Jan. 3, 1928. 1,655,254

M. J. BINKS

FLAT SPRAY APPLIANCE

Filed Dec. 17, 1926

Fig. 1

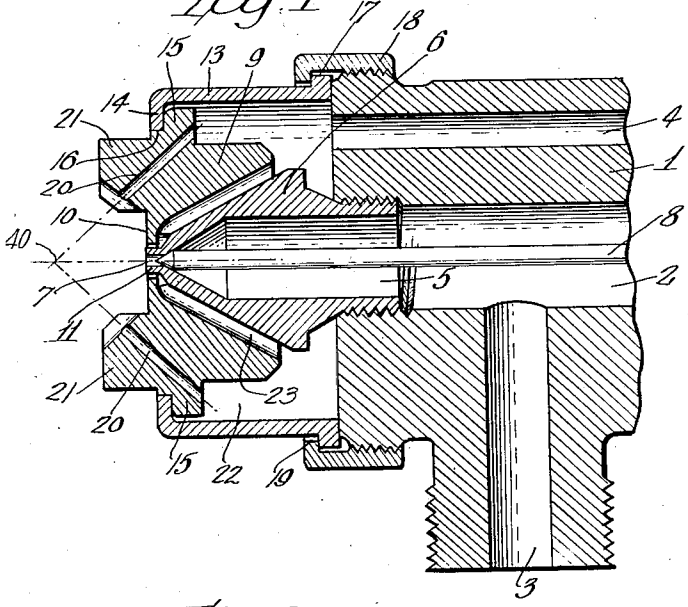


Fig. 4

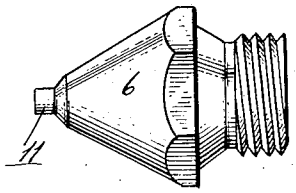


Fig. 2

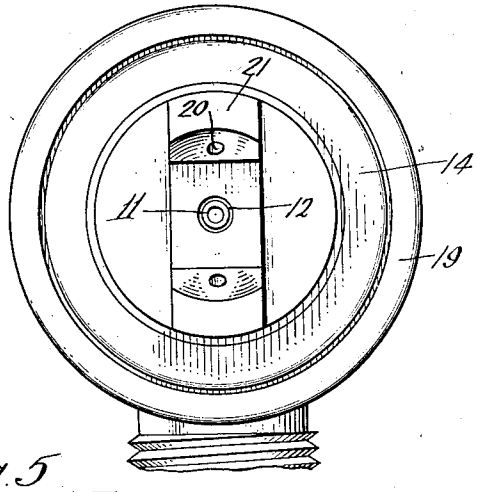


Fig. 3

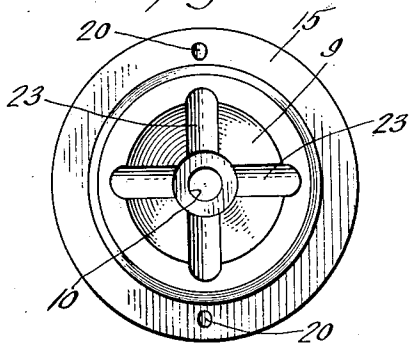


Fig. 5

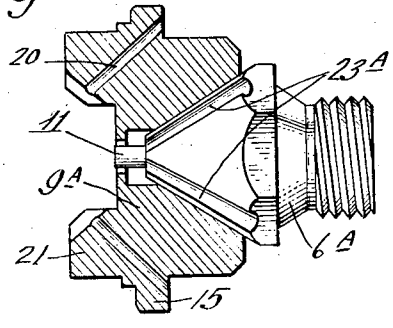
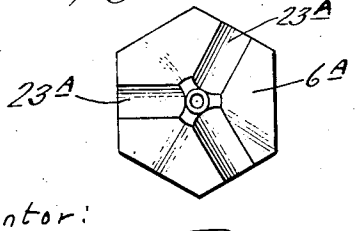


Fig. 6



Inventor:
Melvin J. Binks
by Albert Scheible
Attorney

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UNITED STATES PATENT OFFICE.

MELVIN J. BINKS, OF OAK PARK, ILLINOIS, ASSIGNOR TO BINKS SPRAY EQUIPMENT CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

FLAT-SPRAY APPLIANCE.

Application filed December 17, 1926. Serial No. 155,465.

My invention relates to spray appliances of the general type in which a projected stream of liquid is flattened by the action of opposed and forwardly intersecting lateral air jets, so that the resulting spray is spread out in a somewhat fan-like form.

In appliances of this kind, commonly marked in hand manipulated forms known as spray guns for use in applying liquid coating materials,—difficulties have heretofore been encountered.

First, departure from a proper alining of the parts through which the liquid and the air are projected. To insure uniformity of the resulting spray, the initially projected cylindrical stream of liquid is commonly sheathed by an initially cylindrical tube of air. If the parts between which this tubular sheath of air is projected are not concentric, the sheath will vary in thickness, thereby causing corresponding variations in the atomization. So also, if the axis of the initially projected cylindrical stream of liquid does not bisect the angle between the converging lateral air jets, the desired uniformity of atomization cannot be obtained.

Second, the passages for the lateral air jets have commonly been difficult to keep clean, owing to the collecting of the liquid paint or the like in them when the spraying operation is discontinued.

Third, the necessarily small diameter of the discharge portions of the several air passages has cooperated with the usual small-diametered and bent forms of the passage portions leading to them, so as to throttle the flow of air and require a wastefully high air pressure to be maintained for operating such spray appliances.

My present invention aims to provide a simple head construction for spray guns which will simultaneously avoid all three of the above recited objects and which also will be easy to manufacture without requiring a degree of accuracy beyond that obtainable in ordinary brass finishing shops. More particularly, my invention provides a construction in which the air nozzle seats upon the liquid nozzle so as to insure a proper alining of these parts; in which these nozzles are retained in position by a clamping and air confining collar which permits the said parts to shift somewhat with respect to the body of the spray gun; in which no small-diametered air passages have any bends to throttle the flow of air and to interfere with a cleaning of these passages; and in which the narrow air outlet portions connect directly to air chambers of such large capacity as to permit a reduced operating pressure to be employed effectively.

Still further and also more detailed objects will appear from the following specification and from the accompanying drawings, in which

Fig. 1 is a central, vertical and longitudinal section through the forward portion of a spray gun embodying my invention.

Fig. 2 is a front elevation of the same forward portion.

Fig. 3 is a rear elevation of the air nozzle.

Fig. 4 is a side elevation of the liquid nozzle.

Fig. 5 is a section, similar to a forward part of Fig. 1 but showing another embodiment, namely one in which the grooves for supplying air to the tubular air outlet are formed in the liquid nozzle.

Fig. 6 is a front elevation of the liquid nozzle of the embodiment of Fig. 5.

Referring first to the embodiment of Figs. 1 to 4 inclusive, Fig. 1 shows the forward portion of a spray gun body 1 which has a longitudinal liquid passage 2 connected to a liquid inlet passage 3, and which also has a longitudinal air supply passage 4 formed in it. The liquid passage 2 connects at its forward end with the bore 5 of a liquid nozzle 6 which has a liquid outlet 7 of contracted diameter, the flow of liquid through this outlet being controlled in the usual manner by a longitudinally movable needle valve 8. The liquid nozzle is here shown as initially constructed separately for convenience in manufacturing and as threadedly connected to the body 1, so that this body and the liquid nozzle together form a rigid body member.

The liquid nozzle has a relatively long and forwardly tapering frusto-conical portion fitting the rearwardly flaring bore of an air nozzle 9, and this air nozzle has a cylindrical central aperture 10. This aperture is larger in bore than the outside diameter of a tubular liquid nozzle tip 11 in which the liquid outlet 7 is bored, so as to provide an intervening annular space 12 between the parts 10 and 11, through which space the tubular sheath of compressed air is projected.

The air nozzle 9 is held tightly upon the

liquid nozzle by a collar 13 which has its forward end contracted to form an annular flange 14 engaging the forward face of a peripheral flange 15 on the air nozzle. This flange 15 is somewhat smaller in diameter than the bore of the collar 13, and the air nozzle also has a cylindrical portion 16 extending forward from its peripheral flange 15 and fitting the bore for the collar flange 14. The collar 13 is thickened at its rear end to afford an outwardly directed radial flange 17 which bears rearwardly against the forward end of the gun body 1, and this flange is clamped against the said body by a clamping ring 18 which is threaded on the body 1 and which has its forward end contracted to form a clamping flange 19 engaging the forward face of the flange 17 on the collar. The rear collar flange 17 is smaller in diameter than the bore of the clamping ring 18, so as to permit a shifting of the axis of the collar with respect to the gun body, thereby allowing for departures from an exact alining of the axes of the collar and of the two nozzles with respect to the axis of the liquid passage 2.

The part of the air nozzle behind the peripheral flange 15 is considerably smaller in diameter than the said flange, thereby providing a large annular air chamber 22 into which the air supply duct 4 opens. Leading to this air chamber through the air nozzle are two straight air outlet ports 20, each of which extends through a lug 21 which projects forwardly beyond the collar. These ports 20 have their axes in a common plane with the axis of the air nozzle (and hence of the annular air outlet 12) and the two port axes converge forwardly so as to intersect at a common point 40 on the axis of the air nozzle, as indicated by dotted lines in Fig. 1.

To connect the air chamber 22 with the annular air outlet 12, I provide longitudinal grooves in one of the tapering surfaces which afford the interfitting seat portions of the two nozzles, as by providing grooves 23 in the bore of the air nozzle.

With a spray gun head thus constructed, the fitting of the tapering bore of the air nozzle on the corresponding taper of the liquid nozzle—both of which tapers can easily be machined to uniform angles—insures an accurate alining of the walls of the annular air outlet 12, while the fitting of the collar flange 14 upon the air nozzle seals the joint between these. If the threading of the liquid nozzle is not concentric with the threaded connection of the clamping ring to the gun body, the collar 13 may not be concentric with the clamping ring, but the two nozzles will still be accurately alined without preventing an adequate sealing of the collar to the air nozzle and to the gun body. Likewise, a lack of alinement of the liquid nozzle with the bore of the liquid passage 2 is immaterial, as the length of the needle valve will permit the latter to spring sufficiently for tightly closing the liquid outlet.

By making the rear portion of the air nozzle considerably smaller in diameter than the bore of the air confining collar 13 I provide a large air storage chamber 22 through which the air for the flattening jets is supplied by straight ports which are easily drilled and easily kept clean. This large air chamber, together with the plurality of grooves 23 (which have a total cross-section many times greater than the area of the annular air outlet 12) effectively prevent any material throttling of the air, so that the air pressure required by my spray gun is much lower than that needed with the types heretofore in use.

However, I do not wish to be limited to the details of the construction and arrangement above described, since changes may obviously be made without departing either from the spirit of my invention or from the appended claims. For example, Figs. 5 and 6 show parts of an embodiment in which the air supply grooves 23^A are formed in the tapering exterior of the liquid nozzle 6^A while the air nozzle 9^A has its rear and major bore portion of a simple frustro-conical form.

I claim as my invention:

1. In a flat spraying appliance, a body having a liquid passage and an air passage open at its forward end, a liquid nozzle extending forwardly from the body and having its bore connected to the liquid passage, the liquid nozzle having a tubular tip and a rearwardly flaring conical portion behind the said tip; an air nozzle fitted upon the said conical portion and having an outlet bore freely housing the said tip to provide an annular air port therebetween; the air nozzle having a peripheral flange and a smaller diametered annular portion forwardly of the flange, and having a pair of forwardly converging ports extending through the said flange and opening radially inward of the annular portion; and a collar detachably secured to the body and having its forward end contracted to form an annular flange fitting the said annular portion and engaging the said peripheral flange to clamp the air nozzle on the liquid nozzle; the part of the air nozzle behind the peripheral flange being smaller in diameter than the bore of the collar to afford an annular air space into which the air passage opens and from which the converging ports lead; there being a passage leading from the said air space to the said annular port.

2. A flat spraying appliance as per claim 1, in which the last named passage comprises a groove formed in one of the said nozzles and extending along the said conical portions of the two nozzles.

3. A flat spraying appliance as per claim 1, in which the collar abuts rearwardly against the body and has a peripheral flange, and in which the collar is secured to the body by a ring threaded upon the body and having an inwardly directed flange engaging the front of the peripheral flange on the collar; the bore of the inwardly directed flange being larger in diameter than the part of the collar housed by it, and the bore of the ring being larger than the outside diameter of the peripheral collar flange, so as to permit a shifting of the axis of the collar with respect to that of the ring.

4. In a flat spraying appliance, a body, a liquid nozzle projecting forwardly from the body and having a forward tip of reduced diameter, an air nozzle fitted upon a part of the liquid nozzle and having a forward portion of larger diameter than its rear portion, a collar secured to the body and fitting a part of the air nozzle forward of the rear face of the said larger diametered portion, the latter portion being smaller in diameter than the bore of the collar to provide an annular air chamber therebetween, the air nozzle having forwardly converging air ports extending through the said larger diametered portion from the said air chamber to the front of the air nozzle, the air nozzle having a central forward part freely housing the tip of the liquid nozzle to provide an annular port therebetween, there being air passages leading from the said air chamber to the said annular port; the air nozzle and liquid nozzle being formed to afford an annular chamber around the rear portion of the liquid nozzle tip and in front of the liquid nozzle part upon which the air nozzle is fitted, so as to provide an annular space opening into the said annular port and forming a portion of the said air passages, the said air passages also including grooves formed in one of the nozzles leading from the said air chamber to the said annular space adjacent to the interfitting parts of the two nozzles.

Signed at Chicago, Illinois, December 14th, 1926.

MELVIN J. BINKS.