Sept. 15, 1959 D. J. PEEPS 2,904,262

SPRAY GUN

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FIG-1-

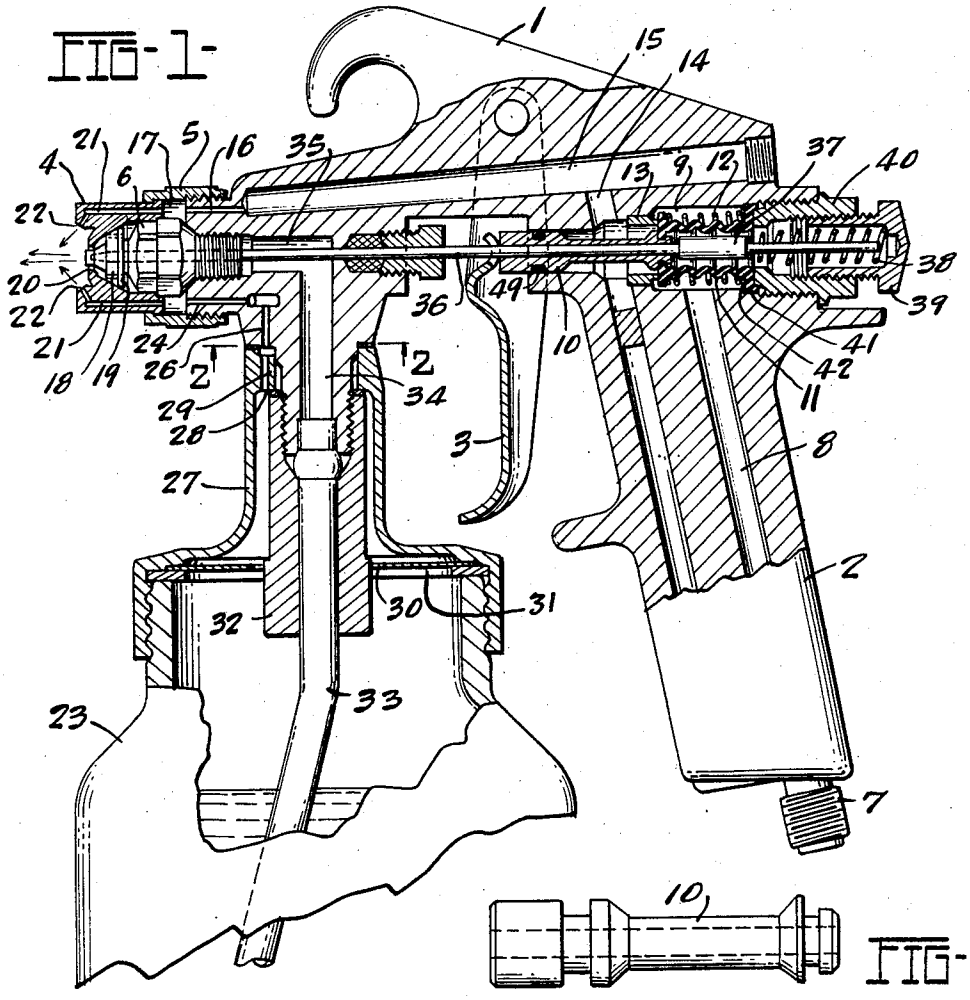

FIG-3-

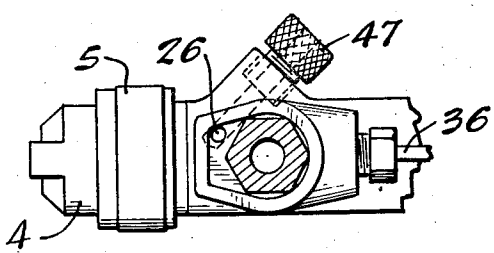

FIG-2-

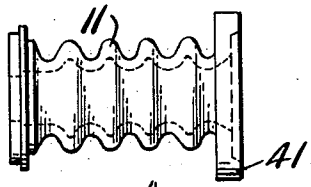

FIG-4-

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SPRAY GUN

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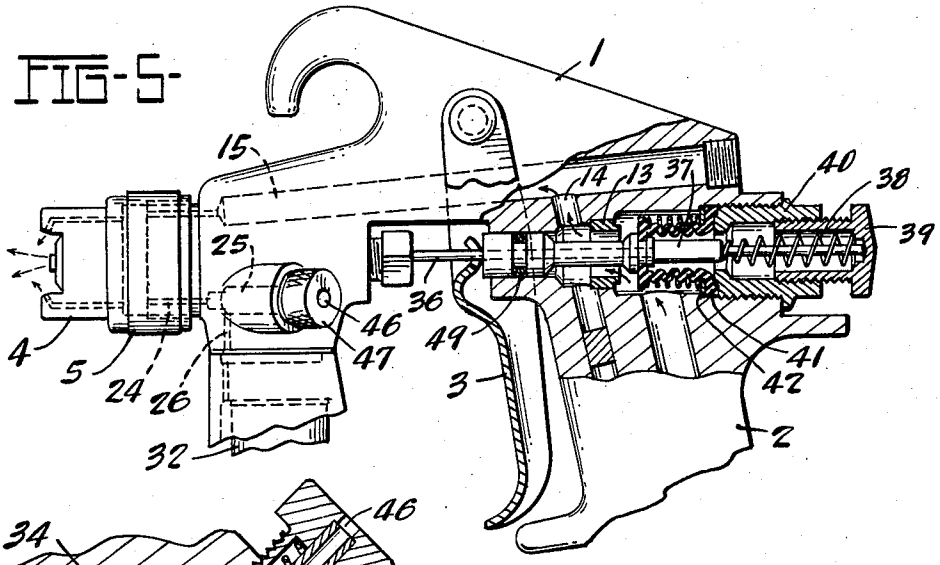
FIG-5-



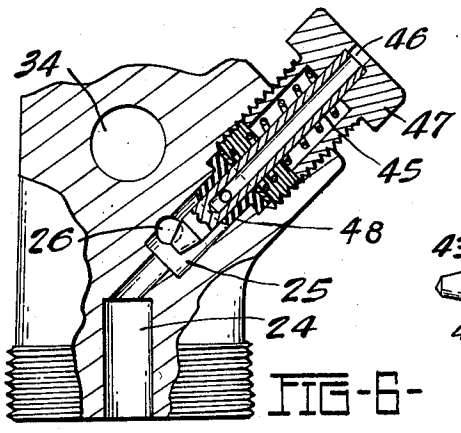


FIG-6-

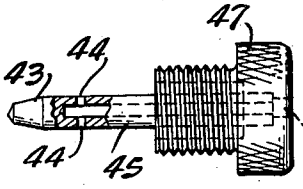


FIG-8-

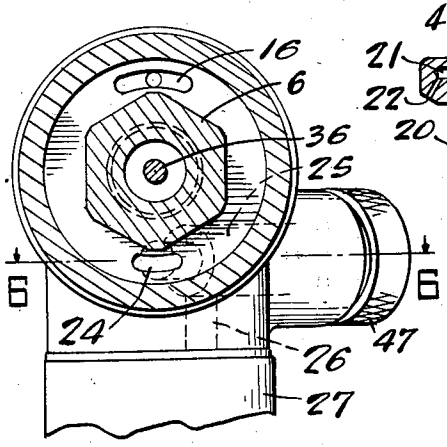


FIG-7-

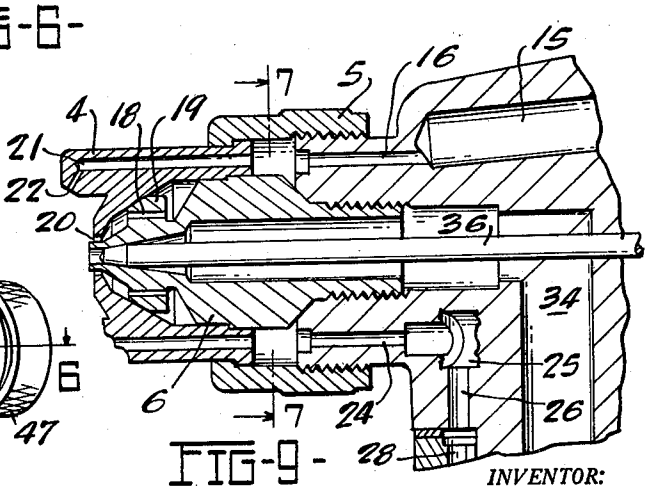


FIG-9-

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SPRAY GUN

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Application November 4, 1954, Serial No. 466,902

1 Claim. (Cl. 239—408)

This invention relates to a spray gun for applying lacquers, enamels and other coating materials and to such a spray gun which may have an attached container for the coating material.

This type of spray device is generally used for comparatively small jobs such as the refinishing of furniture, radiators and automobiles but is also adaptable for coating walls and other surfaces of larger area.

Some of the spray guns of this capacity draw the material from the container to the spray nozzle by the suction of the flow of atomizing air while others direct air into the container to force the material under positive pressure. The latter arrangement is preferred for the handling of heavier coating materials.

Suction feed has advantages in applying light materials. It avoids the likelihood of an excessive discharge and it possesses a self regulating action as an increase in air pressure proportionately increases the flow of material and similarly a decrease in flow follows a decrease in air pressure. This is a desirable condition as the atomizing power of compressed air varies in direct relation with changes in its pressure.

One object of this invention is to provide a spray gun with means for readily changing the type of material feed from suction to pressure and vice versa.

Another object is to provide a spray gun which is compact and simple in design with particular reference to the control of the air flow therethrough.

Other objects and advatnages of the invention will be apparent on reading the following description and study of the accompanying drawings.

In the drawings, Figure 1 is a vertical, longitudinal, section of a spray gun embodying my invention;

Figure 2 is an underside view of the forward end of the spray gun taken on the line 2—2 of Figure 1;

Figure 3 is a side elevation of the main air valve stem;

Figure 4 is a like view of the rubber bellows valve;

Figure 5 is a side elevation with parts broken away of the upper portion of the spray gun of Figure 1;

Figure 6 is a partial horizontal section taken on the line 6—6 of Figure 7 with outer portions of the gun body shown in full;

Figure 7 is a vertical section of the spray gun taken on the line 7—7 of Figure 9;

Figure 8 is a side elevation of a supplemental valve member;

Figure 9 is a longitudinal vertical section of the forward end of the spray gun.

Referring to the drawings in more detail, the spray gun is shown having a main body 1 with a handle 2 and a trigger 3. On the forward end of the body is an air cap 4 secured to the body by nut 5. Within and concentric with the air cap is a fluid tip 6.

At the base of handle 2 is a threaded air inlet nipple 7 for attachment to an air supply hose. From the inlet nipple air flows up passage 8 into valve chamber 9; upon manual retraction of the trigger 3 air valve stem 10 is moved rearwardly and the rubber bellows valve member

11 attached to the stem 10 is partially collapsed rearwardly against spring 12 and moved away from its closed position upon ring valve seat 13. An enlarged illustration of bellows valve member 11 may be seen in Figure 4.

The compressed air then flows from valve chamber 9 through ring 13 up vertical passage 14 into longitudinal bore 15. At the forward end of bore 15 the air enters horizontally flattened passage 16 to reach the annular chamber 17 from which a large portion of the air flows forwardly over the hexagon outline of the fluid tip 6, then through ports 18 in the flange 19, on which the air cap is centered, to the annular discharge opening 20 between the tip and the cap. Another portion of the air travels from chamber 17 through air cap passages 21 to horn outlets 22. This air flattens the spray pattern of the discharged coating material after it is initially atomized by the air from annular opening 20.

For applying feeding pressure to the coating material in attached container 23 a small amount of air is directed into the container from chamber 17 by way of horizontally flattened bore 24, valve chamber 25, vertical passage 26 and then into the interior of the container cover 27 through bore 28 drilled through the interior rib 29 at the top of the cover. The air reaches the container through the opening 30 in baffle disc 31. This opening loosely encircles the hexagon head of retaining thimble 32. The latter not only holds in place the material outlet tube 33 but also secures the container cover 27 in assembled relation with the gun body 1. With the spray gun in operation the coating material moves up tube 33 into the vertical drilling 34 and from axial bore 35 out fluid tip 6.

The discharge of material from tip 6 is controlled by the needle valve 36. This valve is opened just subsequent to the opening of the bellows valve member 11 by the abutment of air valve stem 10 against the cylindrical enlargement 37 on the needle valve. The valve seating spring 38 thrusts against the rear end of the enlargement. The degree of opening of material valve 36 may be set by adjustment of the stop nut 39. The latter is threaded into the sleeve 40 which in turn is screwed into the gun body to hold the rear flange 41 of the valve member 11 in sealing arrangement against the body. A ring 42 held on a narrow shoulder supports the other side of flange 41.

Valve member 11 prevents the air from reaching material valve 36. This makes it unnecessary to seal between valve 36 and air valve stem 10. An O-ring 49 on the forward end of stem 10 seals between the stem and the wall of the bore in which it slides.

When it is desired to utilize suction instead of pressure feed, supplemental valve 43 is turned to its seat to close communication between bore 24 and valve chamber 25. Vertical passage 26 leading to the container then has access to the atmosphere through lateral openings 44 into the hollow stem 45 of valve 43. In line with the hollow bore of the stem there is a final outlet orifice 46 in valve knob 47. By way of these passages atmospheric pressure reaches the interior of the container 23.

When atomizing air is discharged from annular opening 20, pressure immediately in front of the outlet of fluid tip 6 is reduced below atmospheric and atmospheric pressure in the container causes the movement of material to and out the fluid tip. A continuing communication of the container with the atmosphere is necessary in order that air may enter the container to take the place of coating material being removed.

It may be noted that when valve 43 is properly opened for the delivery of compressed air to the container, lateral openings 44 into the hollow stem 45 are covered and sealed by stem packing 48. This prevents any wasteful leak of compressed air to the exterior of the spray gun. Conversely, lateral openings 44 are out of sealing cover-

age by the packing **48** when the valve **43** is advanced to its seat at the exit end of bore **24**.

The telescopic arrangement of the fluid needle valve **31** and air valve **11** reduces the space required as compared to the usual design in which the two valves are in separate locations.

The structure of the spray gun of this invention is further simplified by the use of the bellows air valve **11** which functions not only as a valve but also serves to seal the rearward end of the valve chamber **9**. In addition it constitutes an isolating enclosure around the portion of the needle valve projecting through the air valve stem **10** and no seal is therefore needed between the needle valve and the air valve stem.

Bellows air valve **11** is described as being formed of rubber. While a natural rubber composition would serve mechanically for this valve, a resilient synthetic rubber or plastic composition with greater resistance to solvents in coating materials is preferred. In any use of the term "rubber" in the description of claims it should be interpreted sufficiently broadly to encompass any rubber-like material.

While the invention has been described in considerable detail with reference to a preferred embodiment, it will be understood that variations and modifications may be made within the spirit and scope of the invention as defined in the appended claim.

What I claim is:

In a spray gun, a spray nozzle, an air passage for delivering atomizing air to the nozzle, a spray material passage to the nozzle, a needle valve controlling the flow of material, a valve chamber in the air passage, an annular valve seat in the valve chamber, an air valve of resilient material having a forward face seating against the valve seat and a rearwardly facing peripheral shoulder, an integral bellows-like rearward extension of the air valve, an annular flange terminating the extension, a spring encircling the extension and longitudinally compressed between the rearwardly facing peripheral shoulder of the air valve and the annular flange to yieldingly retain the air valve upon its seat and to hold the flange in sealing relation around the rearward end of the valve chamber, means for moving the air valve rearwardly away from its seat and compressing the bellows-like extension, a hollow valve stem fixed to the air valve and open to the rearward side of the air valve within the bellows-like extension, said stem extending forwardly of the air valve to the exterior of the air passage, a shank on the needle valve projecting through the hollow stem, and an enlargement of the shank within the bellows-like extension which is engageable by the air valve as the air valve is moved rearwardly away from its seat whereby continued opening movement of the air valve draws the needle valve into open position.

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