Jan. 4, 1927. 1,613,588

W. F. GRADOLPH ET AL

AIR BRUSH

Filed Dec. 26, 1923

Fig 1

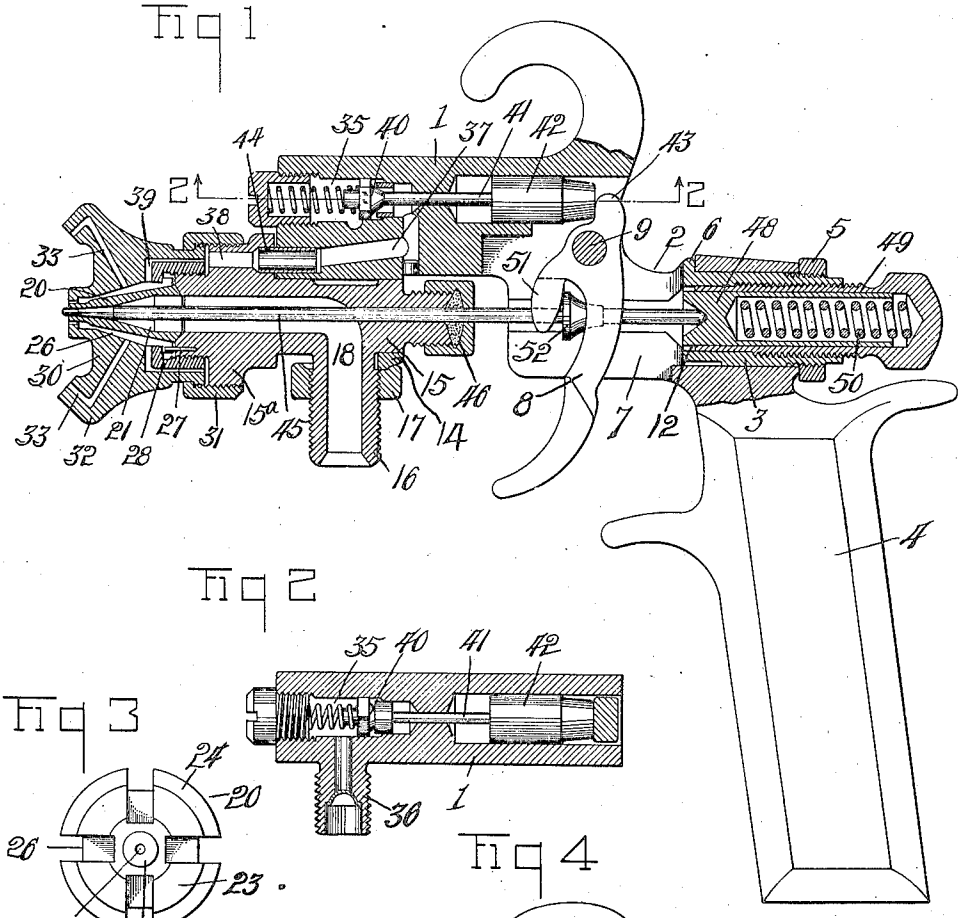


Fig 2

Fig 3

Fig 4

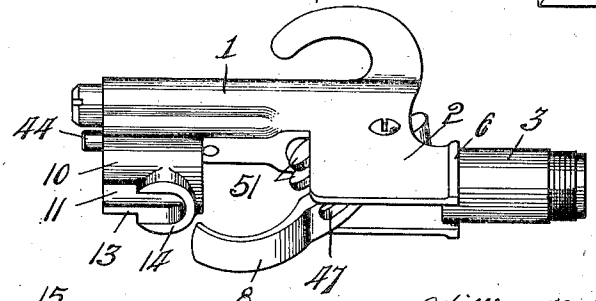
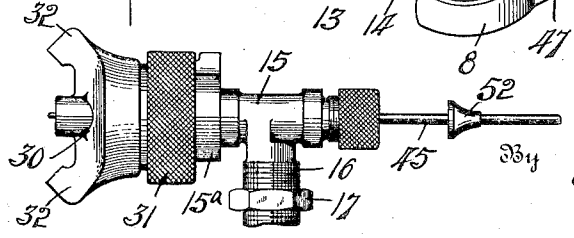


Fig 5



Inventor

William F. Gradolph,

Godfrey Mueller.

By Owen Owen & Crampton

Attorney's

Patented Jan. 4, 1927. 1,613,588

UNITED STATES PATENT OFFICE.

WILLIAM F. GRADOLPH AND GODFREY MUELLER, OF TOLEDO, OHIO, ASSIGNORS TO THE DE VILBISS MANUFACTURING COMPANY, OF TOLEDO, OHIO, A CORPORATION OF OHIO.

AIR BRUSH.

Application filed December 26, 1923. Serial No. 682,700.

This invention relates to spraying instruments, of the type commonly known as air-brushes, and has particularly for its object the provision of various improvements on the air-brush shown and described in United States Letters Patent No. 1,260,522, dated March 26, 1918, whereby to enhance the practicability and commercial value of apparatus of this character.

One object of the invention is the provision of an air-brush, having its parts so assembled and secured together as to enable them to be easily and quickly separated for the purpose of cleaning or repairing.

Another object of the invention is to so mount the air nozzle on the liquid nozzle that one is centered in true concentric relation on the other, thereby maintaining the discharge orifices of the two in concentric relation.

This invention is fully described in the following specification, and while, in its broader aspect, it is capable of embodiment in numerous forms, a preferred embodiment thereof is illustrated in the accompanying drawings, in which—

Fig. 1 is a central vertical section of an air-brush embodying the invention, with parts in full. Fig. 2 is a horizontal section on the line 2—2 in Fig. 1. Fig. 3 is an outer end view of the liquid discharge nozzle. Fig. 4 is a reduced perspective view of the stock, or body member, of the device, and Fig. 5 is a reduced side elevation of the spray parts removed from the stock or body member.

Referring to the drawings, 1 designates the stock or body member of an air-brush embodying the invention, such stock being provided at its rear end with a downwardly and rearwardly projecting extension 2, which terminates at its rear end in a stud portion 3, on which the upper socketed end of a handle member 4 is mounted. A nut 5 threads onto the rear end of the stud 3 to clamp the socketed portion of the handle against a shoulder 6 at the forward end of the stud. The forward end portion of the extension 2 and the lower rear end portion of the body 1 are provided with a vertically disposed slot or opening 7 in the plane of the longitudinal axis of the handle 4, and a trigger member 8 is mounted in this opening on a pivot 9 for the purpose hereinafter described. The pivotal movements of the trigger are longitudinal to the body 1, and its lower end projects downward in engaging position below said body and in front of the handle 4.

A boss 10 is formed on the bottom edge of the forward end portion of the stock or body 1 in advance of the extension 2, and is provided longitudinally therethrough with an opening 11 in axial register with an opening 12 provided longitudinally through the stud 3. The bottom wall of the opening 11 is slotted for a distance back from its forward end, as shown at 13 in Fig. 4, and the rear end portion of the slot is provided with a tapered segmental marginal flange 14, which projects downward from the boss 10.

A spray-head body part 15 is adapted to have its rear end portion removably projected through the opening 11 in the boss 10 and to be securely mounted therein. The tubular stem 16 projects downward from the lower side of the part 15 through the slot 13 in the boss 10 and has a nut 17 threaded thereon. This nut is flanged at its upper or inner side to adapt it, when screwed home, to engage the tapered surface of the marginal flange 14 of the slot wall to prevent an outward removal of the spray-head body 15 from engagement with the stock 11, and also to cause a close seating of the body 15 against the nipple 44. The nipple 16 is adapted to be connected to a source of supply of paint, or other material to be sprayed, and its passageway 18 continues forwardly through the part 15 to its forward end.

An inner or material spraying nozzle 20, which for convenience may be termed the liquid nozzle, is seated at its inner end against the forward end of the spray-head part 15, and has a conical or forwardly reduced bore 21 axially therethrough, the rear enlarged end of which bore axially registers with and, in the present instance, is of the same size as the passage 18. The forward end of the nozzle bore 21 terminates in a small or restricted discharge orifice 22 (Fig. 3). The outer side of the nozzle 20 is tapered, or conically reduced, from near its rear end to near its forward end to form a conical seat 23, and at the rear end of this seat the nozzle is provided with an annular radially projecting flange 24, while at the

forward end thereof it is provided with a cylindrical projection 25 co-axial with the orifice 22. The outer surface of the nozzle 20 is provided, in the present instance, with four longitudinally extending grooves 26 for the purpose hereinafter described. The nozzle 20 is prevented from turning relative to the part 15, against which it seats, by a pin 27 projecting from said part and into one of the grooves 26. The nozzle 20 is held firmly to the forward end of the part 15 by a union 28, which is threaded over the forward end portion of the part 15 and has its forward end in flanged engagement with the flange 24 of the nozzle.

An air nozzle 30 is rotatably mounted on the conical portion 23 of the nozzle 20 and has its forward end portion encircling the projection 25 of the nozzle 20 in slightly spaced relation thereto to provide an annular air discharge passage between said parts. The seating of the air nozzle 30 on the conical portion 23 causes the discharge passage or orifice of the air nozzle to be in true concentric relation to the projection 25 of the nozzle 20. The bore of the air nozzle is complemental to the conical surface 23 of the nozzle 20 so as to have valve seating engagement therewith. The air nozzle 30 is rotatably retained on the nozzle 20 by a union 31, which has flanged engagement with the rear end of the nozzle 30 and threads over the enlarged forward end portion 15^a of the part 15. The air nozzle 30 is provided at opposite sides thereof in diametrically opposed relation with outwardly and forwardly projecting arms 32, having angled air discharge passages 33 therein which communicate at their inner ends with the interior bore of the air nozzle and have their outer ends disposed to discharge air therefrom across the path of discharge of material from the nozzle 20 slightly in advance of the nozzle. The air nozzle may be turned to place the inner ends of the air passages 33 in communication with opposed grooves 26 in the nozzle 20, or the air nozzel may be turned to dispose the passage 23 intermediate the grooves to prevent the passage of air through said passages.

The stock 1 is provided with an air chamber 35, in communication through a side nipple 36 (Fig. 2) with a source of air pressure supply, and this chamber is in communication with the grooves 26 in the liquid nozzle 20 through passages 37 and 38 provided, respectively, in communicating relation in the stock 1 and enlargement 15^a of the part 15. The passage 38 opens into the space 39 between the inner portion of the air nozzle 30 and the union 28, which space is in communication with the liquid nozzle grooves 26. A valve 40 normally closes the outlet from the chamber 35 to the passage 37 and has a stem 41 projecting rearwardly therefrom and provided with an enlargement 42 at its rear end which is guided for reciprocatory movements in a part of the stock 1 and has its rear end entering the stock opening 7 in position to be engaged by a finger 43 on the trigger 8, whereby a rearward pull of the lower end of the trigger will cause an opening of the air valve 40.

It is apparent that when the air valve is open air under pressure enters the grooves 26 in the nozzle 20 and passes forward therefrom through the restricted annular air discharge space at the forward end of the air nozzle and in enveloping relation to the discharge orifice 22 of the liquid nozzle, thereby setting up an outward suction through the liquid nozzle to discharge material therefrom, as is well understood in the art. When the air nozzle passages 33 are in communication with the grooves 26, a portion of the air will be discharged through said passages and laterally against the stream of air and material discharging from the center orifices of the two nozzles, thereby flattening the stream in fan form.

A nipple 44 projects from the forward end of the passage 37 and is adapted to removably seat in the rear end of the passage 38 when the spray-head part 15 is mounted in the boss 10.

A conical needle form of valve 45 seats in the forward restricted end portion of the liquid nozzle 20 and has its stem portion projecting rearwardly axially through the horizontal portion of the passage 18, thence through a bearing in the rear end of the part 15 and through a stuffing box 46 mounted on said part. The stem then extends into the stock opening 7 through a slot 47 in the trigger 8 and into abutment at its rear end with a spring pressed plunger 48 that is mounted for axial movements in a socketed stud 49 that is adjustably threaded in the opening 12 of the stock boss 3. A coiled compression spring 50 is disposed within the stud 49 in opposed end-thrust engagement with it and the plunger 48, tending to normally hold the valve 45 seated. The trigger 8 is provided in advance thereof near its pivot with two downwardly projecting fingers 51, which straddle the stem of the valve 45 in advance of a shoulder or enlargement 52 on the stem whereby a rearward movement of the trigger imparts an opening movement to the valve.

One of the important features of our airbrush is the ease with which the stock and spray-head parts thereof may be separated and assembled, thus facilitating cleaning and repairing of the parts. To release the parts, the operator merely turns the nut 17 down on the stem 16 to disengage the flange 14, and is then permitted to draw the part 15 and the spraying parts attached thereto from the stock. In doing this, the valve

45 remains in connection with the part 15, the trigger 8 swinging forward to permit the enlargement 52 to pass forward from engagement with the fingers 51. It is thus apparent that the parts which are connected respectively to the air and material supply lines are separated from each other and either may be repaired or cleaned as desired. It is also apparent that the air nozzle 30 co-operates with the liquid nozzle 20 to form a valve whereby a turning of one on the other places the auxiliary air passages 33 either into or out of operative relation to the air supply grooves 26 in the liquid nozzle, thereby enabling the air nozzle to be easily and quickly adjusted to effect either a round or a fan type of spray.

We wish it understood that our invention is not limited by 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 our invention, what we claim as new, and useful by Letters Patent, is:

1. In an instrument of the class described, a body unit having an air supply passage adapted to be placed in communication with a source of air pressure supply, a valve normally closing said passage, a spray-head unit detachably carried by the body unit at one side of the forward end portion thereof and having concentric air and material discharge passages, the former in communication with the air supply passage of the body unit, a valve controlling the material discharge passage and having a portion projecting rearwardly beyond the rear end of the spray-head unit, and means adapted to have engagement with the outwardly projecting end portion of said last valve and also with the air control valve and operable to control the opening movements of both of said valves.

2. In an instrument of the class described, a body unit having an air supply passage adapted to be placed in communication with a source of air pressure supply and having a laterally offset rearwardly extending portion provided with a handle, a valve normally closing said passage, a spray-head unit detachably carried by the body unit at one side thereof and in advance of its said offset rearwardly projecting portion and having a discharge passage for material to be sprayed, and an air discharge passage, the latter adapted to have communication with the air supply passage of the body unit when the two units are in assembled relation, a valve mounted in the spray-head unit to control the material discharge passage and projecting beyond the rear end of the spray-head unit, means in the rearward extension of the body unit acting on the material control valve to normally maintain it closed, and control means carried by the body unit and operable to open both of said valves.

3. In an instrument of the class described, a body unit having a valve controlled air supply passage therein, a spray-head unit in sliding releasable engagement with the body unit and having an air discharge passage in communication with the supply passage when the units are assembled, means at one side of the forward end portion of the body unit for releasably retaining the units in assembled relation, said spray-head unit also having a liquid discharge passage, a valve normally closing said liquid discharge passage, and means carried by the body and operable to open the liquid control valve.

4. In an instrument of the class described, the body unit having an air passage portion with a laterally projected extension at one side adjacent to its forward end and with a handle portion at its rear end, said unit having a valve controlled air supply passage therein, a spray-head unit adapted to be releasably engaged with said lateral projection and having concentric air and liquid discharge passages with the air passage in communication with the air supply passage of the body unit when the two units are assembled and with the liquid passage adapted to have communication with a source of liquid supply, means for releasably securing the spray-head unit to the body unit and its lateral projection, a valve normally closing the liquid discharge passage and having a stem portion projecting rearwardly from the spray-head unit, and means operable to open said valve.

5. In a device of the class described, a body member having a handle projecting therefrom and having an air supply passage, said member having a slotted part at one side thereof in advance of the handle, a valve in said passage, a spray-head unit having a part in releasable engagement with the slotted part of the body member and having an air discharge passage in communication with the air supply passage and also having a material discharge passage, means releasably securing said member and unit in assembled relation, a control valve for the material discharge carried by said unit, and a unitary control means for the air and material control valves carried by the body member.

6. In an instrument of the class described, a body member having an air supply passage in its forward portion and having a laterally offset rearward extension terminating in a rearwardly projecting boss, a handle detachably mounted on said boss, a valve in said air passage, a spray-head means detachably carried by the body member in line with said boss and having an air discharge passage in communication with the first passage and a material discharge passage, a

normally closed valve controlling said latter passage and projecting into said boss, and control means for both said valves carried by the body member.

7. In an instrument of the class described, a body member having an air supply passage in its forward portion and a rearwardly projecting, laterally offset extension at its rearward portion terminating in a rearwardly extending boss, a valve in said passage, a handle mounted on said boss, a spray-head means carried by the body member at one side thereof and having an air discharge passage in communication with said first passage and a material discharge passage, a valve for controlling said latter passage, said valve having a stem projecting rearwardly from the spray-head means toward said boss, adjustable tension means mounted in the boss and acting on the valve stem to normally retain the valve closed, and a control member carried by the body member and operable to act on the air valve and on said stem to open both valves.

8. In an instrument of the class described, inner and outer nozzles having concentric discharge orifices and one having a conical bearing on the other to retain the orifices in concentric relation and to permit rotary adjustment of one on the other, the outer nozzle having lateral air discharge passages, and provision in the conical bearing for the supply of air from a supply source to the outer discharge orifice and also to the lateral discharge passages for producing a fan spray when the outer nozzle is in predetermined positions only of adjustment on the inner nozzle.

9. In an instrument of the class described, inner and outer nozzles, one having a conical seat on the other for relative rotary adjustment, the inner nozzle having a central material discharge orifice and the outer nozzle cooperating with the tip end portion of the inner nozzle to form an annular air discharge orifice, the inner nozzle having a plurality of longitudinally extending surface grooves in its conical portion communicating at their forward ends with said annular orifice and at their rear ends with a source of air pressure supply, said outer nozzle having lateral air discharge passages adapted to be placed into or out of registering communication with predetermined grooves of said inner nozzle when one nozzle is turned on the other.

10. In an instrument of the class described, a member having a conical liquid discharge nozzle and having its conical surface portion longitudinally grooved, a second nozzle rotatably mounted on the conical portion of said first nozzle and co-operating with the forward end portion of the liquid nozzle to form an annular air discharge passage and with said grooves to form air passages leading to said orifice, said second nozzle also having lateral air discharge passages adapted to be placed into or out of registering communication with predetermined grooves in said liquid nozzle when one nozzle is turned on the other, a valve for said liquid discharge passage, and valve controlled means for supplying air to the passages formed by said grooves.

11. In an instrument of the class described, an inner liquid nozzle having a discharge orifice and an outer conical surface portion, and an outer nozzle having a discharge orifice surrounding and concentric to and entirely enveloping the discharge orifice of the inner nozzle and having an inner conical surface rotatably seating on the conical surface of the inner nozzle to maintain the discharge orifices of the two nozzles in concentric relation, means for securing the two nozzles in such assembled relation, said nozzles having provision between their coacting conical surfaces to supply air from a supply source to the outer discharge orifice.

12. In an instrument of the class described, an inner nozzle having a discharge orifice and an outer conical bearing surface portion, and an outer nozzle having a discharge orifice surrounding and concentric to the discharge orifice of the inner nozzle and having an inner conical bearing surface rotatably seating on the conical surface of the inner nozzle to maintain the discharge orifices of the two nozzles in concentric relation, means for securing the two nozzles in such assembled relation, said nozzles having provision between their coacting conical bearing surfaces to supply air from a supply source to the outer discharge orifice, and said outer nozzle having lateral air discharge passages adapted to be placed into or out of registering communication with the air passing between the two nozzles when one nozzle is turned on the other.

In testimony whereof we have hereunto signed our names to this specification.

WILLIAM F. GRADOLPH.
GODFREY MUELLER.