

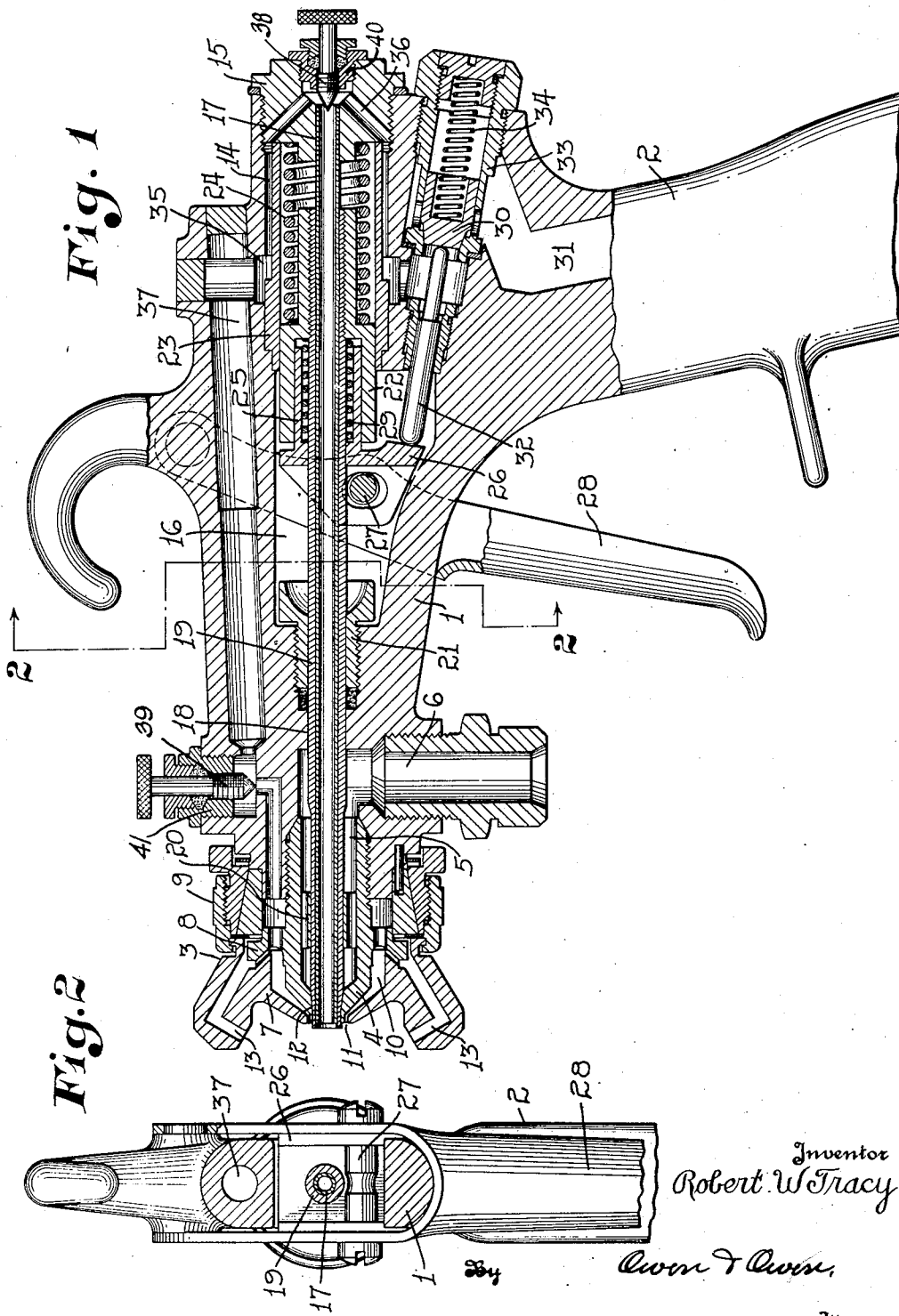
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SPRAY GUN

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## UNITED STATES PATENT OFFICE

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## SPRAY-GUN

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3 Claims. (Cl. 91-45)

This invention relates to apparatus of the type adapted for applying paints, lacquers, or other materials by air pressure to surfaces to be coated, and has particular reference to the guns used in connection with such apparatus.

In the spraying of "brushing dopes" and other materials of a more viscous nature than ordinary surface coating materials, it is desirous to discharge the atomizing air from the gun both interiorly and exteriorly of the discharging material stream so as to effect a more thorough breaking up and atomization of the material than is possible where the air is discharged only in enveloping relation thereto. This has heretofore been accomplished by making the customary control needle hollow and directing air therethrough into the center of the material stream. In all of such uses of which I am aware, the hollow needle valve is the center conduit of the gun and its discharge end is therefore shifted axially with respect to the material and outer air discharge orifices during any movement of the needle valve in an operation of the gun, which feature has certain objections.

The primary object of my invention is the provision of a gun of this character in which the discharge of at least a portion of the atomizing air is centrally through the control valve but wherein the discharge end of such central air passage remains constant or fixed with respect to the material and outer air discharge orifices of the gun and is not varied by controlling movements of the valve.

Other objects and advantages of the invention will be apparent from the following detailed description thereof.

While in its broader aspect the invention is capable of embodiment in numerous forms, one embodiment thereof is illustrated in the accompanying drawing, in which—

Figure 1 is a fragmentary side elevation of a spray gun embodying the invention with a part in central longitudinal section and with the control parts in inoperative position, and Fig. 2 is a cross-section on the line 2-2 in Fig. 1.

Referring to the drawing, 1 designates the gun body having the customary handle portion 2 and provided at its discharge end with a spray head 3 of any suitable form, many types of such spray heads being in use.

The spray head illustrated comprises the inner material discharge nozzle 4 which is threaded into the forward end of the gun body with its passageway 5 in communication with the material supply passageway 6 of the gun

body. An outer air nozzle 7 is mounted in concentric spaced surrounding relation to the outer end portion of the material discharge nozzle 4 and has a portion held seated against an annular flange 8 of the nozzle 4 by a union nut 9 engaged to the forward end of the gun body in any convenient or suitable manner. The nozzles 4 and 7 cooperate to form an air space 10 therebetween which terminates at its forward end in an annular air discharge orifice 11 in concentric relation to the material discharge orifice 12 of the inner nozzle 4. The nozzle 7 is of the supplemental air discharge type having the supplemental air discharge passages 13 in communication with the air supply space 10. This feature of the nozzle has nothing, however, to do with the invention.

The gun body 1 is provided at its rear end substantially in axial alignment with the discharge orifice of the spray head with a bore or opening 14, the rear end of which is closed by a plug 15 shown in the present instance as being threaded therein and its forward end being open, except as hereinafter described, to the transverse opening 16 of the gun body. A tube 17 is carried at its rear end by the plug 15 and projects forwardly therefrom through the openings 14 and 16 and an opening 18 in the forward end portion of the stock, and axially through the center of the material discharge nozzle 4, terminating substantially at the outer end of the discharge orifice of such nozzle, or in any desired predetermined relation thereto. The tube 17 is concentrically spaced laterally from the wall of the nozzle passage 5 and its orifice 12 permit the passage of material through the nozzle around the tube.

The control valve for the material discharge orifice 12 constitutes a tube 19, which is sleeved on the air tube 17 for movements axially thereof and has its forward end projecting through the opening 18 and into and through the material nozzle 4. The tube 19, which may be referred to as a "sleeve valve", is spaced from the wall of the nozzle passage 5 to permit the passage of material therethrough, but has its outer end adapted to project through the material discharge orifice 12, and when at the limit of its outward movement therein to seat in such orifice to effectually close the same. When the valve sleeve is retracted from its forward position shown in the drawing, it effects an opening of the orifice 12 to permit the discharge of material therethrough from the passage 5.

The forward end portions of the air tube 17

in valve sleeve 19 are centered within the nozzle 4 by a spider member 20 disposed in the nozzle passage 5. The opening 18 is sealed against leakage around the valve sleeve 19 by the gland 5 nut 21 and the customary packing.

The rear end of the valve sleeve 19 is fixedly secured to a slide member 22 that is mounted for sliding movements in a sleeve 23, mounted in the gun body opening 14, and cooperating with the slide member 22 to close the rear end of said opening. The sleeve 23 is held to its seat in the forward end of the opening 14 by the plug 15.

A coiled expansion spring 24 is mounted within the sleeve 23 with one end thrust against the plug 15 and its other end thrust against a shouldered portion of the slide member 22, and acts to normally urge said member and the valve sleeve 19 forward to seating position in the nozzle 4. The forward end of the slide member 22 is annularly recessed around the valve sleeve to slidably receive the tubular stem portion 25 of a thrust-member 26 which has a transverse opening through its forward end portion for receiving the cross-pin 27 of the control trigger 28 of the gun. A coiled expansion spring 29 is mounted within the members 22 and 25 in opposed end thrust engagement therewith to normally maintain the thrust member 26 at the limit of its forward movement relative to the slide 22. The spring 29 is weaker than the spring 24 and the permissible rearward movement of the thrust-member 26 relative to the slide 22 is only sufficient to permit such thrust-member to actuate an air valve 30 disposed in an air supply passage 31 and open such valve before the continued movement of the thrust-member 26, by an operation of the trigger 28, effects a rearward movement of the sleeve 22 against the tension of the spring 24 and a consequent retraction of the valve sleeve 19 and opening of the material discharge orifice 12.

A stem 32 connects the thrust plate 26 to the valve 30 and imparts movement from one to the other thereof. The valve 30 is disposed with a valve cage 33 and is normally held seated by the action of a spring 34 disposed in such cage.

It will be understood that when the gun is in use, the passage 31 will be connected to a source of air pressure supply. When the valve 30 is opened, air will be permitted to pass through a passageway 35 surrounding the sleeve 23, a portion of such air then passing to the rear end of the tube 17 through passage 36 provided in the plug 15 and a portion passing through the passage 37, provided in the top portion of the gun body, to the air space 10 between the nozzle members 4 and 7.

It is apparent that to operate the gun, the operator retracts the trigger 28, causing first a movement of the thrust plate 26 relative to the slide member 22 to effect an initial opening of the air valve 30 and then, upon a continued rearward movement of the trigger and thrust plate to effect a rearward movement of the slide member 22 and sleeve valve 19 to open the material discharge orifice 12 without disturbing the position of the discharge end of the air tube 17 relative to the nozzle. By opening the air valve before the sleeve valve is moved to open the orifice 12 permits the discharge of air both from the tube 17 and from the air discharge orifice 11 in advance of the discharge of material from the orifice 12, thereby insuring

the breaking up and atomizing of any material discharging from the gun.

By discharging the atomizing air interiorly of the material stream and also in enveloping relation thereto, a very efficient breaking up and finely atomizing of the material is effected and this manner of discharging the air is particularly important when handling "brushing dopes" and other materials of a more viscous nature than other paints and surface coating materials.

It is sometimes desirable to regulate the pressure of the air streams discharging from the tube 17 and from the orifice 11 so that they may be of the same pressure or of different pressures to suit the particular use. For this purpose, a valve 38 is provided to control the quantity of air and consequently the pressure of the same passing through the tube 17 and a valve 39 is provided in the passage 37 for regulating the quantity and pressure of the air passing therethrough to the orifice 11 and also to the supplemental air discharge passages 13. The valve 38 in the present instance is threaded in a plug 40 in position to seat against the rear end of the tube 17, said plug being threaded in an opening provided in the rear end of the plug 15. The valve 39 is carried by a plug 41 in position to seat against a portion of the passage 37 as shown, said plug being threaded in a top opening provided in the gun body 1.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of parts, as it is capable of numerous modifications and changes without departing from the spirit of the claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a spray gun, a spray head having an inner material discharge nozzle and an outer air discharge nozzle, a tube projecting into the inner nozzle to cooperate therewith to form a material discharge orifice and adapted to have communication with a source of air pressure supply, a valve member slidably mounted on said tube and operable to open and close said orifice, a valve for controlling the supply of air to both said tube and said air nozzle, and means operable to open both said air valve and said nozzle valve member.

2. In a spray gun, a gun body having an opening in its rear end and a spray head at its forward end, said spray head having an inner material discharge nozzle, a bearing sleeve disposed in said opening, a member closing the rear end of the opening, a tube projecting from said member forwardly through said opening and into said nozzle and cooperating with the latter to form a material discharge orifice, said tube having communication through said member and a portion of said body with a source of air pressure supply, a normally closed valve in said communication, a valve sleeve slidably mounted on the tube and having its forward end adapted to enter and close said orifice and having its rear end extending into said opening and having a bearing in said bearing sleeve, means acting on said bearing to normally retain the valve sleeve in orifice-closing position, and control means operable to open the air valve upon an initial movement thereof and upon a continuing movement to retract the valve sleeve from orifice closing position.

3. In a spray gun, a spray head having an inner material discharge nozzle and an outer

air discharge nozzle, a tube projecting into the inner nozzle to cooperate therewith to form a material discharge orifice and adapted to have communication with a source of air pressure

supply, a valve member slidably mounted on said tube and operable to open and close said orifice, a valve for controlling the supply of air to both said tube and said air nozzle, means operable to open both said air valve and said nozzle valve member, and separate means independently operable to regulate the pressure of discharge of air from said tube and air discharge nozzle.

4. In a spray gun, a gun body having a spray head at its forward end with an inner material discharge nozzle and outer air discharge nozzle and having an opening in its rear end, means removably mounted in said opening, a tube carried by and projecting forwardly from said means into said material discharge nozzle and cooperating therewith to form a material discharge orifice, said tube having communication at the rear of its forward end with a source of air pressure supply, a valve sleeve mounted on said tube for movements lengthwise thereof and having its forward end adapted to enter said orifice and to close the same, means acting on said valve sleeve to normally retain it in orifice-closing position, means operable to retract the valve sleeve from orifice-closing position, a valve operable to control the supply of air to both said tube and air nozzle, and separate independently controlled valves operable to regulate the air pressure discharging from said tube and air nozzle.

5. In a spray gun, means forming three concentric orifices, the intermediate orifice being for the discharge of a material and having communication with a source of material supply, and the other two orifices being for the discharge of air and in communication with an air pressure supply, and means for regulating the volume and pressure of air discharge from the

center orifice to effect a greater or less pressure of discharge from said center orifice than from said outer orifice.

6. In a spray gun, a nozzle having three concentric discharge orifices, the inner and outer orifices for air and the intermediate orifice for the material being sprayed, said orifices having communication with respective sources of material and air pressure supplies, and separate independently regulable valves operable to control the respective discharge of air and material from said orifices.

7. In a spray gun, a spray head having a fixed inner material discharge nozzle and a fixed outer air discharge nozzle cooperating to form an annular air discharge orifice in outwardly spaced concentric relation to the material discharge orifice of the inner nozzle, a fixed tube projecting into the inner nozzle to cooperate therewith to form an annular material discharge orifice and adapted to have communication with a source of air pressure supply, and a control valve member sleeved on said tube for reciprocatory movements relative thereto and adapted when in one position of its movement to seat in said annular material discharge orifice and close the same.

8. In a spray gun, a spray head having a fixed inner material discharge nozzle and an outer air discharge nozzle cooperating to form an annular air discharge orifice therebetween, a fixed air discharge tube projected through the inner discharge nozzle and cooperating therewith to form an annular air discharge orifice, a tubular valve member closely sleeved on said tube for reciprocatory movements longitudinally thereof and having its outer end adapted to enter and close the annular material discharge orifice, manual control means for said valve member, and means for controlling the supply of air respectively to said tube and said outer air discharge orifice.

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