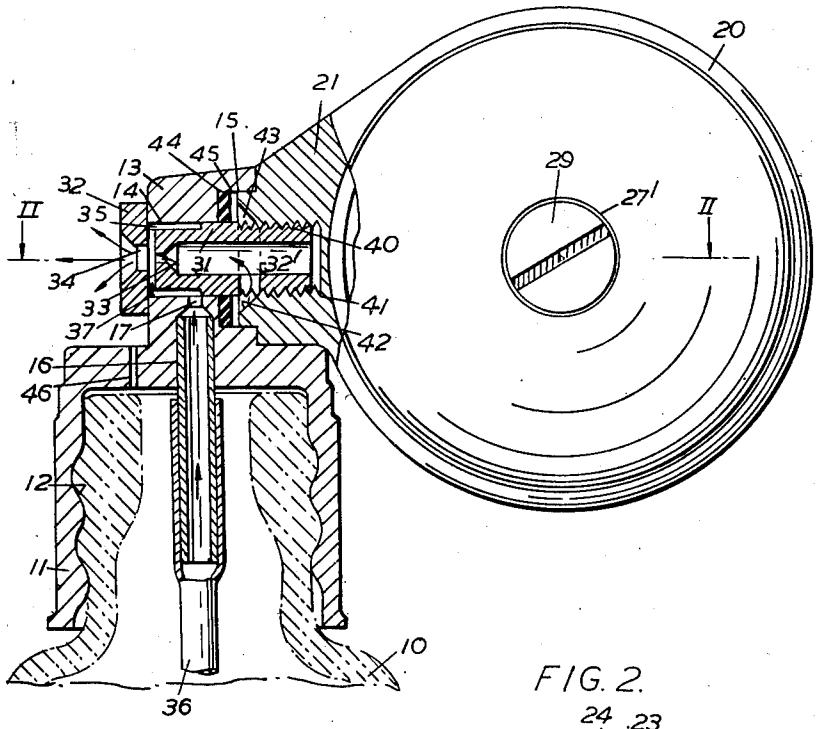
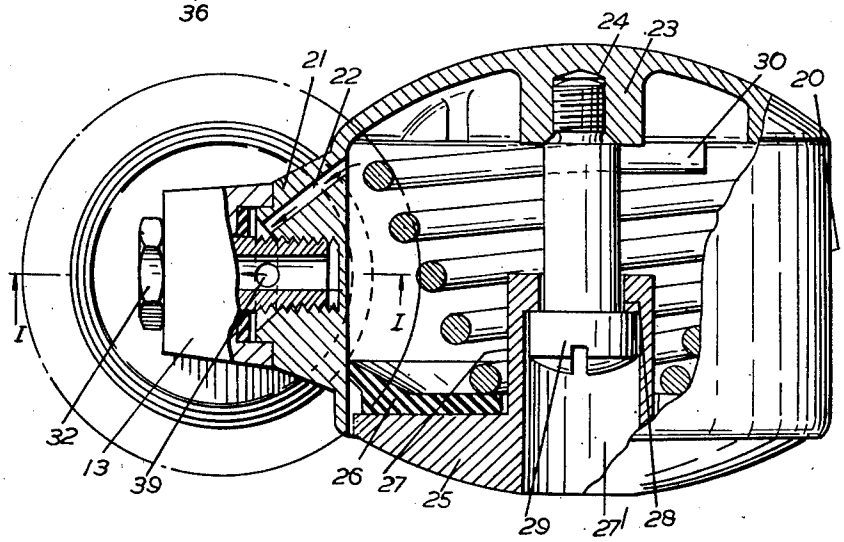


FIG. 2.



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ATOMIZER HEAD

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6 Claims. (Cl. 299—88)

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This invention relates to atomizer heads for connection to a bottle, flask or like vessel containing liquid to be atomized, comprising a fitting for attachment to the bottle or other vessel, a manually operated pump to provide a supply of pressure air, and a nozzle to which the pressure air is supplied in such a way as to produce a drop in pressure, whereby liquid is drawn up from the liquid container through a tube depending into the container and communicating with the nozzle and is discharged in an atomized state through the nozzle outlet.

The object of the invention is to provide a simple construction of atomizer head of the kind above referred to which can be readily and cheaply produced by modern methods of production.

With this object in view an atomizer head of the kind above referred to made in accordance with the present invention is characterised by the feature that the nozzle is a member made in one piece and is provided with the necessary air and liquid ducts for the purpose of atomizing and spraying the liquid, and with means for operatively connecting the said fitting to the pump.

The means for connecting the fitting to the pump may comprise a screw thread on the nozzle arranged to engage a tapped recess in the pump body, and a head on the nozzle to engage and press the fitting against the pump body.

The nozzle may be bored throughout its length and an annular space is provided between the fitting and the pump body, this space communicating through a duct with the air compression chamber in the pump body, and, through a boring in the wall of the nozzle, with the interior of the nozzle.

The diameter of the through boring in the nozzle may be reduced adjacent to the nozzle outlet which is of wider diameter than this reduced part of the boring and the external diameter of the nozzle is reduced to form an annular chamber between the wall of the nozzle and the inner wall of the fitting, the wall of the nozzle being bored to provide communication between this annular chamber and the reduced diameter part of the through boring, whereby when pressure air passes from this latter part of the through boring to the outlet a drop in pressure is produced which serves to draw liquid from the container via the annular chamber into the nozzle where it mixes with the pressure air by which it is atomized and discharged through the nozzle outlet in the form of a fine spray or mist.

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In the accompanying drawings which illustrate how the invention may be carried into effect:

Fig. 1 is a side view, partly in section on line 1—1, Fig. 2; and Fig. 2 is a plan view mainly in section taken on line 11—11, Fig. 1, of one form of device made in accordance with the invention.

The device shown in the drawings comprises three separate units, namely a cap unit, arranged for screwing on to the neck of a bottle 10 containing liquid to be atomized, a manually operated pump unit for supplying pressure air, and a nozzle unit.

The cap unit is moulded from any suitable plastic material and is formed with a cap 11 having an internal screw thread 12 and with an upright extension 13 formed with a central aperture 14 and with a recess 15. One end of a depending tube 16 is fixed in the cap by pressing it into position after the moulding (or at the time of moulding), so as to communicate with an aperture 17 therein the tube 16 depending axially into the cap.

The manually operated pump unit comprises a cylindrical body part 20 moulded from a suitable plastic and closed at one end and formed with a solid lateral extension 21 formed with a through duct 22 and with a projection 23 on the closed end of the body, the projection 23 having a central tapped recess 24. The open end of the body is closed by a piston member comprising a disc 25 moulded from plastic material and a flanged washer or cup 26 made for example of plastic material or rubber, the disc 25 having a central projection 27 formed with an aperture 28 to receive a screw 29 which screws into the tapped recess 24. A return spring 30 bears at one end against the cup 26 and at the other end against the closed end of the body 20. The diameter of the unthreaded part of the screw 29 is slightly less than that of the aperture 28 to permit air to enter into the compression chamber in the body 20, the projection 27 also forming an air inlet passage 27'.

The nozzle unit or member 31 is formed with a head 32 and is continuously bored throughout its length to provide a relatively wide bore 32', a relatively narrow bore 33, and a nozzle outlet 34. The outside diameter of the nozzle member is reduced near the nozzle outlet to provide an

annular chamber 35 between the cap unit and the nozzle.

This chamber 35 is in communication with the tube 16 the free end of which engages in a tube 36 depending in the bottle 10. Communication between the annular chamber 35 and the narrow bore 33 is provided by a duct 37 in the nozzle. Communication between the duct 22 and the wide bore 32 is provided by an aperture 39 in the wall of the nozzle. The inner end of the nozzle is formed with an external screw thread 40 which, when the device is assembled, engages in a correspondingly tapped recess 41 in the extension 21. The inner edge 42 of this extension is tapered to form, when the device is assembled, an annular chamber 43 between the tapered edge 42, the nozzle, and washers 44, 45, inserted in the recess 15 to form a fluid-tight joint between the extensions 13 and 21, to prevent leakage of pressure air from the chamber 43 between the contacting surfaces.

The top of the cap 11 is bored at 46 this bore communicating with the interior of the bottle 10.

As will be evident from the foregoing description the cap unit and the pump unit are operatively connected together by the nozzle unit, the screwed end 40 of which engages the tapped recess 41, and the head 32 of which presses the extension 13 against the extension 21.

In use, when the parts of the atomizer head have been assembled and the cap 11 is screwed on to the neck of the bottle 10, the piston 25—26 is pushed in by the thumb, compressing the air in the cylindrical body 20 and forcing compressed air through the duct 22 into the annular chamber 43, whence it passes through the aperture 39 into the boring 32', escape of air past the screw 29 being prevented by placing the thumb over the air inlet passage 27'. Passage of the pressure air through the small bore 33 to the nozzle outlet 34 produces in the well known way a drop in pressure which is communicated through the duct 37, annular chamber 35 and tubes 16, 36, to the interior of the bottle and acts to draw liquid up the tubes 16, 36 into the annular chamber 35 and bore 33 where it mixes with and is atomized by the pressure air, subsequently passing through the nozzle outlet in the form of a fine spray. Any non-atomized drops of liquid dripping from the nozzle on to the cap pass through the bore 46 and are returned to the bottle.

What I claim is:

1. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said manually operated pump comprising a pump body and an air compression chamber in said pump body, and an annular space being provided between said fitting and said pump body, said annular space surrounding the nozzle and communicating on the one hand with said air compression chamber through an air duct in the pump body and, on the other hand, with the said air ducts in said nozzle.

2. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said nozzle being of T-shape and passing through an aperture in said fitting, the head of said nozzle being pressed tightly against said fitting and the external diameter of said nozzle being reduced adjacent the head thereof to provide an annular chamber between the wall of the nozzle and the inner wall of said fitting, and further comprising a duct in said fitting providing communication between said annular chamber and the interior of the liquid container, said air ducts in said nozzle comprising an axial longitudinal duct terminating in the nozzle outlet and a duct through the wall of said nozzle providing communication between said manually operated pump and said axial longitudinal duct, and said liquid ducts comprising a duct through the wall of said nozzle providing communication between said annular chamber and said axial longitudinal duct.

3. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said nozzle being of T-shape and passing through an aperture in said fitting, the head of said nozzle being pressed tightly against said fitting and the external diameter of said nozzle being reduced adjacent the head thereof to provide an annular chamber between the wall of the nozzle and the inner wall of said fitting and further comprising a duct in said fitting providing communication between said annular chamber and the interior of the liquid container, said air ducts in said nozzle unit comprising an axial longitudinal duct terminating in the nozzle outlet, a duct through the wall of said nozzle providing communication between said manually operated pump and said axial longitudinal duct, and said liquid ducts comprising a duct through the wall of said nozzle providing communication between said annular chamber and said axial longitudinal duct, the diameter of said axial longitudinal duct being reduced in front

of said liquid duct through the wall of said nozzle and the nozzle outlet being of wider diameter than said reduced part of the axial longitudinal duct, whereby, when pressure air passes through the said reduced part of said axial longitudinal duct into the outlet a drop in pressure is produced, which serves to draw liquid from the liquid container via said annular chamber into the nozzle where it mixes with the pressure air by which it is atomized and discharged through the nozzle outlet in the form of a fine spray or mist.

4. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said manually operated pump comprising a pump body, a lateral extension to said pump body, and an air compression chamber in said pump body, and in which said nozzle is of T-shape and passes through an aperture in said fitting, the head of said nozzle being pressed tightly against said fitting and the external diameter of said nozzle being reduced adjacent the head thereof to provide an annular chamber between the wall of the nozzle and the inner wall of said fitting, and further comprising a duct in said fitting providing communication between said annular chamber and the interior of the liquid container, an air duct in said lateral extension, said air ducts in said nozzle comprising an axial longitudinal duct terminating in the nozzle outlet and a duct through the wall of said nozzle in permanent communication with said duct in said lateral extension and with said axial longitudinal duct, said liquid ducts comprising a duct through the wall of said nozzle providing communication between said annular chamber and said axial longitudinal duct, the diameter of said axial longitudinal duct, being reduced in front of said liquid duct through the wall of said nozzle, and the nozzle outlet being of wider diameter than said reduced part of the axial longitudinal duct, whereby, when pressure air passes through the said reduced part of said axial longitudinal duct into the outlet a drop in pressure is produced, which serves to draw liquid from the liquid container via said annular chamber into the nozzle where it mixes with the pressure air by which it is atomized and discharged through the nozzle outlet in the form of a fine spray or mist.

5. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid

ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said manually operated pump comprising a pump body and an air compression chamber in said pump body, and further comprising a lateral extension to said pump body, said fitting being connected to said extension by a screw connection between said nozzle and said extension, the connected surfaces being shaped to provide an annular chamber between said lateral extension and said fitting, said chamber surrounding said nozzle, said extension being formed with a tapped recess to receive a screwed end of said nozzle and with a duct affording communication between said air compression chamber and said annular chamber, one of the air ducts formed in said nozzle unit providing communication between said annular chamber and another air duct in said nozzle unit extending to the nozzle outlet.

6. An atomizer head to be connected to a liquid container containing liquid to be atomized, comprising a fitting for attachment to the liquid container, a manually operated pump to provide a supply of pressure air, a nozzle made in one piece, means integral with said nozzle for operatively connecting said fitting to said pump, said nozzle also being formed with air and liquid ducts through which air from the pump and liquid from the container can respectively pass, said ducts being so arranged that passage of pressure air through the nozzle produces a drop in pressure which causes liquid to be sucked up from the container and to be atomized by the pressure air passing through said nozzle unit, the atomized mixture being discharged through the nozzle outlet, said manually operated pump comprising a pump body and an air compression chamber in said pump body, and further comprising a lateral extension to said pump body, said fitting being connected to said extension by a screw connection between said nozzle and said extension, an annular chamber surrounding said nozzle being formed between said lateral extension and said fitting by a recess in said fitting, and a packing disposed in said recess to form a fluid-tight joint between said fitting and said extension.

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