March 13, 1945. H. A. ROSELUND 2,371,546

SPRAY GUN

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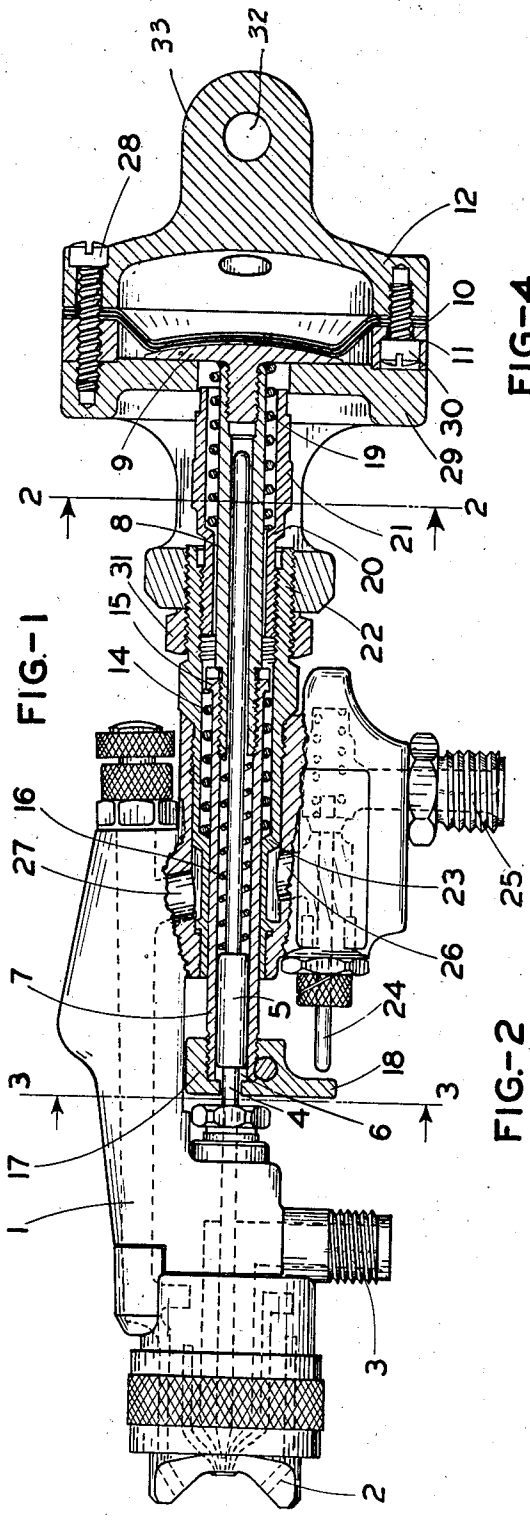


FIG.-1

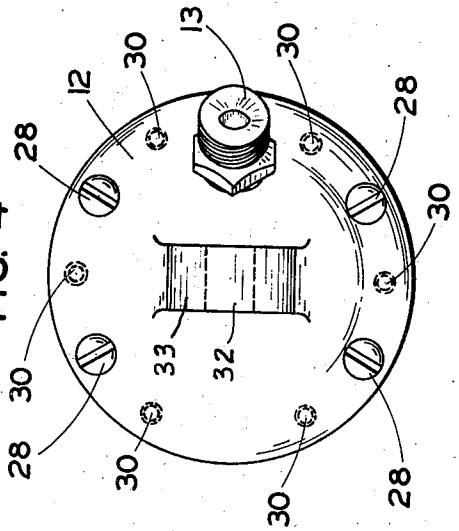


FIG.-4

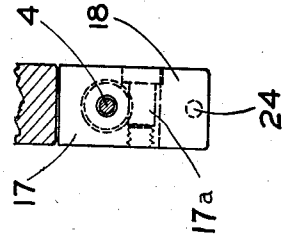


FIG.-3

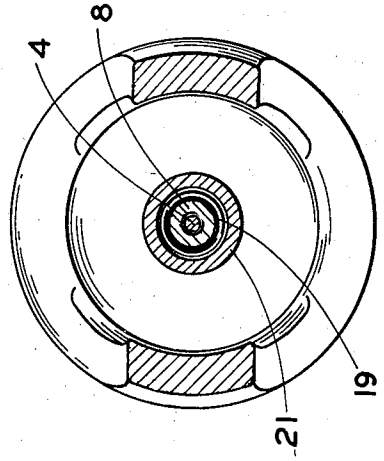


FIG.-2

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SPRAY GUN

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6 Claims. (Cl. 299—140)

This invention relates to spray devices utilizing compressed air for atomization and particularly to such devices in which the liquid discharged is controlled by a valve actuated in one direction by compressed air and in the other by spring means.

Previously it has been the practice to utilize compressed air for initiating the spraying operation of such spray guns. In this appliance however, applicant has utilized compressed air for maintaining the spray gun in non-spraying position by holding the liquid discharge valve closed.

A principal purpose of the invention is to produce a spray gun that is simple in design and less troublesome than previous models. Another is to produce a spray gun that opens and closes quickly.

In the drawing,

Figure 1 is a side elevation of a spray gun embodying my invention with a portion thereof in section.

Figure 2 is a vertical section taken on the lines 2—2 of Figure 1.

Figure 3 is a view of the forward side of the finger member for operating the atomizing air valve and a small vertical section of the gun body taken on the line 3—3 of Figure 1 and,

Figure 4 is a rear end view of the spray gun shown in Figure 1.

The spray gun illustrated in the drawing includes a main spray gun body portion 1 with a spray nozzle 2 and a liquid inlet nipple 3. The spray gun has a conventional needle valve 4 seating within the nozzle, as indicated with dotted lines in Figure 1. The needle 4 has an enlarged cylindrical section 5 which is confined in the chamber 6 within tube 7. To the latter is fastened another tubular piece 8. Upon the other end of 8 is permanently attached the diaphragm contacting button 9. The laminated diaphragm 10 is held between the clamping ring 11 and the outer cap 12, which are held together by cap screws 30.

Air is admitted to the cap 12 through the nipple 13. This air forces the diaphragm against the button 9, moving it forwardly with the tubes 7 and 8 compressing the spring 14 which acts upon the annular shoulder 15 of the tube 7. The forward movement of the button also acts to propel the needle valve 4 to its seat in the nozzle 2 through spring 16 which bears against the enlarged cylindrical section 5 of the needle. The tension developed in this spring holds the needle valve 4 upon its seat.

In case it is desired to remove the needle valve 4 for replacement purposes, the diaphragm assembly is removed and the button 9, together with the tubular part 8, is unthreaded from the tube 7 and withdrawn from the gun body. The end of the needle valve may then be reached with a pair of long-nosed pliers and drawn from the gun. The spring 16 will ride along with the needle valve as it is no longer retained by the end of the tube 8.

The tube 7 has lug 17 fastened to its forward end with a depending finger part 18. Set screw 17a holds lug 17 in place on the end of tube 7. When the air is released from the chamber between cap 12 and the diaphragm 10, the tubular parts 7 and 8 move rearwardly through the expansion action against the button 9 of spring 19 (which has also been compressed by the forward movement of the button 9) and the expansion of the spring 14 bearing upon the shoulder 15 at the end of tube 7. The other end of spring 19 is thrust against the shoulder 20 of the adjustable ring 21 which may be moved axially through its threaded connection with the insert 22. The forward end of the adjustable ring 21 acts as a stop for the rearward movement of the tube 7 and therefore, by positioning ring 21, the extent of the rearward travel of the needle 4 may be predetermined. The tension of the spring upon the adjustable ring 21 acts to hold it in whatever position it may be set.

The other end of spring 14 is thrust against the shoulder 23 of the insert 22. When through the coaction of springs 14 and 19 the joined tubular pieces 7 and 8 are moved rearwardly the finger 18 contacts the air valve stem 24 and opens the air valve controlling the air for atomizing the liquid which enters the gun body through inlet nipple 25. The structure of this valve is indicated by dotted lines in Figure 1.

Air released thereby passes from passage 26 around insert 22 into passage 27 by which it reaches the spray gun nozzle. After the air valve is opened the inner face of the piece 17 contacts the enlarged cylindrical section 5 of the needle 4, and rearward movement of the needle 4 begins and the liquid is then released. The spray operation is thus started. The spray discharge will continue until air is admitted to the chamber between the cap 12 and the diaphragm 10 to force the tubular sections forwardly causing the needle 4 to seat itself through the forward propelling action of the spring 16 and the atomizing air to be shut off through the release of the air valve stem 24.

The assembly composed of the cap 12 and the diaphragm retaining ring 11 holds the diaphragm 10 in a sealed and fixed position. This assembly is held together by the cap screws 30 and is

fastened to the supporting member 29 by cap screws 28. By withdrawing the latter cap screws the assembly may be removed. The member 29 is threaded to the rear end of the insert 22 and is held in position by the adjustable nut 31. The member 29 may be set forwardly or rearwardly according to the amount of distance it is desired to have the finger 18 ahead of the valve stem 24.

The gun is supported from a rod by means of an interconnecting bracket that has a bolt (these three parts are not shown) passing through the port 32 in the rearwardly projecting boss 33 of cap 12. The main body of the gun may be removed by withdrawing cap screws 28. This does not disturb the clamping arrangement by which the diaphragm assembly is fastened to the supporting rod, nor the seal of the diaphragm as it remains locked between the ring 11 and the cap 12.

This arrangement provides an automatic spray gun in which the diaphragm controlling the needle is a part of a sub-assembly from which the main spray gun body may be disconnected. A standard spray gun and various types or sizes of diaphragm or piston units may be used interchangeably.

By having the air acting upon the diaphragm upon the side opposite to that which contacts the needle valve opening elements, there is no need of providing sealing means around the elements to prevent air escaping from the needle side of the diaphragm. This is a common source of trouble among other spray guns of the automatic type. Leaks of air at this point are objectionable as they may adversely affect the operation of the spray gun by lowering the air pressure and thus slowing up the piston or diaphragm movement.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangements of parts may be resorted to, without departing from the spirit of my invention, or the scope of the following claims.

For instance the spray gun shown and described herein has a diaphragm for operating the liquid discharge needle valve. A piston would serve substantially as satisfactorily, and I therefore wish it understood that a piston and a diaphragm should be considered equivalent as far as this invention is concerned and that reference to either in the claims should be broadly interpreted.

Having thus described my invention I claim:

1. In an automatic spray gun, a liquid discharge nozzle, a needle valve for controlling the flow of liquid from the nozzle, a rearwardly facing seat in the nozzle, a needle motivating member of tubular shape surrounding the rear end of the needle and extending beyond it, an air actuated diaphragm, a diaphragm contacting portion on the needle motivating member against which the forward face of the diaphragm bears, spring means opposing the forward movement of the motivating member and moving the member and the needle away from the needle seat when compressed air is not applied against the diaphragm, and adjustable means concentric with the motivating member positioned to stop the latter after a predetermined rearward movement.

2. In an automatic spray gun, a spray gun body, a spray discharge nozzle, liquid and air passages leading to the nozzle, a needle valve seating in the nozzle to control the flow of liquid, an air valve for controlling the discharge of air adjacent and parallel to the liquid needle valve, a rearward extension of the gun body, an air chamber in the extension, a diaphragm forming the forward wall of the chamber, means for supplying compressed air to the chamber, a tubular member surrounding the rear end portion of the liquid needle and having a button shaped end contacting the diaphragm, a spring within the gun body surrounding the tubular member and bearing against a forward facing shoulder of the member and a normally fixed rearwardly facing shoulder to impel the member rearwardly, an enlarged portion on the needle within the tubular member, an inwardly extending flange on the forward end of the tubular member in line to engage the enlarged portion of the needle and to move the latter rearwardly, and a laterally extending finger secured to the tubular member in line with the air valve and engaging it when the tubular member is moved rearwardly.

3. In an automatic spray gun, a body member, a liquid discharge nozzle, a needle valve for controlling the flow of liquid from the nozzle, a rearwardly facing seat for the needle valve within the nozzle, a needle motivating member positioned in surrounding relation to the rear portion of the needle, spring means so supported and positioned that it bears against a normally fixed rearwardly facing shoulder within the body member and a forwardly facing surface of the motivating member to move the member rearwardly, a forwardly facing lateral shoulder on the needle, an inwardly offset portion of the motivating member engaging the forwardly facing lateral shoulder on the needle and moving the needle from its seat when the motivating member is moved rearwardly by the spring means, an air actuated diaphragm associated with the rear end of the motivating means, means to supply air on the rear side of the diaphragm to force it and the motivating member toward the nozzle, and a compressible member positioned between a forwardly facing surface of the motivating member and a rearwardly facing surface of the needle to urge the needle forwardly toward its seat in the nozzle.

4. In an automatic spray gun using air for atomization, a body member, a liquid discharge nozzle at the forward end of the body member, a needle valve for controlling the flow of liquid from the nozzle, a rearwardly facing seat for the needle within the nozzle, a tubular needle motivating member positioned in surrounding relation to the rear portion of the needle, spring means so supported and positioned that it bears against a normally fixed rearwardly facing shoulder upon the body member and a forwardly facing shoulder of the motivating member to move the member rearwardly away from the nozzle, an annular enlargement on the needle, an offset portion of the motivating member in line to engage the annular enlargement on the needle when the motivating member is moved rearwardly by the spring means, an air valve, positioned adjacent the motivating member, for controlling the flow of atomizing air to the nozzle, a laterally extending finger on the motivating member positioned to contact and open the air valve when the motivating member is moved rearwardly by the spring means, a diaphragm associated with the rear end of the motivating member, means to actuate the diaphragm by applying compressed air to the rear surface thereof whereby the motivating member is moved forwardly, and spring means positioned between a forwardly facing surface of the motivating member and a rearwardly facing spring thrust receiving surface

on the needle to urge the needle ahead of the motivating member toward the nozzle.

5. In an automatic spray gun utilizing air for atomization of the liquid to be sprayed, a main body member, a liquid discharge nozzle at the forward end of the body member, a needle valve seating in the nozzle for controlling the flow of liquid therefrom, a reciprocable needle motivating members having an axially extending interior chamber, said chamber being closed at its rear end and having a small bore at its forward end through which the needle extends, spring means supported upon a forwardly facing surface within the chamber and thrusting against a rearwardly facing surface of the needle to urge it forwardly toward its seat, a radially enlarged portion on the needle within the chamber spaced slightly from the interior forward wall of the chamber and against which the interior forward wall surrounding the bore strikes when the needle motivating member is moved rearwardly to withdraw the needle from its seat, a passage through the spray gun body member for the atomizing air, a reciprocable air valve adjacent the needle motivating means for controlling the flow of air through the passage, a contact means extending from the motivating member to the air valve, secondary spring means with one end resting against a support fixed to the gun body and with the other thrust against a surface of the motivating member to urge it axially into and hold it in one position, and means responsive to air pressure and associated with the motivating member for moving it axially in opposition to the action of the secondary spring means into an alternate position, when the motivating member is in one of said positions the needle is held to its seat in the nozzle and when said member is in the other position the needle is withdrawn from its seat and the air valve is opened.

6. In an automatic spray gun, a main body member, a liquid discharge nozzle at the forward end of the body member, a needle valve seating in the nozzle for controlling the flow of liquid therefrom, a reciprocable needle motivating member having an axially extending interior chamber, said chamber being closed at its rear end and having a small bore at its forward end through which the needle extends, spring means supported upon a forwardly facing surface within the chamber and thrusting against a rearwardly facing surface of the needle to urge it forwardly toward its seat, a radially enlarged portion on the needle within the chamber against which the interior forward wall of the chamber surrounding the bore strikes when the needle motivating member is moved rearwardly to withdraw the needle from its seat, an air valve for controlling the flow of atomizing air positioned adjacent and substantially parallel to the motivating member, a laterally extending finger on the motivating member positioned to contact and open the air valve when the motivating member is moved rearwardly, secondary spring means with one end resting against a fixed support upon the gun body and with the other thrust against the motivating member to move it axially into and hold it in one position and means responsive to air pressure and connected to the motivating member for moving it axially in opposition to the action of the secondary spring means into an alternate position, when the motivating member is in one of said positions the needle is held to its seat in the nozzle and when said member is in the other position the needle is withdrawn from its seat and the air valve is opened.

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