

Oct. 28, 1930.

W. B. THOMPSON

1,779,922

SPRAY GUN

Filed April 9, 1927

4 Sheets-Sheet 1

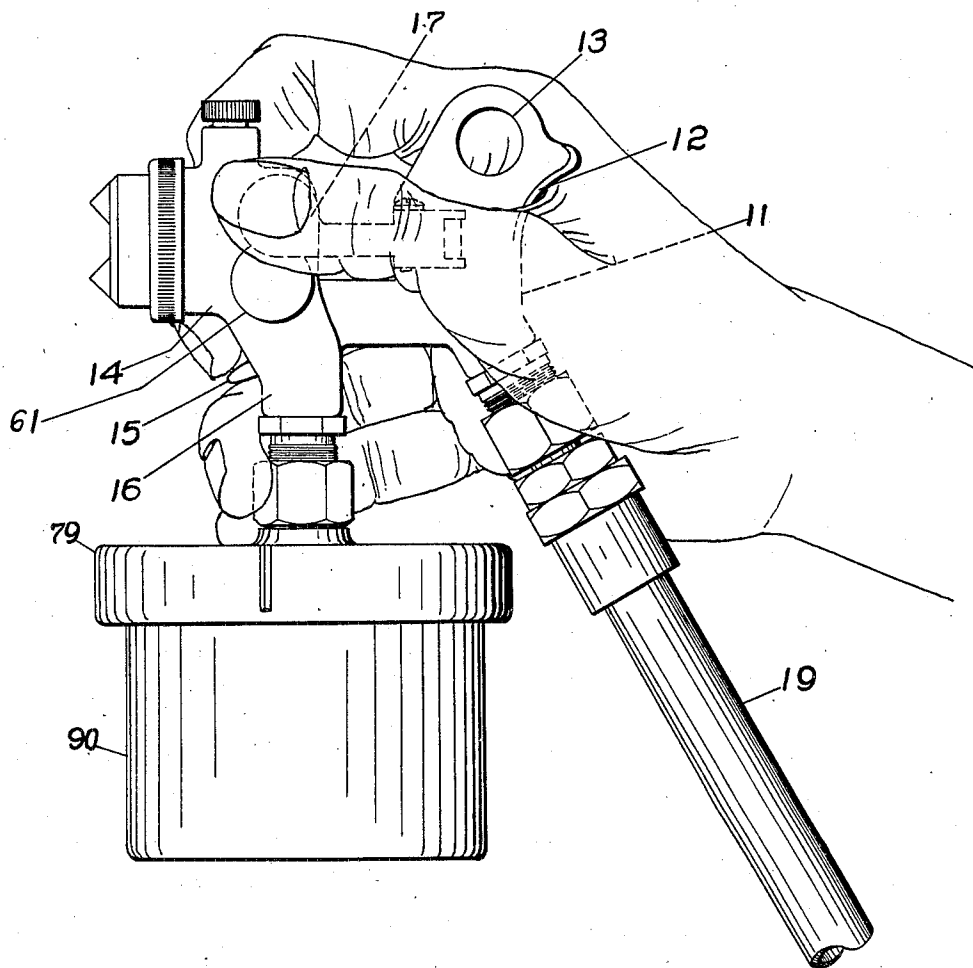


Fig. 1

Inventor

Wayne B. Thompson
by Charles W. Hedemuth
his attorney

Oct. 28, 1930.

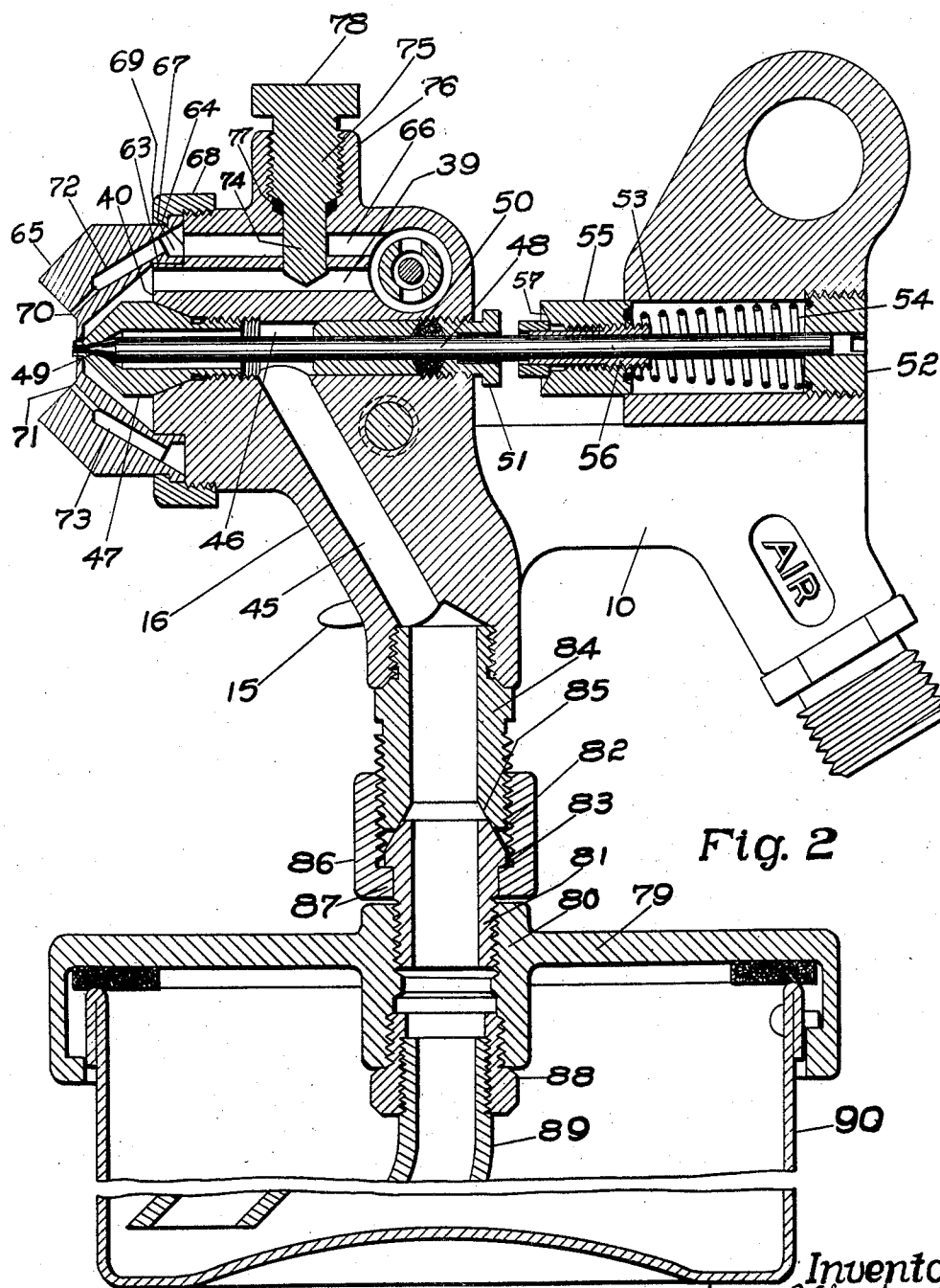
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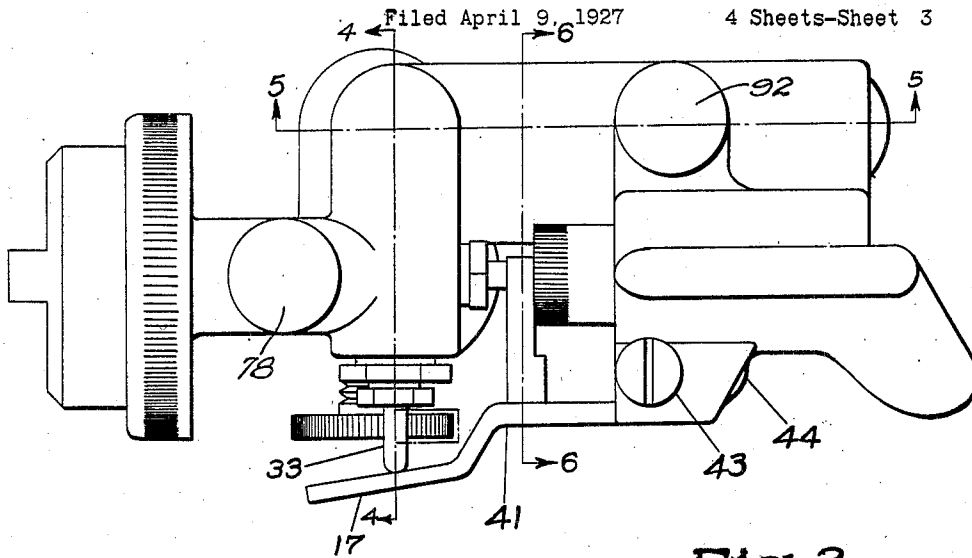


Fig. 3

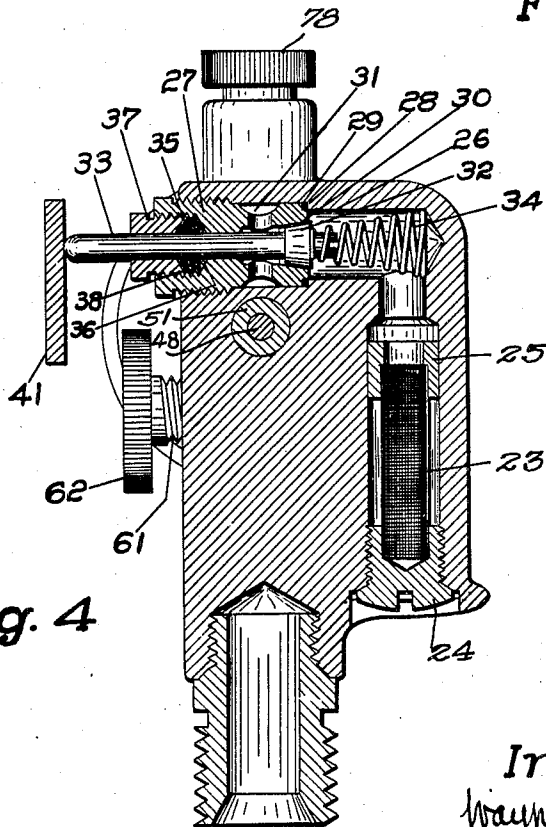


Fig. 4

Inventor
Wayne B. Thompson
by Charles W. McDermott
his attorney

Oct. 28, 1930.

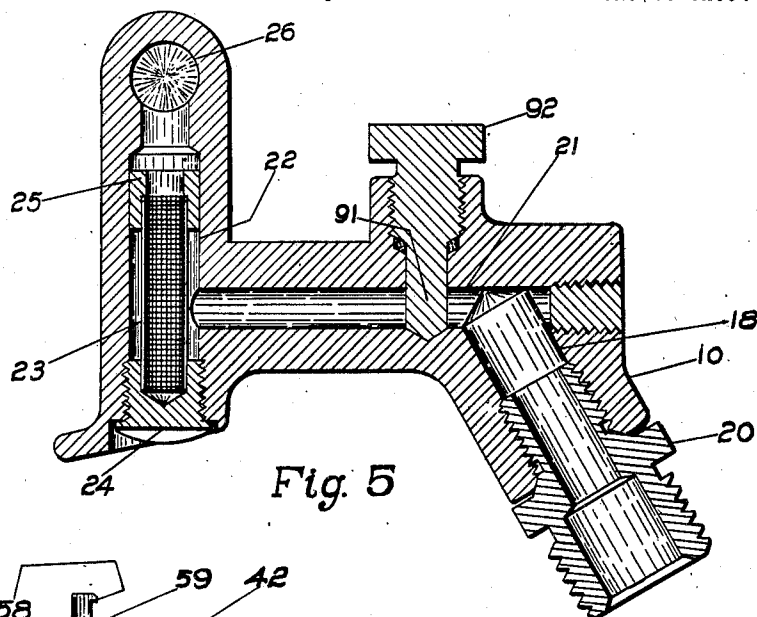
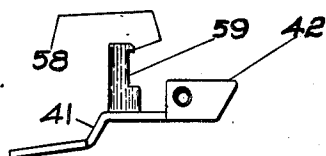
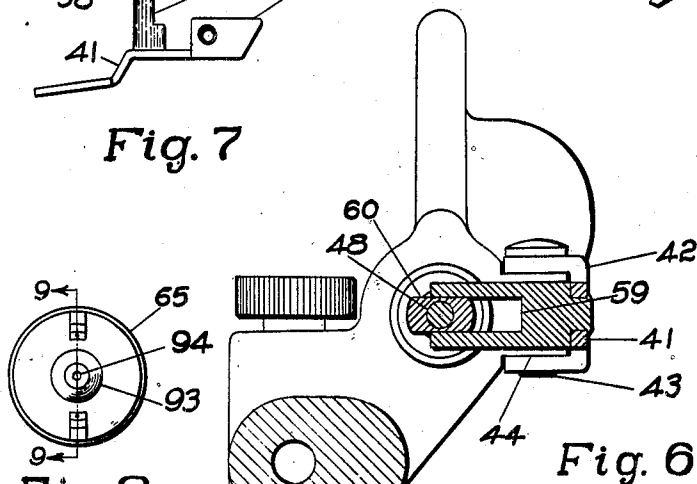
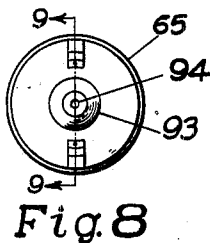
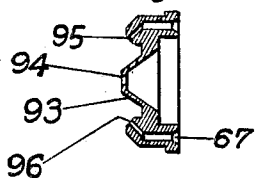
W. B. THOMPSON

1,779,922

SPRAY GUN

Filed April 9, 1927

4 Sheets-Sheet 4



Inventor

Wayne B. Thompson
by Charles W. McDevitt
his attorney

UNITED STATES PATENT OFFICE

WAYNE B. THOMPSON, OF WINCHESTER, MASSACHUSETTS

SPRAY GUN

Application filed April 9, 1927. Serial No. 182,245.

The present invention relates to coating apparatus, and more particularly to spray guns.

Heretofore, spray guns have been generally constructed so that in use they must be grasped like a pistol. That is, the handle of the spray gun is provided with a pistol grip which is tightly grasped in the palm of the hand by the thumb, third and little fingers, the index and second fingers being free to engage a trigger connected to open the coating material and motive agent valves within the spray gun. The grasp of the pistol grip of the spray gun in the manner described produces a twist in the wrist as the normally inside face thereof must be turned upward to maintain the spray gun upright. Many spray gun operatives are women employed in the finishing of factory products which operation requires the grasping of the pistol grip and the holding of the spray gun in a forward position for extended periods. The grasping of the pistol grip, the twisting of the wrist, the maintaining of the coating material and motive agent valves open by the index and second fingers, and the holding of the spray gun in a forward position for use produces severe muscular strains in the forearm and hand particularly to women operatives.

The principal object of the present invention is to produce a spray gun which may be held for operation in the hand with a minimum of muscular strain.

To the accomplishment of this object, and such others as may appear hereinafter, the features of the present invention relate to certain devices, combinations and arrangements of parts hereinafter described and then set forth broadly and in detail in the appended claims which possess advantages which will be apparent to those skilled in the art.

The various features of the present invention will be readily understood from an inspection of the accompanying drawings illustrating the best form of the invention at present devised, in which,

Figure 1 is a left-side elevation of the spray gun showing how its rear end is constructed to hang on the operative's hand on the crotch

between the thumb and fingers and how its front end is constructed to hang upon at least one of the fingers;

Fig. 2 is a longitudinal sectional elevation;

Fig. 3 is a plan, without the container;

Fig. 4 is a sectional elevation on the line 4—4, Fig. 3;

Fig. 5 is a sectional elevation on the line 5—5, Fig. 3;

Fig. 6 is a detail sectional elevation on the line 6—6, Fig. 3;

Fig. 7 is a detail plan of the arm for opening the valves;

Fig. 8 is a plan of the front face of a modified motive agent nozzle, and

Fig. 9 is a sectional elevation on the line 9—9, Fig. 8.

In the embodiment of the invention illustrated in the drawings the apparatus or tool for applying coating material is preferably provided with a metallic body portion 10. The rear end of the body portion 10 is provided with an inclined off-set extension 11 (Fig. 1), preferably integral with the body portion, constructed to seat upon the palm of the right hand of the operative between the thumb and forefinger thereof. The extension 11 is also provided with a rest 12 constructed to hang on the hand over the crotch between the thumb and forefinger. The rest 12 is provided with an opening 13 to enable the tool to be hung up when not in use. The thumb and fingers extend along the opposite side faces of the tool, respectively. The length of the body portion 10 is such that the first joint of the second finger may extend under the cylindrical front end portion 14 of the body with the third finger engaged beneath a rest 15 formed on an extension 16 of the body.

Directly beneath the thumb, as shown in Fig. 1, is a thumb piece 17 connected, through connections to be described, with either the motive agent valve or the coating material valve, and preferably with both the motive agent and coating material valves. With this construction the tool is hung on the hand with the palm directed downwardly thus minimizing the muscular strain on the

forearm in holding the tool in a forward position for use. The tool hangs on the hand thus eliminating the strain heretofore produced in a tool constructed to require the hand to grasp it. The location of the thumb piece 17 on one side face of the tool directly beneath the thumb permits the motive agent and coating material valves to be opened with a minimum of effort and without muscular strain as the motion of the thumb, in actuating the thumb piece 17 to open the motive agent and coating material valves, is the same as in its natural hand closing movement.

The motive agent, which may be air under pressure, is preferably introduced into the body portion 10 through an air passage 18 (Fig. 5) which is connected to an air hose 19 (Fig. 1) through an air-hose coupling 20 fitted to the lower end of the passage 18. At its upper or leading end the air passage 18 communicates with a longitudinal passage 21 (Fig. 5) communicating with a vertical passage 22. To remove particles of dirt or other foreign matter from the inflowing motive agent, the passage 22 is provided with a cylindrical screen 23 removably mounted within the passage. To this end the screen 23 is soldered at its lower end to a plug 24 having threads engaged with similar threads in the lower end of the passage 22. The upper end of the screen 23 is soldered to a hollow ferrule 25 having a fit within the passage 22 sufficiently tight to exclude dirt while permitting the ferrule to slide or rotate within the passage.

With this construction the screen 23, plug 24 and ferrule 25 may be inserted into and withdrawn from the passage 22 as a unit.

The air or other motive agent from the passage 21 enters the screen 23 and passes out of the interior thereof into the upper end of the passage 22 from which the air passes into a transverse chamber 26 (Fig. 4) open at one end. The chamber 26 is interiorly threaded to receive a valve casing 27 which also acts as a plug to close the open end of the chamber. The interior of the chamber 26 is provided with a shoulder 28 to limit the movement of the valve casing into the chamber. Interposed between the valve casing 27 and the shoulder 28 is a lead washer 29 which prevents the air leaking out between the valve casing 27 and the shoulder 28. The valve casing 27 is provided with a valve seat 30 and with transverse air passages 31. The valve seat 30 is adapted to receive and seat a suitable air valve 32 having a spindle 33. The valve 32 is normally held upon the seat 30 by a coiled spring 34 of the cone type interposed between the valve 32 and the bottom of the chamber 26. Near its outer end the spindle 33 passes through suitable packing shown as a gland packing 35 mounted in a cavity 36, formed in the valve casing 27, and held in place therein by a gland or plug 37 threaded into the cavity 36. The motive agent entering through the passages 18, 21 and 22, and

the chamber 26 passes through the valve casing 27 when the air valve 32 is opened, and enters a passage 39 (Fig. 2) which opens on the front face 40 of the gun body 10.

As shown in Figs. 3 and 4 the spindle 33 is positioned for direct engagement by the thumb piece 17. The thumb piece is formed on one end of an arm 41 having on its other end a yoke 42 (Fig. 6) whereby the arm 41 is pivotally mounted on a pivot pin 43 secured to a boss 44 on the body 10.

The coating material, such as paint, lacquer, and the like, may be introduced into the body 10, under pressure, by threading a hose coupling (not shown) into a passage 45 formed in the extension 16. The passage 45 conducts the coating material into a chamber 46 opening upon the front face 40 of the gun body. With this construction the air chamber 39 and the paint chamber 46 are always out of communication with each other within the gun body.

The forward or discharge end of the chamber 46 is internally threaded to receive a threaded nozzle 47 through which the coating material is discharged from the gun. The interior and exterior of the nozzle 47 are constructed substantially like the coating material discharge nozzle disclosed in my Patent No. 1,706,006, March 19, 1929.

Extending longitudinally through the chamber 46 and substantially axially thereof is a needle or spindle 48 having a front end 49, substantially like the needle disclosed in my patent referred to in the preceding paragraph, to act as a valve to shut off the discharge of coating material.

The rear end of the chamber 46 is closed by packing 50 through which the spindle 48 extends. The packing 50 is held in place by a packing or gland plug 51 threaded into the rear end of the chamber 46. The spindle 48 may be withdrawn or inserted into the chamber 46 while the packing 50 is in place as the reduced front end of the spindle passes through the packing without picking up strands thereof. The rear end of the spindle 48 slides freely in a plug 52 which closes one open end of a longitudinal bore or spring chamber 53 formed in the body 10. The spindle 48 is actuated in a direction to keep the coating material discharge orifice normally closed by a cone spring 54 coiled about the spindle 48 and interposed between the plug 52 and an adjustable sleeve 55 movable within the spring chamber 53. The sleeve 55 is threaded on the cylindrical surface of a bushing 56 fitted tightly on the spindle 48.

In order to move the spindle 48 in a direction to open the coating material discharge orifice in the nozzle 47 against the tension of the spring 54 the sleeve 55 on its front face is provided with a concavity 57 which is engaged by two curved feet 58 (only one of

which is shown in Fig. 7). The feet 58 are formed on the free ends of a yoke 59 (Fig. 6) which slides on the slabbled-off portion 60 on the bushing 56. The yoke 59 is rigidly connected to the arm 41.

5 Movement of the arm 41 inwardly towards the body 10 under pressure of the thumb on the thumb piece 17 slides the feet 58 across the concavity 57 thus pushing the sleeve 55 to the right, viewing Fig. 2. The arm 41 thus operates the spindles 33 and 48 to open the motive agent and the coating material valves. The connections between the arm 41 and the spindle 48 are constructed so that 10 when the thumb piece 17 is pressed upon by the thumb the air-valve 32 is opened before the coating material valve 49 is opened. When the thumb piece 17 is released the springs 34 and 54 restore the parts to their normal positions. During this return movement the coating material valve 49 is closed before the air-valve 32 is closed.

From an inspection of Fig. 3 it will be apparent that the inward movement of the arm 41 on the pivot pin 43 would wedge the spindle 48 to open the coating material valve even if the contacting faces of the free ends of the yoke 59 and the front end face of the sleeve 55 were plane-surfaced. The feet 58, which normally engage the bottom of the concavity 57 on the front face of the sleeve 55, impart an increment of wedging movement to the spindle 48 as the feet 58 travel on the concave surface 57 in a direction towards the peripheral edge of the front face of the sleeve 55.

In order to vary the duration of the discharge of air through the air-valve 32 before the coating material valve 49 is opened and after the coating material valve 49 is closed, the exterior of the sleeve 55 is knurled to permit it to be grasped by the operative and rotated on the bushing 56. When the sleeve 55 is adjusted to its limit towards the left, viewing Fig. 2, the duration of air-blow prior to the opening of the coating material valve 49 and the duration of air-blow subsequent to the closing of the coating material valve 49 is short. When the sleeve 55 is turned in the other direction the duration of air-blow prior to the opening of the valve 49 and subsequent to the closing of the valve 49 is lengthened. Some materials, such as nitrocellulose coating compositions, require the positioning of the sleeve 55 forwardly to obtain a short period of air-blow. Other materials, such as water cut dyes, require that the sleeve 55 be positioned backwardly to obtain a longer period of air-blow.

60 In order to regulate the amount of opening movement of the coating material and motive agent valves and thus vary the speed of application of the coating material to the surface to be coated, the body 10 carries a screw 61 (Figs. 1, 3 and 4) which is provided

with a head 62 arranged in the path of movement of the arm 41. The screw 61 may be adjusted to vary the extent of movement of the arm 41 before it engages the stop 62. Variation in the extent of movement of the arm 41 varies the extent of opening movement of the coating material and motive agent valves.

In order to provide a discharge nozzle for the air the front face 40 is reduced in diameter to form a cylindrical seat 63 and a vertical seat 64 upon which a main air discharge nozzle 65 is seated concentric with the inner nozzle 47. The nozzle 65 has an internal surface spaced from the external surface of the nozzle 47 throughout its length so that air can pass out of the passage 39 and be discharged from the gun.

The spray gun embodying the present invention preferably includes means for supplementally discharging air under pressure upon the discharged mist or cloud of material to effect the flattening, spreading or fan-shaping thereof when desired and accordingly there is formed in the body 10 a supplemental air passage 66 parallel to the passage 39 having one end communicating with the chamber 26 and having its other end terminating at the seat 64. In the rear face of the nozzle 65 is an annular groove constituting, with the seat 64, a circular air passage 67 communicating with the supplemental air passage 66.

The nozzle 65 is held adjustably in a fixed position flatwise against the seat 64 by a suitably locking means shown as an internally threaded collar or nut 68 having an inturned flange 69 to engage an outturned flange on the nozzle 65. The outer face of the nozzle 65 is provided with a pair of diametrically opposed jet members 70 and 71 having the inwardly directed air passages 72 and 73 in communication with the air passage 66 in any position of angular adjustment of the nozzle 65. The nozzle 65 is assembled with the body 10 merely by placing it on the cylindrical seat 63 and positioning it flatwise against the seat 64 and screwing on the nozzle lock. When it is desired to adjust the plane of the sprayed material this may be readily effected merely by backing off the nozzle lock slightly, turning the nozzle 65 on the seat 63 to bring the supplemental jets 70 and 71 to the desired position and again tightening the nozzle lock.

The supplemental air discharge is desirably readily controllable and for this purpose I have provided a valve spindle 74 arranged to completely close the supplemental air passage 66. The valve spindle 74 projects from a body portion 75 which is threaded to engage internal threads formed in a hollow boss 76 on the body 10. Surrounding the valve spindle 74 and interposed between the body portion 75 and the boss 76 is a

packing 77. The body portion 75 is provided with a knurled cap 78 by which the valve spindle 74 may be manipulated to control the volume of the supplemental air discharged through the supplemental air passage 66 to vary the width of the fan-spray or to stop the fan-spray completely.

When it is desired to admit coating material not under pressure or gravity to the spray gun the material hose (not shown) is disconnected and a vented closure 79 (Figs. 1 and 2) is coupled to the passage 45. To this end the closure 79 is provided with a central hollow boss 80 threaded on opposite sides of the closure. Into the upper end of the boss 80 is threaded a male coupling member 81 which is provided with a frusto-conical head 82 and a shoulder 83. The internal screw threads within the passage 45 receive similar threads upon the female coupling member 84, which is provided with an internal frusto-conical surface 85 seated on the head 82. The male and female members of the coupling are connected by a union 86 threaded on the exterior of the female coupling member 84 and provided with an inverted flange 87 engaged with the shoulder 83 on the male coupling member 81. The lower threads on the boss 80 are engaged by outer threads on a bushing 88 to which is fitted a pipe 89 extending down towards the bottom of a container 90 which contains the coating material. The container 90 is attached to the closure 79 by substantially the same means as disclosed in the application filed by J. J. Preble and me, December 26, 1924, Serial No. 758,005.

As shown in Figs. 3 and 5 the passage 21 is provided with a valve so that the flow of air through the passage 21 may be controlled for various purposes such, for instance, as the production of a stipple spray. To this end the passage 21 may be closed by a spindle 91 having the same construction and mode of operation as the spindle 74. The knurled cap 92 of the spindle 91 may be manipulated to permit a free flow of air through the passage 21 or to restrict in varying degrees the flow of air therethrough. The spindle 91 restricts the flow of air through the passage 21 to a greater degree for a coarse stipple spray than for a fine stipple spray.

Referring to Fig. 2 it will be apparent that the supplemental motive agent discharge orifices 70 and 71 are located in advance of the main motive agent discharge orifice in the nozzle 65. It will also be apparent that the portion of the front face of the nozzle 65 immediately adjacent the main motive agent discharge orifice is flat. With this construction when operating the spray gun with certain kinds of coating materials eddy currents are produced which cause the coating material to accumulate in an undesirable manner on the front face of the nozzle 65.

In order to prevent the production of eddy currents I provide the front face of the nozzle 65 with a frusto-conical projection 93 (Figs. 8 and 9) having the main motive agent discharge orifice 94 centrally located in the smaller base. With this construction the main motive agent discharge orifice 94 is located in advance of the supplemental motive agent discharge orifices 95 and 96. Furthermore the larger base of the projection 93 is spaced from the part of the nozzle 65 containing the supplemental motive agent discharge orifices 95 and 96. With this construction sufficient space is provided for a free circulation of air around the main motive agent discharge orifice 94 and consequently no eddy currents are produced with the result that the coating material does not accumulate on the front face of the nozzle.

It will be apparent to those skilled in the spray gun art that changes may be made in the details of construction, the described and illustrated embodiment of the invention being intended as an exploitation of its underlying essentials, the features whereof will be definitely stated in their true scope in the claims hereto appended.

What is claimed as new, is:

1. An apparatus or tool for applying coating material having, in combination, a body portion having at its rear end a seat for the palm of the operative's hand and having at its front end a surface affording a rest for at least one of the fingers of the hand, the body portion being supported with the thumb of the hand extending longitudinally thereof, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, coating material and motive agent valves, spindles therefor mounted in planes normal to each other, a device movable on the body portion arranged to engage one of the spindles and be actuated by the thumb in its natural hand closing movement, and a connection between said device and the other one of said valve spindles.

2. An apparatus or tool for applying coating material having, in combination, a body portion having at its rear end a seat for the palm of the operative's hand and having at its front end a surface affording a rest for at least one of the fingers of the hand, the body portion being supported with the thumb of the hand extending longitudinally thereof, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, coating material and motive agent valves, spindles therefor mounted in planes normal to each other, a device movable on the body portion arranged to engage one of the spindles and be actuated by the thumb in its natural hand closing movement, a connection between said device and the

other one of said valve spindles, and an adjustable stop for limiting the movement of said device in one direction.

3. An apparatus or tool for applying coating material having, in combination, a body portion having at its rear end a seat for the palm of the operative's hand and having at its front end a surface affording a rest for at least one of the fingers of the hand, the body portion being supported with the thumb of the hand extending longitudinally thereof, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, coating material and motive agent valves, spindles therefor mounted in planes normal to each other, an arm pivoted on the body portion arranged to engage one of the spindles and be actuated by the thumb in its natural hand closing movement, and an adjustable connection between said arm and the other one of said valve spindles.

4. An apparatus or tool for applying coating material having, in combination, a body portion having at its rear end a seat for the palm of the operative's hand and having at its front end a surface affording a rest for at least one of the fingers of the hand, the body portion being supported with the thumb of the hand extending longitudinally thereof, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, coating material and motive agent valves, spindles therefor mounted in planes normal to each other, an arm pivoted on the body portion arranged to engage one of the spindles and be actuated by the thumb in its natural hand closing movement, an adjustable connection between said arm and the other one of said valve spindles, and an adjustable stop for limiting the movement of said arm in one direction.

5. A spray gun having, in combination, a body portion having at its rear end a seat for the palm of the operative's hand and having at its front end a surface affording a rest for at least one of the fingers of the hand, the body portion being supported with the thumb of the hand extending longitudinally thereof, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, spindles therefor, one of said spindles being located in the longitudinal axis of the gun and the other one of said spindles being located in a plane normal to the plane of said axis, and means for operating said spindles to open said valves comprising a device extending along one side of the gun in a direction substantially parallel to one of said spindles and movable by the thumb in its natural hand closing move-

ment in a direction longitudinally of the other one of said spindles.

6. An apparatus or tool for applying coating material having, in combination, means to admit coating material including a valve and a valve spindle therefor; means to subject the coating material to the action of a motive agent thereby effecting the discharge of the coating material including a valve and a valve spindle therefor, said valve spindles being arranged in planes normal to each other, an arm pivoted on the body portion arranged to engage the motive agent valve spindle, and an adjustable connection between the arm and the coating material valve spindle comprising a bushing, secured to the coating material valve spindle, provided with exterior threads, a sleeve having threads engaged with the threads on the bushing, said sleeve having a concaved end face, and a pair of feet, embracing said bushing and engaging the concaved face on the sleeve, secured to said arm.

7. In a tool for applying coating material, an unitary member having on its front face a frusto-conical projection having a central orifice in its smaller base through which the motive agent is discharged and a pair of supplemental motive agent discharge orifices spaced from said frusto-conical projection and arranged in a plane intersecting the frusto-conical projection between its bases.

8. A spray gun having, in combination, means to supply coating material, means to subject the same to the action of a motive agent thereby effecting the discharge of the coating material, coating material and motive agent valves, spindles therefor mounted in planes normal to each other, means for opening the motive agent valve before the coating material valve is opened and for closing the coating material valve before the motive agent valve is closed, means for varying the duration of air-blow before the coating material valve is opened and after the coating material is closed, and independent means for controlling the amount of opening of said valves.

9. A spray gun having, in combination, means for hanging the tool on the operative's hand, means to admit coating material and a motive agent for discharge therefrom, coating material and motive agent valves, spindles therefor, one of said spindles being located in the longitudinal axis of the gun and the other one of said spindles being located in a plane normal to the plane of said axis, one of said spindles having an adjustable sleeve, and means mounted in reach of the thumb of the said hand and having contact with said sleeve and contact with the other one of said spindles for opening said valves.

10. A spray gun having, in combination, means to admit coating material and a motive agent for discharge therefrom, coating ma-

terial and motive agent valves, spindles there-
for, one of said spindles being located in the
longitudinal axis of the gun and the other
one of said spindles being located in a plane
normal to the plane of said axis, and means
5 for operating said spindles to open said valves
comprising a device extending along one side
face of the gun in a direction substantially
parallel to one of said spindles and movable
10 in a direction longitudinally of the other one
of said spindles.

In testimony whereof I have signed my
name to this specification.

WAYNE B. THOMPSON.

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