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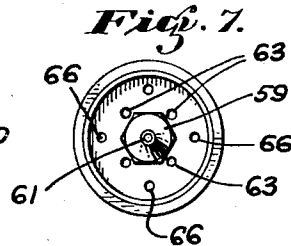
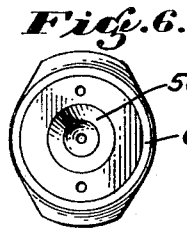
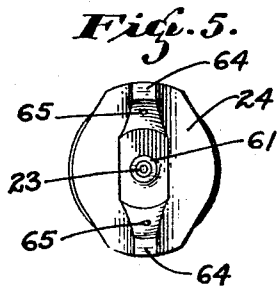
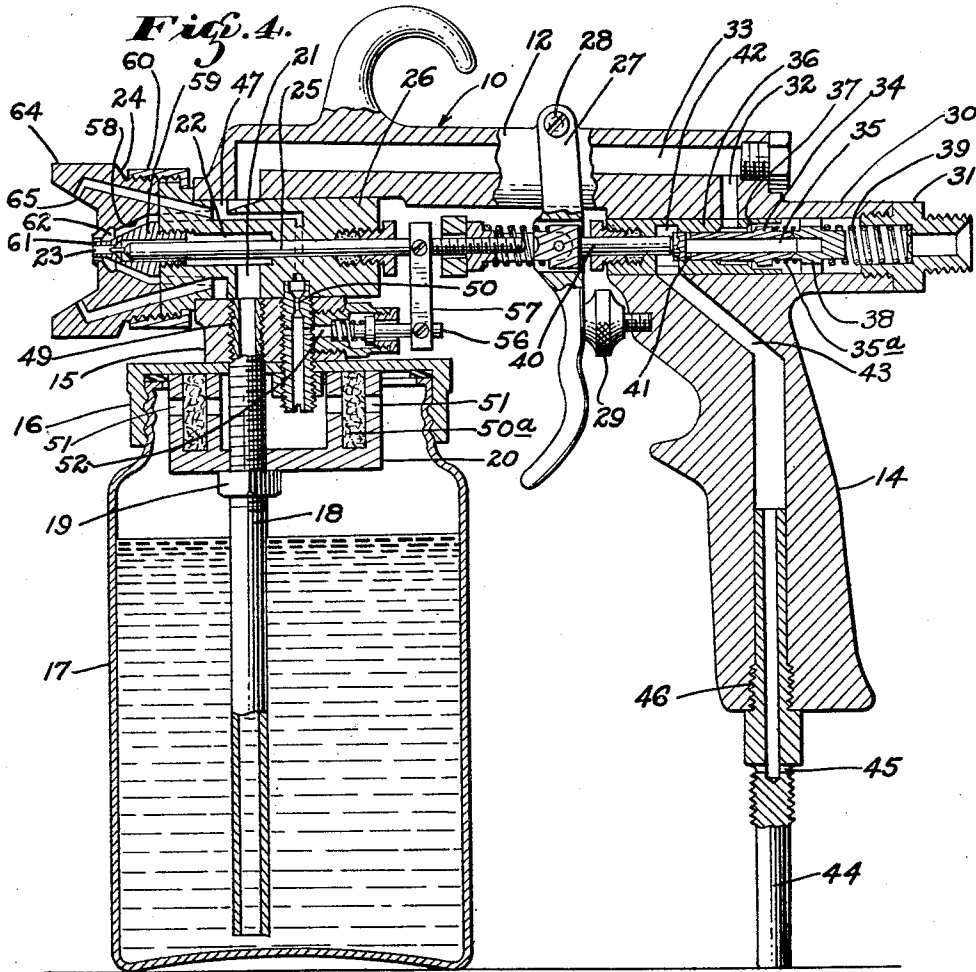
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SPRAY GUN

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2 Sheets-Sheet, 2



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SPRAY GUN

Application filed February 25, 1930. Serial No. 431,122.

This invention relates to spray guns for use in spraying lacquers, paints, etc.

It is the principal object of the present invention to generally improve the construction and operation of devices of the character referred to whereby to provide a spray gun capable of spraying heavier materials than prior guns and which is provided with an improved adjustable nozzle so that various forms of sprays may be obtained.

In carrying the invention into practice I have provided a spray gun wherein a portion of the air when the gun is in operation is diverted to the paint container so as to assist in elevating the material being sprayed. This enables me to use heavier materials in the gun than can be ejected from spray guns of the present day type. The spray gun is also fitted with a novel and improved adjustable nozzle which enables a circular spray, a vertical fan spray or a horizontal fan spray to be obtained by merely adjusting the position of the nozzle head. Another feature of the device is that I have provided an automatically operating valve mechanism which relieves the compressor when the gun is not in use in the event that the gun is directly connected with the compressor.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a view in central longitudinal section through a spray gun assembly embodying the preferred form of my invention.

Fig. 2 is a view in plan of the gun with parts broken away to more clearly disclose certain features of construction.

Fig. 3 is a transverse section taken on line III—III of Fig. 1.

Fig. 4 is a view similar to Fig. 1 with the exception that the parts are in a position which they assume when the gun is in operation.

Fig. 5 is an end view of the nozzle head.

Fig. 6 is a view of the inner end of the nozzle head.

Fig. 7 is a view of the outer end of the head block.

Referring more particularly to the accompanying drawings, 10 indicates a spray gun for use in spraying paint, lacquer, etc. This apparatus comprises a frame generally indicated by the numeral 11 which includes a horizontal barrel 12 fitted with a depending grip or handle 14 at one end. The other end of the barrel is formed with a head 15 the bottom of which is flat so that it may be connected with the top or cap 16 of a container 17.

The connection between this top 16 of the container 17 and the head 15 of the spray gun frame includes a tube 18 which is threaded into a tapped hole extending upwardly into the head member as illustrated. A lock nut 19 is threaded onto the tube 18 and engages a cylindrical shield member 20 so as to simultaneously clamp the shield member upwardly against the bottom of the cap 16 and clamp the cap to the head 15.

The cap or top 16 of the container is threadedly connected to the container so that the shield 20 and the cap 16 may be firmly connected to the head 15 and the container latter threaded to the cap so as to complete the assembly.

It will be noticed that both ends of the tube 18 are open so that it will comprise a feed tube for feeding paint or lacquer in the container 17 to the nozzle of the gun. The lower end of the tube as illustrated extends to a point just short of the bottom of the container while the upper end communicates with a duct 21 which in turn communicates with a discharge passageway 22 leading to the discharge orifice 23 of the nozzle head 24. The discharge orifice 23 is controlled by a needle valve 25 which is arranged coaxially of the passageway 22 and is reciprocally mounted so that the discharge orifice 23 may be controlled thereby.

It is desired to point out that the duct 21 and part of the passageway 22 are formed in a cylindrically shaped head block 26 tightly fitted within a horizontal bore formed in the head 15. This facilitates the construction and assembly of the device as is apparent.

The needle control valve 25 extends rearwardly and projects through the head block

26 and is connected with a pivotal oscillatory trigger 27 pivoted as at 28 to the barrel 12 of the frame 11. The lower end of the trigger depends downwardly in a position relative to the grip or handle 14 so that it may be operated easily from the hand that grasps the handle. An adjustable member 29 is connected with the grip 14 and interposed between it and the trigger 27 so as to limit the rearward movement of the trigger.

The connection between the needle control valve 25 and the trigger 27 is adjustable so that a proper operative relation may be maintained between the trigger and the control valve.

In axial alignment with the needle control valve 25 but on the opposite side of the trigger 27 is a cylinder 30. At one end of this cylinder is a fitting 31 by means of which the spray gun may be connected with a suitable source of air under pressure; that is, either to an air compressor or to an air storage tank. When the gun is in operation the air entering the cylinder 30 may pass upwardly through a duct 32 to an air passageway 33 formed in the barrel 12 and by this passageway it is led to a point where it communicates with other ducts leading to the nozzle as will be hereinafter set forth.

The passage of air from the cylinder 30 to the air passageway 33 is, however, controlled by an air valve 34 interposed between the cylinder 30 and the duct 32. This valve 34 is formed on a hollow stem 35 which is reciprocally mounted in a bushing 36 tightly fitting the cylinder 30. The bushing 36 is formed with a valve seat 37 with which the valve 34 cooperates to control the passage of air from the inlet end of the cylinder 30 to the duct 32.

A guide member 38 is reciprocally mounted in the cylinder and is adapted to abut against the outer end of the valve stem 35 under certain conditions. The abutting ends of the two members are formed with complementary parts of a valve and seat so when they are in abutment air cannot enter the hollow stem of the valve. An expansion spring 35a is interposed between the guide member 38 and the valve 34 so as to maintain these two parts separated when the valve 34 is seated so that air can pass into the valve stem for the purpose hereinafter described. However, when the valve 34 is opened the passageway therethrough is closed by engagement of the complementary parts of the valve stem 35 and the guide member 38. An expansion spring 39 is interposed between the outer end of the cylinder 30 and the member 38 and constantly tends to maintain the valve 34 seated on the seat 37.

The pressure of the springs is also transmitted to the trigger through the medium of a small plunger 40 interposed between the valve stem 35 and the trigger. Therefore, the action of the spring 39 through the medi-

um of the plunger 40 and the trigger constantly tends to maintain the needle control valve 25 seated. Also the operation of the trigger will simultaneously move the control valve 25 to open position and unseat the air control valve 34 so that air will be delivered through the passageway 33 to the nozzle.

I have provided means for relieving the pressure in the cylinder 30 when the valve 34 is closed so that if the gun is connected directly to a compressor, the compressor will not heat up due to an overload imposed thereon. To accomplish this the inner end of this hollow valve stem is closed but small bleeder openings 41 are formed through the sides of the stem 35 in communication with the interior thereof. When the valve 34 is seated these bleeder openings 41 open into a chamber 42 at the inner end of the bushing 36 so that the air may pass through the hollow valve stem and discharge into this chamber 42. This chamber is in communication with an air relief passageway 43 which extends downwardly through the handle or grip 14.

It will be seen that when the valve 34 is seated that the spring 35a maintains it spaced from the guide member 38 so that air passing by the guide member may enter the hollow valve stem and thereafter pass out of the small bleeder openings into the chamber 42.

The lower end of the passageway 43 is connected with a fitting 44. One end of this fitting is hollow and is formed with discharge openings 45 so that air pressure passing through the passageway 43 will escape to the atmosphere through the openings 45. However, the other end of the fitting 44 is solid so that if the fitting is inserted in the opening in a reverse manner the passageway 43 will be plugged and the air will not escape to the atmosphere.

To connect the fitting 44 to the handle 14 it is provided with similarly threaded sections 46 which engage a tapped portion at the extreme end of the passageway.

In case the fitting 31 is connected directly to an air compressor the fitting 44 is arranged with its hollow end in the passageway 43 so that when the valve 34 is seated the compressor will be relieved of overload due to the fact that the pressure may escape through the bleeder openings 41 and thence through the passageway 43 to the atmosphere through the openings 45 in the fitting 44. However, if the fitting 31 is connected to a tank containing air under pressure the fitting 44 is reversed so as to plug the passageway 43 and thus prevent the reducing of the pressure in the air tank.

When the valve 34 is open the air under pressure passes through the duct 32 and along the passageway 33. This passageway communicates with an annular chamber 47 formed around the head block 26, so that the air passing through the passageway 33

will distribute about the annular chamber 47.

In order that the gun may be used with heavier liquids than hitherto used in spray guns I build up air pressure in the container 17 during the operation of the gun which assists in lifting the liquid and delivering it to the nozzle. I accomplish this by providing an air duct 48 which leads from the chamber 47 to the open end of a hollow stud 49 threaded upwardly into the head 15. The lower end of this stud projects through the cap 16 of the container into the interior of the member 20. A nut is fitted on the lower end of the stud to assist in clamping the cap 16 against the head 15. The opening through the stud 49 is restricted as at 50 so that the volume of air admitted to the container 17 will be limited. It is obvious, however, that air from the passageway 33 will be delivered into the interior of the member 20.

The member 20 is formed with concentric cylindrical walls between which is interposed a felt ring 50a. The cylindrical walls of the member 20 are formed with ports 51 so that the air under pressure delivered to the interior of the member 20 will pass through the felt ring 50a and build up a pressure in the container. As the pressure in the container builds up it will, of course, assist in elevating the liquid to the nozzle orifice and by this means I am enabled to use a more viscous fluid in connection with the spray gun than it was hitherto possible.

It is pointed out, however, that the air pressure is only built up in the container when the nozzle orifice is open and paint is being discharged. Therefore, I provide means for automatically relieving this pressure when the gun is not in operation and the trigger is released. This is accomplished by providing a relief passageway 52 which communicates with the interior of the stud 49. This relief passageway is formed with a valve seat 53 with which a valve 54 cooperates. A spring 55 normally tends to maintain the valve 54 seated.

When the trigger is moved to a position opening the discharge orifice the valve 54 is seated by means of the spring 55 thereby shutting off communication between the relief passageway 52 and the atmosphere.

When the trigger is released, however, the valve 54 is moved from its seat so that the air passing through the stud 49 may discharge into the atmosphere around the valve and through the relief passageway 52. For this purpose I provide a valve actuator 56 connected by a member 57 to the control valve 25 so that these two elements will be operated in unison by the trigger 27.

When the trigger is moved to a position moving the control valve 25 to open position the valve actuator 56 is moved to a position permitting the valve 54 to seat on the seat

53. When the trigger is released, however, the valve actuator 56 moves inwardly and unseats the valve 54 allowing the air to escape around the valve and to the atmosphere about the valve actuator 56. Thus, the pressure in the container is only built up while the gun is in actual operation.

In order to discharge the paint at the discharge orifice 23, the nozzle head 24 is formed with a conical chamber 58 which converges toward the discharge orifice. This conical chamber 58 is greater in diameter than a conical orifice member 59 which is threaded concentrically into the end of the head block 26. The orifice member 59 is formed with a chamber or passageway which aligns with or forms a continuation of the passageway 22 in the head block 26. Likewise, the discharge orifice 23 which is controlled by the control valve 25 is formed at the extremity of the orifice member 59.

The nozzle head 24 is maintained in concentric relation with the orifice member 59 by a sleeve 60 which is rotatably connected with the head block 26 but collared from axial movement. The interior bore of the sleeve 60 is threadedly connected to the nozzle head 24 so that the latter will be held in proper concentric relation with respect to the orifice member 59. Therefore, as the conical chamber 58 in the nozzle head 24 is greater in diameter than the orifice member 59 an annular chamber 62 will be formed about this orifice member 59 which chamber communicates with a circular orifice 61 around the orifice 23. Paint is discharged through the orifice 23 under the influence of the air discharging under pressure through the circular air orifice 61.

In order to deliver air to the annular chamber 62, I provide four passageways 63 which extend between annular chamber 47 and the annular chamber 62. These four passageways 63 are arranged on a circle of a diameter agreeing with the diameter of the larger end of the annular chamber 62, so that air will be delivered under pressure from the passageway 33 to the annular chamber 47 and thence through the passageway 63 to the annular chamber 62 and thence through the circular orifice 61.

The ejection of this air at the circular orifice creates a suction in the passageway 22 which aided by the air pressure built up in the container 17 causes the paint or lacquer to be elevated through the tube 18 and discharged through the orifice 23.

I have, however, so constructed the nozzle head 24 that I may obtain either a circular spray, a vertical fan spray or a horizontal fan spray by merely adjusting the position of the nozzle head 24 by rotating it.

From the drawings it will be seen that the nozzle head is formed with two diametrically opposed projections 64, the inner sur-

faces of which diverge outwardly. Formed inwardly through the inner surface of each projection 64 is a fine opening 65 which is directed on an angle outwardly toward the center of the nozzle head. A passageway is formed longitudinally through the nozzle head 24 from each opening 65.

Formed in the end of the head block 26 between the outer end of the head block and the annular chamber 47 are four passageways 66 which are arranged 90° apart. These passageways are arranged two on the vertical center and two on the horizontal center and on a circle struck from the axial center of the head block. The distance from the center of these passageways is the same as the distance from the center to the passageways which extend from the fine openings 65, so that when the nozzle head 24 is arranged with the projections 64 in a vertical line a vertical fan spray will be obtained as the passageways from the fine openings 65 will communicate with the two passageways 66 above and below the center of the nozzle head.

However, if the nozzle head 24 is turned so that the projections 64 will lie in a horizontal plane the passageways extending from the fine openings 65 will communicate with the other two passageways 66 and cause a horizontal fan spray to be projected.

If the projections are disposed so that the passageways extending from the fine openings 65 do not align with any of the passageways 66 the spray discharged from the nozzle will be a circular one.

It is obvious that by manipulation of the trigger and the adjustment of the head 24 that a variety of shapes of sprays may be obtained from a line spray to a full circular spray.

In operation of the device the fitting 31 is connected with a source of air pressure. If the fitting 31 is connected directly to a compressor the fitting 44 is arranged so as to form a communication between the passageway 43 and the atmosphere. If the fitting 31 is connected to an air storage tank the fitting 44 is reversed so as to plug the passageway 43.

Assuming that the device is properly assembled and that the container 17 contains a paint or lacquer, operation of the trigger will first open the air valve 34 so that air under pressure will pass through the passageway 33 to the nozzle. It should be pointed out that due to the formation of the control valve 25 the air valve is open prior to the opening of the orifice 23 so that the air will have ample opportunity to reach the point of discharge prior to the discharge of paint through the orifice 23.

As the trigger is moved to open the valves, the valve actuator 56 will permit the valve 54 to seat so that a portion of the air delivered through the gun will be directed into the container 17 to build up a pressure there-

in. This pressure aids in elevating the paint or lacquer upwardly through the tube 18.

By adjusting the nozzle head 24 about its center as previously described either a circular spray may be obtained or a horizontal or vertical fan spray.

When the trigger is released the valves 34 and 25 are closed and the valve 54 is opened so as to relieve any pressure accumulating in the container. When the valve 34 is closed should the gun be directly connected to a compressor the air will by-pass through the valve stem 35 and downwardly through the grip 14 to the atmosphere through the openings 45 in the fitting 44, thus relieving the compressor of any overload. However, when the trigger is moved to open the valves the bleeder openings 41 are covered by the bushing 36 so that there will be no by-passing of air from the compressor through the grip when the gun is in operation.

From the foregoing it is obvious that I have provided a spray gun which may be used with heavier paints and lacquer than the guns hitherto provided and wherein the nozzle is adjustable so as to obtain various forms of sprays. Likewise, I have provided means automatically relieving the compressor of any overload when the gun is not in operation.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A spray gun having a discharge orifice, a control valve controlling the same, an air inlet connection, a passageway formed in the gun connecting the inlet connection with the orifice, an air valve controlling said passageway to control the passage of air from the inlet connection to the orifice, a trigger relatively associated with said valves for operating the same substantially simultaneously, a material container suspended from the gun and adapted to communicate with the orifice when the control valve is opened, means for diverting a limited amount of air from said passageway to the interior of the container when the gun is in operation, a passageway extending from said last named means to the atmosphere, a valve in said passageway controlling the passage of air therethrough, a connection between said valve and the control valve whereby said valve will be closed when the control valve is open and opened when the control valve is closed whereby to relieve pressure accumulating in the container when the gun is not in operation.

2. A spray gun comprising a frame having a grip at one end, a nozzle head at the

other end, said nozzle head having a central orifice, a barrel connecting the grip and the nozzle head, a control valve controlling the orifice, an inlet connection at the end of the
 5 gun opposite the nozzle head and in axial alignment with the orifice, a passageway extending from the inlet connection through the barrel and communicating with the orifice, an air valve in the inlet connection controlling the passage of air through said passageway, a pivotal trigger depending from the barrel contiguous to the grip and operatively associated with the control valve and the air valve for operating the same, a container suspended from the forward end of the gun, a tube connected to the gun and projecting into the container to a point short of the bottom thereof, said tube communicating with the orifice, an air duct intermediate
 10 said air passageway in the barrel and the interior of the container for supplying air pressure to the container when the gun is in operation, said duct being restricted whereby to limit the pressure in the container, and a porous member interposed between said duct and the interior of the chamber to prevent the flow of liquid from the container into the air passages of the gun.

3. A spray gun comprising a frame having
 30 a grip at one end, a nozzle head at the other end, said nozzle head having a central orifice, a barrel connecting the grip and the nozzle head, a control valve controlling the orifice, an inlet connection at the end of the gun opposite the nozzle head and in axial alignment with the orifice, a passageway extending from the inlet connection through the barrel and communicating with the orifice, an air valve in the inlet connection controlling the passage of air through said passageway, a pivotal trigger depending from the barrel contiguous to the grip and operatively associated with the control valve and the air valve for operating the same, a container suspended from the forward end of the gun, a tube connected to the gun and projecting into the container to a point short of the bottom thereof, said tube communicating with the orifice, an air duct intermediate said air passageway in the barrel and the interior of the container for supplying air pressure to the container when the gun is in operation, said duct being restricted whereby to limit the pressure in the container, a passageway forming a communication between said duct and the atmosphere, a valve in said passageway, said valve being operatively associated with the control valve whereby communication between said duct and the atmosphere
 60 will be interrupted when said control valve is opened, and communication between the duct and the atmosphere established when said control valve is closed.

4. A spray gun comprising a frame having
 65 a grip at one end, a nozzle head at the other

end, said nozzle head having a central orifice, a barrel connecting the grip and the nozzle head, a control valve controlling the orifice, an inlet connection at the end of the gun opposite the nozzle head and in axial alignment with the orifice, a passageway extending from the inlet connection through the barrel and communicating with the orifice, an air valve in the inlet connection controlling the passage of air through said passageway, a pivotal trigger depending from the barrel contiguous to the grip and operatively associated with the control valve and the air valve for operating the same, a container suspended from the forward end of the gun, a tube connected to the gun and projecting into the container to a point short of the bottom thereof, said tube communicating with the orifice, an air duct intermediate said air passageway in the barrel and the interior of the container for supplying air pressure to the container when the gun is in operation, said duct being restricted whereby to limit the pressure in the container, and means for by-passing air to the atmosphere from the inlet connection when said air valve is closed.

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