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R. W. TRACY

2,046,592

SPRAY HEAD

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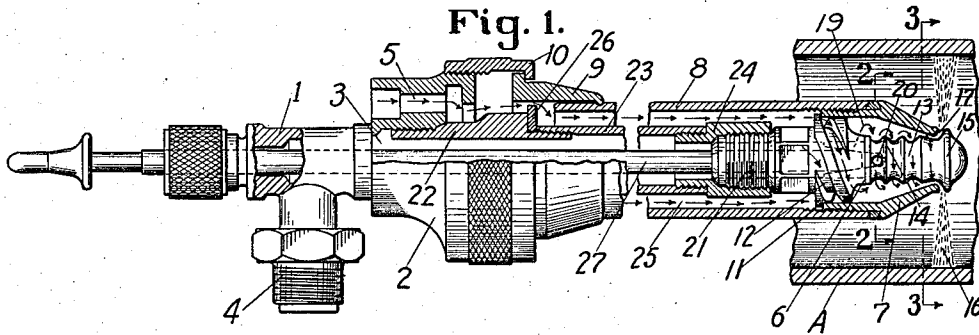


Fig. 2.

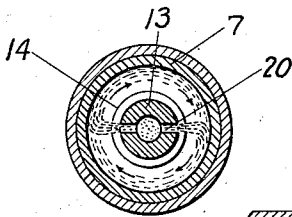


Fig. 3.

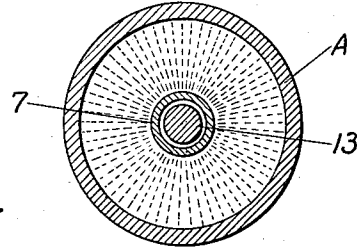


Fig. 4.

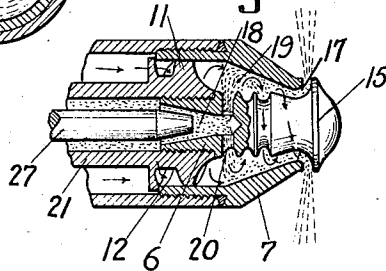
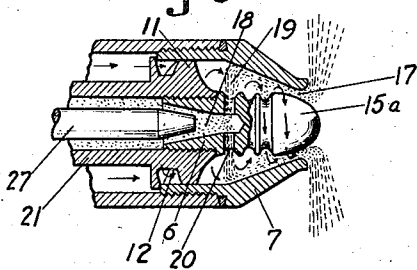


Fig. 5.



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SPRAY HEAD

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7 Claims. (Cl. 299—114)

This invention relates to spray coating apparatus, and particularly to devices adapted for spraying interior surfaces of pipes, cans and other objects of a cylindrical nature.

5 The object of the invention is the provision of a simple and efficient device of the character described, which is operable to thoroughly mix the air and material being sprayed, and to effect the discharge in such manner as to effectively reach all portions of the interior surface of the article being treated as the nozzle is passed therein.

15 Another object of the invention is the provision of an attachment for spray-guns of the character described, which may be easily and quickly substituted for the spray head used in connection with such guns for coating flat surfaces and adapt it for the spraying of the inner surfaces of comparatively small cylindrical articles.

20 The invention is fully described in the following specification and while in its broader aspect it is capable of embodiment in various forms, two embodiments thereof are illustrated in the accompanying drawing, in which—

25 Figure 1 is a side elevation of a spray head embodying the invention with parts in central longitudinal section, with parts broken away, and with the nozzle projecting into a cylindrical object which is fragmentarily shown. Fig. 2 is a section on the line 2—2 in Fig. 1. Fig. 3 is a section on the line 3—3 in Fig. 1. Fig. 4 is a slightly enlarged sectional detail of the forward end portion of the nozzle with a part in full, and Fig. 5 is a view similar to Fig. 4 with the inner member of the nozzle slightly modified.

35 Referring to the drawing, 1 designates the portion of a spray-gun body to which the spray-head is attached and which is provided at its forward end with an enlargement 2, and has the centrally disposed longitudinally extending bore 3 in communication, through a nipple 4 and suitable connection (not shown), with a source of supply for the material to be sprayed. The enlargement 2 is also provided with a passage 5 adapted to have communication with a controlled source of air pressure supply, as well understood in the art. A spray-gun having a body member of this character and equipped with a spray head for discharging either a cylindrical or fan type of spray stream is illustrated in U. S. Letters Patent, No. 1,613,588, dated January 4, 1927.

45 In the equipment of the invention shown in Figs. 1 to 4, 6 designates the inner or material discharge nozzle and 7 the outer nozzle which cooperates with the inner nozzle to control the

discharge of both the air and material in spray form.

5 The outer nozzle 7, which for convenience may be termed the "air nozzle", has its throat large at its inner end and conically restricted at its forward end to its discharge opening, and is carried at the forward end of an extension tube 8, the rear end of which is engaged within and firmly held by an annular member 9. A union-nut 10 is threaded on the body enlargement 2 and has an internal flange engaging a cooperating flange on the member 9 to hold it to the body. The nozzle 7 may be threaded in the tube 8 or otherwise secured thereto. The length of the tube 8 depends on the character of work to be performed, and if the work is short the nozzle can be attached directly to the enlargement 2 in the same manner that the member 9 is attached, or in any other suitable way.

15 The inner nozzle 6 has a portion 11 fitted in the front of the nozzle 7 and provided with one or more spiral grooves 12, which cooperate with the nozzle 7 to form spiral air passages from one side to the other of said portion. The nozzle 6 has a tongue-like part 13 projecting forwardly from the spirally grooved portion 11 and through the discharge orifice of the nozzle 7 in spaced concentric relation to the nozzle and orifice walls. The surface of the part 13 is preferably, but not necessarily, provided with a succession of spaced annular ribs 14 to a point near the outer nozzle orifice and has an annular rib or enlargement 15 at its outer end without the orifice which obstructs the forward discharge of spray from the nozzle and causes it to be deflected annularly in disk form, as indicated at 16, against the interior wall of an article A into which the gun nozzle may be projected. The portion of the tongue-part 13, between the outermost rib 14 and the rib or knob 15, cooperates with the end of the outer nozzle 7 to form an annular discharge orifice 17, which is longitudinally curved or shaped to change the course of a discharging fluid stream from a longitudinal or axial direction to one at substantially a right-angle thereto. Even if the spray directing rib 15 is eliminated, leaving the outer end of the inner nozzle member smooth and rounded, as shown at 15^a in Figure 6, there is still a marked tendency for the discharging stream to follow the continuous curve of the inside surface of the lip at the extremity of the outer nozzle, especially when the stream follows a spiral course through the nozzle, causing a centrifugal action. The use of the rib 15, however, confines the spray into a somewhat narrow stream.

The material to be sprayed is discharged from the throat 18 of the nozzle 6 into the mixing space 19 surrounding the tongue-part 13 through lateral openings 20 and is there picked up and thoroughly mixed by the discharging air which is given a whirling action by reason of its passage through the spiral passages 12. The nozzle 6 is provided at its rear end with a threaded stud part 21 which may be threaded directly into the bore 3 of the body, if the spray head is to be short-coupled, or it may be projected forwardly from said body to suit the extent of projection of the nozzle 7 by an interposed tubular throat structure, as shown. In the present instance this throat structure is shown as comprising an inner part 22 that is threaded into the throat-bore 3 of the body, a tubular part 23 threaded onto the forward end of the part 22, and a union part 24 connecting the part 23 to the nozzle 6.

The throat structure 22, 23, 24 for the nozzle 6 cooperates with the body enlargement 2 and with the extension means for the outer nozzle 7 to provide an annular air passage 25 between the air inlet passage 5 and the spiral passages 12. In order to cause the air to be uniformly distributed around the passage 25, said passage is provided at its inner end with a choke or damping part 26 that is carried by said throat structure. 27 indicates the customary control valve for a material discharge and which has its forward end adapted to seat in the forward conically restricted end portion of the throat passage 18 to close such passage.

It is apparent with this form of spray head that a discharge of air under pressure through the spiral passages 12 into the mixing chamber 19 will cause the air to have a rapid whirling movement in such chamber and to continue such whirling action as it is discharged from the orifice 17. As the material to be sprayed enters the chamber 19, which may be either by the suction action created by the discharging air, or by pressure exerted on the material, or by both, the material is picked up by the whirling air and effectively mixed therewith and then discharged from the annular orifice 17 and deflected by the rib 15 to form a spray which discharges laterally from the nozzle in all radial directions around the same, so as to coat the interior wall of a cylindrical object in which the nozzle may be projected. The lateral discharge of the material from the nozzle is effected both by the deflecting action of the rib 15 and by centrifugal action due to the whirling of the spray. The purpose of the successive ribs 14 on the inner nozzle tongue 13 is to assist in the breaking up and finally commingling of the material with the air.

It is apparent that I have provided a simple and efficient spray head for spray-guns of the air-brush type and that the primary feature of the same is the provision of a whirling spray so as not only to facilitate the mixing of the air and material, but to effect a spray discharge of broad and uniform dimension adapting it for the coating of interior surfaces of objects, particularly where the surface to be coated is disposed at a considerable angle to the spray head axis.

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 head of the class described, inner and outer nozzles cooperating to form an air passage surrounding the inner nozzle through which air under pressure is discharged, said inner nozzle having a tongue projecting therefrom through the discharge orifice of the outer nozzle and having a lateral material discharge into said air passage, and provision for imparting whirling action to the air in its passage through said space before passing said material discharge.

2. In a spray head of the class described, inner and outer nozzles cooperating to form an air space in surrounding relation to the inner nozzle, which space, at its inner end, is adapted to have communication with a source of air pressure supply and at its outer end communication with the discharge orifice of the outer nozzle, said inner nozzle having a lateral material discharge into said space, and a tongue-portion cooperating with the outer nozzle to form an annular discharge orifice, discharging at right angles to the longitudinal axis of the nozzle said inner nozzle having one or more baffling members within said space in advance of its point of discharge therein, and means within said space at the rear of said point of material discharge forming spiral passages for the air entering the space.

3. In a spray head of the class described, an outer air discharge nozzle, an inner material discharge nozzle having a tongue projecting through the discharge orifice of the outer nozzle and cooperating therewith to form a restricted annular discharge orifice, the outer end of which directs the discharge therefrom in a lateral direction with respect to the nozzle axis, said nozzles cooperating to form an air space therebetween in communication with said discharge orifice and with a source of air pressure supply, said inner nozzle having its material discharge into said space, and means for imparting a whirling action to the air in its discharge through said space.

4. In a spray head of the class described, an outer air nozzle having a discharge orifice, an inner material discharge nozzle having a tongue projecting through said discharge orifice in concentric spaced relation thereto, and having a lateral spray deflecting surface without said orifice, said nozzles forming an air space therebetween adapted to have communication with a source of air pressure supply, and the inner nozzle having its material discharge laterally into said space.

5. In a spray head of the class described, an outer nozzle having a discharge orifice with the inner surface of its lip portion gradually curving outwardly from a line concentric to the nozzle axis, an inner nozzle, means to discharge material laterally from said inner nozzle rearwardly of the discharge end of said outer nozzle and means for imparting a whirling action to the air and material discharging from said nozzles through said outer nozzle orifice and causing them to partially at least follow the curved lip surface of the outer nozzle to travel in spray form laterally from the nozzle axis.

6. In a spray head of the class described, outer and inner nozzles with a space therebetween, said inner nozzle being formed with circumferential grooves within said space means for providing a spiral passage in a portion of said space at the rear of said grooves, said outer nozzle hav-

ing provision for the admission of air under pressure at the rear of said means, and said inner nozzle having provision for the admission thereto of a material to be sprayed and for the discharge of the material into said space forwardly of said means and at the rear of said circumferential grooves.

7. In a spray head of the class described, outer and inner nozzles with a space therebetween, baffle means in said space, means for providing a spiral passage in a portion of said space at the

rear of said baffle means, said outer nozzle having provision for the admission of air under pressure at the rear of said spiral means, and said inner nozzle having provision for the admission thereto at the rear thereof of a material to be sprayed and provision between said means for the lateral discharge of material into said space in the path of movement of air discharged through said spiral means.

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