

UNITED STATES PATENT OFFICE

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SPRAY GUN

William P. Dalrymple, Rochester, N. Y., assignor
to American Brake Shoe Company, New York,
N. Y., a corporation of Delaware

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3 Claims. (Cl. 299—140)

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This invention relates to spraying devices and more particularly to improvements in spray guns of the type adapted to spray two solutions simultaneously such as is disclosed in the application of Burr W. Mantle, Serial No. 119,850, filed October 6, 1949.

In certain commercial processes and the like, such as, for example, in the silvering of mirrors, it has been found desirable to simultaneously spray two solutions on a surface to be coated. Various types of spray guns and other similar spraying devices have heretofore been developed for so spraying two solutions. However, the spraying devices heretofore developed for this purpose have had several inherent disadvantages such as, for example, being complicated in construction or operation; being heavy in weight, large in size, and, therefore, difficult to handle; or being impractical and inefficient in operation.

It is a primary object of my invention to overcome these disadvantages and to afford a novel spray gun of the aforementioned type which is constructed, and operable, in a novel and expeditious manner.

During the operation of spray guns of the type to which my invention relates, the guns are customarily connected to the source of fluid supply by flexible rubber hoses and the like, and the proper positioning of the latter so that they do not interfere with the manipulation of the gun during a spraying operation has been a problem. In this connection, it is a further object of my invention to provide a spray gun embodying novel clamping means for supporting the fluid supply hoses in a novel and expeditious manner on the gun.

Yet another object of my invention is to provide a novel spray gun wherein novel clamping means may be mounted on the front end portion of the gun for supporting supply hoses and the like in a novel and expeditious manner.

An object ancillary to the foregoing is to enable a novel clamping means to be embodied on the front end portion of a spray gun, in a novel manner whereby the clamping means affords a novel control unit for opening and closing the fluid supply lines supported thereby in accordance with the position of the trigger, or like unit, which controls the general operation of the gun.

Another object is to enable novel clamping means to be embodied on the front end portion of a spray gun whereby opening and closing of the fluid supply lines may be controlled in a novel and expeditious manner independently of the operation of the trigger of the gun.

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Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment and the principles thereof and what I now consider to be the best mode in which I have contemplated applying those principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a side elevational view of a spray gun, certain parts being broken away, embodying the principles of my invention;

Fig. 2 is a front elevational view of the nozzle head embodied in the spray gun shown in Fig. 1;

Fig. 3 is a detail sectional view taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is a detail sectional view somewhat similar to Fig. 3, but showing the parts in different operative positions;

Fig. 5 is a detail sectional view taken substantially on the line 5—5 in Fig. 1;

Fig. 6 is a detail view somewhat similar to Fig. 1, but showing another modified form of my invention; and

Fig. 7 is a detail view taken substantially on the line 7—7 in Fig. 6.

The gun 20, shown in Figs. 1 to 5, inclusive, of the accompanying drawings to illustrate a preferred embodiment of my invention, is of the same general type as that disclosed in the co-pending application of Burr W. Mantle, Serial No. 119,850, filed October 6, 1949, and, as is discussed in greater detail in the aforementioned co-pending application, is especially well adapted for simultaneously spraying two solutions on a single surface, such as, for example, spraying a silvering solution and a precipitating solution simultaneously onto the back surface of a mirror. The gun embodies a body 22 having a handle 24 projecting downwardly from the rear end portion thereof and a nozzle head 26 attached to the front end thereof. The nozzle head 26 comprises two nozzles 28 and 29, mounted in a nozzle plate 31, Figs. 1 and 3, each of the nozzles 28 and 29 comprises a nozzle cap 28a and 29a and a nozzle body 28b and 29b, respectively. The nozzle head 26 is mounted on the front end portion of the body 22 of the gun 20 and is secured thereto by a screw 33 and a bolt 34, the screw 33 extending through the upper end portion of the nozzle plate 31, as viewed

in Fig. 1, and being in threaded engagement with the body 22, and the bolt 34 extending through a flange 36 depending from the front end portion of the body 22, and being disposed in threaded engagement with the nozzle plate 26 in an opening 37 formed in the lower end portion thereof.

Air enters the gun 20 through a passage 40 in the handle 24 and flows through the handle 24, the body 22, and out through the nozzle head 26, the aspirating effect of the air passing through the nozzles 28 and 29 being effective to cause solutions to be drawn through hoses H1 and H2 from a suitable source, not shown, into the nozzle bodies 28b and 29b, respectively, and discharged from the nozzle caps 28a and 29a, as discussed in greater detail in the aforementioned application of Burr W. Mantle.

The air passage 40, which affords means for feeding a working fluid such as compressed air into the gun 20, terminates at its inner end portion in an air inlet valve chamber 44.

A valve housing 48 having a longitudinally extending opening 49 and a plurality of transversely extending openings 51, Fig. 1, is screwed into the valve chamber 44 wherein it seats against a shoulder 55 formed therein. An air valve 54 having a recess 56 formed therein is mounted in the valve chamber 44 and is positioned to seat against a valve seat 58 formed on the inner end portion of the valve housing 48 adjacent to the inner mouth of the air passage 40. A push rod 60, having one end portion disposed in the recess 56 of the valve member 54, extends forwardly therefrom through a gland plug 61 screwed into the outer end portion of the valve housing 48. Gland packing 62 is positioned between the gland plug 61 and an inwardly extending collar 64 in the valve housing 48 to form a seal around the push rod 60 against the leakage of air from the longitudinal passage 49 in the valve housing 48. A collar 65, is loosely disposed on the push rod 60 and is urged against the packing 65 by a spring 67 mounted between the gland plug 61 and the collar 64, to thereby press the packing 65 against the collar 64. A compression spring 70 having one end portion engaged with the outer face of the air valve 54 and the other end portion thereof engaged with the inner surface of the handle 24 within a recess 72 formed therein, tends to normally maintain the valve 54 in engagement with the valve seat 58 on the valve housing 48 and thereby seal the connection between the air chamber 44 and the longitudinal passage 49 in the valve housing 48. The outer, or front, end portion of the push rod 60, Fig. 1, engages a trigger 75 by which the push rod 60 and, therefore, the valve 54 may be moved inwardly to unseat the valve 54 from the valve seat 58 and thereby permit the flow of air from the air chamber 44 into the air passage 49 in the valve housing 54, the trigger 75 being pivotally mounted on the body 22 of the gun.

A second passageway 77, substantially parallel to the air passage 40, is formed in the handle 24 and extends substantially through the entire length thereof. At the point which the passageway 77 intersects the air chamber 44, the valve housing 48 is somewhat reduced in cross section so that a space 80 is provided between the valve housing 48 and the side walls of the air chamber 44 and the air passage 77, so that air flowing through the openings 51 may flow through the enlarged opening 80 around the valve housing 48 up into that portion of the air passage 77 thereabove.

From the valve housing 48 the air passage 77 extends on into the handle 24 and intersects with another bore 81 formed transversely through the handle 24. A threaded plug member 85, of the type shown in my co-pending application, Serial No. 734,819, filed March 14, 1947, is screwed into the bore 81 and seats against a shoulder 86 formed therein to thereby seal the passageway 81 against the flow of air longitudinally therethrough.

At the point where the passageway 77 intersects the bore 81 in the handle 24, the plug member 85 is reduced in cross section so that a space 81a is formed between the plug member 85, the side walls of the bore 81, and the air passage 77, so that air may pass through the space 81a from that portion of the passageway 77 on one side of the plug member 85 so that portion of the passageway 77 on the other side of the plug member 85.

From the plug member 85 the passageway 77 extends on through the handle 24 and intersects with a suitable passageway such as the passageway 87 which extends longitudinally through the body 22 of the gun 20 for feeding compressed air from the passageway 77 outwardly through the nozzles 28 and 29 as is discussed in greater detail in the aforementioned co-pending application of Burr W. Mantle.

The nozzles 28 and 29 may be of any suitable type, but are preferably of the type disclosed in the aforementioned Mantle application, and include nipples 28c and 29c, Fig. 3, which extend rearwardly through the nozzle plate 31 to thereby afford coupling members to which the hoses H1 and H2 may be connected. It will be remembered that, during operation of the gun 20, solutions may be drawn through the hoses H1 and H2 from a suitable source, not shown, by the aspirating effect of air from the passageway 77 passing forwardly through the nozzles 28 and 29.

A hose clamp 90, Fig. 1, is mounted on the front end portion of the gun 20 for supporting the hoses H1 and H2 connected to the nozzle head 26. The clamping device 90 comprises, in general, a body member 92 depending from the front end portion of the body 22 of the gun 20, and a retaining member 94 slidably mounted in the handle 24 of the gun 20, as will be discussed in greater detail hereinafter.

The body member 92 of the hose clamp 90 comprises a backing plate 96 attached to the rear face of the lower end portion of the nozzle plate 31 by any suitable means such as a bolt 97, and includes a rearwardly projecting abutment or clamping jaw 98 and a pair of rearwardly projecting clip members 101 and 102, disposed at the upper and lower end portions thereof, respectively. The body member 92 may be made of any suitable material, although I prefer to make it of suitable sheet material such as sheet steel and to form the clamping jaw 98 and the clip members 101 and 102 integrally with the backing plate 96 by bending suitable flanges on the upper and lower end portions of the backing plate 96 rearwardly into smoothly curved convex form as best seen in Figs. 1 and 5.

When the body member 90 is mounted in the aforementioned operative position on the nozzle plate 31 of the gun 20, the hoses H1 and H2 attached to the nipples 28c and 29c of the nozzles 28 and 29, respectively, may be extended rearwardly and downwardly from the nipples 28c and 29c over the clamping jaw 98, Fig. 1, and secured in this position by the clips 101 and 102,

which may be bent over, and snugly engaged with, the hoses H1 and H2, respectively, Figs. 1 and 5.

The retaining member 94 affords a second clamping jaw which is movable toward and away from the clamping jaw 98 into and out of clamping engagement with that portion of the hoses H1 and H2 disposed on the jaw 98, as will be discussed in greater detail presently. Thus, it will be seen that the retaining member 94 includes an elongated rod 104 slidably mounted in an elongated housing 105 and having an enlarged square head 107 on the front end thereof which is engageable with the front end of the housing 105, being too large to pass through the opening 103 formed in the front end of the housing 105.

A collar 111 having a plug 112 screwed into the free end portion thereof is screwed onto the rear end of the plug member 85 and affords an adjustable cap therefor.

The housing 105 is slidably mounted in the plug member 85 in the handle 24 of the gun 20, and preferably has an outwardly projecting collar 109 on the rear end portion thereof which is engageable with the rear end of the plug 85 within the collar 111 to limit the forward movement of the housing 105 in the plug member 85. A compression coil spring 114 is mounted on the rod 104 within the housing 105 with one end mounted on a nipple 116 on the inner face of the plug member 112 in the collar 111, and the other end engaged with the inner surface of the front wall of the housing 105 to thereby yieldingly urge the housing 105 forwardly in the plug member 85. Adjustment of the forwardly urging force of the spring 114 on the housing 105 may be readily made by adjustment of the plug 112 inwardly or outwardly in the collar 111.

As is best seen in Fig. 3, the rod 104 projects forwardly from the housing 105 through the trigger 75 on the gun 20, with the enlarged head 107 slidably disposed through a slot 116 in the trigger 75, the side walls of the slot 116 engaging the sides of the square head 107 to thereby prevent the rod 104 from turning upon its longitudinal axis. A crossbar 118 is mounted in the head 107 of the rod 104, forwardly of the trigger 75, and projects outwardly from the head 107 on both sides thereof in parallel alignment with the jaw 98 of the hose clamp 90. The crossbar 118 is so disposed in the head 107 of the rod 104 that, when the trigger 75 is disposed in full forward position, the crossbar 118 is urged by the spring 114, acting on the housing 105, into full forwardly disposed position as shown in Fig. 4, in which position it is effective to collapse the hoses H1 and H2 against the clamping jaw 98 to thereby effectively close the hoses and prevent the passage of fluid therethrough.

During the operation of the gun 20, when the trigger 75 is disposed toward the handle 24, the trigger 75 engages the front end of the housing 105 and presses the latter rearwardly, against the urging of the spring 114, to thereby permit the rod 104 and the crossbar 118 to be moved rearwardly out of clamping engagement with the hoses H1 and H2 to thereby permit the latter to be opened by their inherent resiliency and the pressure of the fluid therein.

Thus it will be seen that the hose clamp 90a not only affords a novel and practical means for holding the hoses H1 and H2 in desired, out-of-the-way position on the gun 20, but also includes a novel clamping means for controlling the opening and closing of the hoses and thereby for controlling the flow of fluid therethrough.

The modified form of my invention which I have shown in Figs. 6 and 7 operates on the same principle as the form of my invention illustrated in Figs. 1 to 5, inclusive, and is interchangeable therewith, and like reference numerals have been used on like parts and the same reference numerals but including the suffix "b" have been used on parts which are similar to, but which have been substituted for, parts of the form of my invention shown in Figs. 1 to 5.

It will be noted that the changes made in the modified form of my invention shown in Figs. 6 and 7 over the form of the invention illustrated in Figs. 1 to 5 comprises embodying means in the clamping device attached to the gun 20 for supporting the hoses H1 and H2 for adjusting the flow of fluid through the individual hoses H1 and H2.

For this purpose, the hose clamp 90a may embody a body member 92 comprising a backing plate 96, a clamping jaw 98, and clip members 101 and 102, as embodied in the clamp 90, and also includes a clamping bar 120 movably mounted on the jaw 98 by two screws 122 and 123, Figs. 6 and 7, which extend through the bar 120 and are screwed into the lower portion of the clamping jaw 98. The bar 120 is disposed transversely across the hoses H1 and H2 on the opposite side thereof from the clamping jaw 98, and the screws 122 and 123 are effective to move the bar 120 toward and away from the jaw 98 to thereby adjust the clamping pressure applied to the hoses by the jaw 98 and the bar 120. Thus, it will be seen that by adjusting the individual screws 122 and 123, to thereby adjust the position of the respective ends of the bar 120, the pressure of the bar 120 on the individual hoses H1 and H2 may be adjusted to thereby control the size of the free opening therethrough, and therefore, the flow of fluid therethrough. This, it will be seen, affords a novel, and quickly operable means for adjusting the flow of fluid through the hoses H1 and H2 which is readily accessible to the operator of my novel gun.

From the foregoing it will be seen that I have provided a novel spray gun which is adapted to simultaneously spray two solutions from separate nozzles, in a novel and expeditious manner.

Also, it will be seen that I have provided a novel gun wherein the hoses by which the working fluid is fed to the gun, are supported in a novel and expeditious manner thereon.

Furthermore, it will be seen that I have provided a novel gun which is practical and efficient in operation, is quickly and easily assembled and disassembled for the purposes of cleaning and repairing, and may be readily handled.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a spray gun, a relatively elongated body, a handle depending from the rear end of said body, a substantially flat plate secured to the front end of the body and including portions respectively extending outwardly of opposite sides of the body, a nozzle member mounted in each of said portions and disposed to cause the fluid streams emitted therefrom to converge forwardly of said plate, said handle, body and plate having

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communicating passages formed therein through which air under pressure may be supplied to said nozzle members, valve means for regulating the flow of air through said passages, each nozzle member including a nipple disposed to project from the rear face of the portion of said plate in which the nozzle is mounted whereby the free ends of hoses respectively disposed on opposite sides of said body may be connected to said nozzles to supply liquid thereto, clamp means secured to and depending from said plate and in which the hoses may be disposed to be connected to the gun, a second valve means operative to regulate the flow of liquid through said hoses, said second valve means including a first member fixed to said flat plate in position to engage one side of the hoses, and a second member normally being urged against the other sides of the hoses to thereby constrict the passageways in the hoses, a trigger member mounted pivotally on said body and disposed to depend therefrom forwardly of said handle and inwardly of said plate, and means engaged with said trigger and operative to withdraw the second member of the second valve means in a direction away from the hoses upon movement of said trigger toward said handle.

2. In a spray gun, a relatively elongated body, a handle depending from the rear end of said body, a substantially flat plate secured to the front end of the body and including portions respectively extending outwardly of opposite sides of the body, a nozzle member mounted in each of said portions and disposed to cause the fluid streams emitted therefrom to converge forwardly of said plate, said handle, body and plate having communicating passages formed therein through which air under pressure may be supplied to said nozzle members, valve means for regulating the flow of air through said passages, each nozzle member including a nipple disposed to project from the rear face of the portion of said plate in which the nozzle is mounted whereby the free ends of hoses respectively disposed on opposite sides of said body may be connected to said nozzles to supply liquid thereto, a portion of said plate depending below the lower edge of said body, clamp means connected to the last named portion of said plate and including a part disposed below and in spaced relation with the lower edge of the plate, said part being constituted and arranged to afford means for clamping the hoses to secure the same to the gun, a second valve means operative to regulate the flow of liquid through said hoses, said second valve means including a first member fixed to said flat plate in position to engage one side of the hoses, a second member disposed to bear against the other sides of said hoses, and spring means urging said second member in the direction of the first member and against the other sides of the hoses to thereby constrict the passageways in said hoses, a trigger member pivotally mounted on said body and disposed to depend therefrom forwardly of said handle and inwardly of said plate, and means engaged with said trigger and operative to

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open said second valve means upon movement of said trigger toward said handle.

3. In a spray gun, a relatively elongated body, a handle depending from the rear end of said body, a substantially flat plate secured to the front end of the body and including portions respectively extending outwardly of opposite sides of the body, a nozzle member mounted in each of said portions and disposed to cause the fluid streams emitted therefrom to converge forwardly of said plate, said handle, body and plate having communicating passages formed therein through which air under pressure may be supplied to said nozzle members, valve means for regulating the flow of air through said passages, each nozzle member including a nipple disposed to project from the rear face of the portion of said plate in which the nozzle is mounted whereby the free ends of hoses respectively disposed on opposite sides of said body may be connected to said nozzles to supply liquid thereto, a portion of said plate depending below the lower edge of said body, clamp means connected to the last named portion of said plate and including a part disposed below and in spaced relation with the lower edge of the plate, said part being constituted and arranged to afford means for clamping the hoses to secure the same to the gun, a second valve means for regulating the flow of liquid through said hoses and comprising a reaction member disposed between the rear face of the plate and the hoses and also including a member engaged with said hoses on sides thereof opposite those engaged with said reaction member, means normally urging said second valve means and said member engaged with said hoses in opposition to said reaction member into positions to close off flow through said passages and said hoses, a trigger member pivotally mounted on said body and disposed to depend therefrom forwardly of said handle and inwardly of said plate, and means engaged with said trigger and operative upon movement of said trigger toward said handle to open said second valve means and to withdraw said member engaged with the hoses in a direction away from said reaction member to thereby permit flow of air under pressure and liquid to said nozzles.

WILLIAM P. DALRYMPLE.

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