

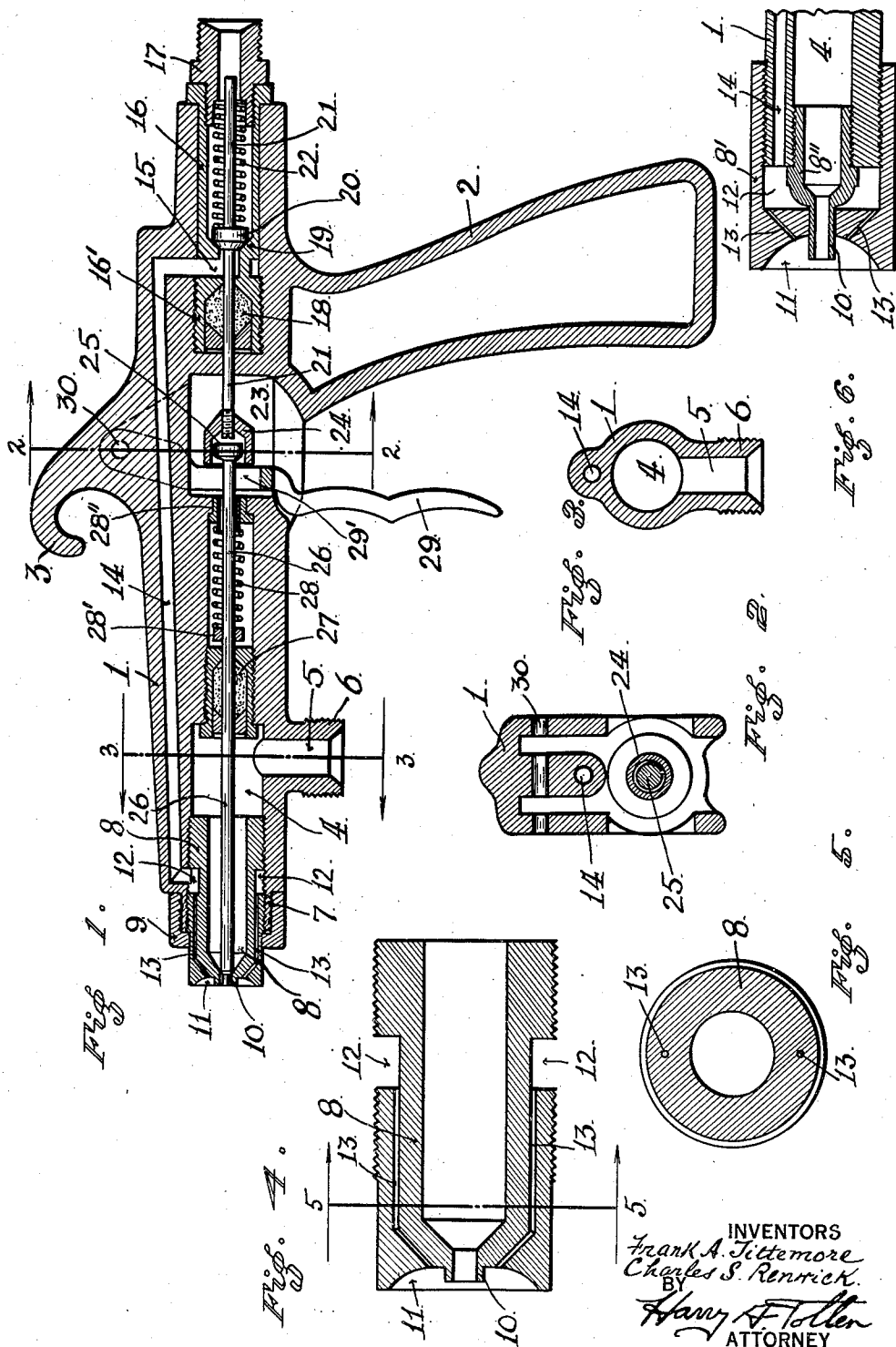
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PAINT AND LACQUER SPRAY GUN

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PAINT AND LACQUER SPRAY GUN

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Our invention relates to spray-guns in general, and particularly to a gun adapted for the spraying of paint and lacquer.

The general object of our invention is to eliminate some of the objectionable features of spray guns in present use; which object we attain by providing a gun possessing, by reason of its novel construction, certain advantages which may be divided and considered under four heads, namely:—

First, the production of a fan or fish-tail spray, by means of two opposing, flattening air-jets, so disposed with relation to the issuing material jet as to perform the additional functions of siphoning and atomizing, without an additional or third air-jet, thereby effecting economy in air consumption.

Second, providing for the timely successive opening of the material-control and the air control, by an aligned disposition of their assemblies, which yields an advantage in simplifying the structure, and reducing the weight of the gun.

Third, providing for the easy removal of the material plunger-assembly for necessary repairs and substitution, and its ready replacement in the gun.

Fourth, providing for a similar removal and replacement of the air plunger-assembly, for a like purpose.

These, and other objects, including features of adjustment, will hereinafter be fully set forth in detail, after a description of the gun has been given in connection with and by reference to the accompanying drawings, in which a preferred form of our gun is disclosed, it being understood that changes in details may be made without departing from the spirit of our invention as defined by the claims hereunto appended.

In the drawings:—

Fig. 1 is a longitudinal section of our gun.

Fig. 2 is a section on the line 2—2 of Fig. 1, the trigger being omitted.

Fig. 3 is a section on the line 3—3 of Fig. 1, all interior parts being omitted.

Fig. 4 is a longitudinal section, enlarged, of the spray-head nozzle, the material-controlling plunger being omitted.

Fig. 5 is a section on the line 5—5 of Fig. 4.

Fig. 6 is a modification of the spray-head nozzle.

The body casting of the gun, comprises the barrel 1, the handle stock 2 and the suspension hook 3. The forward end of the barrel is formed with a bore 4 which constitutes the material chamber, entrance to which is had through a passage 5 in a nipple 6 formed on the lower side of the barrel, said nipple being adapted for connection with a source of material (not shown) which may be under gravity head or other pressure, or under no other pressure than that due to the suction of induction or siphoning.

The forward end of the material chamber 4 is internally threaded and terminates in a flange 7 which is threaded both internally and externally.

Into the flange 7 and the material chamber 4 is screw-fitted the spray head or nozzle 8, which is further locked by a cap 9 screwed upon the flange 7. The forward end of the bore of the nozzle 8 is coned as usual, and its outlet orifice or port terminates in a nipple 10 which projects in the axis of a concavity 11 with which the forward extremity of the nozzle is provided.

The nozzle 8 is formed with an encircling groove 12, from which two air-ducts 13 separated by 180 degrees lead forwardly in the nozzle wall parallel for a portion of their length, with the axis of the nozzle; but in the tip of said nozzle, said ducts converge and open out into the concavity 11 in lines which if projected are inclined to and intersect, from opposite sides, a hypothetical projection of the nipple 10, and preferably as close to the extremity of said nipple as possible. See Fig. 4.

In the upper portion of the barrel 1 is the air passage 14 which at its forward end communicates with the groove 12 of the nozzle 8, and at its rear end communicates with a port 15 in a valve-seat member 16 removably fitted within the rear end or heel of the barrel 1. This member 16 removably carries a nipple 17 by which connection is made with a suitable source (not shown) of air under pressure.

The member 16 is best removably secured

in the barrel by threading its forward end 16' in the barrel bore and said end is recessed to carry a packing 18. Back of the port 15 said member 16 is formed with a valve seat 19.

20 is the air controlling valve operating upon the valve seat 19. The valve has a plunger or stem 21 which projects rearwardly and is fitted with a spring 22 shouldered between the nipple 17 and the valve. The valve stem 21 also projects forwardly, passes slidably through the packing 18, and terminates within the trigger opening 23, of the barrel; and said forward end carries a regulating connection in the form of a cup 24, the latter being adjustably secured to the stem as, for example, by being threaded thereon.

Within the cavity of the cup 24 is freely housed the head 25 of the material-plunger stem 26 the forward end of which controls the outlet of the spray head or nozzle 8.

The plunger stem 26 passes through a packing gland 27 removably secured, as by screw fitting, in the barrel 1, and the head of said gland is properly formed for the reception of a tool adapted to remove said gland when necessary. A spring 28 lying between a collar 28' and a guide 28'' controls said plunger stem.

29 is the trigger, fitting upwardly into the opening 23 of the barrel. The upper portion of the trigger is forked freely over the plunger stem 26, the forks 29' passing in front of and in normal contact with the regulating cap 24, and said forks are removably pivoted in the barrel at 30.

Before pointing out in detail the several features of novelty in our gun, it will be well to describe in general terms its operation, in order that its structure may be reviewed, and more perfectly appreciated.

The material to be sprayed, say, for example, paint or lacquer, enters at the connection 6, and the air enters at connection 17. When the trigger 29 is pressed back, its forks 29', by contact with the cup 24, opens the valve 20, so that the air will pass through port 15, passage 14, groove 12, and ducts 13, from the latter of which it will be discharged.

The trigger 29 will also, by continuance of movement, contact with the head 25 of the plunger stem 26, and move said stem back to open the discharge orifice of the spray nozzle 8 to the passage of the material. The first feature to which attention is directed concerns the spray-jet and the novel means herein disclosed for producing it.

Generally speaking the principal feature of spray guns is the atomizing head of the gun. Three principles of atomizing are, at present, in use, namely, the cross-fire atomization, where the material nozzle and the air nozzle are at right angles or nearly so; the center atomization where the air nozzle sur-

rounds the material nozzle and the air passage is parallel with the material nozzle; and the old method of atomization under extreme pressure of the material itself, such as the whitewash spray system.

In guns at present on the market, sprays are produced commonly known as fan sprays, fish-tail sprays and flat sprays, all these terms referring to the same shape of spray. Sprays of this shape are produced on the principle of center atomization combined with two side jets of air striking the spray jet at approximately half an inch from the outlet and thus flattening it out. This procedure, therefore, involves three jets of air, one for siphoning effect and atomization, and two for the flattening of fanning operation.

In our gun the principle of center atomization is omitted, since we use no air jet surrounding and parallel with the material jet for the purpose of siphoning and atomizing. Both these effects are produced in our gun by the two side air jets from the ducts 13, which effects are the result of striking the material jet at an acute angle and preferably at a point as close to the issuing plane of the material jet as possible. Thus we combine by the disposition and use of the two side air-jets only, the siphoning and atomizing effect and the flattening out of the spray into a fan or fish-tail shape, thereby reducing the consumption of air.

It will be noted also that our nozzle 8 is capable of being rotatably adjusted in order to adjust the spray in any position, horizontal, vertical or angular.

A second feature may now be pointed out. In all perfectly operating spray guns of the pressure and gravity feed types, it is necessary to have what is known as the double action control. By this is meant that the air supply or air valve must open slightly before the material plunger or material valve. This operation is usually accomplished by a single trigger control of air valve and material plunger which are not, however, in alignment. It is common practice to either have the air valve below or above the line of the material plunger, thus involving a heavy and cumbersome body casting, as well as a trigger contact at different points.

In our gun we have been able to align the two plungers by means of the cup 24 on the air plunger stem 21 and the head 25 on the plunger stem 26, the relation of said cup and said head being such as shown clearly in Fig. 1, that upon pulling the trigger 29 its forks 29' will contact with the air plunger cup 24 slightly before they will reach and contact with the head 25.

A third feature of novelty will now be mentioned. In guns in which the packing gland of the material plunger assembly is a part of the gun body casting, it is very difficult to repack said plunger assembly when

necessary. In our gun the arrangement and fitting of the material plunger assembly is such as to permit its ready removal for re-packing or substitution of worn or broken parts, and its replacement in the gun. The nozzle 8 is first removed. Then a small socket wrench is introduced to unscrew and free the packing gland 27. Thereupon the plunger 26, gland 27, spring 28 and guide 28" may all be withdrawn through the muzzle of the barrel.

The last point to which attention is directed relates to the novel removable arrangement of the air control assembly. It is common practice in gun assembly to have the air valve with its seat, a part of the body casting. This requires the operator when ordering a new valve stem, to do his own grinding to seat the valve; but when, as in our gun, the whole cartridge-like assembly of the air valve control is removable, the manufacturer can ship the complete assembly ready for a novice to insert.

It will be seen by reference to Fig. 1 that the entire assembly comprising the connection 17, the valve-seat member 16, with its packing gland 18, and the plunger stem 21 with its cup 24 and spring 22, may be readily removed and replaced, thus facilitating the operation of grinding, adjusting and packing.

In Fig. 6 we show a structural modification of the nozzle which in this instance comprises two members, the outer member 8' which carries the opposing air ducts 13, and the inner member 8" which carries the tip or outlet nipple 10 slidably fitted in the outer member. The outer member is screwed upon the muzzle of the barrel 1 and its air ducts communicate with the air passage 14 of said barrel. The inner member is screwed into the barrel and communicates with its material chamber. These two members therefore are relatively linearly movable, whereby the air jets from ducts 13 may be adjusted with relation to the material jet and to the tip or nipple 10 as may be desired.

In this modified form of the nozzle the relative linear adjustment of the two members 8' and 8" provides, by changing the position of the issuing air jets lengthwise with respect to the tip 10 or to the material jet or stream issuing therefrom, for not only varying and adjusting the width of the fan and the atomizing effect, but also, when adjusted to the position shown in this Fig. 6, it serves to keep the tip clean at all times.

We claim:—

1. In a spray-gun, a unitary spray-head comprising a nozzle having a through bore and a discharge orifice solely for the material to be sprayed, said nozzle having in its wall a pair of oppositely disposed longitudinally directed air ducts, the forward portions of said ducts converging on lines inclined to and

intersecting the plane of the nozzle orifice whereby the material to be sprayed and air are first brought into contact at the point of intersection of the air ducts with the material stream.

2. In a spray-gun, a unitary spray-head comprising a nozzle having a through bore and a discharge orifice solely for the material to be sprayed, said nozzle having in its wall a pair of oppositely disposed longitudinally directed air ducts, the forward portions of said ducts converging on lines inclined to and intersecting the plane of the nozzle orifice, in immediate proximity to said orifice whereby the material to be sprayed and air are first brought into contact at the point of intersection of the air ducts with the material stream.

3. In a spray gun, a unitary spray-head comprising a nozzle having an axial bore, the forward end of said nozzle being formed with a concavity and with a discharge nipple projecting into said concavity, and said nozzle having in its wall a pair of oppositely disposed longitudinally directed air-ducts, opening into said concavity, the forward portions of said ducts converging on lines inclined to and intersecting the plane of the discharge nipple whereby the material to be sprayed and air are first brought into contact at the point of intersection of the air ducts with the material stream.

4. In a spray gun, a unitary spray-head comprising a nozzle having an axial material discharge bore, the forward end of said nozzle being formed with a concavity and with a discharge nipple projecting into said concavity, and said nozzle having in its wall a pair of oppositely disposed longitudinally directed air-ducts, opening into said concavity, the forward portions of said ducts converging on lines inclined to and intersecting the plane of the discharge nipple in immediate proximity to the forward edge of said nipple whereby the material to be sprayed and air are first brought into contact at the point of intersection of the air ducts with the material stream.

5. In a spray gun having a body including a barrel provided with connections and passages for the material to be sprayed and for the air, respectively, a control mechanism for said material and air comprising a material-discharge control plunger disposed longitudinally within the barrel; an air-inlet control plunger disposed longitudinally within the barrel; and aligned with the material-discharge control plunger; a trigger member fitted in the body of the gun; and means, associated with the adjacent ends of the two plungers, adapted to be successively engaged by the trigger, to move said plungers in timely succession, consisting of a cup carried by the air control plunger, and a head on the

material control plunger housed within said cup and longitudinally slidable therein.

6. In a spray gun having a body including a barrel provided with connections and passages for the material to be sprayed and for the air, respectively, a control mechanism for said material and air comprising a material-discharge control plunger disposed longitudinally within the barrel; an air-inlet control plunger disposed longitudinally within the barrel, and aligned with the material-discharge control plunger, a trigger member fitted in the body of the gun; and means, associated with the adjacent ends of the two plungers, adapted to be successively engaged by the trigger, to move said plungers in timely succession, consisting of a cup carried by the air control plunger, and a head on the material control plunger housed within said cup and longitudinally slidable therein, said cup being adjustably fitted upon said air control plunger.

7. In a spray gun having a body including a barrel provided with connections and passages for the material to be sprayed and for the air respectively, a control mechanism for said material and air comprising a material-discharge control plunger disposed longitudinally within the barrel; an air-inlet control plunger disposed longitudinally within the barrel and aligned with the material-discharge control plunger; a cup fitted upon the inner end of the air control plunger; a head on the inner end of the material control plunger housed within said cup and longitudinally slidably therein; and a trigger pivoted within the gun body, said trigger being forked past said cup and head and adapted for successive engagement therewith for the purpose described.

8. In a spray gun, the combination of independent aligned, normally closed material-discharge control and air inlet control plungers; a cup fitted upon the end of the air control plunger; a head on the adjacent end of the material control plunger, said head lying and adapted for sliding movement within said cup; and a bifurcated trigger for successively engaging said cup and said head.

9. In a spray gun having a barrel, a valve-seat member removably fitted in the heel of the barrel and carrying on its rear end a removable fitting for connection with a source of air, the forward end of said member being recessed; packing carried in said recessed end; a control-plunger stem removably carried by and slidable linearly in said member and packing; a control valve on said stem; and means for operating said stem to open and close the valve.

10. In a spray gun having a barrel, a valve-seat member removably fitted in the heel of the barrel and carrying on its rear end a removable fitting for connection with a source of air, the forward end of said member being

recessed; packing carried in said recessed end; a control-plunger stem removably carried by and slidable linearly in said member and packing; a control valve on said stem; and means for operating said stem to open and close the valve, consisting of a trigger fitted in the gun barrel, and a spring carried by the stem.

11. In a spray-gun having a body including a barrel member provided with connections and passages for the material to be sprayed and for the air, respectively, a spray-head in the form of a unitary member comprising a nozzle portion fitted in the muzzle of the barrel, the central bore of said nozzle portion communicating only with the material passage of the barrel, said unitary member having also two air ducts disposed oppositely with relation to each other, said air ducts communicating at their rear ends only with the air passage of the barrel and affording the sole outlet therefrom, and converging at their forward ends on lines inclined to and intersecting the plane of the discharge orifice of the nozzle.

12. In a spray-gun having a body including a barrel member provided with connections and passages for the material to be sprayed and for the air, respectively, a spray-head in the form of a unitary member comprising a nozzle portion fitted in the muzzle of the barrel, the central bore of said nozzle portion communicating only with the material passage of the barrel, said unitary member having also two air ducts disposed oppositely with relation to each other, said air ducts affording the sole outlet for the passage through said spray-head and converging at their forward ends on lines inclined to and intersecting the plane of the discharge orifice of the nozzle portion and in immediate proximity to said orifice.

13. In a spray-gun having a body including a barrel member provided with connections and passages for the material to be sprayed and for the air, respectively, a spray-head in the form of a unitary member comprising a nozzle portion fitted in the muzzle of the barrel and adapted for axial rotary adjustment therein, the central bore of said nozzle portion communicating with the material passage of the barrel, said unitary member having also two air ducts disposed oppositely with relation to each other, said air ducts at their rear ends affording the sole communication with the air passage of the barrel, and converging at their forward ends on lines inclined to and intersecting the plane of the discharge orifice of the nozzle.

In testimony whereof we have signed our names to this specification.

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