United States Patent

Beall, Jr.

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[54] HAND HELD SPRAY GUN AND AIR VALVE

[72] Inventor: **Richard W. Beall, Jr.**, 500 Poinsettia, Manhattan Beach, Calif. 90266

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[21] Appl. No.: **72,590**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 8,845, Feb. 5, 1970, abandoned, which is a continuation-in-part of Ser. No. 750,076, Aug. 5, 1968, abandoned.

[52] **U.S. Cl.** **239/415**, 239/528

[51] **Int. Cl.** **B05b 7/04**

[58] **Field of Search** ..... 239/415, 526, 527, 528; 141/4, 141/346–362; 184/55 A; 222/3; 137/223, 231

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Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—John J. Love
Attorney—Huebner & Worrel

[57] **ABSTRACT**

A combination lubricator and air valve in the general character of a hand held lightweight spray gun of simplified form and made principally of plastic, operable as one function for dispensing a liquid lubricant by the flow of air, and in which an air supply valve opens first and a liquid supply valve opens thereafter, and the liquid supply valve closes first and the air supply valve closes thereafter, whereby there is no appreciable time lag in delivering the lubricant upon actuation of the device, and operable as a second function for delivering air only to a tire, or other inflatable member equipped with a conventional check valve, the device embodying a stop in the delivery nozzle to depress the stem in the check valve.

3 Claims, 6 Drawing Figures

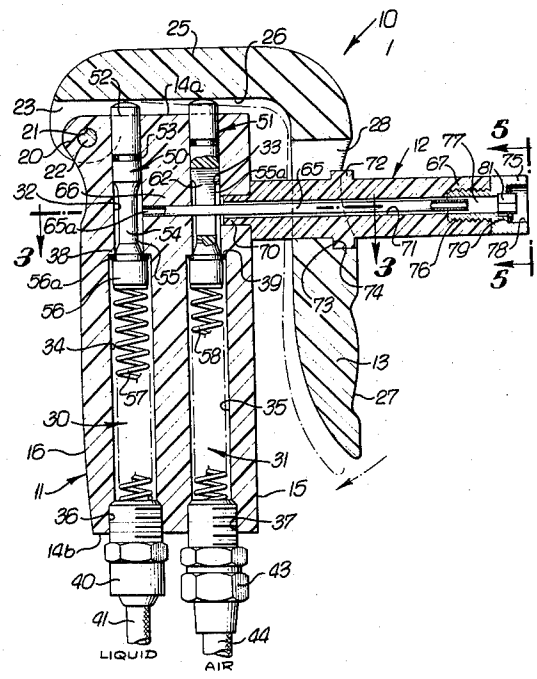


FIG. 1.

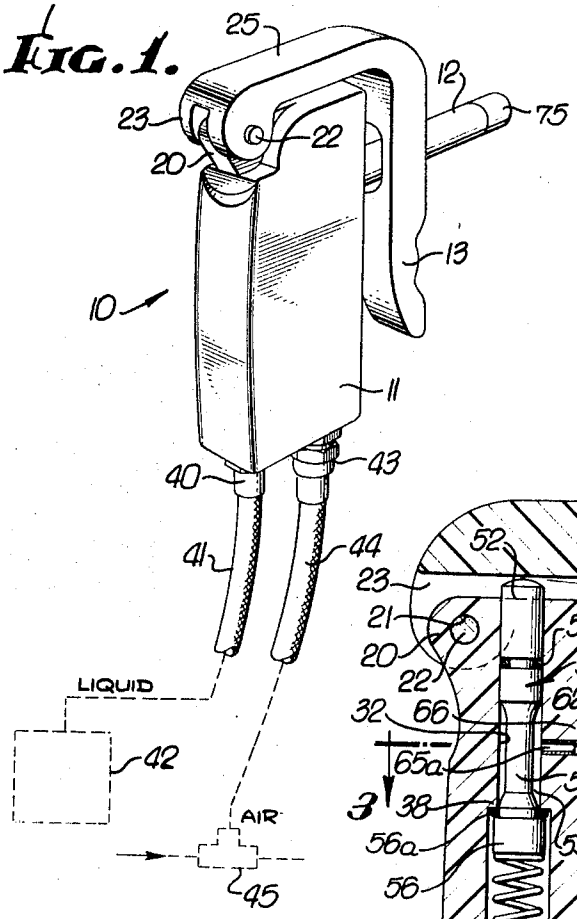


FIG. 3.

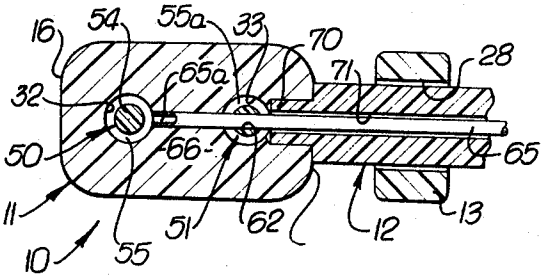


FIG. 2.

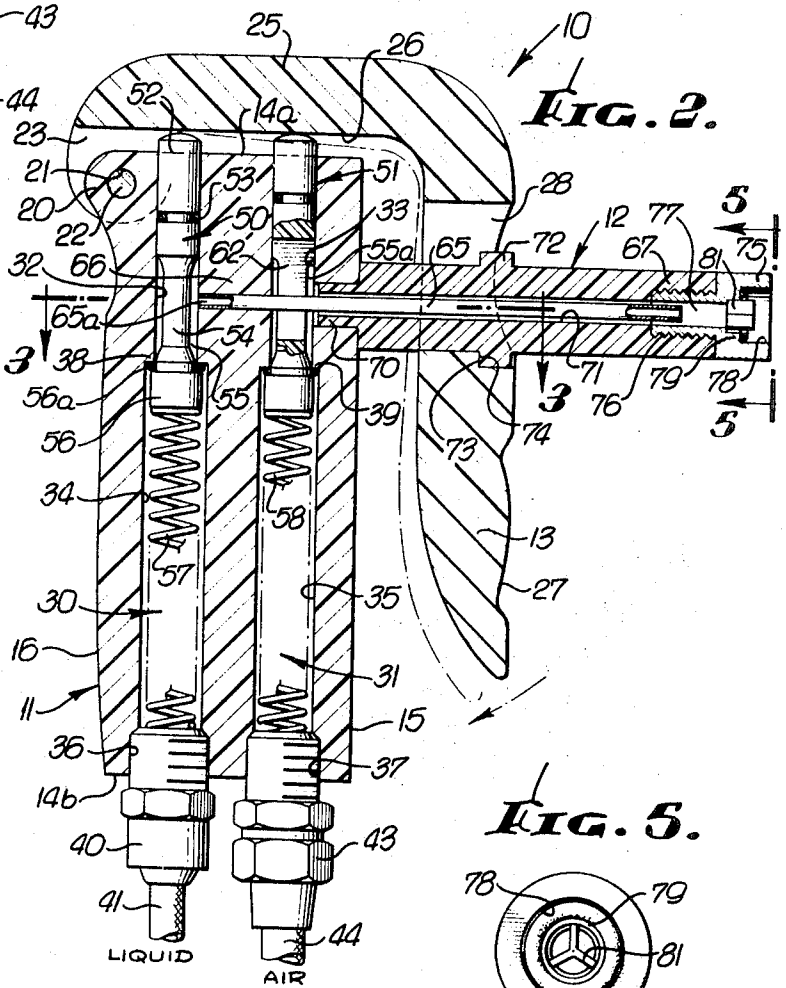


FIG. 4.

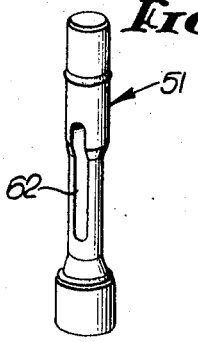
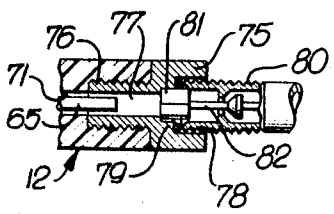


FIG. 5.

FIG. 6.



INVENTOR.
RICHARD W. BEALL, JR.
By Huebner & Worrel
ATTORNEYS.

HAND HELD SPRAY GUN AND AIR VALVE

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application is a continuation-in-part of application Ser. No. 8,845 filed Feb. 5, 1970, now abandoned, as a continuation-in-part of application Ser. No. 750,076 filed Aug. 5, 1968, now abandoned.

BACKGROUND OF THE INVENTION

Utilizing air under pressure to draw liquid from a container and discharge the liquid mixed with air in a spray or mist is known.

A common application is a paint sprayer. In one form a quart container is held in the hand, air under pressure is released by actuating a valve, and paint is sucked up through a tube the lower end of which is close to the bottom of the container. There is a delay in paint reaching the spray nozzle, and when the air valve is closed, the paint in the tube falls back into the container. Moreover, there are instances of use for a liquid spray in areas too confined to accommodate a container.

Another form of paint (or insecticide) sprayer utilizes a large container resting on the ground or on a mobile unit. Air pressure (above atmospheric) is applied in the container for delivery of the liquid through a hose, and a second air supply is delivered at the nozzle. When the pressure in the container is discontinued, the liquid in the hose runs back into the container.

Other forms of spraying devices are known wherein a liquid and a gas from a remote source are intermixed and delivered by the device. Those known to applicant, however, are fabricated of metal, contain numerous parts, are relatively heavy, and are not readily suitable to being made of plastic with consequent lightness.

SUMMARY OF THE INVENTION

The present invention represents an improvement over the prior devices of the several types above described.

One principal objective is to provide a device for dispensing liquid lubricant in a spray or mist through intermixture with a flow of air under pressure wherein the liquid supply is always available closely adjacent the entrance of a discharge tube without the necessity of maintaining a high pressure in the supply container. This is to avoid any appreciable time lag for appearance of the liquid at the nozzle.

A pair of flexible hoses are employed. One leads from the liquid lubricant source, the other from a source of air under pressure. It is not necessary to introduce pressure above atmospheric at the liquid source. The hoses terminate at a dispensing gun which includes a discharge barrel ending in a nozzle of special design. Rapid flow of air through the nozzle creates a vacuum or suction to draw out the liquid, intermix the same with air, and discharge the mixture.

The spray gun incorporates separate liquid and air conduits, each provided with a shut off valve. The mechanism provides sequential opening of the air valve, then the liquid valve, by manual operation of a single handle. When both valves are held open, the liquid is discharged. Upon release of the handle, the liquid valve closes first, and functions as a check valve which prevents retraction of the liquid into the container, so that a liquid lubricant supply is always present at the liquid valve in the spray gun.

For discharging air only, to blow away debris or to inflate a tire, the handle is operated only far enough to open the air valve.

The device was developed especially for spraying a lubricant on a tire to be mounted on a rim, and to inflate the tire with air, or for lubricating rubber grommets on the ends of automobile springs. Other uses contemplated are for spraying a windshield cleaning solution, using a liquid supply on the island at a service station. Clearly, the device will function as an improved paint sprayer, and for numerous other purposes. Its compactness and light weight, however, recommend it as especially suitable for places difficult of access.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective of a spray gun embodying the present invention.

FIG. 2 is an enlarged vertical section of the gun.

FIG. 3 is a horizontal section taken on the line 3—3 of FIG. 2.

FIG. 4 is a perspective of the air valve member of the gun.

FIG. 5 is an elevation of the forward end of the barrel and nozzle taken on the line 5—5 of FIG. 2.

FIG. 6 is an enlarged fragmentary section taken from the right extremity of FIG. 2, and illustrating use of the gun with a tire valve.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The combination lubricator and air valve, generally designated by the reference numeral **10**, comprises a body **11**, a discharge barrel **12** and a handle **13**. These are all fabricated preferably of a plastic material which can be injection molded. The design is such that the straight line bores and simplicity of the overall structure lends itself readily to conventional molding processes. This results in a lightweight, compact device, convenient to handle, and comparatively inexpensive to produce.

The body **11** is elongated, includes an upper end **14a**, a lower end **14b**, a front surface **15** and a rear surface **16**. Its overall dimensions are such as to make it convenient for holding in the hand.

At the upper rear portion of the body an ear **20** is formed, having an aperture **21** for reception of a pivot pin **22**. The rear end portion of the handle is bifurcated to form a yolk **23** which straddles the ear **20** and contains apertures (not numbered) alignable with the aperture **21** for reception of the pivot pin **22**.

The handle includes a horizontal section **25** formed with a flat valve actuating surface **26**. When the handle is in the position shown in full lines in FIG. **2**, the surface **26** lies generally parallel to the upper end **14a** of the body. From the horizontal section **25** depends a hand grip section **27** in general parallel relationship with the front surface **15** of the body. The handle incorporates a slot **28** of sufficient dimension to freely accommodate the barrel **12** which extends through the slot.

The body is formed with a pair of generally parallel bores **30** and **31** which extend entirely through the body from one end to the other. The bore **30** is for the passage of liquid and the bore **31** is for the passage of air.

The bores are identical. Each one embodies an upper section **32** and **33**, respectively, and an intermediate section **34** and **35**, respectively, of somewhat larger diameter, and a lower threaded entrance **36** and **37**, respectively.

At the junction between the upper sections **32** and **33** and the intermediate sections **34** and **35**, in each of the bores, is a shoulder **38** and **39**, respectively, which functions as a valve seat.

The threaded entrance **36** receives a fitting **40** which is the terminal for a conduit **41** leading from a remote liquid source **42**. The liquid supply need not be under greater than atmospheric pressure. The threaded entrance **37** receives a fitting **43** which is the terminal for an air conduit **44** leading from a compressed air source **45**.

A piston type valve member **50** is disposed for reciprocation in the bore **30**, and a valve member **51** of the same general character, but with certain differences, is disposed in the bore **31**.

The valve member **50** comprises a a guide portion **52** snugly but slidably fitting in the bore section **32** and is provided with an O-ring **53**. This valve member includes a stem or waist section **54** of reduced diameter to afford an annular liquid passage **55**.

The lower end of the stem **54** is joined to a valve head **56** of a diameter greater than the internal diameter of the bore section **32**. This valve head is provided with an O-ring **56a** which will seat and seal against the valve seat **38**. A compression spring **57** bears its lower end against the fitting **47** and its upper end against the valve head **56**.

The valve guide portion **52** extends upwardly out of the upper surface **14***a* of the body to present an actuating button which is depressible by operation of the handle to open the valve, the latter being returnable to closed position under influence of the spring **57** when the handle is released.

The air valve member **51** is generally similar to the liquid valve **50**, and its operating relationship with the bore **31** of the air supply, and a compression spring **58** also is similar. However, the spring **58** may be omitted, as air pressure (which is above atmospheric) will keep the valve normally closed.

The air valve member **51** is formed with a vertically elongated slot **62** which does not alter its function as a valve but does provide for reception therethrough of a liquid discharge tube **65**. This tube has its open rear end **65***a* in communication with the annular liquid passage **55** of the bore section **32**. It may be press fitted and bonded through a central section **66** of the body. It extends forward to a discharge end **67**.

The valves preferably are formed of plastic.

The barrel **12** has a reduced inner end **70** which may be press fitted and bonded through the forward portion of the body. It has a bore **71** which surrounds the liquid tube **65** with an annular spaced outside the latter allowing for the passage of air, and this bore **71** terminates at its inner end in communication with the annular air passage **55**a of the bore section **33**.

The barrel is formed with an annular flange **72** which presents a shoulder **73** against an undercut **74** in the handle at the bottom of the slot **28** and functions as a stop to position the handle in neutral.

A nozzle **75** is threaded as at **76** in the forward end of the barrel. The nozzle includes a bore section **77** which is a continuation of the bore **71** and within which the tube **65** terminates. This bore section **77** is in axial communication with a socket **78** which has a diameter greater than that of the bore section **77**, and is of a size to receive a conventional tire valve **80**.

The socket is defined at the inner end by an annular shoulder **79** seated on which is a seal in the form of a resilient O-ring.

Fixed at the intersection of the bore section **77** and the socket **78** is a bridge **81** which will engage and depress the valve stem **82** of the tire valve **80** when the gun is being used to inflate a tire.

The bridge is in the form of thin radial bars joined at the center. It offers but slight obstruction to passage of lubricant or air. Actually it tends to break up the mixture of lubricant and air for better intermixture in spraying it.

In operation, assuming that the conduits **41** and **44** are suitably connected with liquid lubricant and air sources **42** and **45**, respectively, squeezing the handle **13** from the position shown in full lines in FIG. **2** to the phantom lines in the same figure, causes the following to occur: The contacting surface **26** of the handle first depresses the actuating button of the air valve **51**, unseats the valve head and permits air to flow through the bore **31** into the reduced section **33** and out through the air passage of the barrel **12**, thence through the nozzle **75**.

Sequentially next, if the operation calls for delivery of lubricant, the squeezing movement is completed, the valve handle depresses the liquid valve actuating button, thereby opening the liquid valve, whereupon the suction of the air will draw liquid up through the bore **30** and through the liquid tube **65** where it will mix with the air in the nozzle and be dispersed with air from the nozzle.

Once the liquid conduit **41** and the bore **30** have become filled with liquid, the latter will never drain back into the source **42**, but will always be available at the valve head **56** for the following reason: As the handle is released and shifts, under the influence of the spring **57**, from the phantom line position of FIG. **2** to the full line position, the liquid valve **50** will close first because of its proximity to the pivot pin **22**. The air valve being more remote from the pivot pin, will close last. Inasmuch as the liquid valve seals first, with liquid filling the bore **30** up the valve, atmospheric pressure in the liquid source will automatically keep the line full. Thus, the device is ready for substantially instant application of a spray of lubricant entrained with air for convenient and rapid disposal in any area desired.

This condition will not be disturbed if the handle is squeezed only the amount necessary to open the air valve to blow away dust or debris, or to inflate a tire.

Although the invention has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention.

What I claim is:

1. A device of the character described for dispersing by air flow a liquid contained in a source remote from the device, and wherein the liquid supply can be maintained in readiness in the device without pressure at the source greater than atmospheric, said device comprising: an elongated body of external dimensions suitable for holding in the hand, and having an upper end and a lower end, a front face and a rear face, a pair of bores extending through the body from end to end, with their axes in generally parallel relation in a plane extending from the front face to the rear face, the foremost bore providing an air passage and the rearmost bore providing a liquid passage, the bores each having a relatively small diameter valve section in the upper region for reception of a reciprocable valve member, an entrance at the lowermost region for reception of a conduit fitting, and an intermediate section between the valve section and the entrance, the diameter of the intermediate section being greater than that of the valve section, and a valve seat at the junction of the valve section and the intermediate section, a valve member in the valve section of each bore, each of said valve members comprising a cylindrical portion slidably fitting in the valve section bore, with an end of the cylindrical section extending upwardly from the upper end of the body, a valve head adapted to close against the valve seat, a compression spring in the rearmost bore adapted to bear at one end against a stop and at the opposite end against the valve head in such bore, the valve member disposed in the foremost of said bores being slotted, a rigid barrel with a bore therethrough extending forwardly from the front face and having air communication with the forward bore in the body, a rigid liquid tube within the bore of the barrel extending through the slot in said slotted valve member, and having communication with the rearmost bore in the body; the relative inside diameter of the barrel and the external diameter of the liquid tube providing an annular air passage and an open forward end of said tube being disposed inwardly of the forward end of said barrel to provide a mixing area within said barrel for liquid and air admitted thereto by said valves; a nozzle on said barrel in communication with said mixing area, an operating handle pivotally mounted on the body adjacent the rear face and provided with a plane flat valve actuating surface, and a depending portion for hand gripping, the relation of the pivotal mounting, the valve actuating surface, and the upper ends of the valve members being such that when the handle is squeezed toward the forward face of the body the air valve is first shifted to admit air into the bore of the barrel, and thereafter the valve member in the liquid passage is actuated to afford liquid flow through the liquid tube, and when the handle is released the liquid valve shuts first and the air valve shuts last.

2. A device as defined in claim **1**, in which the depending portion of the handle is formed with a slot, and the barrel projects through the slot.

3. A device as defined in claim **1** in which said nozzle comprises concentrically disposed cylindrical members adapted to receive the cylindrical body of a conventional tire valve between them, an annular sealing member disposed between said members in a position to be engaged by the end of such a body, and a tricuspid bridge carried by the inner one of said members for engaging and depressing a valve stem concurrently with the engagement of said sealing member by a valve body.

* * * * *