

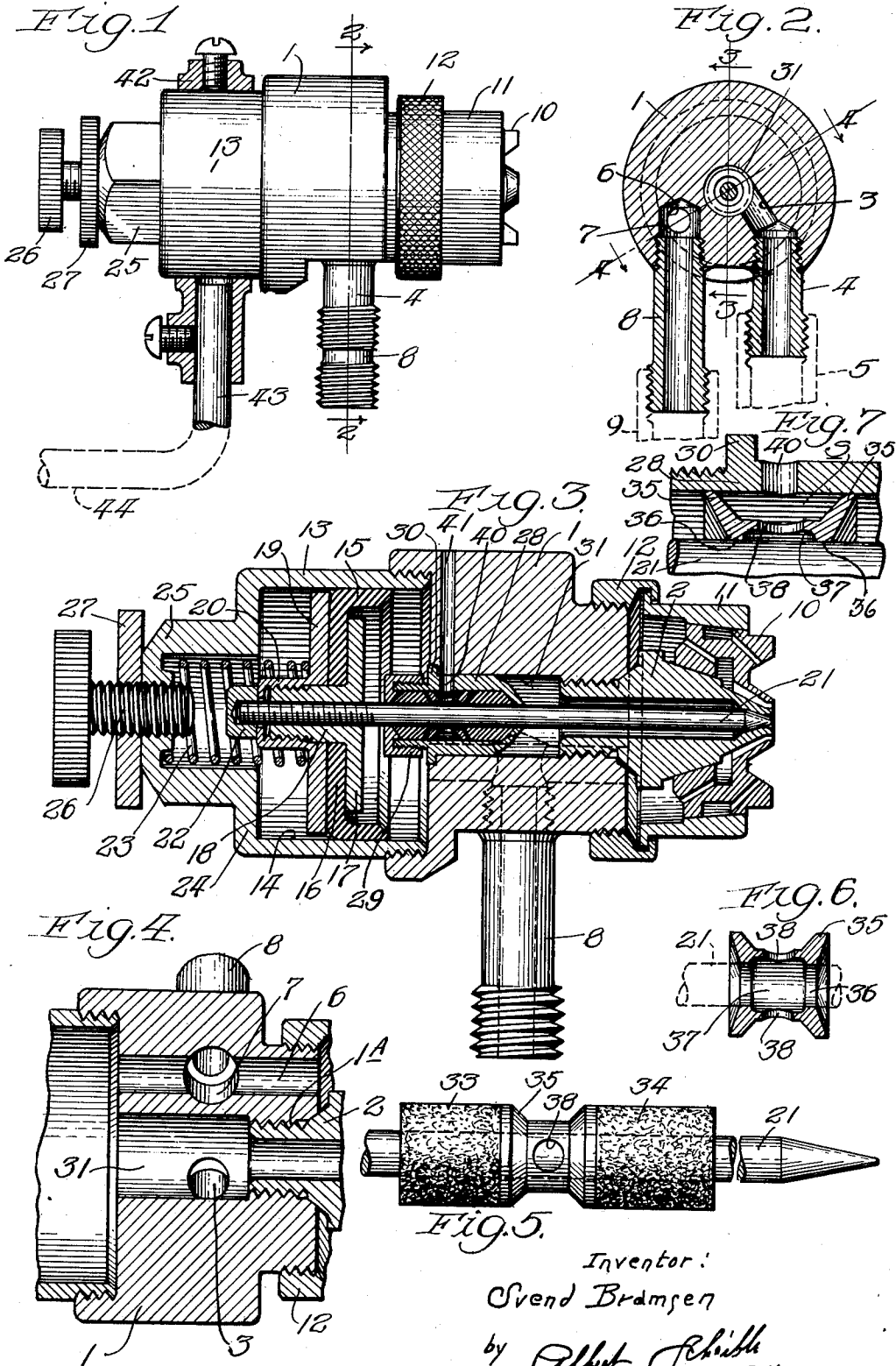
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PNEUMATICALLY CONTROLLED SPRAY APPLIANCE

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PNEUMATICALLY CONTROLLED SPRAY
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My invention relates to a liquid spray appliance in which the flow of the sprayed liquid is controlled by the pressure of the compressed air employed for atomizing the liquid and for flattening the resulting spray.

Spray appliances of this general class have heretofore been employed, or at least proposed, in so-called "spray gun" types designed to be held in the hand of the user and provided with finger-actuated levers (usually shaped as triggers) for controlling the supply of air to the appliance. However, the use of such hand-supported appliances is limited to the spraying of conveniently exposed surfaces, so that these appliances could not be used for internal surfaces of such length that the user's arm is not long enough to hold the appliance in the needed position or positions.

Moreover, the addition of the usual handle at its rear end increases the dimensions of a spray-gun type of appliance to such an extent that this cannot be used within tubes of moderate size; or within other hollow objects having openings of restricted diameter, as for example some of the types of cans having mouth openings of quite small size in proportion to the diameter of the cans.

So also, the heretofore customary constructions of such pressure-controlled spray appliances are apt to permit the liquid to leak into the chamber which houses the piston or diaphragm which actuates the liquid-controlling valve for opening the liquid discharge outlet; thereby permitting the liquid to deteriorate the piston or diaphragm, and also intermingling the air and liquid within the appliance so as to spoil the uniformity of the resulting spray.

My present invention aims to overcome all of these objections and to afford other desirable advantages, and more particularly aims to accomplish the following objects:

(1) Unusual compactness, permitting the appliance when equipped with a customary size of spray-head of the now customary size to be inserted through an opening having a diameter considerably less than three times that of the spray head.

(2) An unusually compact and effective packing arrangement through which the control valve extends from the piston chamber to the liquid passage.

(3) A construction permitting ready access to the packing or stuffing box, and general convenience of assembling and disassembling.

(4) A vent for the discharge of any liquid entering the stuffing box.

(5) Simple and convenient means at the rear of the appliance for adjusting the extent to which the liquid outlet is opened.

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

Fig. 1 is a side elevation of a spray appliance embodying my invention.

Fig. 2 is a transverse vertical section, taken along the line 2—2 of Fig. 1.

Fig. 3 is an enlarged central, vertical and longitudinal section, taken along the line 3—3 of Fig. 2.

Fig. 4 is a similarly enlarged and fragmentary longitudinal section, taken along the line 4—4 of Fig. 2.

Fig. 5 is an enlarged side elevation of the two stuffing box packings and the interposed spacer member, together with portions of the needle valve, showing the packings and the spacer member as they appear before they are compressed.

Fig. 6 is an enlarged central and longitudinal section through the spacer member.

Fig. 7 is an enlargement of a portion of the section of Fig. 3, showing adjacent portions of the liquid-controlling needle valve, the spacer member, and the casing of the stuffing box.

In the illustrated embodiment, my spray appliance includes a body 1 provided with a central longitudinal bore 31 which has its forward portion 1A threaded for receiving the rear end of a tubular liquid nozzle 2. A liquid supply passage 3 extends in a direction approximately radial of the body and a nipple 4 is threaded into the outer end of this passage, so that liquid can be supplied through the passage 3 and the bore 1 to the bore of the liquid nozzle 2 from a liquid supply hose 5 connected to the nipple 4.

The body 1 also has an air passage 6 extending longitudinally through it, to which passage compressed air is supplied by an air inlet passage 7 from a nipple 8 threaded into the body, to which nipple an air hose 9 is connected.

In addition to the liquid nozzle 2, the forward end of the body supports other portions of a suitable spray head. As here illustrated, these include an air nozzle 10 fitted upon a forwardly tapering portion of the liquid nozzle and clamped against that nozzle by an air-confining collar 11, which collar is drawn rearward by a clamping ring 12 threaded upon the forward end of the body 1. However, the particular construction and arrangement of the spray head part is immaterial to my here presented invention.

Threadedly connected to the rear end of the

body 1 is an air cylinder 13 which has its bore 14 in axial alinement with the longitudinal air passage 6 and with the above described head assembly, and into which cylinder the air passage 6 opens. Slidable in this cylinder bore 14 is a piston, comprising a cup-like piston ring (of leather or other suitable material) which consists of an outer ring 15 engaging the cylinder bore and a flat cup bottom in the form of a radial flange 16 having a central perforation. This piston ring portion 16 is clamped between a forward presser disk 17 carrying a stem 18 (which extends rearwardly through the said perforation in the ring portion 16) and a rear presser disk 19 carrying an integral sleeve 20 threaded upon the stem 18.

A needle valve 21 extends axially of the stem 18 through the latter and is locked against unscrewing by a cap-nut 22 which is threaded on the said stem behind the sleeve 20 and which is run up against the rear end of this sleeve. This needle valve extends forwardly through the central bore or liquid passage 31 in the body and into the liquid nozzle 2, the forward end of the valve being tapered and disposed in the usual manner for closing the outlet of this liquid nozzle when the valve stem is slid sufficiently forward with respect to that nozzle.

When the appliance is not in use, the entire piston assembly, including the needle valve, is slid forward (to effect this closing of the liquid nozzle outlet) by a compression spring 23 interposed between the rear presser disk 19 and a rear end portion of the cylinder. To center this spring, I desirably provide the rear end 24 of the cylinder with a cap-like rearward extension 25 having a bore only slightly larger than the outside diameter of the spring 23. Threaded through the end of this cap-like cylinder extension 25 is a screw 26, normally locked by a lock-nut 27. This nut has its inner or forward end disposed for engaging the cap-nut 22 at the rear end of the piston assembly, thereby limiting the opening movement of the liquid-controlling needle valve 21.

To seal the interior of the air cylinder 13 from the liquid passage 31 I provide a stuffing box assembly serving also to guide the needle valve 21 so as to hold the latter in axial alinement with the liquid nozzle, which stuffing box assembly preferably includes two packings 33 and 34 held apart by a spacer member, this spacer member together with adjacent parts of the casing of the stuffing box and of the body 1 being constructed so as to permit the escape (to the outer air) of any fluid that may leak to the spacer member past either of these two packings.

As here illustrated, the stuffing box includes a cylinder 28 having a contracted forward end, and a cap 29 screwed on the rear end of the cylinder 28, these two parts having alined perforations through which the needle valve 21 freely extends. The cylinder 28 has intermediate its ends a peripheral flange 30 which engages the rear end of body 1 when the cylinder 28 is driven forwardly into the liquid bore 31 which this cylinder closely fits, and this cylinder has at one side an aperture 40 alining with a vent bore 41 which connects the said body bore 31 with the outer air.

Disposed within the stuffing box is a three-part assembly, shown on an enlarged scale in Fig. 5 with the two packings as they appear before they are compressed. This packing assembly comprises two tubular packings 33 and 34 of

compressible packing material, and an interposed spool-like spacer member 35, each bored axially so that all three can be slid over the needle valve 21 before the packing assembly is inserted in the stuffing box.

The spacer member has its end portions 36 bored out to a diameter (Fig. 6) closely approximating that of the needle valve 21, and has the intermediate part 37 of its bore enlarged in diameter, so as to provide an annular space around the portion of the valve stem which extends through this sleeve, and radial ports 38 lead from the exterior of the sleeve to this annular space. After the two packings and the interposed sleeve have been assembled on the needle valve, this assembly is slid into the stuffing box portion 28 from the rear of the latter. Then the cap 29 is screwed upon the rear end of the portion 28 thereby compressing the packings 33 and 34.

If any liquid from within the liquid passage 31 should seep or leak past the forward packing 34, or if any of the compressed air within the cylinder 13 should seep or leak past the rear packing 33, such fluid portions will be discharged through the ports 38 into the annular space S (Fig. 7) between the sleeve and the bore of the stuffing box, and will be vented through a port 40 in the stuffing box wall, which port alines with a vent duct 41 in the body 1. Since this vent duct opens into the outer air, and since both the liquid and air are commonly supplied to an appliance of this class under pressure, such leaking fluid portions are readily forced out of the appliance body by their own pressure.

Consequently, I secure an effective sealing of the air cylinder from the liquid supply passage even in case the packings should not seal perfectly around the needle valve. Owing to the providing of the said annular space S within the casing of the stuffing box, any rotation of the spacer member with respect to the said casing is immaterial, as fluid issuing from the ports 38 can readily flow around the shank of the spool-like spacer member to the port 40.

When my appliance is in use, compressed air supplied from the hose 9 through the nipple 8 and the longitudinal body bore 6 enters the air cylinder 13 in front of the piston and forces the latter rearward, thereby drawing the needle valve 21 rearwardly with it against the pressure of the spring 23 until the rearward movement of the piston is halted by the engagement of the lock nut 22 with the adjusting screw 26. As soon as the supply of compressed air is discontinued, the spring 23 again forces the piston and needle valve combination forward to close the outlet of the liquid nozzle, so that no separately manipulated control of the liquid discharge is required.

A mere unscrewing of the cylinder 13 from the body 1 instantly permits this cylinder, together with the spring 23 to be slipped off the piston, and the piston assembly then can be slid further rearward for inspecting and cleaning it. This extended rearward sliding also permits convenient access to the stuffing box cap 29; and if the piston assembly is drawn so far rearwardly as to draw the needle valve entirely out of the stuffing box, the cap 29 of the stuffing box can be detached, thereby permitting the two packings and the interposed spacer member to be dropped out and allowing the packings to be replaced. Consequently, all operative parts of my appliance can easily be inspected and cleaned.

Since no trigger, lever or other manually actu-

ated member is required at the appliance, this can readily be employed in places which could not be reached with a hand-held spray appliance, as for example inside of long tubes, deep barrels or other containers, it being merely necessary to provide means for supporting the appliance and connect this to sufficient lengths of hose for both the liquid and the air supply.

In practice, the diametrically reduced rear end portion 25 of the air cylinder permits a convenient supporting of the appliance, since this can be embraced (as in Fig. 1) by a clamp 42 without materially increasing the bulk of the appliance, and such a clamp can be supported either by a straight rod 43 of any needed length, or by a bent rod 44 as shown in Fig. 1. Thus arranged, my appliance can easily be manipulated at distances of many yards from the operator; and when supported by a straight rod 43 extending at right angles to the axis of my spray appliance, this appliance can readily be rotated about the axis of the supporting rod.

However, while I have illustrated and described my invention in an embodiment including numerous desirable details of construction and arrangement, I do not wish to be limited in these respects, since changes might obviously be made without departing either from the spirit of my invention or from the appended claims.

I claim as my invention:

1. In a spray appliance, a body member, a needle valve extending from a compressed air chamber within a body member to a liquid discharge nozzle, the body member having a liquid passage leading to the said nozzle and a liquid inlet spaced from the said chamber; and two packing members operatively interposed between the air chamber and the said nozzle; the said packing members, both supported within the liquid passage behind the connection of the liquid inlet to that passage and respectively housing longitudinally spaced portions of the said valve and both sealed to the body member, the body member having a vent passage leading to the outer air from the space contiguous to the needle valve and between the two packing members.

2. In a spraying appliance, a body member having a liquid passage extending longitudinally through it and having a vent bore extending radially of the body from a rearward portion of the said passage; a cap-like member mounted on the rear end of the body member and formed to afford a cylinder chamber coaxial with the liquid passage, the body member having an air passage opening into the said chamber; a stuffing box casing disposed in the rear end portion of the said passage and having intermediate its ends

a port connected to the vent bore; a needle valve extending through the stuffing box casing and controlling the discharge of liquid from the liquid discharge passage; two packings disposed within the said casing at opposite sides of the said port and respectively surrounding longitudinally spaced portions of the needle valve; and a spacer member interposed between the two packings, the spacer member being perforated to permit the passing to the said port and vent bore of any fluid leaking past either packing to the portion of the needle valve between the two packings.

3. In a spraying appliance, a stationary body having parts thereof formed to provide both a liquid discharge duct, an air chamber connected to the rear end of the said duct, and a vent bore leading to the outer air from the said duct; a stuffing box casing mounted within the said duct and having intermediate its ends a port connected to the vent bore; a needle valve extending through the stuffing box casing for controlling the outlet of the liquid discharge duct; two packings disposed within the said casing at opposite sides of the said port and respectively surrounding longitudinally spaced portions of the needle valve; and a spacer member disposed within the said casing and interposed between the two packings; the spacer member having a diametrically contracted portion opposite the said port and having in its said contracted portion a second port opening against the needle valve.

4. In a spray appliance, a body member having an air chamber at the rear end of a liquid passage and having a liquid-discharge controlling needle valve extending from the air chamber into the liquid passage coaxial with the said passage; two packings surrounding longitudinally spaced portions of the said valve for effectively separating the air chamber from the part of the liquid forward of that chamber; and a spacer member sleeved upon the needle valve and spacing the two packings, the spacer member having a radial port and the body member having a vent passage leading from the said port to the outer air to permit the escape of air or liquid leaking along the said stem past either of the said packings to the part of the needle valve on which the spacer member is sleeved.

5. A spraying appliance as per claim 2, in which the stuffing box casing includes a cylindrical-walled portion fitting the bore of the said passage and insertible in the said passage from the rear ends of this passage, and in which the body member and the said casing have interengaging portions disposed for limiting the insertion of the casing in the said passage.

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