Feb. 2, 1937. G. A. WILKA 2,069,346

SPRAY GUN NOZZLE

Filed May 4, 1934

Fig. 1

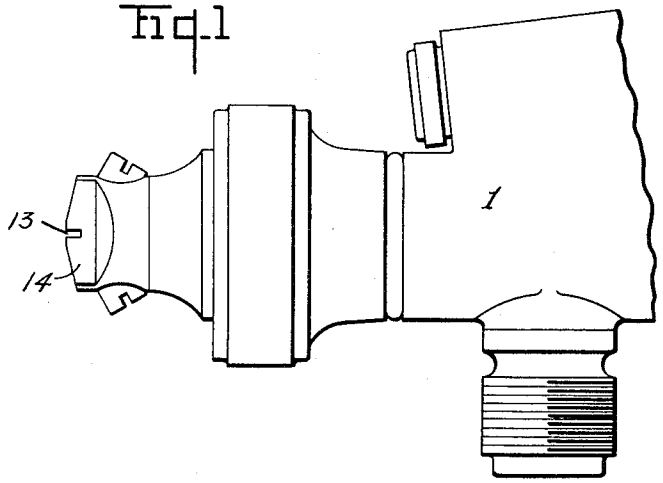


Fig. 3

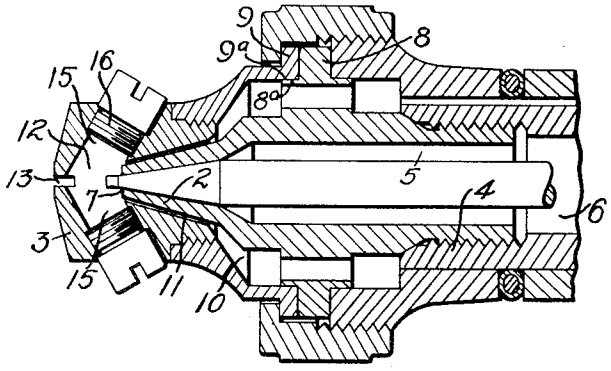


Fig. 2

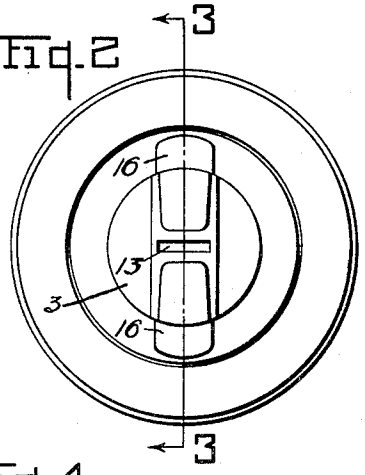


Fig. 5

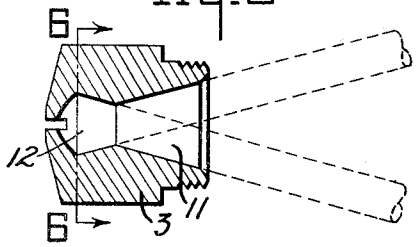


Fig. 4

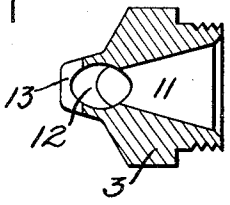
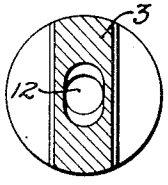


Fig. 6



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UNITED STATES PATENT OFFICE

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SPRAY GUN NOZZLE

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Application May 4, 1934, Serial No. 723,952

5 Claims. (Cl. 299—140)

This invention relates to spray-guns of the type employed in spraying surface coating materials by air pressure, and particularly to nozzles for such guns having slot-like orifices through which the spray stream is discharged in fan-form.

The object of the invention is to improve on the action of spray-guns of this character by so fashioning the air and material mixing chamber of the nozzle thereof with relation to the discharge slot that a more efficient mixing of the air and material will be accomplished, and the material being sprayed will not build up at the end portions of the slot and also in the air nozzle bore adjacent to its discharge end, which latter features tend to decrease the air flow and are particularly present to a greater or less extent with spray-guns of the slotted fan spray type now in use.

A specific object of the invention is to improve on the form of spray-head disclosed in United States Letters Patent 1,897,683, issued February 14, 1933.

Further objects and advantages of the invention will be apparent from the following detailed description and the accompanying drawing, in which—

Figure 1 is an enlarged side elevation of the discharge end portion of a spray-gun embodying the invention; Fig. 2 is an outer end view of the spray-head thereof; Fig. 3 is a section on the line 3—3 in Fig. 2; Fig. 4 is a different section of the air nozzle member than that of Fig. 3, and Figs. 5 and 6 are different sections of a modified form of the air nozzle member.

Referring to the drawing, 1 designates the stock or body portion of a spray-gun having at its forward end the customary spray-head comprising the inner material discharge nozzle 2 and the outer combined air and material discharge nozzle 3.

The inner nozzle 2 is fixedly attached to the gun body, in the present instance, by having a rearwardly projecting stud portion thereof threaded into the body part 4 with its bore 5 in communication, through a bore 6 in said part, with a source of supply of material to be sprayed. The nozzle bore 5 terminates at its forward end in a restricted discharge orifice 7 of circular form in cross-section and is disposed in the customary forwardly projecting conical or cylindrical end portion of such nozzle. This nozzle is provided at the rear of its conical portion with an annular flange 8 adapted to seat against the forward end of the body portion 1.

The nozzle 3 is of greater diameter than the body portion of the nozzle 2 and has its inner or rear end cupped to provide a side wall or flange 9 for seating against the flange 8 of the inner nozzle in spaced relation to the conical portion thereof. The inner surface 9a of the flange 9 is preferably cylindrical to fit over a cylindrical shoulder 8a formed in front of the flange 8, thereby maintaining the outer nozzle 3 in true concentric relation to the inner nozzle 2. The flange 9 seats rearwardly against the front face of the flange 8 and is held in such seated relation by a union nut that is threaded on the forward end of the gun body and has flanged engagement with the nozzle 3, as well understood in the art.

The cupping of the rear end of the nozzle 3 forms a recess or chamber 10 around the inner end or base of the conical portion of the nozzle 2 and the bottom of this recess is further centrally recessed preferably in conical form to provide the recess 11, which is complemental to and adapted to receive the conical portion of the nozzle 2 in a manner to permit the passage of air forwardly therebetween from the chamber 10. The forward reduced end of the conical recess 11 extends to near the forward end of the nozzle and has communication at such end through an enlarged mixing chamber portion 12 with a discharge slot 13. This slot is provided in a nipple portion 14 on the outer end of the nozzle 3, which portion, in the present instance, is in the form of a diametrically disposed ridge. The slot extends entirely across such ridge and a short distance down in the side walls thereof, so that it is preferably open both forwardly and laterally of the nozzle. The exposed edges of the side walls of the ridge or nipple portion 14 are quite thin to prevent the accumulation thereon of material being sprayed, as disclosed in said former Patent No. 1,897,683.

The mixing chamber 12 is intersected at its top portion by the slot 13 with the ends of the slot preferably extending slightly below the top of such chamber, as shown in Fig. 3. The chamber 12 is broadened with respect to the adjacent end of the conical recess 11 and also with respect to the slot transversely thereof, so as to form a pocket at each side of the slot, the forward end wall of which tapers or curves forwardly and inwardly to the slot, so that the spraying mixture is directed by such end walls toward the slot. The chamber 12 is also coextensive in width with the length of the slot, except for the thin side wall portions of the ridge 14, and is preferably slightly broader than the length of the slot below or rearwardly of the slot ends, so that the chamber provides a slight undercut at the slot ends which tapers at its outer side toward the slot, as best shown in Fig. 4.

While the chamber 12 may be formed in various ways, it is preferable, when the nozzle 3 is of one-piece construction, to form it by providing opposed lateral bores 15 in the nozzle, which intersect the outer end portion of the recess 11

and are inclined toward the slot 13 with their axes intersecting on the axial line of the recess 11. The outer ends of the bores 15 are preferably closed by plugs 16 threaded therein and adapted to be easily removed to facilitate cleaning of the interior of the nozzle 3.

The point of intersection of the axes of the bores 15 is disposed rearwardly of the slot 13, so that the bores, the diameters of which are preferably greater than the length of the slot, will undercut to a slight extent the end walls of the slot. It is preferable to have the diameter of the recess 11 at its inner end slightly less than the diameter of each of the bores 15, as it is found that slightly better results are obtained by such relative sizes of the outlet end of the recess 11 and bores 15.

In the form shown in Figs. 5 and 6, the mixing chamber 12 is formed by drilling forwardly of the nozzle through the recess 11 with the axis of the drill intersecting the outer end of the nozzle first at one side and then the other side of the slot in lines substantially parallel with the respective tapered side walls of the recess 11. In this form, the ends of the slot are not undercut. It is apparent, however, that if it is desired to undercut such ends, the nozzle may also be interiorly drilled with the drill inclined first toward one end and then toward the other end of the slot in the plane of the slot.

When the nozzles 2 and 3 are properly assembled, the inner nozzle 2 has its discharge end projecting into the mixing chamber 12 and terminating short of the slot 13, so that a space is provided in the chamber both around the inner nozzle and between its discharge end and the slot. The conical body portion of the inner nozzle is spaced from the conical wall of the recess 11 to permit air under pressure to pass from the chamber 10 entirely around the nozzle 2 and into the mixing chamber where it commingles with the material discharging from the nozzle 2 and then discharges in proper spray-form from the slot 13.

The provision of the chamber 12, which forms pockets at each side of the slot, and in some cases at the ends thereof, is found, in practice, to materially facilitate the proper mixing and discharging of the air and coating material in fan-shaped spray form from the discharge slot, and at the same time prevents, or at least lessens to a minimum, the objectionable building up of the coating material on the inner wall of the outer or air nozzle adjacent to its tip and on the outer edge portions of the slot, particularly at its ends.

In each form of the invention, it will be noted that the outer end of the conical recess 11 in the outer nozzle 3 is restricted with respect to the cross-sectional size of the mixing chamber 12 particularly transversely of the discharge slot, it being found that such restriction produces much better results than if not present. It is also preferable, in practice, that the width of the restricted end of the recess 11 be slightly less than the length of the slot 13 between the inner sides of the end walls thereof, although this is not as important as the restricting of the outlet end of the recess 11 with respect to the cross-sectional size of the mixing chamber, particularly transversely of the slot.

I wish it understood that my invention is not limited to any specific construction, arrangement or form of the 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 United States Letters Patent, is:

1. In a spray-gun for spraying surface coating materials, an inner material and an outer air discharge nozzle, the outer nozzle having a discharge slot in its forward end and a recess in its rear end extending to said slot and receiving the inner nozzle to form an air passage therebetween having communication with an air pressure source, said recess having its forward end enlarged to form a mixing chamber from which said slot opens, said mixing chamber forming pockets at each side of the slot with their outer end walls tapering outwardly toward the slot.

2. In a spray-gun for spraying surface coating materials, an inner material and an outer air discharge nozzle, the outer nozzle having a discharge slot in its forward end and a recess in its rear end extending to said slot and receiving the inner nozzle to form an air passage therebetween having communication with an air pressure source, said recess having its forward end enlarged to form a mixing chamber from which said slot opens, said mixing chamber being broadened with respect to the slot both transversely and longitudinally thereof with its outer wall inclined thereto in both dimensions.

3. In a spray-gun for spraying surface coating materials, an outer nozzle having a discharge slot at its outer end, a mixing chamber adjacent to said slot and a recess in its rear end opening into said chamber in opposition to said slot and being gradually restricted toward the chamber to receive an inner material discharge nozzle, the forward end of said recess being restricted with respect to said chamber.

4. In a spray-gun for spraying surface coating materials, an inner material and an outer air discharge nozzle, the outer nozzle having a discharge slot in its forward end, a throat bore in its rear end receiving the inner nozzle, and a mixing chamber between said slot and bore and from which the slot opens, said bore being restricted at least at its forward end relative to said chamber, said inner nozzle extending substantially to and having its discharge directly into the mixing chamber in line with its slot, and said chamber being enlarged relative to the forward end of said bore to provide pockets at each side of the slot.

5. In a spray-gun for spraying surface coating materials, an inner material and an outer air discharge nozzle, the outer nozzle having a discharge slot in its forward end, a throat bore in its rear end receiving the inner nozzle, and a mixing chamber between said slot and bore and from which the slot opens, said bore being restricted at least at its forward end relative to said chamber, said inner nozzle extending substantially to and having its discharge directly into the mixing chamber in line with its slot, said mixing chamber being broadened with respect to the slot both transversely and longitudinally thereof with its outer wall inclined thereto in both said dimensions.

GUSTAVE A. WILKA.

CERTIFICATE OF CORRECTION.

3

Patent No. 2,069,346. February 2, 1937.

GUSTAVE A. WILKA.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, strike out all of lines 42 to 54 inclusive, comprising claim 4, and for the claim now appearing as "5" read 4; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of March, A. D. 1937.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.