

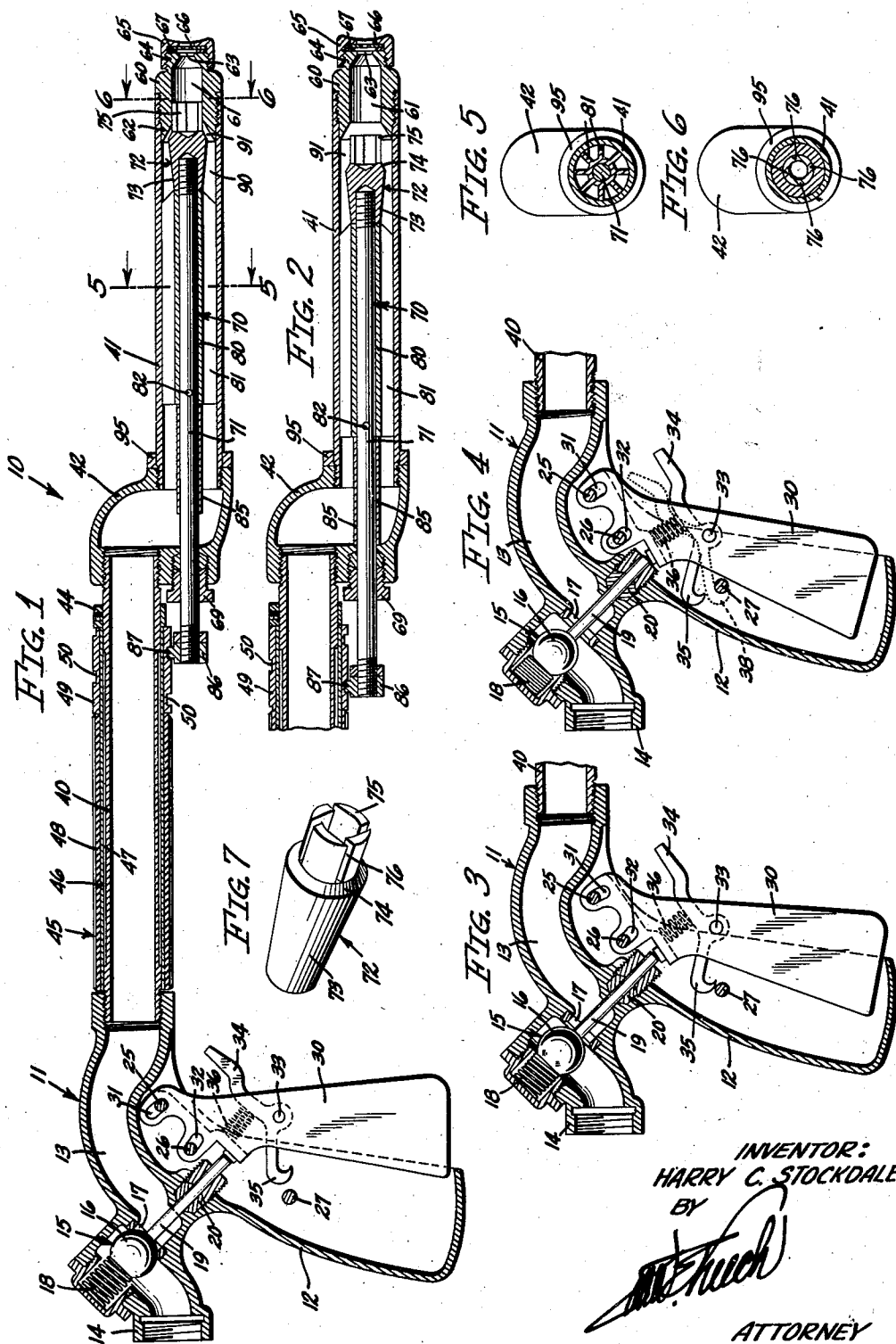
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SPRAY GUN

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SPRAY GUN

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1 Claim. (Cl. 299—117)

This invention relates to spray guns and particularly to spray guns operating under relatively high pressure.

It is an object of this invention to provide a novel and efficient spray gun, the operation of which is relatively easy and which embodies means for controlling the form of the spray produced thereby which can be manipulated without removing the hands from the gun.

It is also an object of this invention to provide a spray gun having a liquid guiding and controlling device for controlling the formation of a spray which may be readily removed as a unit from the barrel of the gun for the purpose of cleaning the same or replacing worn parts.

The manner of accomplishing the aforesaid objects, as well as further objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view through a preferred embodiment of the spray gun of my invention, showing the trigger valve closed and the spray control in a fine spray position.

Fig. 2 is a fragmentary view corresponding to the right hand half of Fig. 1 but illustrating the spray control mechanism positioned so as to throw a solid pencil-like stream of liquid from said gun.

Fig. 3 is a view similar to Fig. 1 of the handle portion of said gun, illustrating the operation of the trigger mechanism to "crack" the valve open.

Fig. 4 is a view similar to Fig. 3 illustrating further opening of the trigger valve after this has been cracked, as shown in Fig. 3.

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 1 showing the liquid straightening spider provided in the invention.

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 1 and a front elevational view of the whirl member of said spray gun.

Fig. 7 is an enlarged perspective view of said whirl member.

Referring specifically to the drawing, the preferred embodiment 10 of the spray gun of this invention shown therein includes a butt member 11 having a pistol grip 12 to assist in supporting and controlling the gun. Formed in the butt member 11 is a liquid passage 13, there being a hose connection 14 at the outer end of this for connecting a hose to the gun. Also provided in the butt member 11 to control the passage 13 is a valve 15 including a valve ball 16 which is urged against a seat 17 by a pressure spring 18 and is adapted to be lifted from this seat by a

valve stem 19 which enters the passage 13 through a packing gland 20.

The pistol grip 12 is hollow and has fulcrum pins 25 and 26, which are disposed varying distance from the stem 19, and a latch pin 27 on the opposite side of the stem therefrom. Mounted in the grip 12 is a trigger 30 having slots 31 and 32 which receive the pins 25 and 26 respectively as clearly shown in Figs. 1, 3, and 4.

Pivotally mounted by a pin 33 on the trigger 30 is a latch 34 having a hook 35 which is adapted to be hooked over the pin 27 when the trigger 30 is compressed so as to hold the valve 15 open. The position of the latch 34 when thus latching the trigger open is shown in broken lines in Fig. 4.

The latch 34 is urged into the position in which it is shown in full lines in Figs. 1, 3, and 4 by a coil spring 36. Thus, if the trigger 30 is compressed to open the valve 15 and while it is compressed the latch 34 is rocked into the broken line position 38 shown in Fig. 4 and the trigger released, the latch will hold the trigger in compressed position. In order to release the trigger 30 from the latch 34, it is now only necessary to press the trigger slightly, whereupon the spring 36 returns the latch to its full line position in the drawing so that when the hand is again relaxed from the trigger, the latter returns to its full line position shown in Fig. 1.

It is also to be noted that in operating the valve 15 by the trigger 30, the initial motion of the latter, which cracks the valve—that is, which first opens it against the pressure of liquid thereagainst—constitutes a rotation of the trigger 30 about the pin 26, thus giving a high degree of leverage to the trigger in cracking the valve. After the valve is cracked, however, not so much pressure is necessary to further open it, and in order to get a considerable movement during subsequent swinging of the trigger 30, the pin 25 provides a fulcrum for the trigger 30 as soon as the lost motion provided by the slot 31 is taken up. This situation is first reached when the trigger is positioned as shown in Fig. 3, after which further inward swinging of the trigger 30 gives a disproportionately large movement of the ball 16 of the valve 15 as shown in Fig. 4.

The spray gun 10 also includes a primary barrel 40 and a secondary barrel 41, adjacent ends of which are connected in offset relation by an adapter 42. These barrels comprise cylindrical tubes which are relatively long when compared with the inside diameter thereof.

The primary barrel 40 is secured to the butt member 11 so as to communicate with the fluid

passage 13. Adjustably fixed on the barrel 40 is a stop ring 44, there being a manual control sleeve 45 rotatably mounted on the barrel 40 between the ring 44 and the butt member 11. The sleeve 45 includes a cylindrical quill 46, the space inside which is partially relieved by a shallow recess 47 formed in the barrel 40. The quill 46 has a friction grip covering 48 which may be of corrugated rubber and a cylindrical cam 49 in which a cam groove 50 is formed.

The secondary barrel 41 has a nozzle member 60 screwed into its front end, this nozzle member being of relatively small cross-section, the portion thereof of largest diameter being flush with the outer surface of the barrel 41. The nozzle member 60 has a liquid whirling chamber 61 which is of smaller diameter than the interior of the barrel 41 and is connected with this barrel by a beveled fillet 62 provided on the inner end of the nozzle member 60. The chamber 61 has a tapered forward end which communicates with a narrow opening 63. The nozzle member 60 is formed with a nipple 64 which is threaded to receive a cap 65 which compresses a disc 66 and a packing washer 67 against the front end of the nozzle, the disc 66 having a central aperture of a size suitable for particular kinds of spraying operations for which it is desired to use the gun 10.

The adapter 42 is provided with an opening having a packing gland 69 which is concentric with the secondary barrel 41.

Longitudinally slidable in the secondary barrel 41 and self-guided by the interior surface of said barrel so as to be axially centered therein at all times under various operating conditions, is a liquid guiding and controlling device 70. This control device includes an assembly and operating shaft 71 which extends slidably through the gland 69 as shown in Figs. 1 and 2. The front end of this shaft is threaded into a liquid spreading and whirling head 72 having an expanding frusto-conical outer surface 73 and a counter-frusto-conical surface 74 at its front end, from which extends a tubular whirl sleeve 75. This sleeve has formed therein a series of slots 76, the latter lying in planes which are parallel with the axis of the barrel 41 and equi-distant from said axis so that said slots 76 have a spiral relation to the axis of the barrel.

It is to be noted that the sleeve 75 is of such a diameter as to slidably fit into the chamber 61 when the device 70 is slid in a rightward direction in the barrel 41. It is also to be noted that the frusto-conical surface 74 is disposed substantially parallel to the frusto-conical surface of the fillet 62 so that as the head 72 is moved to insert the sleeve 75 into the chamber 61 the annular passageway bounded by the frusto-conical surface 74 and the fillet 62 is uniform in thickness at various points therein.

The liquid guide and control device 70 includes a spider sleeve 80 having a series of guide fins 81 preferably formed integrally therewith and extending outwardly to slidably engage with the inner surface of the secondary barrel 41. The spider 80 is rigidly fixed upon the shaft 71 as by a pin 82. Snugly pressed over the shaft 71 is a stop sleeve 85 for limiting the rearward movement of the device 70.

Mounted on the rearwardly extending end of the shaft 71 is a cam follower nut 86 having a lug 87 which extends into the cam groove 50 of the cylindrical cam 49.

Operation

The gun 10 of this invention is adapted to be used for directing high pressure sprays with variable amounts of liquid and to deliver at option a rod-like stream of liquid. While applicable in many arts, this invention is particularly useful in the cleaning of automobiles.

Control of the amount of liquid contained in the spray or rod-like stream projected from the gun is accomplished by the size of orifice in the disc 66. Turning the flow on or off is effected by the trigger 30. Control of the spread of the spray or the selective formation of a rod-like stream of liquid is accomplished by rotation of the cylindrical control sleeve 45. This rotation operates through the cylindrical cam 49 to push and pull on the rod 71 and thus slide the entire liquid guiding and controlling device 70 axially in the secondary barrel 41.

As already pointed out, the fins 81 of the spider sleeve 80 of the device 70 bear against the inner surface of the barrel 41 and maintain this device during said sliding movement at all times axially aligned with said barrel. This, of course, also maintains the head 72 and sleeve 75 in true axial alignment with the nozzle member 60 and the whirling chamber 61 of the latter.

When the valve 18 is opened, by pressing on the trigger 30, the liquid rushes from the passage 13 through the barrel 40 and the adapter 42 into the barrel 41. In passing through the latter barrel, the liquid is guided by the guide fins 81 causing this liquid to travel in paths disposed just inside of the barrel 41 and parallel with the axis thereof. After traveling through the spaces between the fins 81, the liquid enters the annular space surrounding the head 72 where it passes through an increasingly restricted annular passageway 90, from which it flows as a tubular sheet of liquid into an annular space 91 which is disposed between the frusto-conical face 74 and the reverse frusto-conical face of the fillet 62.

If the space 91 is opened up by the extreme rearward positioning of the device 70 as shown in Fig. 2, the liquid passes directly through the space 91 and the nozzle chamber 61 and out through the central aperture in the nozzle disc 66 as a rod-like stream. The stream is thus formed with a high degree of efficiency, this being due to the axial direction imparted to the liquid as it travels between the guide fins 81 and the distention of these streams into a single tube-like sheet of liquid by the passage of these between the head 72 and the barrel 41. This tube-like stream of liquid is caused to converge when it strikes the fillet 62, and enters the chamber 61 with a minimum of friction and turbulence and thus produces a maximum of pressure and dynamic energy in the water occupying this chamber. This in turn produces a relatively high velocity in the rod-like stream of liquid expelled through the aperture in the disc 66.

In order to change this rod to a spray, the operator rotates the sleeve 45, thus propelling the guide and control device 70 axially forwardly in the barrel 41. Fig. 1 shows this operation carried to the point where a relatively fine spray will be emitted from the nozzle of the gun.

As the front end of the tubular whirl sleeve 75 enters the cylindrical nozzle chamber 61, the liquid which theretofore has passed directly from the annular space 91 into the chamber 61, is now forced to flow through the tangential slots 76 into the interior of the sleeve 75 and thence into the

chamber 61. As the liquid enters this chamber after passing through the slots 76, it is whirling rapidly about the axis of the nozzle 60 and forms itself into a whirling spray as it passes outwardly through the aperture in the disc 66.

It is to be noted that the slots 76 are formed in planes which are parallel with the axis of the liquid guiding and controlling device 70 and are spaced uniformly from this axis, these slots being substantially the full length of the sleeve 75 and being uniformly pitched relative to the axis of the head 72.

Attention is called to the fact that as the head 72 of the device 70 is moved toward the nozzle member 60, after the sleeve 75 has once entered the chamber 61, the effective area of the slots 76 is gradually decreased, yet at the same time the angle of the effective portions of these slots relative to the axis of the head 72 remains the same. Thus, although different quantities of liquid are admitted to the chamber 61 for the formation of the whirling spray by the gun 10, a relatively constant whirling tendency is imparted to this liquid as it enters this chamber, so that the spray formed by the gun 10, no matter what its intensity, is of substantially the same whirling character.

One of the important advantages of the present invention resides in the unitary character of the liquid guide and control device 70 which permits this to be assembled with and removed from the secondary barrel 41 of the spray gun as a unit for purposes of cleaning the same or replacing parts which may have become worn. In some instances, also, it is desirable to place the head 72 in use at a given time with another similar head having slots 76 which are differently pitched or of a different size. This may become necessary where the character of liquid to be handled by the gun 10 varies in density or viscosity, or where varying amounts of solid material may be entrained in the liquid handled by the gun.

In the present gun construction, it is to be noted that all of the operating parts of the gun may be exposed to view for the cleaning of the same by the simple operation of unscrewing the secondary barrel 41 from the adapter 42 and sliding this barrel off of the guide and control device 70. In order to render this disassembly and re-assembly of the gun easy, a hex shoulder 95 is provided on the barrel 41, which shoulder abuts against the adapter 42 when the barrel 41 is screwed into the latter.

Another advantage of the spray gun of my invention is the ease with which it may be handled and controlled by the operator. This gun is de-

signed to be carried in the two hands, the pistol grip 12 being gripped in the right hand and the sleeve 45 being gripped in the left hand. The hose is attached to the connection 14 which it is to be noted is above the pistol grip 12 so that when the hose is being pulled along by the operator of the gun it will tend to lift the gun instead of depress this.

In the commercial uses for which the spray gun of my invention is designed it is necessary to be able to quickly alter from time to time the character of the spray issuing from the nozzle of the gun. It is also necessary at frequent intervals to shut the gun off completely and then recommence operations after a short pause. More often than not, it is desirable, when thus recommencing operations, to produce a spray of the same character as was being produced before the gun was shut off. The spray gun 10 of my invention may be operated in this manner without removing the hands from the gun, the function of turning on or shutting off the gun completely being effected by clinching the pistol grip 12 in the right hand so as to swing the trigger 30 inwardly thus opening the valve 15, or the releasing of this grip so as to allow the spring 18 to close this valve and swing the trigger 30 forwardly. The adjustment of the spray control device 70 is effected by rotating the left hand in which the sleeve 45 is gripped.

The design of my spray gun is thus seen to be such that it can be handled so as to direct the spray wherever desired and controlled so as to determine the character of the spray and turn on or shut off the gun without removing the hands from the grips or shifting these in any way from the positions in which the hands grip the gun.

I claim:

In a spray gun, the combination of: a primary tubular barrel; a secondary tubular barrel, the axis of which is offset from said primary barrel; adapter means connecting adjacent ends of said barrels; nozzle means provided in the free end of said secondary barrel; nozzle control means provided in said secondary barrel, said means including a rod for operating said control means; a stuffing box in said adapter means through which said rod passes; a rotary grip provided on said primary barrel, there being a helical thread provided on said grip; and means on the extending end of said rod for engaging with said thread to permit said rod to be shifted axially by the rotation of said sleeve for the purpose of actuating said nozzle control means.

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