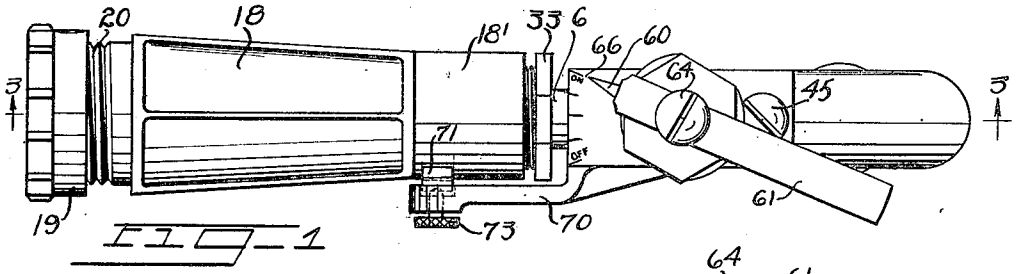
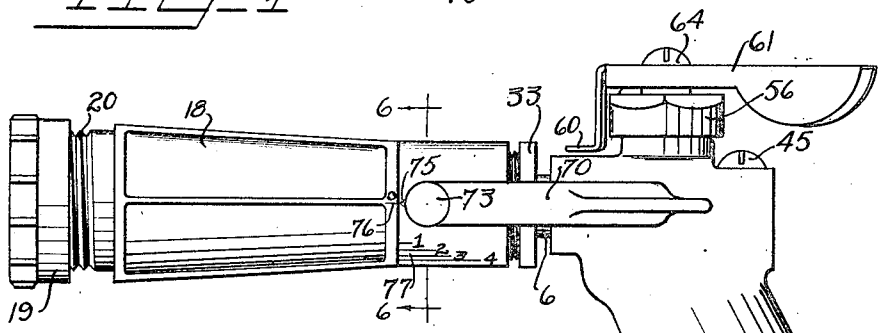
March 5, 1929. W. L. DEMING 1,704,498

SPRAY GUN

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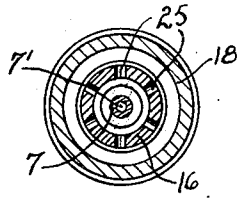



FIG—1

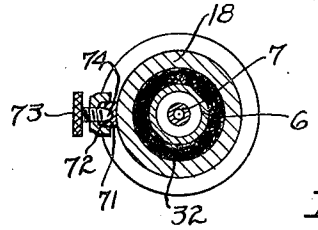



FIG—2

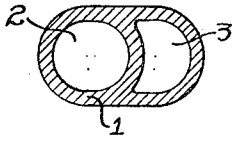



FIG—5




FIG—6




FIG—7

Inventor

William L. Deming

By Bates Macklin Gobrick & Deare

Attorneys

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SPRAY GUN

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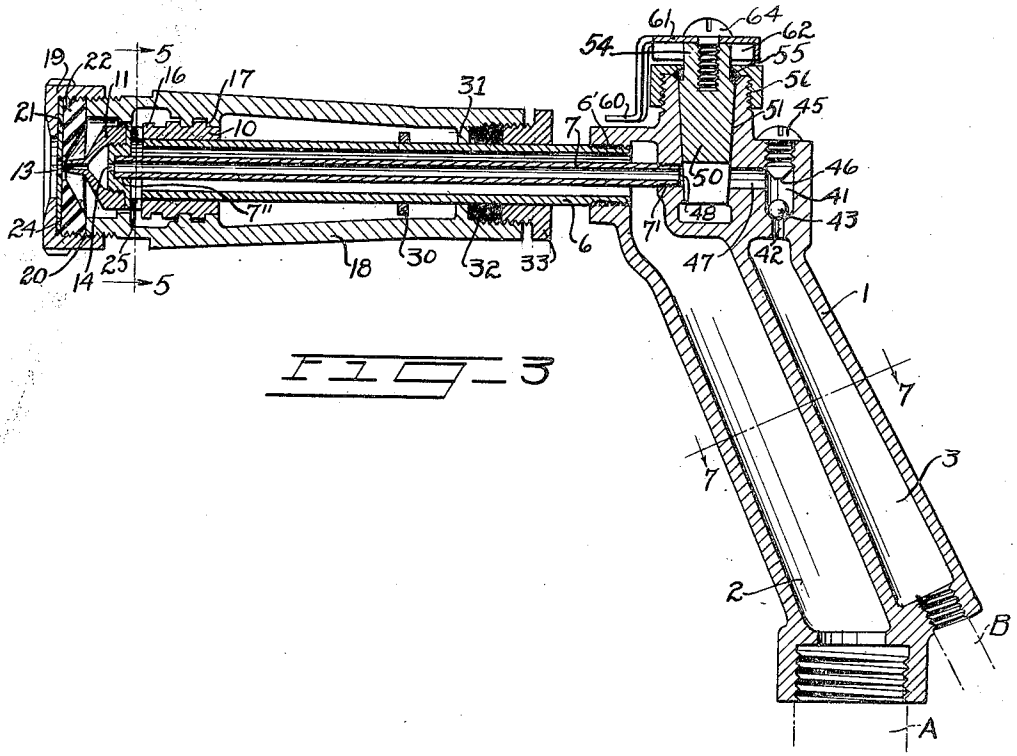



FIG. 3

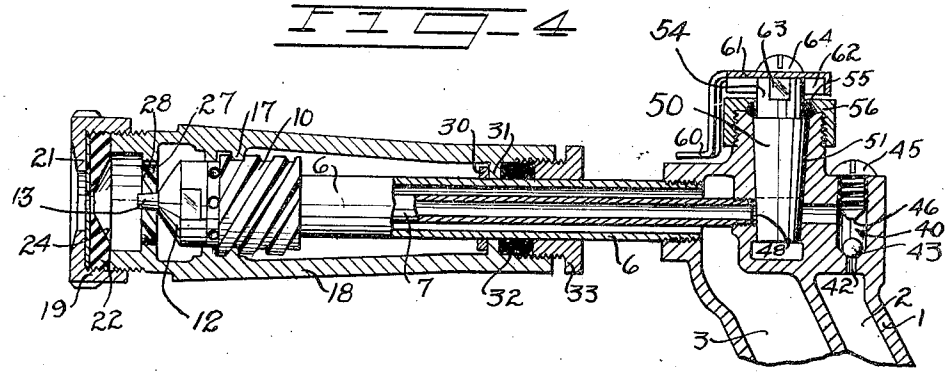



FIG. 4

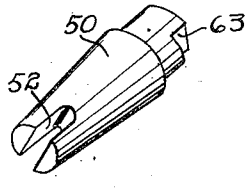



FIG. 8

Inventor

William L. Deming

By Bates Macklin Sobick & Peare

Attorneys

Patented Mar. 5, 1929. 1,704,498

# UNITED STATES PATENT OFFICE.

WILLIAM L. DEMING, OF SALEM, OHIO, ASSIGNOR TO THE DEMING COMPANY, OF SALEM, OHIO, A CORPORATION OF OHIO.

## SPRAY GUN.

Application filed August 14, 1926. Serial No. 129,109.

This invention relates to spraying devices, particularly to a spray gun for projecting a variable mixture of liquids having different characteristics. The particular embodiment shown in the drawings is designed for use with automobile washing apparatus but it is to be understood that it may be used for general spraying purposes, for example spraying disinfecting liquids for destroying insect pests and fungi on fruit trees and other plants.

Car washing establishments have become fairly popular in large cities, in which a car may be washed, while the owner waits. Various cleaning methods employing the use of liquid detergent in some form are followed, such for instance as spraying soapy water from a large tank, or in some cases applying the soapy water with a sponge. The methods now in use however, have various disadvantages, one arising from the necessity of using a large mixing and supply tank for the soapy water. A disadvantage of spraying a mixture of water and soap followed by rinsing with clear water has been that either separate hose lines must be provided (one for the mixture and one for the rinsing water) or the same lines must be reconnected to the clear water source after spraying with soapy water, at a point considerably removed from the nozzle end of such hose lines.

The principal object of the present invention is to provide a spray gun which may be controlled to project liquid under high pressure and liquid under lesser pressure in variable proportions without changing the connections, or having to manipulate valves at a distance from the gun. A further object is to provide a spray gun which will be capable of rapid and simple adjustment for accurately controlling the proportions of the different liquids. More specifically, it is an object to provide a spray gun which will project two liquids of different character from the same nozzle opening, one liquid being admitted to the gun under considerably greater pressure than the other, without danger of the liquid under lesser pressure being forced back into the feed line therefor by the other liquid.

In carrying out my invention, I provide a gun having suitable conduits, one being intended for the clear water under pressure and another for liquid detergent under lesser pressure. There is a valve for shutting off the water and a separate valve for accurately controlling the proportion of detergent or for shutting it off altogether. A peculiarity of the construction is that when properly adjusted for this purpose, the flow of the liquid under greater pressure from the discharge end of the gun induces the flow of the other liquid through the same discharge aperture. There is also provision for preventing the backward flow of the liquid (which is under lesser pressure) consisting, as shown, of a check valve in the liquid detergent conduit. Incidentally, this check valve arrangement functions to shut off the flow of liquid detergent whenever the water control valve is completely opened, wherefore manipulation of this water control valve, for rinsing purposes, effects an automatic control of the detergent without necessitating manipulation of the main detergent or shut off valve.

Other objects and features of my invention will become apparent from the further description, which relates to the accompanying drawings, wherein I have shown my preferred form. The essential characteristics will be summarized in the claims.

In the drawings Fig. 1 is a plan view of my spray gun. Fig. 2 is a side elevation thereof. Fig. 3 is a longitudinal cross sectional view as indicated by the line 3—3 on Fig. 1. Fig. 4 is a similar fragmentary view showing the parts in a different position. Fig. 5 is a transverse cross section through the main water control valve as indicated by line 5—5 on Fig. 3. Fig. 6 is a transverse cross sectional view as indicated by the line 6—6 on Fig. 1. Fig. 7 is a transverse cross sectional view through the handle as indicated by the line 7—7 on Fig. 3. Fig. 8 is a perspective view of the detergent control and shut off valve plug. The spray gun as shown, comprises a pistol grip handle portion 1, having passages 2 and 3 for the main liquid supply and detergent supply respectively. A pair of tubes or barrels 6 and 7, one within the other, as shown, are screwed into this handle portion as at 6′ and 7′ connecting respectively with the passages 2 and 3.

The arrangement for shutting off the flow of liquid from the conduit 6 as well as for secondarily controlling the mixture of liquid detergent and water from the conduits 6 and 7 respectively, comprises an adjustable nozzle device which I will now describe. The tube 6 has rigidly mounted at its outer end a plug, shown as comprising separate parts, a body member 10 and tip 11, the tip being

threaded onto the end of the member 10 as shown, and having conical end surfaces 12, the tip terminating in a tubular extension 13. The interior of this tip member 11, communicates through an opening 14 in the end of the plug 10 with the tube 7. At its rearward portion the body member 10 is externally threaded at 16 to engage complementary internal threads 17 on the interior of a sleeve 18 surrounding and supported by the tube 6. Forwardly of the tip member 11 this sleeve carries an apertured cap nut 19, shown as threaded at 20 to the sleeve and containing an apertured disc 21 and gasket 22. The gasket and disc are securely held in place against the end of the sleeve by the cap nut. The gasket may be formed of any suitable compressible material, such as rubber compound or leather and as shown, has conical surfaces 24 arranged to be engaged by the conical surfaces 12 on the tip member 11 to entirely shut off the water line.

The discharge chamber formed by the plug and sleeve communicates with the discharge orifice formed by the openings in the disc and gasket and with the interior of the tube 6, this latter communication being afforded by reason of radial openings 25 in the body member 10. It will be noted that forwardly of the threads the members 10 and 11 are formed to provide a cylinder of a diameter approximately that of the inside diameter of a rib 27. This rib is positioned forwardly of the threads 17 and has helical grooves 28. It is convenient to form the rib when the sleeve is cast and to afterward form the grooves by the same tools that cut and finish the threads 17. The helical grooves 28 function when the plug is in the relative position shown in Fig. 3, to give the water, forced through the radial openings 25, a whirling movement so that such liquid leaves the opening in the disc 21 in a widely diverging spray. When the sleeve is moved outwardly by turning it to the right into substantially the position shown in Fig. 4, the liquid discharged from the openings 25 is no longer constrained to a whirling movement and leaves the nozzle aperture in a direct jet.

Suppose it is desired to spray a car with a mixture of detergent and water; then the sleeve is turned from closed position, namely with the surfaces 12 and 24 in contact with each other, to substantially the position shown in Fig. 3, in which case the flow of water from the conduit 6, along the conical surfaces 12 and 24 and outwardly through the nozzle opening induces, by suction, the admixture of a quantity of the liquid detergent from the tubular extension 13. If it is desired to get a greater quantity of detergent, the extension may be projected slightly further through the nozzle opening, and if a lesser quantity is desired it is withdrawn farther from the opening by rotating the sleeve to the right.

It will be apparent that when the extension is withdrawn to the position shown in Fig. 4, there will be no tendency for water from the conduit 6 to induce any flow of detergent from the tip since, as a matter of fact, there is then a tendency for such water, which is under greater pressure, to force the detergent back into the tube 7. The means whereby I prevent such backward flow of detergent consists as shown, of a check valve 40, the preferred construction of which I will presently describe.

The above described parts may be easily assembled as follows: The tube 7 may be first screwed into the housing 1, as shown. The plug 10 and stop ring 30 having been securely fastened to the tube 6, and the usual packing 32, and gland nut 33 temporarily assembled in the sleeve 18, the free end of the tube 6 may be then slid through the sleeve and screwed into the handle member at 6′ after which the cap 19 together with the gasket and disc may be put into place as shown. The forward end of the tube 7 is supported by the plug 10, this end of the tube being simply slid into an opening 7″ in the plug when the above mentioned parts are assembled as described.

The check valve 40, above mentioned, may be conveniently placed in a recess 41 having a restricted lower end 42 leading into the passageway 3 in the handle member, the valve comprising preferably a ball 43 normally seating by gravity into the restricted portion 42. A screw 45 may be used to hold the ball in the recess 41.

The primary detergent control and positive shut off valve, as shown, comprises a plug 50 (Fig. 8) seated in a tapered recess 51 in the housing 1, as shown in Fig. 3 and communicating by lateral passages 47 and 48 with the recess 41 and tube 7 respectively. As shown, the plug is slotted at its lower end as at 52, the turned position of the slot determining the amount of detergent allowed to pass to the tube 7. The upper end of the plug is reduced as at 54 and leads through a suitable packing assembly, which may comprise packing 55 and a nut 56.

The means for indicating the position of the valve plug preferably comprises an indicating needle 60 shown as forming a part of valve control handle 61. The handle has downturned flanges 62, fitting over a milled off portion 63 at the upper end of the plug, and may be secured in place by a screw 64 in the top of the plug. Any suitable indicating characters may be placed on the planular surface 66 of the housing 1, or if desired I may provide a separate plate which may have characters stamped thereon for indicating the closed, partially open, and completely open positions of the valve plug.

In Figs. 1, 2 and 6 I have shown means whereby the sleeve 18 may be retained in adjusted position against outward movement

along the tube 6. Such outward movement would ordinarily occur by reason of the water pressure against the inner end surfaces of the nozzle tending to unscrew the sleeve and separate the extension 13 from the nozzle orifice. This, as will be understood from the above description, might result in cutting off the detergent supply unless the operator was careful to maintain a firm grip on the sleeve at all times. In its preferred form, the means consists of a bracket 70, preferably forming a part of the handle member 1, and which extends along the rear end of the sleeve 18. This rear end of the sleeve may be formed cylindrically, as shown at 18′, to coact with an arcuate shoe 71 adjustably mounted in the bracket 70. The shoe may loosely fit a rectangularly formed recess 72 in the inner side of the bracket 70. To regulate the pressure of the shoe on the cylindrical surface, I have shown a set screw 73 bearing at its inner end in a slight recess 74 in the shoe.

To indicate the position of the sleeve the forward end of the bracket 70 may be pointed as at 75 to register with graduations 76 and 77 on the cylindrical surface. The graduation 76 may indicate the "off" position, namely that when the sleeve is screwed to its rearmost position to close the main water conduit, and the graduations 77 may indicate the various washing positions wherein the extension 13 communicating with the detergent line is in such position relative to the nozzle orifice that the detergent is induced to flow therefrom. Other graduations, not shown, may indicate the completely open position of the water control valve.

The intended operation of my spray gun is as follows: Assuming all the valves are closed, the operator will first adjust the handle 61 to admit the required proportionate quantity of detergent and he will then open the nozzle by turning the sleeve to the right. With the sleeve in the position shown in Fig. 3, a diverging spray of water will be projected from the nozzle by reason of the regurgitating effect of the helical grooves 28 above mentioned, and this spray of water will induce the flow of detergent from the tip 13 on the main valve plug 10.

The above parts may be retained in adjusted position without continuous attention on the part of the operator by reason of the shoe 71 engaging the sleeve 18, the positions of the sleeve being varied as desired by simply loosening the screw 73 and turning the sleeve 18 in the required direction and then reclamping the shoe; more or less detergent being admitted, according to the condition of the car to be washed.

The control of the detergent valve is very easily effected by reason of the position of the handle 61 which, it will be noted, is directly above the position of the thumb of the right hand when grasping the handle portion of the gun. When the car has been completely washed, the handle 61 may be turned to "off" position, cutting off the supply of detergent entirely, and the sleeve 18 manipulated to get a stronger and more localized spray of clear water (either hot or cold) whichever may be found most effective in rinsing the car.

Should the operator so choose he need not turn off the detergent valve 50 when rinsing the car since, as above mentioned, when the tip 13 is withdrawn a short distance from the nozzle aperture no flow of detergent from the tip is induced by reason of the back pressure. Should he so fail to turn the valve 50 to closed position all danger of the water backing up in the detergent tube 7, which would result in diluting the detergent in the supply tank, or possibly in overflowing such tank, is prevented by the check valve 40.

Having thus described my invention, I claim:—

1. In a spray gun, a conduit for liquid under pressure, a conduit for liquid under lower pressure, a longitudinally adjustable nozzle for projecting both said liquids from the same nozzle orifice, means whereby the flow of one of such liquids induces the flow of the other from such orifice in varying proportions determined by the adjustment of the nozzle, and means including a check valve for preventing the backward flow of the lower pressure liquid in its conduit.

2. In a spray gun, a conduit for liquid under pressure, a conduit for liquid under lower pressure, an adjustable nozzle for projecting both of said liquids from the same nozzle orifice, means under control of the nozzle whereby the flow of one of such liquids induces the flow of the other from the nozzle orifice or may prevent such flow by a different adjustment, and means including a check valve for preventing the backward flow of the lower pressure liquid in its conduit, during such latter adjustment.

3. In a spray gun, conduit means for a plurality of liquids under different pressures, means including a valve device having a nozzle associated therewith, said device being adjustable to project a higher pressure liquid in a diverging spray while simultaneously inducing the flow of a lower pressure liquid through said nozzle, and means whereby, when the device is adjusted to a certain different position, a direct stream of the first named liquid is projected from the nozzle, and the flow of a lower pressure liquid to the nozzle is cut off by the back pressure.

4. In a spray gun for the purpose set forth, a water conduit, a conduit for liquid detergent, a common adjustable nozzle therefor, arranged to establish communication between the water conduit and nozzle orifice, means whereby the projection of water from such orifice induces the flow of liquid detergent through the nozzle when the nozzle is in

one of its adjusted positions and whereby when in another position the pressure of the water holds back the flow of detergent and means for preventing such detergent from backing up into its conduit.

5. In a spray gun, a conduit for carrying liquid under pressure, another conduit for carrying liquid under lower pressure, a common nozzle therefor having a single discharge orifice, said last named conduit having a tip, arranged to project into the orifice, means including a threaded sleeve for changing the relative position between the orifice and tip, whereby a flow of such liquid under pressure, induces a greater or less quantity of liquid from the tip depending upon its position relative to the orifice, and a check valve in said second named conduit for preventing the return flow of liquid in such conduit.

6. In a spray gun, a supporting member, a conduit carried thereby for conveying liquid under pressure, a nozzle member rotatably carried by the conduit and coaxial therewith, means whereby turning the nozzle with reference to the conduit controls the flow of liquid to the nozzle, and means carried by the supporting member and extending alongside the nozzle member and having a movable part coacting with the nozzle member to lock it in various positions.

7. In a spray gun, a handle portion, a conduit carried thereby, and a valve member mounted on the conduit, a sleeve in threaded engagement with the valve member and having a nozzle portion provided with surfaces arranged to engage the valve member to control the flow of liquid from the conduit, a bracket rigid with the handle member and extending alongside the sleeve, a movable part carried by the bracket and coacting with the sleeve for locking the sleeve in adjusted position, whereby dislocation of the sleeve by reason of the pressure of liquid flowing from the conduit is prevented.

8. In a spray gun, a handle member, a conduit carried thereby, for liquid under pressure, a rotatably adjustable nozzle supported by the conduit and communicating therewith, a bracket rigid with the handle and extending parallel to the conduit alongside a portion of the nozzle, and a set screw carried by the bracket and arranged to lock the nozzle in adjusted position.

9. In a spray gun, a conduit for liquid under pressure, means for supporting the conduit at one end, a valve member carried by the conduit at the other end, a nozzle member in threaded engagement with the valve member and having surfaces contacting with the valve member to control and shut off the supply of liquid flowing from the conduit, said nozzle member having a cylindrical surface at the end adjacent the supporting means, a bracket carried by the supporting means, a brake shoe adjustably carried by the bracket and arranged to contact with the cylindrical surface to hold it in adjusted position, whereby the pressure of the liquid will be prevented from moving the nozzle member.

10. In a spray gun, a supporting member, a conduit carried thereby for conveying liquid under pressure, another conduit for carrying another liquid under lesser pressure, a common adjustable nozzle therefor, means including a tip communicating with the latter conduit and positionable by the adjustment of the nozzle within the nozzle orifice whereby the flow of liquid from the first named conduit induces the flow from the other conduit in variable proportions depending on the adjusted position of the nozzle, and means carried by the supporting member for locking the nozzle in adjusted position.

11. In a spray gun, a nozzle member, a conduit for conveying liquid thereto under pressure, another conduit for conveying liquid thereto under lower pressure, screw threads on the member and one of the conduits permitting adjustment of the nozzle, means controlled by the nozzle when turned for varying the character of the spray, means controlled by the nozzle whereby the flow of liquid under higher pressure induces the flow of the lower pressure liquid to the nozzle, and means for locking the nozzle in adjusted position whereby a spray of a given character may be maintained.

12. In a spray gun, a conduit for liquid under pressure, a conduit extending therethrough for liquid under lower pressure and having an abrupt surface at its end to serve as a valve plug, a cooperating valve member formed to provide a nozzle, said member being in threaded engagement with the first named conduit, said latter member being positionable to open and close the higher pressure conduit to the nozzle orifice and means including a tip projecting abruptly forwardly from the said surface and communicating with the second named conduit and adjustable relative to the nozzle orifice by such positioning of the nozzle member, whereby the flow of liquid therefrom is induced by the flow of liquid from the first named conduit in variable proportions.

13. In a spray gun two conduits each being adapted to carry fluid under a different pressure, a common nozzle therefor having a single orifice, venturi means including such nozzle orifice, whereby the projection of fluid from one conduit induces the flow of fluid from the other conduit, means for adjusting the venturi to cause the difference in pressure to prevent flow from such other conduit and a check valve to at such time prevent return flow in such other conduit.

14. In a spray gun two fluid conduits, one

containing fluid under a different pressure than the other, a nozzle common to both, a sleeve carrying the nozzle and adjustably supported by one of the conduits, a tip communicating with one of the conduits and projecting into the nozzle orifice when the sleeve is in one position, means within the sleeve for at such time imparting a whirling motion to liquid fed under pressure from the other conduit to the nozzle, said sleeve being adjustable to another position in which the whirling means is ineffective and in which the nozzle is carried forwardly from the tip whereby the greater pressure of liquid fed to the nozzle from one conduit may oppose the feeding of liquid under lesser pressure from the other during said latter adjustment.

15. In a spray gun of the character described, a pair of conduit members one surrounding the other, a nozzle member having a discharge aperture communicating with both conduit members, a valve plug having external threads engaging threads on the nozzle member and carried by the other conduit member, said plug being arranged to engage the nozzle and to at such time close communication between the outer conduit member and the nozzle, a handle having recesses formed therein, communicating with the respective conduit members, said handle extending downwardly at an angle from the conduit members, and a valve operably supported by the handle, arranged to restrict and cut off the other conduit passageway, said valve having a handle projecting rearwardly from said handle member and adapted to be moved by the thumb of the operator's hand in position on said handle member.

16. In a spray gun for projecting and mixing two fluids, a conduit member having a threaded enlargement near one end, a sleeve rotatably fitting the conduit member, and engaging the threads, a nozzle cap removably secured to the sleeve, a removable member carried by the enlargement and adapted to serve as a valve plug in cooperation with a valve seat within the cap, said removable member being recessed and adapted to communicate with a separate fluid line, and a hollow projection on said removable member communicating with the recess and arranged to enter the nozzle orifice, whereby the passage of fluid from said conduit induces the passage of fluid from the said separate fluid line at such projection.

In testimony whereof, I hereunto affix my signature.

WILLIAM L. DEMING.