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SPRAY GUN

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UNITED STATES PATENT OFFICE.

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SPRAY GUN.

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This invention relates to a new and useful improvement in spray guns of the type illustrated in U. S. Letters Patent to Johns, No. 1,361,527, dated December 7th, 1920, to Heinrich, No. 1,382,641, dated June 28, 1921, and to myself, No. 1,436,145, dated November 21, 1922.

My present invention relates particularly to the spray nozzle and nipple of the gun, the object being to produce columns of paint, or other material, possessing different shapes and characteristics, and which columns are to be projected under air pressure against the surface or wall to be coated.

One feature of my invention consists in a relative adjustment between the nozzle and nipple, whereby a column of air of uniform pressure introduced to the nozzle, by having its balance or equilibrium disturbed, will produce columns of paint having different characteristics.

Another feature of my invention is to accomplish the above by a relative longitudinal adjustment between the nozzle and the nipple.

Another feature of my invention resides in an adjustable abutment on the trigger-operated saddle in joint control of the air and paint valves, whereby the operation of the latter may be advanced or retarded with respect to the former.

Another feature of my invention consists in a fixed trigger stop at the point of application of the pressure on the trigger whereby it is practically impossible to spring or accidentally bend the trigger by excessive pressure in operation.

In the drawings:

Figure 1 is a horizontal sectional view through my improved spray gun.

Figure 2 is a front elevational view of a washer used in the gun.

Figure 3 is a front elevational view of a gun.

Figure 4 is a front elevational view of the nipple.

Figure 5 is an enlarged horizontal sectional view through the nozzle and nipple, and

Figure 6 is a sectional view through the nozzle showing the related parts in a changed position.

In the drawings, 1 indicates a casting in the form of a pistol or body having a han-

dle portion 2 provided with an air conduit extending through a nipple 3 to which is connected a flexible tubing leading from a source of compressed air or gas supply (not shown).

4 is a nipple by which paint, powder, or other material to be sprayed, is introduced into the spray gun. 6 indicates a trigger member pivoted by a bolt 7 to a lug extending upwardly from casting 1. This trigger is preferably made of stamped metal, the two leg portions being integrally connected together at the top while the two lower extremities are connected by a rivet 8.

9 indicates a lug on casting 1 against which the trigger contacts when in its fully open position. The presence of this lug 9 prevents the trigger being bent or sprung from excessive pressure on the part of the operator.

10 indicates a floating saddle member with which the upper end of the trigger co-operates. This saddle member is guided in its vertical movement by means of legs 10^a, as disclosed in my patent aforesaid.

In my present construction, the valve 13 which controls the air conduit to the nozzle, is operated by the saddle 10 through the medium of the valve stem 15, whereas the valve 18 which controls the admission of paint to the nipple is controlled by means of a set screw 19 co-operating with its stem 20, said set screw being mounted in the saddle 10. By this arrangement, the set screw 19 can be so adjusted that valve 18 will not be operated at all even though the trigger is fully retracted; or, said set screw may be adjusted so that the valve 18 will be more or less open when the trigger is retracted, or said valve 18 can be operated simultaneously with the operation of the air valve 13. The advance or retardation of the movement of valve 18 relative to valve 13 depending upon the character of material, such as paint or powder, being used, the quantity desired for surface coverage, and other conditions.

21 indicates a nozzle whose inner end is flanged outwardly, said flange being loosely confined between two rings 22-23, which are sweated together, or, in some manner fixed with relation to each other. The ring 23 is interiorly threaded so as to engage a threaded zone on the barrel of the spray gun and when said rings 22-23 are rotated, nozzle 21 is adjusted longitudinally of the barrel.

The nozzle 21 has a slight clearance relative to the barrel and in order to prevent paint from entering between the nozzle and the barrel, I provide a washer 24 at the end of the barrel which washer is forced outwardly by means of a yielding or spreading metal washer 25.

Washer 24 is preferably made of felt or leather and the edges of washer 25 bearing thereagainst tends to force said washer tightly against the interior bore of nozzle 21. Washer 25 is held in place by means of an enlarged body portion of the nipple 26 which is screwed into the forward end of the barrel and which nipple is provided with a central bore contracted at its forward end and through which paint or other material to be applied as a surface covering passes.

The forward end of nipple 26 is reduced to provide a cylindrical portion 27, and an extension 28 lies in advance of the cylindrical portion 27, said extension being produced by an abrupt shoulder constituting the forward wall or terminus of the cylindrical portion 27.

29 indicate a series of short saw kerfs or cuts, preferably produced by rotary cutters so that said kerfs or cuts, are deepest at their forward end and taper thence rearwardly.

30 represents saw kerfs or cuts similarly produced and possessing similar characteristics by being deepest at their forward ends and tapering rearwardly until running out at the surface of cylindrical portion 27. These cuts 30 are longer than the cuts 29, but cuts 30 terminate short of the rear end of the cylindrical portion 27. The cuts 29 and 30 function as metering slots.

The forward wall of nozzle 21 is provided with an axial bore designed to snugly receive the cylindrical portion 27 of the nipple. This central bore of the nozzle is indicated at 31 and is slightly longer than the cylindrical portion 27 which it receives.

32 indicates a concentric recess in the outer face of the front wall of the nozzle encircling the bore 31, the outer inclined wall of this crater-like recess being provided with apertures 33 arranged at diagonally opposite sides, as shown in Figure 3, and directed to one side of the axis of the bore 31, as shown by the arrows in Figure 3.

Assuming that the spray gun is connected to a supply of paint and air pressure, and the set screw is adjusted so that shortly following the opening of the air valve a supply of paint will be admitted to the nipple: If the parts are in the position shown in Figure 6, it will be obvious that when the air pressure is admitted in the nozzle and around the nipple, its easiest passage will be through the bore 31, and while, of course, the ducts 33 are open, they will not emit air under such pressure as will influence the column of air passing through the central orifice 31. Hence, with the parts in the position shown in Figure 6,

the paint, or other other material, is siphoned through the nipple and issues through the orifice 31 practically as a solid cylindrical column enveloped by a carrying cylinder of air under pressure and possessing the requisite velocity. By adjusting the nozzle 21 rearwardly on the barrel so as to cause the cylindrical portion 27 to enter bore 31, the passages for the air will now be so restricted that the air will be caused to pass through the deepest portions of the circular series of kerfs 29 and 30. Hence, the velocity of the air will be increased by these restricted openings, but the circular form of the enveloping column of air around the central column or core of paint will be preserved so that practically a solid circular pattern of paint will be made on the wall or surface to be covered.

By adjusting nozzle 21 rearwardly on the barrel, the areas of the cuts or kerfs 29-30 are gradually decreased, and as the air meets with greater resistance at this point, its pressure and velocity builds up in the ducts 33. Finally, the inner edge of the end wall of nozzle 21 closes the short openings 29 so that only the small shallow openings of the cut 30 are exposed. This position of the parts builds up pressure and velocity of the air passing through the openings 30 as well as through the ducts 33. A further adjustment of the nozzle 21 will eventually close the openings 30, in which event the air will pass through the ducts 33 and as there is no siphoning action in the orifice 31, the spray gun to all intents and purposes is inoperative in this condition.

It will be observed from the above description that the nozzle 21 is free to be rotatably adjusted on the barrel of the casting 1 in any longitudinally adjusted position of said nozzle; hence, the ducts 33 may be in vertical or horizontal alignment or arranged in any angular position, depending upon the desired longitudinal axis of the fan-like spray produced by the gun.

The outer position of the nozzle, as shown in Figure 6, will cause the gun to deliver a practically solid circular column or stream of paint, and as the nozzle is adjusted rearwardly on the barrel, the enveloping film of air is cut down in volume but built up in pressure and velocity, so that as the nozzle is adjusted rearwardly, the column of paint is more thoroughly broken up until eventually it becomes a stream of finely atomized particles. As the nozzle is adjusted inwardly on the barrel, the pressure and velocity is gradually built up in the ducts 33 until the air issuing from these ports becomes effective on the column of paint.

It will be observed from Figure 3, that the blasts emitted from ducts 33 are directed to the side edges of the column of paint, and hence a flattened or elliptical shaped target is produced by lateral distortion rather than

pressure directed against the center of the column.

What I claim is:

5 1. The combination of a spray gun, a trigger, a valve stem, a floating independently movable member interposed between the valve stem and trigger, and an adjustable part on said member for co-operating with said valve stem.

10 2. The combination of a spray gun, a trigger, valve stems for operating valves in control of air pressure and paint, or the like, respectively, a floating independently movable member interposed between said trigger and
15 the ends of said valve, and means on said member and co-operating with one of said valve stems whereby the operation of its controlled valve may be advanced or retarded with respect to the operation of the other
20 valve.

3. In a spray gun, a nozzle adjustably mounted on the barrel portion of said gun, a soft washer mounted on the forward portion of said gun and co-operating with said
25 nozzle, a yielding metal washer bearing against said soft washer, and a nipple screwed into the barrel portion and engaging

said yielding metal washer for forcing the same into spreading contact against said soft washer. 30

4. In a spray gun the combination of a body having a barrel, a nozzle adjustably fitted over the barrel, a nipple in the barrel cooperating with said nozzle, sealing means at the end of the barrel, and means pressed
35 against said sealing means by said nipple, whereby said sealing means is pressed against the barrel and the nozzle.

5. In a spray gun, a nozzle movable longitudinally on the gun and having an orifice, 40 and a nipple having a cylindrical portion operative in said orifice, metering slots in the nipple adapted to be covered and uncovered by the nozzle as it moves relatively to the nipple, supplementary ducts in the nozzle, means
45 for supplying air to the nozzle, whereby air is ejected through at least some of said slots and the supplementary ducts in proportion depending upon the metering action of said ducts in a predetermined position of said
50 nozzle.

In testimony whereof I hereunto affix my signature this 24th day of November, 1922.

THEODORE BIRKENMAIER.