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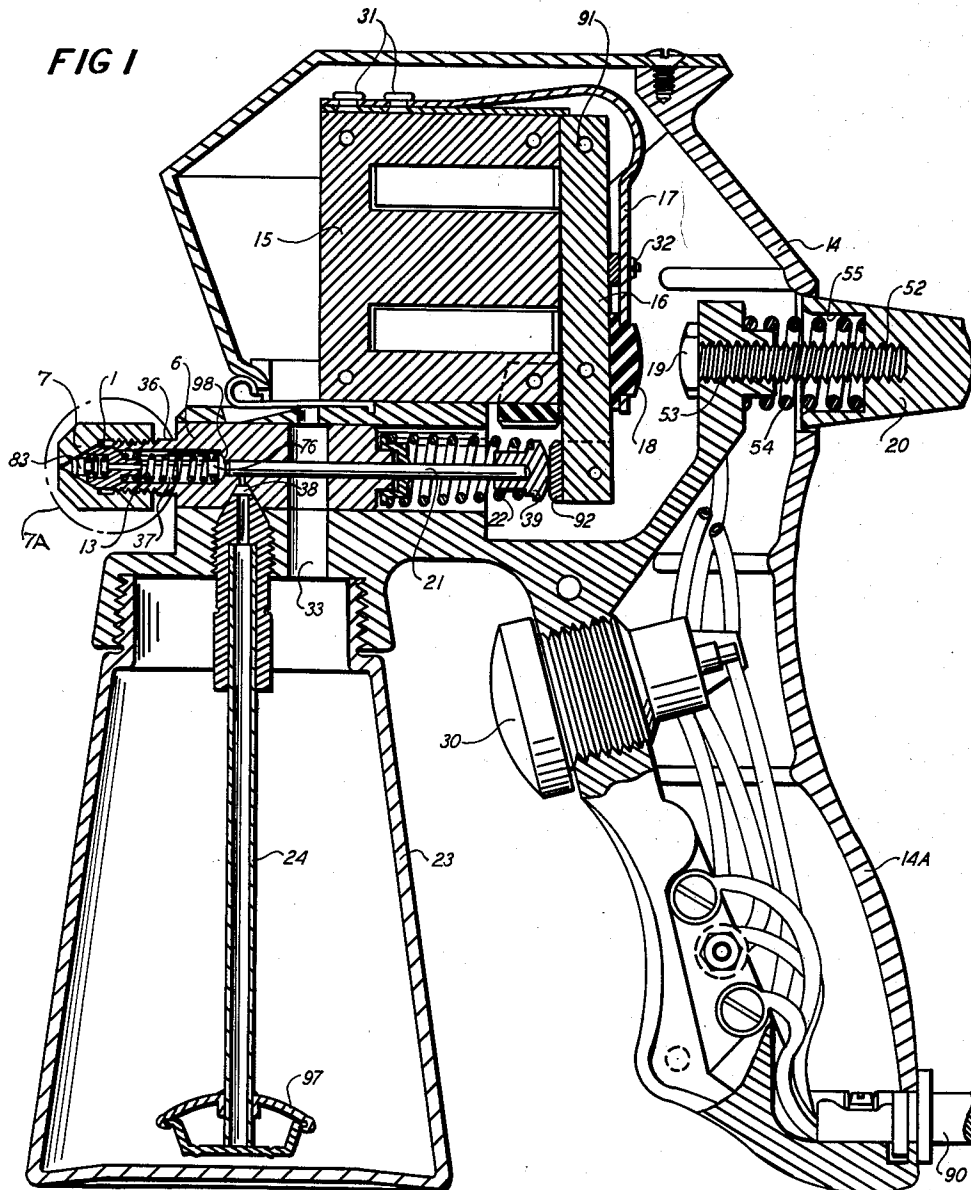
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3,116,879

SPRAY HEAD FOR SPRAY GUN

Filed Jan. 30, 1962

2 Sheets-Sheet 1



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FIG 2

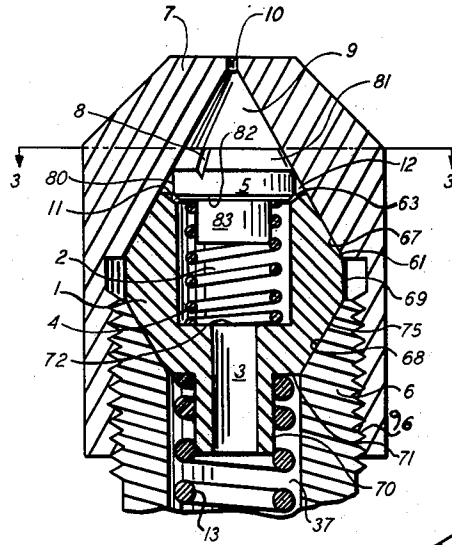


FIG 3

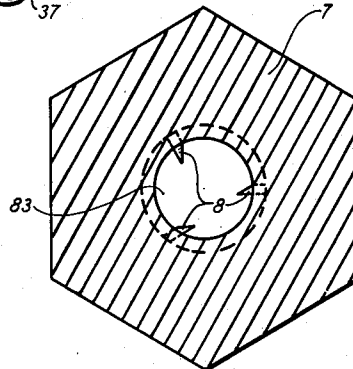
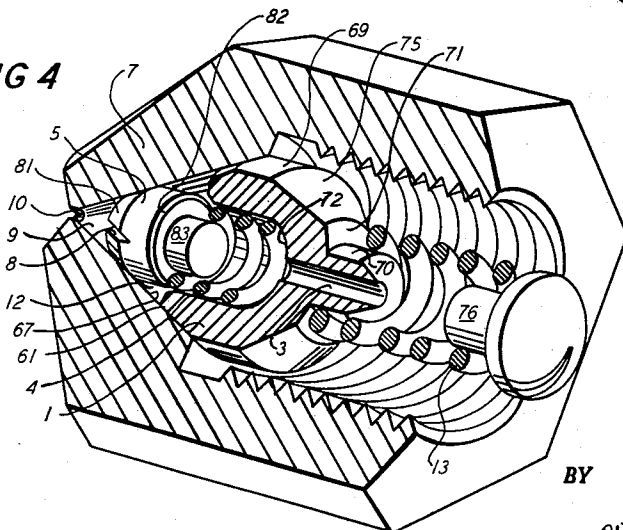


FIG 4



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SPRAY HEAD FOR SPRAY GUN

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3 Claims. (Cl. 239—332)

This invention relates to compressorless spray guns for the atomization of liquids, and more particularly to an improvement in the spray head or nozzle.

The present invention has particular application to that class of spray guns which have a housing constructed in the form or shape of a gun. A liquid holding receptacle is secured to the housing. Within the housing there is located an armature which drives a piston type pump. The liquid aspirated by the pump from a receptacle passes through a spring loaded check valve to and through the apertures in the spray head or nozzle.

The type of spray gun described is used for paints and lacquers. The present nozzle has particular application in the use of cleaning fluids to remove stains on the fabrics of garments. In this use the cleaning fluid must be sprayed at very high speeds in order to permeate the stain.

It is therefore an object of the present invention to provide a new and improved spray head or nozzle for use with a compressorless spray gun.

Other objects of the present invention will become apparent in part and be pointed out in part in the following specification and claims.

Referring to the drawings in which similar characters of reference indicate corresponding parts in all the figures:

FIGURE 1 is a vertical sectional view through a compressorless spray gun.

FIGURE 2 is an enlarged sectional view of the spray head encompassed in the area of the dot and dash circle 7A.

FIGURE 3 is a transverse cross sectional view taken on line 3—3 of FIGURE 2.

FIGURE 4 is a perspective view, partly in section, of the working mechanism of the spray head.

Reference is directed to FIGURE 1 of the drawings. The spray gun consists of a hollow housing 14 having a hollow handle 14A formed in the lower extremity. A starting switch or pressbutton 30 is mounted in handle 14A. An electro-magnet 15 provided with an oscillating armature 16 is located and secured in hollow housing 14. An L-shaped leaf spring 17 is secured at 31 to the top of electro-magnet 15 and is secured to oscillating armature 16 at 32. A resilient or rubber shock absorber 18 is interposed between L-shaped leaf spring 17 and oscillating armature 16. The shock absorber 18 projects through an opening in the leaf spring 17. A pump cylinder 6 having an internally fitted piston 21, an externally threaded projection 36, a chamber 37 axially located in projection 36 and axially aligned with piston 21, is secured in hollow housing 14. A buffer 39 is fixed to the end of piston 21. A coil spring 22 is interposed between buffer 39 and the end of pump cylinder 6. Buffer 39 abuts oscillating armature 16.

A liquid holding receptacle 23 is removably secured to hollow housing 14. An air vent or passageway 33 is provided in housing 14 and in pump cylinder 6 for the venting of and the admission of atmospheric pressure to receptacle 23. A suction pipe 24 secured in hollow housing 14 projects into receptacle 23. Suction pipe 24 provides a passageway between said liquid container and piston 21 through orifice 33 in pump cylinder 6.

The range of movement of the oscillating armature 16 may be varied through the adjustment of the impact

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unit or anvil 19. This is effected by means of a regulating knob or dosage button 20 which is fixed to the shank 52 of anvil 19. Shank 52 is threaded and rotatable within a threaded opening 53 in hollow housing 14. The knob 20 is spring loaded by means of a spring 54 set in a recess 55, to prevent free play and to maintain a given setting.

When the oscillating armature 16 is at its greatest deflection, the liquid discharge is at a maximum. If the deflection of the oscillating armature is adjusted to a reduced range by means of knob 20 which positions anvil 19, then the quantity of the liquid pumped is diminished.

Applicant's contribution to the art, the new and improved nozzle or spray head will now be described. Reference is directed to FIGURES 1 thru 4 and particularly to FIGURE 2.

A nozzle head or cap 7 is axially provided with a threaded area 96 and a truncated cone shaped wall 61 which forms a conically shaped chamber 9. A nozzle orifice 10 provides an outlet from chamber 9 to the atmosphere. Threaded area 63 rotatively engages and is removably secured to externally threaded projection 36.

A packing cone 1 provided with an axial conduit 3, an axial bore 2 and a beveled end 63 and externally with a front cone 67 and a rear cone 68 separated by a circular land 69. Front cone 67 and rear cone 68 taper in opposite directions and away from circular land 69. A reduced diameter 70 projects from rear cone 68 with a wall 71 formed on said rear cone 68 at said reduced diameter 70. A spring seat 72 is formed in the base of axial bore 2. Front cone 67 is adapted to matingly engage truncated cone shaped wall 61. Pump cylinder 6 is provided with a beveled cylindrical surface 75 at the entrance to chamber 37. Said beveled cylindrical surface 75 is adapted to matingly or hermetically engage rear cone 68 with reduced diameter 70 projecting into chamber 37 whereby chamber 37 communicates with axial bore 2 through axial conduit 3. A cap or valve head 76 located in chamber 37 abuts the end of piston 21. A valve seat 98 is formed in the base of chamber 37. A spring 13 is interposed between valve head 76 and wall 71 to yieldingly urge valve head 76 toward valve seat 98 against the tension of spring 22 acting on piston 21.

A swirl head 5 provided with a cylindrical diameter 80 having a truncated cone shaped front surface 81, a beveled rear surface 82 and a projection 83 is positioned in conically shaped chamber 9. Beveled rear surface 82 is in effect a valve plug which engages valve seat 63 to plug or seal one end of axial bore 2. Truncated cone 81 matingly engages front cone 67. A plurality of grooves 8 located in edge of truncated cone 81 and extending through cylindrical diameter 80 provide a fluid passage presently to be described. A swirling head spring 4 is interposed between spring seat 72 and cylindrical diameter 80 to provide passageway 11 between axial bore 2 and a ring chamber 12 formed between cylindrical diameter 80 and front cone 67. Grooves 8 provide an outlet or passageway or conduit between ring chamber 12 and chamber 9. Grooves 8 are not aligned with respect to a common point.

In operation, the driving electric current enters the spray gun through cable 90 to energize electro-magnet 15. Control over the current is obtained by a normally open push button switch 30. The spray gun is driven in a known manner by electro-magnet 15 whose vertical oscillating armature 16 is pivotally supported at its upper end at 91 to electro-magnet 15. Further supporting the oscillating armature 16 is the L-shaped leaf spring 17 fastened at 31 to the electro-magnet 15 and at 32 to oscillating armature 16. During the suction stroke

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buffer 18 impinges against adjustable anvil 19 which limits the movement of oscillating armature 16. The buffer 18 also acts to absorb the shock of said impingements.

The suction stroke is actuated by coil spring 22 which urges piston 21 through buffer 39 against a buttress 92 fastened to oscillating armature 16. It is thus seen that leaf spring 17 acts in conjunction with the attractive force of electro-magnet 15 to urge the oscillating armature 16 against the force of coil spring 22.

The liquid to be atomized is sucked from liquid holding receptacle or container 23 through a suction cup 97 attached to suction pipe 24. From suction pipe 24 the liquid is sucked through orifice 38. This suction effect occurs when the piston 21 moves away from the suction head or nozzle, out of the position illustrated in the drawing, i.e., towards the right, and whereby piston 21 moves away from blocking orifice 38. Piston 21 and liquid pressure will move valve head or cap 76 away from its valve seat 98 located in pump cylinder 6 at the base of chamber 37. Valve head or cap 76 is opposed in this movement by spring 13. During the suction stroke, spring 13 bearing against wall 71 forces valve head or cap 76 against valve seat 98 thus closing the gun, or hermetically sealing the bore in which piston 21 slides between cap 76 and the end of piston 21. Atmospheric pressure passing through vent 33 forces the liquid in container 23 through suction pipe 24.

As valve head or cap 76 is forced away from valve seat 98 the liquid passes through chamber 37, axial conduit 3, axial bore 2, passageway 11, ring chamber 12, grooves 8, conically shaped chamber 9 and nozzle orifice 10. The liquid issues from nozzle orifice 10 in a finely atomized form, at a high rate of speed or velocity. The high velocity is caused by the liquid being forced through the narrow passageway 11, ring chamber 12 and the narrow swirl head grooves 8.

Having shown and described a preferred embodiment of the present invention by way of example, it should be realized that structural changes could be made and other examples given without departing from either the spirit or scope of this invention.

What I claim is:

1. A spray head for a spray gun having a pump cylinder provided externally with a threaded projection and axially with a chamber and a beveled cylindrical surface, a nozzle head axially provided with a threaded area and a cone shaped wall forming a conically shaped chamber, a nozzle orifice in said nozzle head providing an outlet from said conically shaped chamber to the atmosphere, a packing cone provided axially with an axial conduit, axial bore and beveled end, and externally with a front cone and a rear cone separated by a circular land, said front cone and said rear cone taper in opposite directions away from said circular land, a spring seat formed in the base of said axial bore, said front cone matingly engaging said cone shaped wall, said rear cone matingly engaging said beveled cylindrical surface, said threaded area rotatively engaging said threaded projection to secure said nozzle head to said pump cylinder, a swirl head provided with a cylindrical diameter, a cone shaped front surface, a beveled rear surface, a plurality

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of grooves in said cone shaped front surface, spring means interposed between said beveled rear surface and said spring seat urging said cone shaped front surface into mating engagement with said cone shaped wall, a ring chamber formed between said cylindrical diameter and said cone shaped wall, and a passageway formed between said beveled rear surface and said beveled cylindrical surface.

2. A spray head for a spray gun having a pump cylinder, a nozzle head provided axially with a cone shaped wall forming a conically shaped chamber, a nozzle orifice in said nozzle head providing an outlet from said conically shaped chamber to the atmosphere, a packing cone provided axially with an axial conduit, and externally with a front cone, means securing said nozzle head to said pump cylinder, and means securing said front cone in engagement with said cone shaped wall, a swirl head provided with a cylindrical diameter, a cone shaped front surface and a plurality of grooves in the periphery of said cone shaped front surface and said cylindrical diameter, means holding said cone shaped front surface into mating engagement with said cone shaped wall, and a ring chamber formed between said cylindrical diameter and said cone shaped wall, thereby providing a fluid passageway extending from said pump cylinder to said axial conduit, ring chamber, said plurality of grooves, cone shaped chamber, nozzle orifice, to the atmosphere.

3. A spray head for a spray gun having a pump cylinder, a nozzle head provided axially with a cone shaped wall forming a conically shaped chamber, a nozzle orifice in said nozzle head providing an outlet from said conically shaped chamber to the atmosphere, a packing cone provided axially with an axial conduit, and externally with a front cone, means securing said nozzle head to said pump cylinder, and means securing said front cone in engagement with said cone shaped wall, a swirl head provided with a cylindrical diameter, a cone shaped front surface and a plurality of grooves in the periphery of said cone shaped front surface and said cylindrical diameter, resilient means interposed between said swirl head and said packing cone urging said cone shaped front surface into mating engagement with said cone shaped wall, a ring chamber formed between said cylindrical diameter and said cone shaped wall and a passageway formed between said cylindrical diameter and the end of said packing cone, thereby providing a path for fluid extending from said pump cylinder to said axial conduit, said passageway, said ring chamber, said plurality of grooves, said cone shaped chamber, said nozzle orifice, to the atmosphere.

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