May 15, 1951 F. W. OFELDT 2,552,644

BLENDING NOZZLE

Filed Dec. 14, 1946

Fig. 1

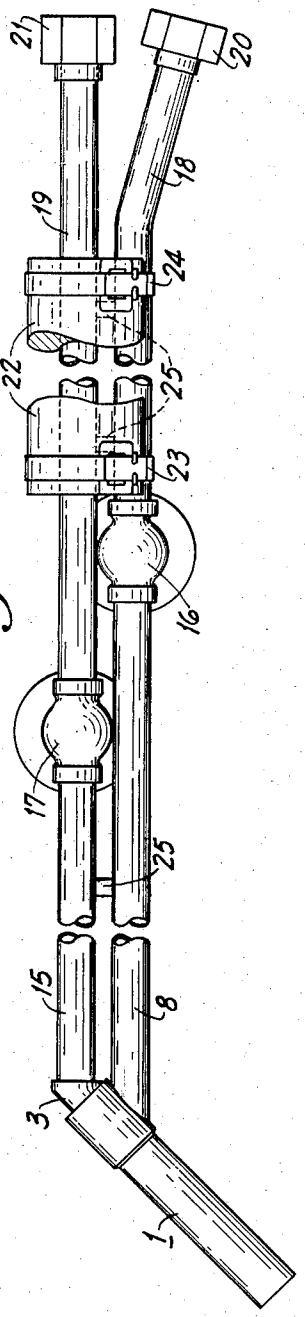
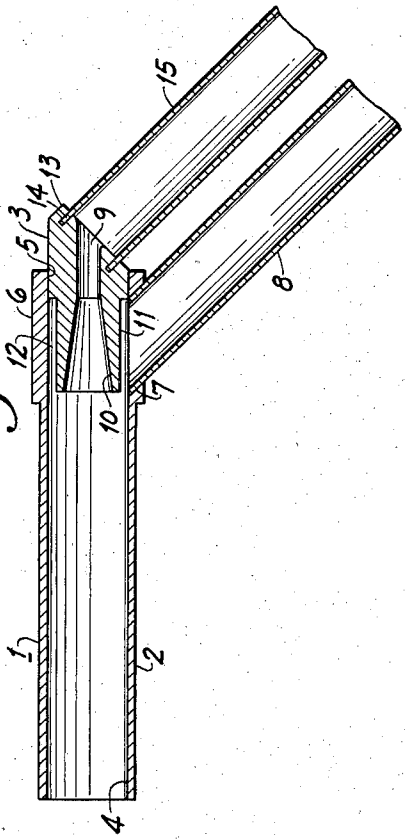


Fig. 2



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2,552,644

BLENDING NOZZLE

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Application December 14, 1946, Serial No. 716,239

1 Claim. (Cl. 299—140)

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This invention relates generally to the method and apparatus for controlling the discharge of fluids under pressure and more particularly to spray gun nozzles for controlling a discharge of a spray mixture composed of a liquid and a vapor of a liquid from the spray generating apparatus.

This invention is an improvement over the invention entitled, Hydraulic System and Nozzle Therefor, disclosed in United States Letters Patent No. 1,958,094, issued May 8, 1934.

Spray generating apparatus with which the spray gun nozzle comprising this invention is particularly adapted comprises a heat transfer means such as a coil to which the liquid spray solution is supplied in metered quantities where it is heated to convert a portion thereof into vapor or steam under pressure to produce a spray mixture composed of liquid and the vapor of a liquid under pressure and the amount of the vapor or steam generated is determined by correlating the amount of heat with the amount of liquid spray solution supplied to the heating coil. Such a spray generating apparatus may be advantageously employed for cleaning or agricultural spraying.

When the spray mixture under pressure is discharged to atmosphere it is atomized and produces a spray for cleaning or a mist, which, if fortified with a chemical such as a germicide, a fungicide or an insecticide may be advantageously employed for agricultural spraying or disinfecting. When used for cleaning purposes such a spray usually contains cleaning compounds and is effective as a cleaning agent when the surface to be cleaned is close to the nozzle from which the spray is discharged. However such a cleaning spray is ineffective as a cleaning agent when the surface to be cleaned is a few feet away from the spray gun nozzle.

The principal object of this invention is the provision of a method and apparatus for the discharge of fluid under pressure such as a spray mixture that is effective as a cleaning agent when the surface to be cleaned is located at a material distance from the spray gun nozzle.

Another object is the provision of a method and apparatus for discharging a liquid under pressure that prevents atomization of the mixture by flashing at the mouth of the nozzle, making the cleaning spray effective at greater distances.

Another object is the provision of a spray gun nozzle for producing a spray stream having a substantially solid liquid central core.

Another object is the provision of a spray gun

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nozzle that produces a concentrated central core of liquid slugs.

Other objects and advantages appear hereinafter in the following description and claim.

A practical embodiment illustrating the principles of this invention is shown in the accompanying drawing wherein:

Fig. 1 is a view in side elevation of the spray gun comprising this invention.

Fig. 2 is a sectional view of the nozzle of the spray gun shown in Fig. 1.

The spray gun shown in Figs. 1 and 2 of the drawing, consists of the nozzle 1 made up of an outer nozzle member 2 and an inner nozzle member 3. The outer nozzle 2 is provided with a bore 4 of uniform diameter throughout its length. The inner nozzle member 3 is arranged to close the rear end of the bore 4 of the outer nozzle as shown at 5 in Fig. 2. The enlarged head 6 of the outer nozzle 2 is provided with a laterally disposed opening 7 arranged to receive a water supply tube 8.

The inner nozzle 3 is materially shorter in length than the outer nozzle and is provided with a central bore 9 which is considerably smaller in diameter than the bore 4 of the outer nozzle 2. The bore 9 of the inner nozzle 3 is provided with an outwardly flaring mouth 10 which terminates within the outer nozzle slightly beyond the mouth of the tube 8 where the latter enters the bore 4 of the outer nozzle 2. The perimetral surface of the inner nozzle 3 is cut away as indicated at 11 for a length substantially equal to the outwardly flaring mouth 10 to provide the annular chamber 12 between the inner nozzle 3 and the bore 4 of the outer nozzle 2 and into which water may be discharged from the pipe 8.

The rear end of the inner nozzle 3 is provided with a flattened surface 13 preferably disposed at an angle to the axes of the nozzles and is provided with an annular recess 14 surrounding the opening of the bore 9 for receiving the end of the tube 15. The tubes 8 and 15 are disposed parallel with one another. This arrangement of parts provides a convenient spray gun that may be readily manipulated without obstructing the view of the operator and also provides an economical structure due to the manner in which the tubes 8 and 15 are connected to the nozzles.

The nozzles and tubes 8 and 15 may be made of any suitable metal which lends itself to be fabricated as by welding or brazing. The tubes 8 and 15 extend rearwardly of the nozzles to their respective shut-off valve members 16 and

17. The other or inlet side of the valve members 16 and 17 is connected with the tubes 18 and 19 respectively, the ends of which are provided with hose fittings 20 and 21. A handle 22, made of insulating material such as wood, encircles the intermediate portion of the tube 19 and partially surrounds the water tube 18, being retained in place by the handle strap clamping members 23 and 24. The handle 22 is preferably made of considerable length, such as two feet, which permits the gun to be readily manipulated. The tubes 8, 15, 18 and 19 are held in spaced relation by means of three spacer blocks 25 distributed therealong. Thus the nozzle 1 together with the strap handle clamps 23 and 24 maintain the tubes in parallel clamped relation against the blocks 25 and provide a unitary spray gun structure.

The included angle of the outwardly flaring mouth 10 of the inner nozzle 3 is approximately fourteen and one-half degrees. If the bore 4 of the outer nozzle 2 is substantially five-eighths of an inch in diameter it should be approximately four inches long and the chamber 12 approximately three-fourths of an inch long and the bore 9 of the inner nozzle 3 should be approximately three-sixteenths of an inch in diameter. A nozzle of these dimensions is capable of discharging water through the tube 8 at the rate of approximately eight gallons per minute when the spray mixture of liquid and vapor of a liquid being transmitted by the tube 15 is approximately one and one-half gallons per minute at a pressure from one hundred to one hundred and fifty pounds per square inch and at a water saturation of from eighty to ninety per cent. A nozzle of these dimensions supplied with such a spray mixture and water, will produce a spray with a substantially solid liquid core which may be projected against a surface twenty to thirty feet in the air and produce an efficient cleaning action on the surface. The water being supplied under domestic pressure and forced into the chamber 12 flows through the bore 4 of the outer nozzle 2 and robs the spray mixture, coming from the mouth 10 of the inner nozzle 3, of its latent heat. A sufficient amount of heat is removed from the spray mixture by the water at this position within the nozzle to prevent the spray mixture of liquid and vapor of a liquid from atomizing by flashing as it issues from the nozzle and a stream of considerable force is formed carrying a substantially solid liquid core which has improved erosive force.

If the valve 16 is shut off to prevent further flow of water to the nozzle, the latter will produce a spray, the central core of which contains concentrated water slugs larger than water drops or globules and has excellent cleaning qualities at distances approximating three feet. This improved nozzle will function to discharge an improved cleaning vapor spray mixture whether the water tube 8 is present or not.

A nozzle of this character is disclosed in my co-pending application Serial No. 716,238, filed December 14, 1946.

I claim:

A spray nozzle structure comprising an outer nozzle closed at one end and having a cylindrical bore of uniform diameter extending inwardly for its full length from its open mouth, an inner nozzle projecting into said closed end and coaxially spaced from the wall of said cylindrical bore to form with said wall an annular rear chamber, an outwardly flaring mouth at the exit end of the inner nozzle, a conduit to supply a spray mixture of liquid and a vapor of a liquid under pressure to the bore of the inner nozzle, and a second conduit to supply liquid to said annular rear chamber, to thereby discharge a spray having a concentrated core of liquid slugs effective to clean a surface a material distance from the nozzle.

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