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PAINT GUN

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This invention relates to coating apparatus, and with regard to certain more specific features, to spray guns for applying liquids as a coating to surfaces.

5 Among the several objects of the invention may be noted the provision of apparatus for spraying materials such as paints, varnishes and the like, and more especially quick drying kinds of these liquids; the provision of means for proportionately regulating and target-shaping air; and means for preventing clogging of the device while not in operation. Other objects will be in part obvious and in part pointed out hereinafter.

15 The invention accordingly comprises the features of construction, combinations of elements and arrangements of parts, which are exemplified in the description hereinafter in connection with the accompanying drawings, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

25 Fig. 1 is a side elevation of the spray gun assembled with parts broken away;

Fig. 2 is a front view of the nozzle; and

30 Fig. 3 is an enlarged longitudinal section of the nozzle tip and nipple showing the nozzle casing adjusted forwardly.

Referring now more particularly to Fig. 1 of the accompanying drawings there is illustrated at 1 a body for the gun. This body is provided longitudinally with a paint or material passage 3 and a compressed air passage 5. Each passage is enlarged at its rearward opening to receive a valve mechanism.

40 At the rear of the body 1, and screwed substantially upwardly therein, are two supply pipes, 7 and 9, one for air and one for spraying material under pressure. The material pipe 7 is located forwardly of the air pipe 9 and is adapted to be capped with a dead-end nipple 11, the use of which will appear later. These pipes 7 and 9 are enclosed by a grip 13 which is held up against the body 1 by nuts 15 and 17. An air supply line 19 of flexible material is coupled to the air pipe 9 by means of the nipple 21. A

guard 23 extending rearwardly from above the grip and on the body prevents the hand from slipping upwardly from said grip.

The material supply pipe 7 communicates with the material passage 3 by means of the bore 25 which is offset vertically to pass the air passage 5 untouched, and is closed at its upper end by the plug 27. The air supply pipe 9 communicates with the air passage 5 by means of the bore 29. The described arrangement for the passages lends itself to easy manufacture.

In the present embodiment, liquid under pressure may be supplied to the passage 3 through the pipe 7 by uncoupling the dead-end nipple 11 and fastening a flexible liquid supply line similar to the flexible air line 19. However, in so far as quick-drying liquids are seldom mixed in large enough batches to warrant the use of an independent reservoir, it is intended to provide a small reservoir on the spraying apparatus itself.

An upwardly extending lug 31 is provided on the body 1, and is bored at 33 to meet the material passage 3. To this lug is threaded the reservoir cup 35. This cup 35 supplies liquid to the material passage 3. It is provided with a cover 37 which may be clamped down on the cup 35 by means of cooperation between the wedges 39 on the downwardly extending ears 41 of the cover 37 and the slanting lugs 43 of the cup 35. It is evident that this cooperation may be brought about by first placing the cover 37 on the cup 35 and then twisting said cover to the left. A sealing gasket 45, placed in a groove of the cover, becomes interposed between said cover and the cup, thus preventing a liquid therein from drying.

The material and air passages 3 and 5, respectively, end forwardly in a nozzle cylinder 47 formed at the forward end of the gun (Fig. 1). The material passage 3 is threaded at its forward end within this cylinder 47 and receives the nipple 49 which nipple contains the passage 51 as a continuation of the paint passage 3. The details of this nipple will be described later.

Around the nozzle cylinder 47 is placed the snugly fitted nozzle casing 53 flanged 100

outwardly at 55 (see Fig. 1). This flange abuts the threaded ring 57 over which ring 57 is forced with a press fit, the flanged outside ring 59. A flange 61 on ring 59 cooperates with flange 55, permitting the latter to turn freely with respect to the rings 57 and 59, which rings are one piece to all intents and purposes. The ring 57 is provided with an outwardly extending stop-flange 63 for stopping the pressing on of ring 59 when the proper tolerance for easy rotation of flange 55 has been obtained. When the threaded ring 57 is screwed to the nozzle cylinder its rotation in screwing it on, causes a longitudinal movement of the nozzle casing 53 on the nozzle cylinder 47 without causing said casing to rotate. Rotation of the nozzle casing on the nozzle cylinder is, however, free to be accomplished by other means.

The forward end of the nozzle cylinder or casing 53 extends out beyond the nozzle cylinder 47, forwardly, and is flanged inwardly to form a crater portion 65. The crater 65 is centrally bored at its base and receives with a force fit a bushing 67 bored centrally at 69. The bore 69 is provided with a chamber 71 rearwardly thereof.

The nipple 49 comprises, among other elements, an extension 73, which extension is forwardly beveled at 75 in order to cooperate annularly with the chamber 71 of the bushing 67. The bevel 75 and chamber 71 have different slope angles and are adapted to gradually diminish the section of the annulus between them, that is, forwardly.

Extending forwardly from said bevel 75 of the extension 73 is a teat 77 integrally formed therewith. This teat 77 extends through the bore 69 of said bushing 67 and is so proportioned that an annular space is left between it and the bushing bore 69.

Forced on the extension 73 is a spider 79. This spider 79 is provided with a plurality of passages 81 and a forwardly extending flange 83. The flange 83 has its front surface beveled at such an angle that it is adapted to flatly cooperate with the rear side of said crater 65 under certain operating conditions. At such point of cooperation the crater 65 is provided with a plurality of, preferably two, through-going holes 87 which are adapted to be covered when cooperation takes place between said crater and flange. This cooperation is adapted to take place without cooperation taking place between chamber 71 of the bushing 67, and the bevel 75 of the extension 73.

The spider 83 is kept in proper central alignment by means of a radial flange 89 thereof, cooperating with the inner wall of the casing 53.

The casing 53 and crater 65 enclose an air chamber 91 which receives its air supply from the passage 5.

As will be described later, some air pressure will build up in this chamber 91 so that a seal is needed between the casing and cylinder. This is accomplished by cutting a groove at the end of the cylinder and placing a soft gasket 93 therein. Against this gasket is placed a forwardly dished metallic washer 95 having a central hole therein adapted to receive the nipple 49. A shoulder 97 on the nipple tends to flatten out the dish shape of the washer as the nipple is screwed home in the end of the paint passage, thereby forcing the edges of the washer to exert a local pressure on the gasket 93 and causing it to seal the joint between the casing and cylinder. The washer has a hole 99 cut therein to permit air to pass from the passage 5 to the chamber 91.

The teat 77 is provided with a cleaning plug 101 in the through bore thereof. Said bore connects with said passage 51 by means of a bevel seat 103.

The plug 101 is integrally formed with the valve plug 105 on the material valve stem 107. This stem 107 and the two plugs 101 and 103 are capable of being withdrawn rearwardly to the dotted line position shown in Fig. 3, thus opening the material passage of the nozzle. A guide spider 109 holds the assembly within the nipple in alignment.

The material valve stem 107 and a stem 111 of the air valve have adjustable nuts 113 and 115 mounted rearwardly thereon. The nuts engage saddle straps 117 and 119, reaching around the gun and pivoted to the trigger 121 which is itself pivoted to the body 1 at 123. When the trigger 121 is pressed the valve stems are caused to be drawn rearwardly. This is brought about by means of the engagement between the saddle portions 125 and 127 of the straps and enlarged knurled portions of the nuts 113, 115. However, the saddle portion 125 of the material valve strap rides on a cylindrical portion 129 of the nut 113 before striking the enlarged portion mentioned thus permitting the air valve to be opened first and obviating the possibility of spreading any unatomized paint when starting the apparatus.

The operation of the device is as follows:

The nozzle may be adjusted as shown in Fig. 3, i. e., with the casing 53 so set that the air passages 87 are open and the chamber 71 not against bevel 75. The holes 87 are vertically positioned with respect to one another. The cup 35 is filled with liquid to be sprayed. Upon pressing the trigger, the air valve is immediately opened, in so far as the saddle portion 127 was already in contact with the enlarged portion of nut 115. Air then flows from the flexible conduit 19, through pipe 9, the air valve, duct 5, through hole 99 and chamber 91, passages 81 and thence to the open atmosphere by two routes. One way of leaving is through the annulus between the

teat 77 and the bushing 67. An aspirating effect is thus produced at the outer end of the teat 77. This aspirating effect is enhanced by the converging sides and diminishing areas of the central annular air passage which increase the velocity of the leaving air.

Another way for the air to leave chamber 91 is by means of the passages or ducts 87 in the crater 65. From these ducts it is impinged on the central stream of air passing out as above described.

As the trigger 121 is further pressed, the saddle 125 rides over the cylinder 129 and contacts with the enlarged portion of nut 113 thereby opening the material valve plug 105. The material under a head or pressure finds its way out of the teat 77 and is picked up by the said aspirating air, atomized and thrown on the surface to be covered. The plug 101 has been fully withdrawn rearwardly from the passage in teat 77. The converging streams of air from the openings 87 exert their influence in modifying the shape of the centrally outflowing air and atomized material. The cross section, or target shape, of the outflowing stream thus becomes practically elliptical.

If a vertically disposed elliptical target is wanted it is only necessary to turn the ducts 87 into a horizontal plane by turning the casing 53. This does not affect the ring 59 and no longitudinal motion of the casing 53 occurs.

It will be noted that in the operating position shown in Fig. 3 the teat 77 extends out beyond the forward face of the bushing 67. Therefore, when, upon turning off the flow of material by means of plug 101, a residue of paint is forced outwardly, there will be formed no film of paint over the annulus between the teat 77 and bushing 67 there to dry, harden and prevent operation of the gun. Rather the drop or two of paint thus forced outwardly drops directly away from the end of teat 77 and on the face of crater 65 where it may be cleaned off at an operator's convenience. Thus deleterious clogging is prevented and yet drippings do not fall to the floor where they are objectionable.

If the operator desires a target of less pronounced elliptical form he needs only turn the knurled ring 59, hence drawing the casing 53 rearwardly and thereby gradually closing off the passages 87. The distorting streams thus are made to lose much of their force and a less elliptical target is produced.

A round target may be produced by drawing the casing 53 rearwardly until the edge 85 of the flange 83 seats over the ducts or by-passages 87. No distorting side streams of air then flow.

Over the range of adjustment described (including closed positions for ducts 87) the central annular exit for aspirating air be-

tween the chamber 71 and bevel 75 remains open.

Should the operator desire to throw a stream of unatomized paint, he needs only lift the saddle strap 119 so that the saddle 127 rides over the nut 115. Thus the air valve is made inoperative while the paint valve opens under pressure on the trigger.

From the above it will be seen that the several objects of the invention are attained and other advantageous results achieved.

As many modifications of the embodiments above illustrated might be made without departing from the spirit or scope of the present invention, it is intended that the above description and accompanying drawings and claims shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a nozzle for coating apparatus, the combination of a body, a nozzle cylinder forming an extension from said body, a nozzle casing adjustably mounted on said cylinder, a nipple fastened in said cylinder and a bushing mounted in and movable with said adjustable casing adapted to be annularly spaced with respect to said nipple.

2. In a nozzle for coating apparatus the combination of a nozzle cylinder, a nozzle casing adjustably mounted thereon, a nipple screwed in said cylinder and a spider mounted on said nipple within said casing, a portion on said casing having a central opening therein in annular spaced relationship to said nipple and having laterally disposed openings therein adapted to impinge fluid convergently on fluid which has passed through said central opening, said lateral openings being adapted to be closed by said spider from beneath the said portion.

3. In a nozzle for coating apparatus the combination of a nozzle cylinder, a nozzle casing adjustably mounted thereon, a nipple screwed in said cylinder and a spider mounted on said nipple within said casing, a crater portion on said casing having a central opening therein in annular spaced relationship to said nipple and having laterally disposed openings therein adapted to impinge fluid convergently on fluid which has passed through said central opening and through said nipple and adapted to be closed by said spider.

4. In a nozzle for coating apparatus the combination of a nozzle cylinder and a rotatably and longitudinally adjustable nozzle casing thereon, a bored valved nipple centrally located on said cylinder and a teat on said nipple, a spider mounted within said casing, a central passage in the forward end of said casing adapted to be in annular spaced relationship with said teat, and a plurality of auxiliary passages in said forward end of said casing adapted to be opened and closed by the relative position-

ing of said casing with respect to said spider.

5. In a nozzle for coating apparatus the combination of a nozzle cylinder and a rotatably and longitudinally adjustable nozzle casing thereon, a bored valve nipple centrally located on said cylinder and a teat on said nipple, a spider mounted within said casing, a central passage in the forward end of said casing adapted to be in annular spaced relationship with said teat, and a plurality of auxiliary passages in said forward end of said casing adapted to be opened, closed and adjusted as regards fluid passage therethrough by the relative positioning of said casing with respect to said spider.

6. In a nozzle for coating apparatus the combination of a nozzle cylinder, a nozzle casing adjustably mounted thereon and a valved nipple thereon, a teat on said nipple, a central opening in said casing adapted to receive said teat in spaced relationship thereto said nipple extending forwardly beyond the limits of said opening, a plurality of auxiliary side openings in said casing and a spider within said casing adapted to open and block said auxiliary openings upon adjustments being made of said casing on said cylinder.

7. In a nozzle for coating apparatus, the combination of a body, a nozzle cylinder forming an extension from said body, a nozzle casing longitudinally movable and adjustable on said cylinder, a nipple fastened in said cylinder and a bushing pressed into said casing and annularly spaced and movable with respect to said nipple.

In testimony whereof I have signed my name to this specification this 18th day of February, 1925.

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