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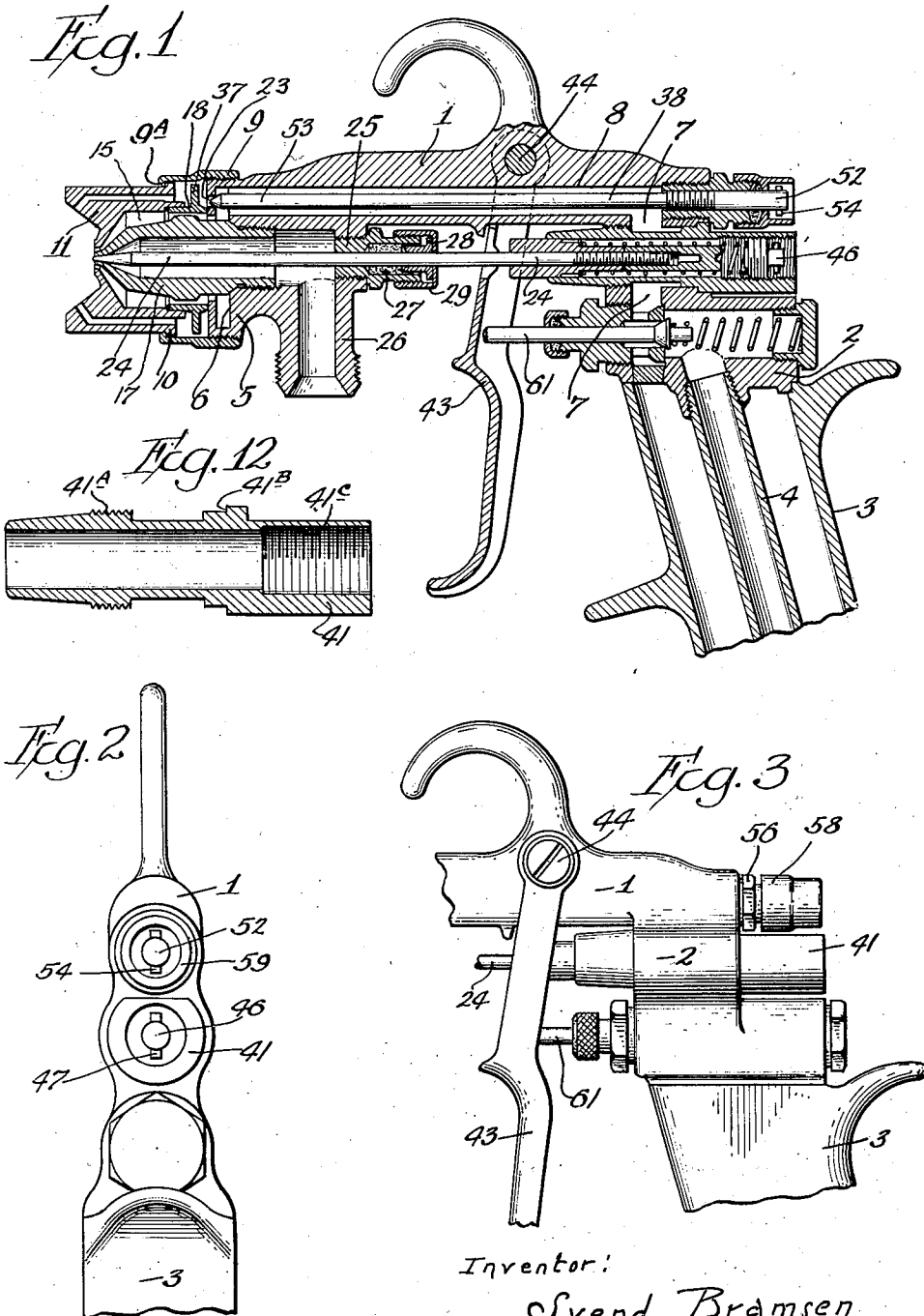
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SPRAY GUN WITH LOCKED CONTROLS

Filed Aug. 10, 1931

2 Sheets-Sheet 1



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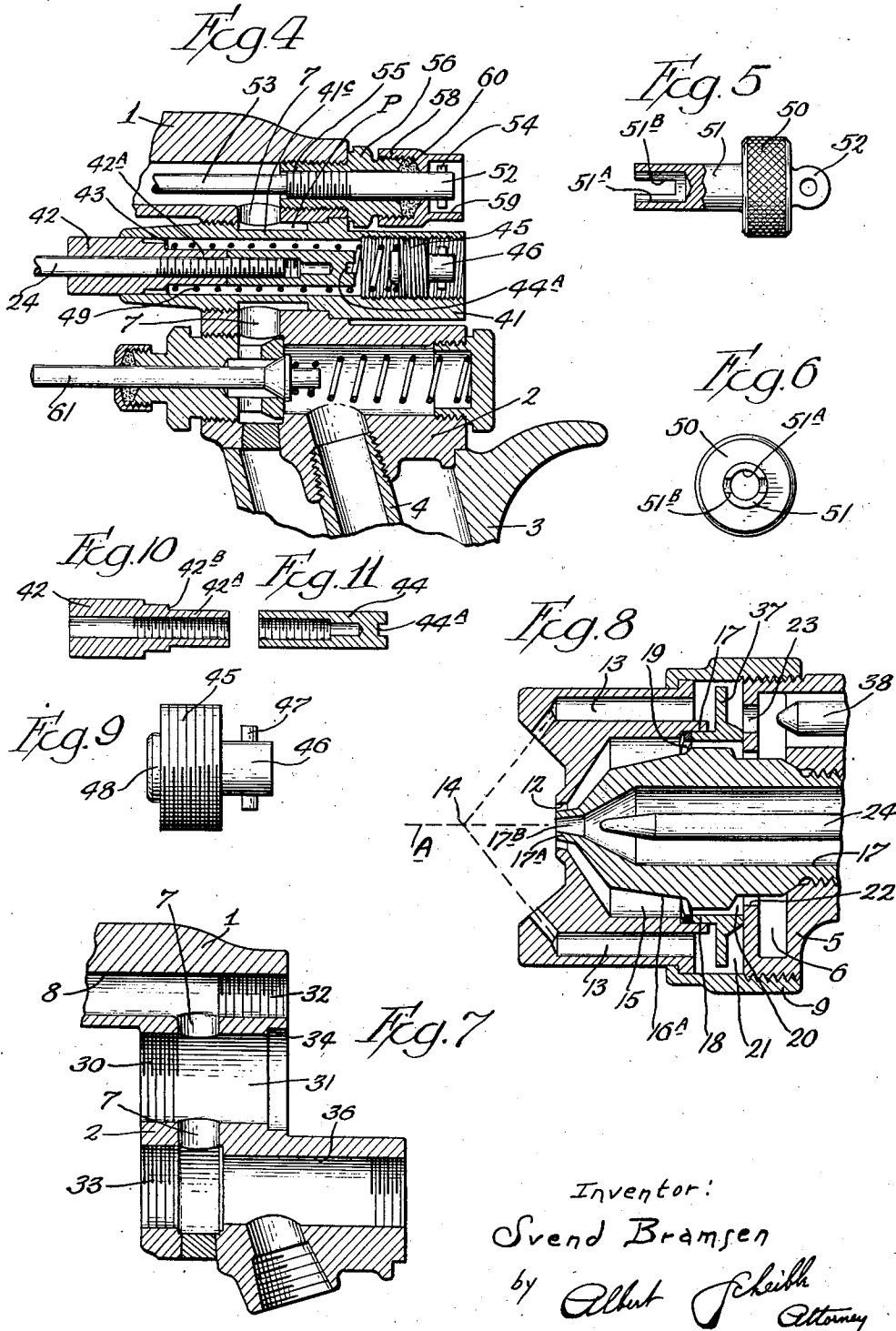
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UNITED STATES PATENT OFFICE

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SPRAY GUN WITH LOCKED CONTROLS

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Application August 10, 1931, Serial No. 556,143

7 Claims. (Cl. 91—45)

My invention relates to the class of liquid-spraying appliances in which the liquid is atomized by means of compressed air, and in one of its major objects aims to provide means for locking the adjustment of the liquid flow and of the air flow, or either thereof, against modification. In a further object, my invention aims to provide novel constructions of spray appliance parts associated respectively with the air-flow control member and with the liquid-flow control member, for guiding and adjusting these members.

In both of these aspects, my invention aims to provide an easily manufactured, compact and inexpensive arrangement of the novel parts, and one which will permit a speedy assembling of such parts, and which can readily be employed with modern types of spray guns.

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

Fig. 1 is a central, vertical and longitudinal section through a spray gun having my novel adjustment-locking means provided both for the air control and for the liquid control, with the lower portion of the handle broken away.

Fig. 2 is a rear elevation of the same.

Fig. 3 is a fragmentary side elevation of the same.

Fig. 4 is an enlargement of a portion of Fig. 1.

Fig. 5 is a side elevation of a key suitable for use in making both adjustments, with the inner end portion in section.

Fig. 6 is an end view of the key, taken from the left-hand side of Fig. 5.

Fig. 7 is a longitudinal and vertical section through the rear end portion of the body member alone, drawn on the same scale as Fig. 4.

Fig. 8 is an enlargement of the left-hand end portion of Fig. 1, with both of the control valves in their full open positions.

Fig. 9 is an enlarged elevation of the spring-engaging plug member which effects the adjustment of the liquid control valve.

Fig. 10 is a diametric section through the guide member which is threaded on the liquid control valve.

Fig. 11 is a diametric section through the locking sleeve which locks the guide member on the liquid valve.

Fig. 12 is a diametric and longitudinal section through the guide sleeve in which this guide member slides.

In its immediate commercial application, my invention is particularly suited for use in con-

nection with the type of flat-spraying gun disclosed in my copending application # 497,130 on a spray gun, as filed November 21, 1930. That application disclosed a spray gun in which a single air passage extends from the handle end of the gun to an air storage chamber in the forward end of the body of the gun, and in which air is supplied from this chamber to separate head compartments one of which leads to passages for discharging lateral air jets.

With the construction disclosed in that application, the usual needle valve for controlling the discharge of the liquid can be parallel and close to a valve which controls the supply of air to the compartment connected to the said lateral air discharge passages, and both of these valves can conveniently be attached and adjusted from the rear of the gun body.

When spray guns of this class are used in large establishments, as for example by automobile manufacturers or in furniture factories, economy demands that both the liquid adjustment and the adjustment of the spray-flattening air should be judiciously made so that the density and spread of the projected spray will permit a large surface area to be sprayed in a given time with a uniform coating and without using more liquid than necessary.

Since the men employed for such spraying rarely have sufficiently good judgment for making the economical spray gun adjustments, this adjusting is usually done by the foremen or other supervisors. However, when such adjustments can be made by merely turning exposed knobs, the men who do the spraying are often tempted to tamper with the adjustments when their superiors are not looking, thereby interfering with the speedy and economical production of the needed coating.

My present invention overcomes this serious objection by arranging the construction so that the making of adjustments requires the use of a key which can be carried by the foreman; thereby giving this supervisor complete control of the adjustments; while still permitting the spray operator to change the plane along which the spray is flattened, or to detach the entire head assembly for cleaning it when necessary.

In the illustrated spray gun, the body member is a single-piece casting (desirably of an aluminum alloy) comprising a barrel 1 having a tail-piece 2 depending from its rear end, to which tail-piece both a handle 3 and an air supply tube 4 are connected. The forward portion of the body member includes a head 5 depending

from the barrel 1 and having in its forward end an air distribution chamber 6, to which chamber the bore of the air tube 4 is connected by a generally upright passage 7 and an air passage 8 forming the bore of the barrel.

Threaded upon the head 5 is an attaching collar 9 which has its forward end turned inwardly to form a flange 9A engaging a radial flange 10 on the rear end of an air nozzle 11. This air nozzle has the usual central air discharge opening 12 (Fig. 8), and the usual diametrically opposed supplemental air passages 13, which passages have their axes intersecting at a common point 14 on the axis A of the air nozzle.

The air nozzle 11 also has the usual inwardly directed webs 15 formed for seating on a forwardly tapering exterior portion 16A of a liquid nozzle 17 which has its tip 17A extending freely into the central discharge opening 12 so as to leave an annular air discharge port between the two nozzles. The rear end of the air nozzle is spaced forwardly from the front of the head 5, and the rear end portion of the bore of the air nozzle is enlarged in diameter behind the said webs 15 to afford a cylindrical rear bore portion 17. Extending slidably into this bore portion 17 is the forward end of a tubular partition 18 which has its rear end bearing against the front of the head 5, and which partition is continually pressed against the said head by a spring 19.

This tubular partition divides the air space which is within the retaining ring 9, and between the head and the air nozzle, into two concentric compartments; namely an inner annular compartment 20 through which the liquid nozzle extends, and an outer compartment 21. These two compartments are respectively connected to the air distribution chamber 6 by a port 22 leading to the inner compartment 20, and by a port 23 which leads to the outer compartment 21, the port 23 being coaxial with the air passage 8 or bore of the barrel 1. Moreover, the tubular partition 18 has intermediate its ends a peripheral flange 37 somewhat smaller in outside diameter than the bore of the retaining ring 9, which flange extends in front of the air port 23 and forms a baffle for compelling part of the air admitted through the port 23 to flow part way around the tubular partition, so as to equalize the supply of air for the two supplemental air passages 13. To control the supply of air to these supplemental air passages past the said baffle flange through the port 23, I provide a needle valve 38 which extends coaxial with this port within the air passage 8, this needle valve being considerably smaller in diameter than the bore of the air passage 8 so as to permit an ample flow of air alongside the valve.

To control the discharge of liquid, I provide a liquid-controlling needle valve 24 extending axially within the bore 17 of the liquid nozzle. This needle valve extends rearwards successively through a tubular guide bushing 25 threaded into the head 5 behind a liquid inlet 26 which leads to the bore of the liquid nozzle, then through a packing 27 housed by the guide bushing, a compressing member 28, and a perforated cap 29 which is threaded on the said bushing and which clamps the compressing member against the packing to compress the latter.

To provide means for guiding both of the aforesaid needle valves, and also for the control of the supply of air from the air tube 4 to the air passage 8, I initially provide the tail portion of the body member with two superposed bores,

as shown in Fig. 7, both of which bores are below and desirably parallel to the air passage 8, and also thread the rear end portion 32 of this air passage.

The upper of these tail bores is intercepted by the riser passage 7 and has its forward portion 30 threaded, while the rear part 31 of this bore has its rearmost portion enlarged in diameter to present a rearwardly facing annular shoulder 34. Extending through this bore is a guide sleeve, shown separately in Fig. 12, which sleeve has a threaded portion 41A threaded into the bore portion 30, and a shoulder 41B engaging the said tail bore shoulder 34. The part 41C of this sleeve which intercepts the riser passage 7 is reduced to an exterior diameter smaller than that of the bore portion 31, so as to provide an annular air passage P around the sleeve to connect the upper and lower portions of the said riser passage.

Extending slidably into the forward portion of this sleeve is the head 42 of a presser member which is disposed for engagement by the usual trigger 43 pivoted to the barrel 1 of the body on a pivot screw 44. The rearwardly extending stem 42A of this presser member is reduced in diameter to present a rearwardly facing shoulder 42B, which shoulder may be effectively enlarged in radial width by a washer 43, and the liquid-controlling needle valve 24 is threaded through the presser member and presents a threaded portion rearwardly beyond that member. Threaded upon this rear end portion of the needle valve 24 is a locking cap 44 which is screwed up tightly against the rear end of the presser member to lock the latter against rotation on the said valve, and which cap desirably has a transverse slot 25A in its rear end for engagement by a screwdriver.

The liquid needle valve 24 and the just described presser member and locking cap 44 are of such lengths that the rear end of the cap is disposed within the guide sleeve (generally designated as 41) and desirably forward of the rear end of that sleeve, and the rearward portion 41C of the bore of this sleeve is threaded. Disposed within this threaded rear sleeve bore end is a stop member, shown separately in Fig. 9. This member comprises a body 45 threaded to fit the sleeve bore end 41C, a rearwardly extending smaller-diametered stem 46 carrying a cross-pin 47, and a forwardly extending nub 48. Bearing against the forward face of the body 45 of the stop member and centered at its rear end by the said nub 48 is a compression spring 49 which bears at its forward end against the said washer 43, or directly against the shoulder 42B of the presser member if the washer is omitted, the spring being of such a length that it continually tends to seat the forward end of the liquid needle valve in the outlet 17B of the liquid nozzle (Fig. 8) when the said stop member is entirely housed by the guide sleeve.

The bore of the spiral compression spring also may be only slightly larger than the outside diameter of the stem 42A of the presser member, so that this stem also cooperates in centering the spring.

Thus arranged, the forward end of the stop member is disposed for engaging the rear end of the locking cap 44 on the liquid needle valve to limit the rearward or opening movement of that valve by the trigger 43, and the stop member can be adjusted in its distance from the

liquid nozzle by rotating this member in either direction.

For making this adjustment, I provide a key having a stem designed for entering the guide sleeve 41 and for interlocking with the two projecting parts of the cross-pin 47. This key desirably is of a compact type, such as that shown in Fig. 5, so as to include a knurled knob 50 whereby the stem 51 of the key can conveniently be rotated, and an eye 52 at the rear end of the key for attaching it to a key ring. The forward end of the key has a bore 51A slidably fitting the stem 46 on the stop member, and has this bore intercepted by a diametric slot 51B so that the forward end of the key presents two forked portions adapted to straddle the projecting parts of the cross-pin 47 on the stop member. These forward portions of the key likewise slidably fits the rear end 52 of a (needle valve type) air valve 53, which rear air valve portion has a cross-pin 54 also adapted to interlock with the slot portions 51B in the key.

This air valve 53 extends within the air passage 8 in the gun body and is of considerably smaller diameter than that passage, the forward end of the valve being tapered and disposed for controlling the air port 23 through which air is supplied to the lateral air discharge passages 13, the valve being shown in its closed and full-opened positions respectively in Fig. 1 and Fig. 8.

To guide the said air-controlling needle valve 53, I thread the rear end of the air passage 8 in the gun body for receiving the forward tubular stem 55 of a nipple which has a rearward tubular stem 57 spaced from the said forward stem by a peripheral bead 56 which seats on the rear end of the gun body to seal the nipple to that body. Threaded upon the rearward stem 57 is the forward portion 58 of a tubular guard member which has its rearward portion 59 only slightly larger in diameter than the diameter of the key stem 51 and which has a perforated partition 60 between its said forward and rearward portions. Then I interpose a compressible packing 60 between the rear end of the said nipple and the partition 54, which packing is compressed when the attaching member is screwed upon the nipple, to prevent leakage of air past the valve stem 52, this valve stem being threaded through the forward stem 55 of the nipple as shown in Fig. 4.

In using my above described spray gun, the operation is the same as with the one described in my said copending application #497,130. That is to say, a rearward pressure on the trigger 43 moves the main air valve stem 61 rearwardly, so as to admit air from the air tube 4 through the upright passage 7 and the longitudinal air passage to the air distribution chamber 6; and the engagement of the rearwardly moved trigger with the guide member 42 also slides the liquid needle valve 24 rearwardly so as to open the liquid discharge port 17B.

The air distribution chamber supplies air through the annular port 22 (Fig. 8) for emission as a tubular sheath of air through the annular air discharge port 12, and also supplies air through the auxiliary port 23 to the supplemental air discharge passages 13. This latter air supply (for the spray-flattening air jets) depends on the position of the needle valve 38 with respect to the port 23.

Since neither this valve nor the stop member (which limits the opening movement of the liq-

uid needle valve 24) can readily be changed in position without the use of a suitable special key, both of the commonly needed adjustments are effectively locked against tampering. Consequently, when an expert has made these adjustments with his key, the ordinary user of the spray gun cannot alter them, so that my invention insures a uniformity of the spraying and avoiding wastes of both liquid material and air.

However, my highly desirable provisions for locking the adjustments do not interfere with the speedy cleaning of the appliance, since the entire head assembly can be detached without affecting the adjustments. Consequently, the customary dipping of these head portions into a solvent at the end of the working period (to remove residual liquid which otherwise would more or less clog the passages) does not in any way modify the adjustment or "setting" of the spray gun.

Moreover, by forming one of my tamper-preventing tubular guards integral with a part of the stuffing box for the air valve 53, and by forming the other guard integral with the tubular member in which the guided enlargement 42 on the liquid needle valve slides, I secure the additional advantages of my invention with a quite light and compact construction and without any considerable addition to the cost of the appliance.

However, while I have heretofore described my invention in connection with a spray gun having the general characteristics of the one disclosed in my said copending application, and have pictured desirable types of interlocking formations on the valve stems and the key, I do not wish to be limited to these or other details of the construction and arrangements above disclosed. Obviously, many changes might be made without departing either from the spirit of my invention or from the appended claims. So also, I do not wish to be limited to the use of the various novel features of my invention conjointly with each other, or to the employment of my invention in connection with spray appliances of the spray gun type as here illustrated.

I claim as my invention:

1. In a spraying appliance of the recited class, a body having a forwardly opening air passage, a guide sleeve mounted in the rear end of the said passage; a valve member extending within the said passage for controlling the outlet of the passage, the valve member being threaded through and extending rearwardly beyond the guide sleeve; and a guard member mounted on the rearward portion of the sleeve and including a tubular portion housing the rearward part of the valve member, the said rearward part of the valve member being formed for engagement by a key.

2. In a spraying appliance of the recited class, a body member, a forwardly open liquid nozzle supported by the body member, the body member including a tubular guide sleeve supported rearwardly of the said nozzle and in axial alignment with the latter; a needle valve having its forward portion disposed within the said nozzle for controlling the discharge of liquid from the nozzle, and having other portion slidable in the guide sleeve; a presser member adjustably mounted in the said sleeve behind the needle valve, and having a key-engagable portion housed of the rear end portion of the sleeve; and

a spiral compression spring interposed between the presser member and the valve member.

3. In a spraying appliance, a body member, a liquid nozzle and an air nozzle both supported
5 by the forward end of the body member, the said nozzle having two air discharge ports at opposite sides of the axis of the liquid nozzle, and the body member having an air passage and being provided with an air supply port, for sup-
10 plying air to the said discharge ports; an air valve member controlling the air supply port and adjustably supported on the body member, the air valve member having its rear end portion formed for engagement by a key; a liquid
15 valve controlling the discharge of liquid from the nozzle, a presser member adjustably supported by the body member and having a key-engageable rear end portion of counterpart formation to that of the air valve member a compression
20 spring interposed between the presser member and the air valve member; and two tubular guards respectively housing the said key-engageable rear end portions of the air valve member and the said presser member.
4. In a spray appliance of the class described, a body member having a longitudinal bore; a tubular member supported by the body member in alinement with the said bore and projecting
30 behind the body member; a needle valve threaded through the bore of the guide member and presenting a key-engageable portion behind the rear end of the guide member; a tubular guard mounted on and alining with the guide member and extending farther rearwardly than the
35 said key-engageable portion of the needle valve, the said guard including an annular partition disposed between the rear end of the guide member and the said key-engageable needle valve

portion; and an annular packing surrounding a part of the needle valve and clamped between the said partition and the rear end of the guide member.

5. In a spraying appliance of the recited class, a body member, a forwardly open liquid nozzle supported by the body member, the body member including a tubular guide sleeve supported rearwardly of the said nozzle and in axial alinement with the latter; a valve member having its forward portion disposed within the said nozzle for controlling the discharge of liquid from the nozzle, and having another portion slidable in the guide sleeve; a presser member adjustably mounted in the said sleeve behind the needle valve, and a spiral compression spring interposed between the presser member and the valve member; the valve member including a stem extending from within the liquid nozzle into the guide sleeve, a tubular element threaded on the said stem and slidably fitting the forward portion of the sleeve, and a cap nut threaded on the rear end of the stem and engaging the rear end of the tubular element to lock the latter against rotation on the stem.

6. In a spraying appliance, an assemblage of elements as per claim 5, in which the tubular element and the presser member each have a portion thereof substantially fitting the spring to center the spring.

7. A spraying appliance as per claim 5, in which the presser member has its rear end portion formed for engagement by a key, and in which the said tubular guide sleeve extends rearwardly beyond the said rear end portion of the presser member.

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