

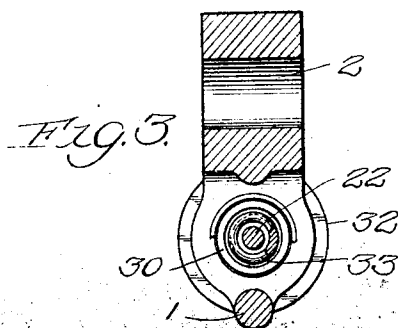
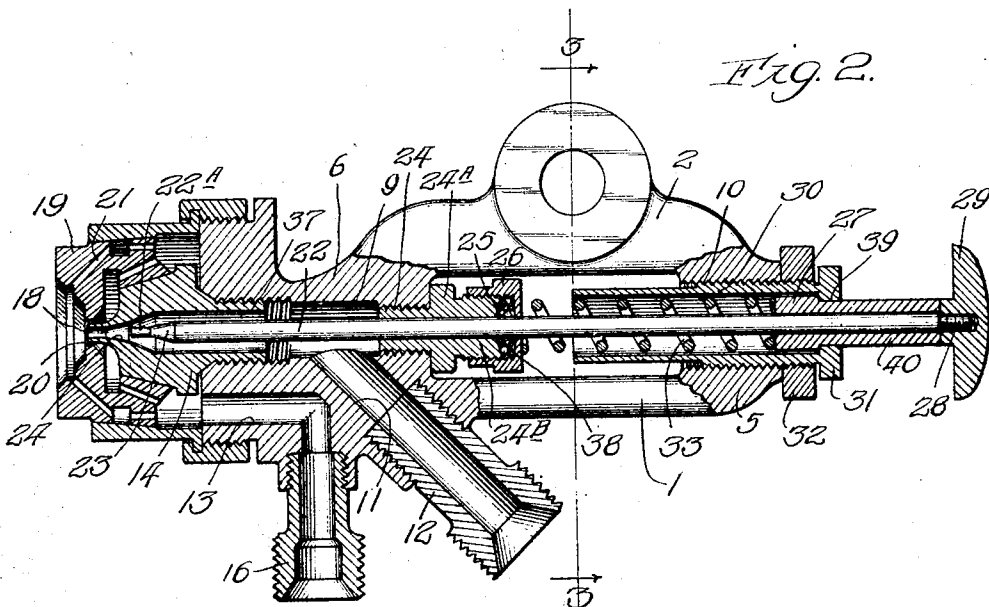
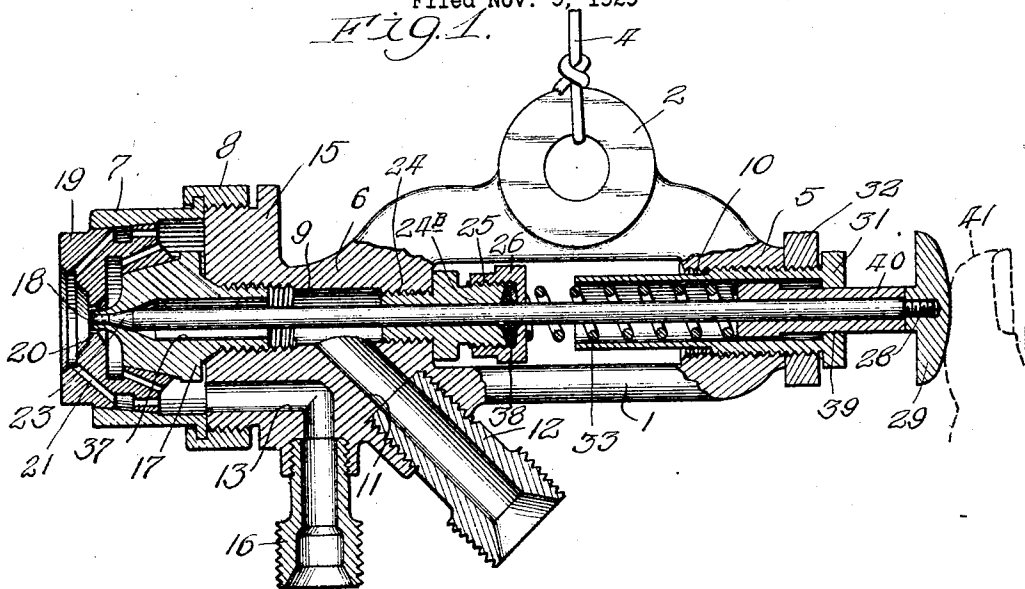
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SPRAY APPLIANCE

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UNITED STATES PATENT OFFICE

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SPRAY APPLIANCE

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Our invention relates to the class of spray appliances in which a liquid is forcibly projected and atomized into a spray by the action of compressed air; and in its general objects it aims to provide an unusually compact, inexpensive and conveniently manipulated appliance which can be operated for long periods of time without disassembling or cleaning the appliance even when this is employed in connection with liquids which contain impurities or which otherwise tend to clog the liquid outlet port of the appliance.

In using spray appliances of this general class, frequent and time-wasting delays are commonly encountered when the liquid which is being sprayed contains solid or sticky particles, as for example with glazings for ceramic products, or with the cheap grades of oil used for laying dust on coal. Owing to the quite small bore required for the liquid outlet port of such an appliance when designed for affording a fine spray (which spray may be either of conical form or flattened to an elliptical section), such clogging is quite frequent in ordinary practice.

Even a partial clogging of this liquid outlet port greatly reduces the discharge of liquid so as to reduce the surface area which the user of the appliance can spray in a given time. And, if the spray is being made to afford a finished surface—as is usually desired in the case of furniture or of ceramic ware—a partial clogging of the liquid discharge port also distorts the shape of the projected spray, thereby making it difficult (if not impossible) to secure the uniformity in the sprayed coating which is desired both for the sake of appearance and to avoid a waste of the liquid coating material, since any distorted shape of the spray produces a coating of excessive thickness on portions of the object on which the coating material is sprayed.

Consequently, whenever such a clogging of the liquid material nozzle occurs even to a partial extent, the spraying must be discontinued until the liquid outlet port is properly cleaned. This usually cannot be done from the exterior of the appliance, since the prying of a needle or the like into this port would

merely force the clogging particles back into the larger bored part of the liquid material nozzle behind the discharge port, or possibly into the liquid supply passage of the appliance, and the same particles would again be carried into that port by fresh liquid when the operation of the spray appliance is resumed.

To avoid such a repeated clogging of a spray appliance by the same impurities, sticky particles or the like, it has heretofore been necessary to disassemble the head portion of the spray appliance. With the devices now in common use, this means the disconnecting of a clamping ring from the body of the appliance, the detaching of the air nozzle, the unscrewing of the liquid nozzle, and the dipping of the liquid nozzle into a cleaning liquid, after which the just recited head parts all have to be reassembled on the body of the appliance. Consequently, such a procedure involves a considerable amount of labor and a long interruption of the spraying operation.

In one of its main objects, our present invention aims to provide a spray appliance which will entirely avoid the just recited disassembling, dip-cleaning and reassembling of the spray head during the ordinary operating periods of the appliance; which will permit an easy and almost instantaneous ejecting of the clogging particles; which will employ the needle valve of the appliance for this ejecting, and which will automatically return the needle valve to its normal liquid-flow-controlling position after each such ejecting of the clogging material.

Moreover, our invention aims to provide a spray appliance construction in which such an employment of the needle valve for clearing the liquid outlet port is secured while still providing a convenient and easily effected control of the needle valve to regulate the supply of the liquid material, and without complicating the construction of the spray appliance. So also, our invention aims to provide a spray appliance of this class which will be light, compact, inexpensive, easily assembled, and adapted to be supported inde-

pendent of the hands of the man who manipulates the appliance.

Illustrative of our invention,

Fig. 1 is a side view of a spray appliance 5 embodying our invention, with its major portions in central, vertical and longitudinal section, and with the needle valve pressed forward to clear the liquid discharge port.

Fig. 2 is a view similar to Fig. 1, but with 10 the needle valve retracted, as it appears in a normal operative position.

Fig. 3 is a transverse section, taken along the line 3—3 of Fig. 2.

In the illustrated embodiment of our invention, the body of the appliance includes a 15 frame-like structure comprising a lower frame member 1, an upper frame member 2 provided with an eye 3 to permit the entire appliance to be suspended (as for example by a cord 4), a rear frame portion 5, and a forward frame portion 6. The forward frame 20 portion 6 has at its forward end an enlarged head 15 against which a collar 7 is clamped by a retaining ring 8 threaded on the head, and the front and rear frame portions have aligned longitudinal bores respectively designated as 9 and 10.

The forward frame portion also has a liquid inlet bore 11 leading to the forward bore 9, 30 to which inlet bore liquid is supplied through a nipple 12 attached to the said body; and has an air passage 13 opening through the head 15 into the interior of the collar 7, to which air passage compressed air is supplied 35 through a hose attached to a nipple 16.

Threaded into the forward end of the bore 9 is a tubular liquid nozzle 17 having a bore 37 coaxial with the collar 7, this bore being 40 contracted at its forward end to a liquid discharge port 18 (Fig. 2). Clamped upon the liquid nozzle is an air nozzle 19 having the usual axial air port 20 and the usual two diametrically opposite and forwardly converging flattening air ports 21.

To control the discharge of liquid through 45 the discharge port we provide a so-called needle valve comprising a stem 22 which projects rearwardly beyond the body of the appliance at all times, and which has a cylindrical forward end portion 22A connected to the 50 main stem portion 22 by a tapering portion 23, this tapering portion being formed to fit the taper of the liquid nozzle bore portion 24 which is immediately behind the discharge port 18. The needle valve tip 24 has a diameter closely approximating the bore of the 55 discharge port, so that this tip will clear the said port of any material in this port when the needle valve is slid forward to the position shown in Fig. 1.

To support the needle valve slidably and in axial alinement with the liquid discharge 60 port 18, we provide two guides through which the stem 22 of this valve extends. One of these is a forward guide 24 which is thread-

ed into the forward frame portion 6 and 70 which presents a medial enlargement 24A within the frame and a threaded stem 24B extending rearwardly from this enlargement, the said enlargement having its forward face in engagement with the forward edge of the 75 aperture of the said frame when this stem guide is attached. A cup-like packing cap 26 is threaded on the stem 24B and a compressible packing 38 is disposed within this 80 cap and the end of the cap, the rear end of the stem 24B being desirably flared out so that the packing will be expanded when the cap is tightened, thereby insuring a seal between the needle valve stem and the exterior of the 85 forward guide.

The companion or rear needle valve guide consists of a tube 30 threaded through the 90 rear frame bore 10 and presenting a head 31 behind the body of the appliance, and the threaded portion of this tube also extends 85 through an exterior locknut 32 which is screwed up against the rear end of the said body to lock the tube 30 against unscrewing.

Extending slidably through an axial bore 90 39 in the head 31 on this tube is a plunger 40 provided at its inner end with an enlarged head 27 which is disposed within the tube 30. Either the plunger 40 or the head 27, or both 95 thereof, are soldered to the stem 22 of the needle valve, so that this part forms a unit with the needle valve. The valve stem 22 has a threaded rear end 28 projecting beyond the plunger 40, on which projecting stem end a 100 button 29 is threaded.

Interposed between the packing cap 26 and 105 the head 27 is a compression spring 33, which desirably is a spiral spring only slightly smaller in outside diameter than the bore of the adjusting tube 30 so as to be centered by 110 the latter. This spring normally retracts the needle valve unit as far as the engagement of the head 27 with the head 31 of the adjusting tube will permit. Thus, Fig. 2 shows 115 an adjustment in which the tip or forward end of the needle valve is considerably behind the rear end of the liquid discharge port, but still within the tapering portion 24 of the liquid nozzle, so that the flow of liquid 120 to the discharge port is somewhat throttled. By loosening the lockout 27, and then turning the adjusting tube 30 by manipulating the 125 exposed head 31 on that tube, the flow of liquid can easily be regulated to the desired extent, after which the locknut is run up 130 against the rear end of the body of the appliance to maintain this adjustment.

With liquid supplied through the nipple 21 and compressed air supplied through the 135 nipple 16, our appliance can then be operated for affording a spray of predetermined consistency without manipulating any trigger or other hand valve, and without the variations in spray density which always occur with 140 digitally controlled valves owing to the im-

possibility of having the user hold the valve-actuating finger continuously in exactly the same position.

Moreover, the entire appliance, together with part of the weight of the two hose lines respectively attached to the nipples 12 and 16, and the weight of liquid in the attached portion of one hose, can be supported for many classes of work by a cord 4 or the like.

Consequently, very little manual effort is required by the user for manipulating our spray appliance to direct the spray to different portions of the object which is being sprayed.

Whenever any change in the size, shape or density of the spray indicates that the liquid discharge port 18 is even partially clogged, the user merely presses the needle valve forwardly by pressure on the knob 29 (as by the thumb 41 indicated in Fig. 1) against the resistance of the retracting spring 33. By making the cylindrical tip 22A of the needle valve at least as long as the liquid discharge port 18, we readily enable the user to clear that port (as in Fig. 2), after which a relaxing of the pressure on the knob 29 permits the said spring to retract the needle valve. Since this ejecting of any accumulations in the liquid discharge port can readily be effected by a finger of the same hand with which the user directs our appliance, the needed liquid-nozzle cleaning can be secured almost instantaneously, so that the time required for the repeated clearing of the bore of this nozzle even during an entire half is inappreciable.

However, the head of the appliance can readily be disassembled in the usual manner. So also, when the lock nut 33 is loosened, the adjusting tube 30 can readily be unscrewed and detached from the appliance, thereby permitting this tube together with the needle valve unit and the knob 29 to be detached as a unit from the body of the appliance. Then, if the knob is unscrewed from the stem 22, the needle valve unit (consisting of the needle valve and the headed plunger 40) can be slid out of the adjusting tube and replaced in case the tip of the needle valve stem is worn. With the loosened rear portions and the needle valve thus removed from the body of our appliance, the packing cap 26 also can readily be detached for inspecting or even replacing the packing 28, so that the entire arrangement makes it easy to keep our spray appliance in proper working condition.

Moreover, the compactness of the appliance and the attaching of both the liquid supply hose and the air hose forwardly of the middle of the frame portion of the appliance body allow the frame of the body to be relatively thin transversely, so as to be easily grasped by a hand of the user to vary the direction in which the spray is projected.

However, while we have heretofore de-

scribed our invention in an embodiment including numerous desirable details of construction and arrangement, we do not wish to be limited in these respects, since many changes might be made without departing either from the spirit of our invention or from the appended claims.

We claim as our invention:

1. In a spraying appliance, a body member including a frame portion having the end members of the frame provided with bores having a common axis extending through the interior of the frame, a liquid nozzle mounted on the forward frame end member in axial alinement with the said bores, a tubular adjusting member threaded into the said bore in the rear frame end member, a needle valve extending through the said adjusting member and into the liquid nozzle, a stop element fast upon the needle valve within the adjusting member and disposed for engaging a portion of the adjusting member to limit the rearward movement of the needle valve; and a compression spring operatively interposed between the stop element and the forward end member of the frame for continuously urging the needle rearward so as to press the stop element against the said portion of the adjusting member, thereby holding the needle valve in a liquid-nozzle-opening position; the needle valve presenting a digitally manipulable portion behind the adjusting member whereby the needle valve may be pressed forward against the action of the spring to close the outlet of the liquid nozzle.

2. A sprayingg appliance as per claim 1, in which the compression spring is operatively interposed between the forward end member of the frame and the said stop element.

3. A spraying appliance as per claim 1, including a tubular valve guide mounted on the forward end member of the frame, through which guide the needle valve slidably extends, the compression spring being operatively interposed between the valve guide and the needle valve.

4. In a spraying appliance, a body member including a frame portion having the end members of the frame provided with bores having a common axis extending through the interior of the frame, a liquid nozzle mounted on the forward frame end member in axial alinement with the said bores, a tubular adjusting member threaded into the said bore in the rear frame end member, a needle valve stem extending forwardly through the adjusting member across the frame and into the liquid nozzle and projecting beyond the rear end of the body member, and a plunger fast on the said stem, the adjusting member having a perforated head through which the plunger extends and the plunger having a head normally engaging the forward face of the said perforated head of the adjusting member.

5. A spraying appliance as per claim 4, including a spring operatively interposed between a portion of the body member and the said plunger for continuously urging the plunger and needle valve stem rearwardly.

6. A spraying appliance as per claim 4, including a spring operatively interposed between a portion of the body member and the said plunger for continuously urging the plunger and needle valve stem rearwardly, and also including a knob threaded on the needle valve stem behind the plunger.

7. A spray appliance as per claim 1, in which the needle valve has a cylindrical tip portion closely approximating the diameter of the outlet portion of the liquid nozzle.

Signed at Chicago, Illinois, November 6th, 1929.

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