May 9, 1944. R. R. PELLAR 2,348,568

SPRAY-GUN

Filed Dec. 11, 1941

FIG. 1.

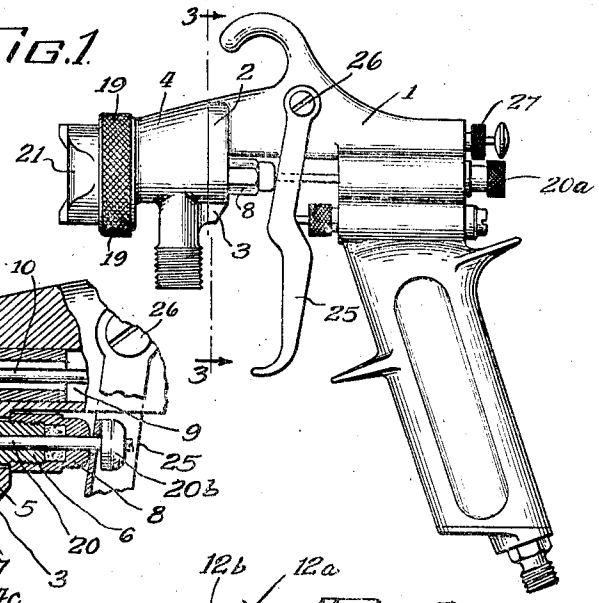


FIG. 2.

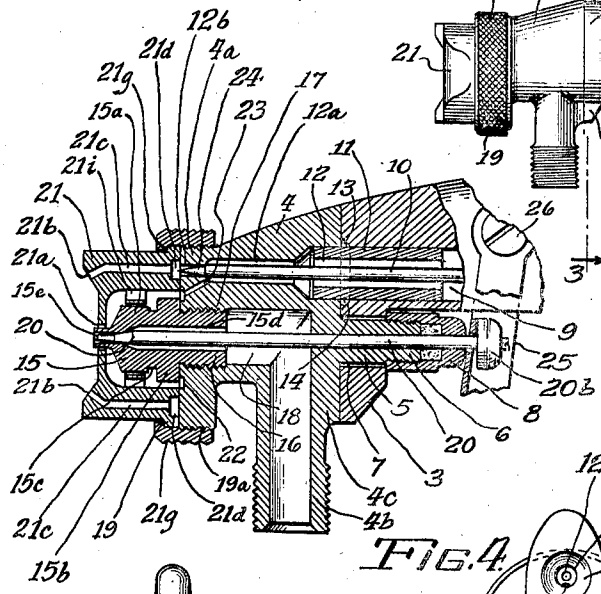


FIG. 4.

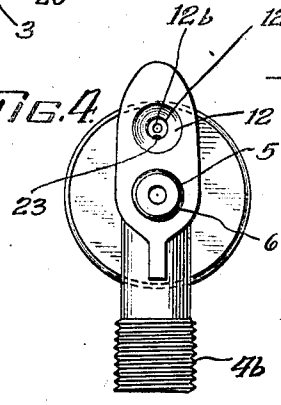
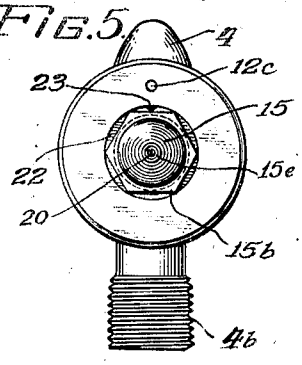


FIG. 5.



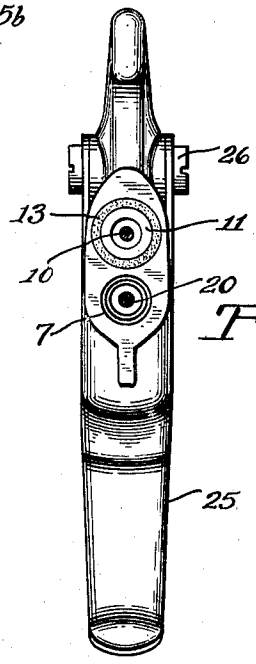


FIG. 3.

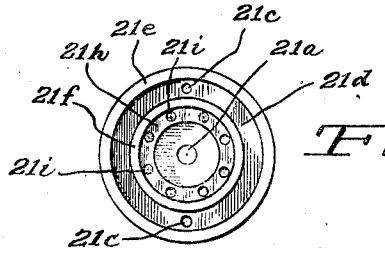


FIG. 6.

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SPRAY GUN

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Application December 11, 1941, Serial No. 422,481

6 Claims. (Cl. 299—140.1)

My invention relates to a nozzle or spray-head for a spray-gun or airbrush used for spraying paint or other surface coating materials and similar purposes.

Great difficulty has been experienced in conserving air introduced into the spray-head due to the employment generally of a tapered nozzle in a male and female relationship with the aircap to obtain an airtight fitting of the parts. This has necessitated not only a precision in the machining of parts with consequent relatively high cost of the product but a multiplicity of parts, including baffles, springs, gaskets and other devices. These expedients generally have complicated the problem rather than contributed materially to its solution.

An object of my invention is to provide simple and efficient means for conserving the air introduced into the spray-head not only at the juncture of the spray-head and the body of the spray-gun but also at the juncture of the air-cap and the spray-head. The first is accomplished in my invention by providing the front portion of the body of the spray-gun with a shoulder or flange having a downwardly extending portion or lug which serves as a leverage against a similar portion provided on the reverse of the spray-head, the abutting surfaces being smooth for obtaining an air-tight abutment of the spray-head against the body of the spray-gun when the two are drawn together by means of a screw nut acting upon a threaded projection of the spray-head which extends through an opening in the flange of the air-gun body. The second is accomplished in my invention by substituting a nozzle of cylindrical surface for the tapered form heretofore generally used, thus eliminating the need for a high degree of precision in the tapering of the nozzle and the female interior of the air-cap, by providing a plurality of spaced annular flanges on the rear of the air-cap and making the abutting surfaces of the spray-head and the air-cap smooth to permit air-tight seating of the air-cap against the spray-head, and by providing a transverse annular flange in the interior of the air-cap with a plurality of spaced holes therethrough to afford the necessary air passages for the desired distribution of air and adapted to be mounted upon the cylindrical surface of the nozzle.

In the drawing which diagrammatically shows my invention—

Figure 1 is a side view of a spray-gun embodying my invention.

Figure 2 is a central longitudinal section of the forward portion of the spray-gun shown in Figure 1.

Figure 3 is a front view of the body of the spray-gun shown in Figure 1 with the spray-head removed.

Figure 4 is a rear view of spray-head shown in Figure 1 removed from the body of the spray-gun.

Figure 5 is a front view of the same spray-head with the air-cap removed.

Figure 6 is a rear view of the air-cap shown in Figure 1.

Referring to the drawing, the spray-gun shown has a body portion 1 provided at its front end with a shoulder or flange 2 having a downwardly extending projection or lug 3. Abutting the forward end of the body 1 is spray-head 4 having a projection or stem 5 with a threaded end 6 adapted to seat in opening 7, which is provided in flange 2 and has a slightly greater diameter than stem 5, the threaded portion 6 extending therethrough and being engaged by nut 8.

Air chamber 9 in the upper portion of body 1, in which is seated adjustable needle valve 10, is fitted at its forward end with a sleeve 11 which extends forwardly into an aligned air passage 12 in spray-head 4. A gasket 13 is seated in a recess 14 in the body 1 about the sleeve 11. The abutting surfaces of the gray-head and body are smooth and the conformation of the parts is such that when fitted together and nut 8 is tightened upon stem 5 an airtight juncture is formed.

Nozzle 15, the threaded rear portion 16 of which is screwed into threaded forward portion 17 of material chamber 18 of spray-head 4, instead of being tapered to engage an air-cap in male and female relationship, is cylindrical in form in its forward portion 15^a and flat sided or polygonal in its middle portion 15^b and provided intermediately with a groove 15^c. Nozzle 15 is also provided with a central tubular channel 15^d, which is adapted to receive a needle valve, the forward portion of the channel converging to form a central cylindrical projecting outlet 15^e adapted to be closed by the needle 20.

Coupled to the forward portion of spray-head 4 by means of coupling 19 having interior threaded portion 19^a adapted to engage externally threaded portion 4^a of spray-head 4, and flanged portion 19^b, is air-cap 21 preferably having central material orifice 21^a and supplemental air ports 21^b as shown in my United States Letters Patent No. 2,261,279, dated November 4, 1941. Ports 21^b are connected by means of air pas-

sages 21c with a circular groove 21d defined by two concentric, rearwardly extending flanges 21e and 21f co-axial with orifice 21a, in the rear of the air cap. The outer diameter of flange 21e, which also extends radially as indicated at 21g, is slightly less than the inner diameter of coupling 19. Flange 21g is adapted to be engaged by flange 19b to secure the air-cap to the spray-head, the flanges 19b, 21e and 21g being of such conformation as to form an airtight connection between the air cap and the spray-head when the air-cap is coupled to the spray-head by tightly screwing the coupling 19 upon the threaded portion 4a of the spray-head. The inner diameter of flange 21f is substantially the same as the outer diameter of circular groove 22 which is provided in the face of spray-head 4 and is co-axial with flange 21f.

Air-cap 21 is also provided with an internal annular flange or baffle 21h which is co-axial with orifice 21a and has an inner diameter slightly greater than the cylindrical portion 15a of nozzle 15 upon which it is adapted to be slidably mounted. Flange 21h is provided with holes 21i to permit suitable distribution of air about the forward portion of the nozzle.

Spray-head 4 is provided with an air passage 23 connecting groove 22 with constricted portion 12a of air chamber 12, the forward end of which is still further constricted at 12b to form a seat for end 24 of needle valve 10 (which is adjustable through nut 27) but has an outlet 12c in communication with groove 21d.

Needle 20, which is journalled in stem 5 of the spray-head and is adjustable through screw-head 20a, as shown in Figure 2, is normally held in position closing outlet 15e of the nozzle by means of a spring (not shown), but is rearwardly shiftable by rearward pressure upon trigger 25 which is pivoted to body 1 at 26 and engages stop 20b which is adjustably secured to needle 20.

The rear of the spray-head has a flanged portion 4c conforming with the face of the abutting flanged portion 2 of the body. Depending stem 4b of the spray-head is adapted to be connected with a source of material to be sprayed.

A suitable source of compressed air being provided and its admission to chamber 9 being controlled through trigger 25 by suitable valves (not shown) and the needles 20 and 24 being suitably adjusted, the operation of the spray-gun is as follows:

Air admitted to chamber 9 by rearward pressure upon trigger 25 passes through passage 12 including constricted portion 12a into passage 23 and groove 22 and thence around nozzle 15 through holes 21i and orifice 21a creating suction about the outlet 15e of nozzle 15, causing material to pass through chamber 18, channel 15d, around needle 20 and to issue from outlet 15e. Simultaneously with the passage of air as described, air also passes from constrictions 12a and 12b into groove 21d and thence through passages 21c to issue from ports 21b and converge upon the material stream which issues from outlet 15e in the manner described in the aforesaid Letters Patent. This is accomplished in the construction shown without substantial loss of air at the junctures of the several parts.

The configuration of the parts may be varied to suit various undertakings without departing from my invention.

Having thus described my invention, I claim:

1. A spray-gun, comprising a body having an air chamber extending longitudinally therethrough and a peripheral shoulder at its forward end, said shoulder having a depending portion with a longitudinally extending opening therethrough and a downwardly extending projection below said opening, the axes of said chamber and opening being in the same vertical plane; a spray-head having an air passage in its upper portion extending longitudinally therethrough in axial alignment with said air chamber and a rearwardly extending stem in axial alignment with said opening and adapted to extend therethrough, the rear of said spray-head in other respects conforming to the front of said body; means connecting said body and said spray-head through said air chamber and the corresponding air passage in said spray-head; means adapted to engage the end portion of said stem and the rear surface of said projection to secure said body and said spray-head together in substantially airtight relationship; said stem having a longitudinally extending opening therethrough in which a needle may be movably mounted; said spray-head having a material chamber with an outlet having its axis in alignment with the axis of the opening in said stem and adapted to receive a nozzle; said spray-head also having in its face an annular air channel co-axial with said outlet and communicating with said air passage; a nozzle adapted to be seated in said outlet having a central longitudinally extending opening adapted to receive said needle with a constricted forward portion adapted to seat the forward portion of said needle and a cylindrical outlet; the external surface of said nozzle being cylindrical in its forward portion and polygonal in its middle portion and having an annular channel therebetween; an air-cap having a central material orifice of slightly greater diameter than the cylindrical outlet of said nozzle, and a plurality of supplemental air ports spaced therefrom in opposed relation, each of said supplemental air ports communicating with a circular groove in the rear surface of said air cap defined by two concentric annular, longitudinally extending flanges thereon co-axial with said orifice, said flanges being adapted to seat against the forward portion of said spray-head, and the outer flange extending radially to form a peripheral flange; said air-cap also having an internal annular flange co-axial with said orifice adapted to be mounted upon the cylindrical portion of said nozzle and having circumferentially spaced longitudinal openings therethrough; said air-cap having a central opening in its rear portion whose diameter is coextensive with the outer diameter of said air channel; and means for securing said air cap in substantially airtight relationship to said spray-head; the conformation of the parts being such as to provide simultaneously for the creation of an airstream about the outlet of said nozzle and supplemental airstreams converging upon said first airstream in advance of said outlet without substantial leakage of air through the connections of said parts.

2. In a spray-gun the combination of a body, a spray-head, a nozzle and an air cap; said body and spray-head being in juxtaposition, with a longitudinal conduit extending therethrough and being connected by a sleeve in said conduit therebetween, said body having a peripheral shoulder adjacent to said spray-head with a downwardly extending flange bored longitudi-

nally substantially above its lower extremity, said spray-head having a rearwardly extending stem in axial alignment with the base of said flange and adapted to extend therethrough, and said body and spray-head being secured together in airtight relationship by means engaging said stem and the rear of said flange; said spray-head having a central frontal material outlet adapted to receive a nozzle and a substantially smooth face with an annular groove therein co-axial with said outlet, said groove communicating with said conduit; said nozzle being cylindrical for a substantial portion of its length and being adapted to be secured in said outlet; said air-cap having a central material orifice adapted to receive the forward portion of said nozzle, a plurality of supplemental air ports, a plurality of rear spaced annular flanges co-axial with said orifice and defining an annular channel communicating with said air ports and with said conduit, said annular flanges abutting the face of the spray-head in a common plane and the inner diameter of the inner flange being co-extensive with the outer diameter of said groove; said air-cap also having an internal annular flange adapted to be slidably mounted on the cylindrical portion of the nozzle; and said air-cap and said spray-head being secured together in substantially airtight relationship.

3. A spray-gun comprising a body and a spray head, said body and said spray head having corresponding faces arranged in abutting relation, said body having an air chamber extending longitudinally therethrough and a peripheral shoulder adjacent its forward end, said shoulder having a depending portion with a longitudinally extending opening therethrough and a downwardly extending projection below said opening, the axes of said chamber and opening being in the same vertical plane, the distance from the axis of the opening to the bottom of said projection being from one-third to one-half of the distance from the bottom of the projection to the top of said shoulder, said spray-head having an air passage in its upper portion extending longitudinally therethrough in axial alignment with said air chamber and a rearwardly extending stem in axial alignment with said opening and adapted to extend therethrough, the rear of said spray-head in other respects conforming to the front of said body, means connecting said body and said spray-head through said air chamber and the corresponding air passage in said spray-head, and means adapted to engage the end portion of said stem and the rear surface of said projection to secure said body and said spray-head together; the parts being of such conformation as to form a substantially airtight juncture between said body and spray-head when thus secured.

4. In a spray-gun, a body and a spray-head in juxtaposition, with a longitudinal conduit extending therethrough, a sleeve in said conduit therebtween, said body having a peripheral shoulder adjacent to said spray-head, said shoulder having a downwardly extending flange provided with a longitudinally extending bore and a depending portion below said bore, said depending portion extending below said bore a distance at least equal to the distance between the axis of said sleeve and the axis of said bore, the diameter of said bore and the diameter of said conduit being substantially equal, said spray-head having a rearwardly extending projection corresponding with and arranged to abut a surface of said depending portion and a stem in axial alignment with the bore of said flange and adapted to extend therethrough, and means adapted to engage said stem and said flange and secure the parts together, the parts being of such conformation as to form a substantially airtight juncture between said body and spray-head when thus secured.

5. In a spray-gun, a body and a spray-head in juxtaposition, with a longitudinal conduit extending therethrough, a sleeve in said conduit therebetween, said body having a peripheral shoulder adjacent to said spray-head, said shoulder being provided with a downwardly extending flange bored longitudinally substantially above its lower extremity and having a depending finger below said opening, said spray-head having a stem in axial alignment with the bore of said flange and adapted to extend therethrough, and means adapted to engage said stem and said flange and secure the parts together, said spray-head having a rearwardly extending projection arranged to abut a surface of said finger and as the parts are thus secured together to co-operate with said finger and with said sleeve and the interior walls of said conduit to facilitate the bringing of said body and spray-head into juxtaposition and the formation of an airtight juncture between them, the parts being of such conformation and so arranged as to form a substantially airtight juncture between said body and spray-head when thus secured.

6. A spray-gun comprising a body and a spray-head, each having a face arranged in abutting relation with a corresponding face of the other, said body having an air chamber extending longitudinally therethrough, said spray-head having an air passage in its upper portion extending longitudinally therethrough in axial alignment and in open communication with said air chamber, means connecting said body and said spray-head through said air chamber and said air passage, said body having a peripheral shoulder adjacent its said face, said shoulder having a depending portion provided with a longitudinally extending opening therethrough and a downwardly extending finger below said opening, said opening having its axis in the same vertical plane as the axis of said air chamber, said spray-head having a stem in axial alignment with said opening and adapted to extend therethrough and a projecting portion corresponding with said finger, and adjustable means adapted to engage an end portion of said stem and a surface of said finger to secure said body and spray-head together, said means being arranged to cooperate with said finger, said corresponding projecting portion and said connecting means to adjust said faces in abutting relation, the parts being of such conformation and so arranged as to provide a substantially air tight juncture between said body and said spray-head when thus secured.

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