

June 4, 1963

S. J. RIDENOUR ETAL

3,092,330

HAND PUMP FOR SPRAYING LIQUIDS

Filed Feb. 13, 1961

2 Sheets-Sheet 1

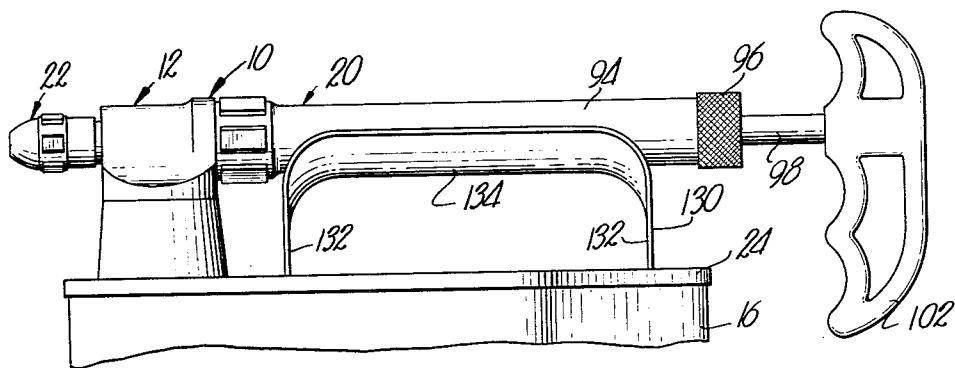


Fig. 1.

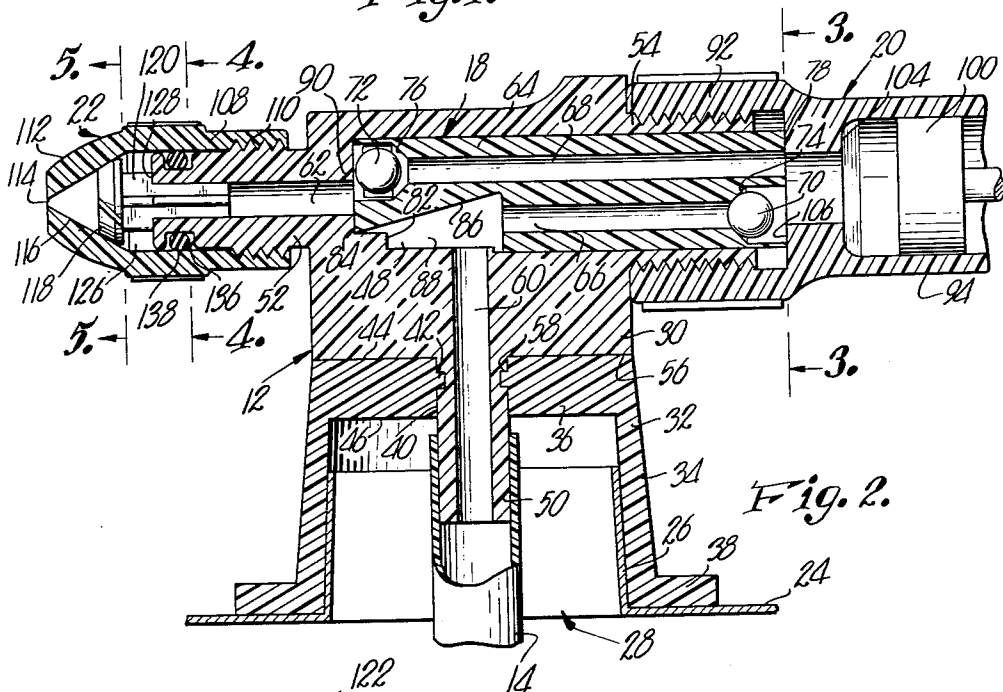


Fig. 2.

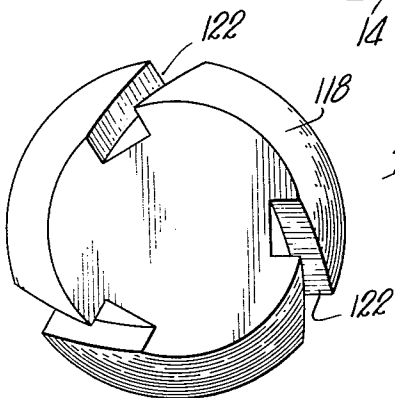


Fig. 6.

INVENTORS.

Stewart J. Ridenour
BY Asa Pickinpaugh

Hovey, Schmidt, Johnson & Hovey
ATTORNEYS.

June 4, 1963

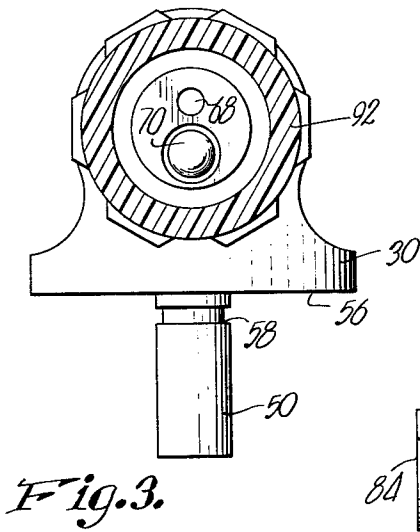
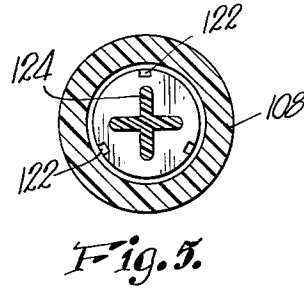
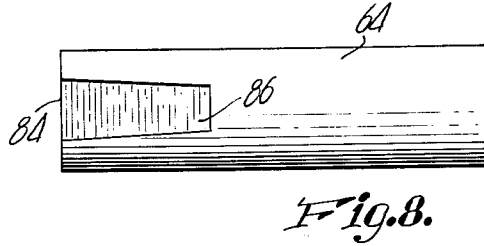
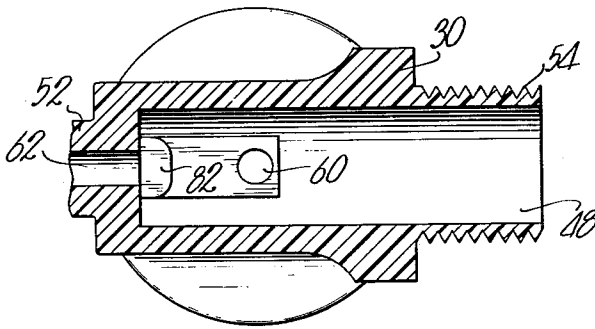
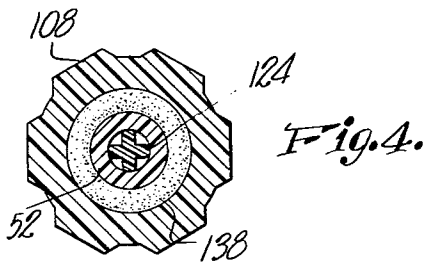
S. J. RIDENOUR ETAL

3,092,330

HAND PUMP FOR SPRAYING LIQUIDS

Filed Feb. 13, 1961

2 Sheets-Sheet 2



INVENTORS.
Stewart J. Ridenour
BY Asa Pickinpaugh

Hovey, Schmidt Johnson & Hovey
ATTORNEYS.

1

3,092,330

HAND PUMP FOR SPRAYING LIQUIDS

Stewart J. Ridenour, Raytown, and Asa Pickinpaugh,
Kansas City North, Mo., assignors to Cook Chemical
Company, Kansas City, Mo., a corporation of Missouri
Filed Feb. 13, 1961, Ser. No. 88,882
6 Claims. (Cl. 239-333)

This invention relates to apparatus for dispensing liquids, such as disinfectants, bug sprays or the like, and relates more particularly to a pump adapted to be attached to a liquids-carrying container for pumping liquids from the latter.

It is the primary object of the present invention to provide a pump for dispensing liquids from a container, which pump includes a body engageable with the container and being of a novel configuration so as to more effectively and positively dispense liquids from the container.

Another object of the present invention is the provision of a pump for dispensing liquids carried by a container, which pump is provided with means for securing the same to the container so that the liquids may be immediately dispensed to thereby preclude the transfer of the liquids to a separate container for the dispensing thereof.

Still another object of the present invention is the provision of a pump for attachment to a container having liquids to be sprayed therein, which pump is provided with a body of yieldable material adapted to be fitted over a spout normally carried by containers carrying liquids of the aforesaid type, whereby to preclude the necessity of external fastening means for securing the pump to the container.

Yet another object of the present invention is the provision of a pump having nozzle means thereon, which nozzle means is adjustable relative to the remainder of the pump so as to obtain various spray patterns to suit the pump to varying conditions of use.

A further object of the present invention is the provision of a pump for spraying liquids, which pump includes a body having an elongated bore therein, valve means within the bore, and pressure varying means operably coupled with the body whereby liquids are consecutively delivered to the bore and dispensed therein under the action of the pressure varying means operated by the user of the pump.

Another object of the present invention is the provision of pressure equalizing means carried within the nozzle for equalizing the pressure of the fluid delivered to the nozzle, whereby the fluid is more effectively dispensed from the nozzle and the spray pattern obtained therefrom is substantially uniform throughout the effective cross section of the spray.

Other objects of the present invention relate to the provision of a cylinder and piston unit providing the pressure varying means operably coupled to the body forming a part of the pump, whereby the liquids may be delivered to the bore of the body and dispensed therefrom under the shifting movement of the piston within the cylinder; to the provision of a support adapted to be secured to the container and engageable with the cylinder for supporting the latter, whereby the cylinder is adequately rendered immovable relative to the remainder of the pump during the operation of the latter; to the

2

provision of a U-shaped support having a bight portion of yieldable material and including a concave, cylinder-receiving surface, whereby the cylinder is cradled in the bight portion at the concave surface thereof and releasably clamped thereto for rendering the cylinder immovable relative to the remainder of the pump during the operation of the latter; to the provision of a body including a pair of removable sections whereby the sections may be molded from a suitable plastic material to obtain a novel configuration for the pump; to the provision of a notched disc disposed within the nozzle of the pump, whereby the disc provides a pressure equalizing means within the nozzle prior to the discharge of the liquids from the latter; to the provision of a stem rigid to the disc and operably coupled to the body for attaching the disc to the latter in spaced relationship thereto; and to the provision of a body having an elongated bore therein and a pair of fluid passages therethrough extending outwardly from the bore, whereby liquids may be introduced into the bore through one of said passage means and dispensed therefrom through the other of said passage means under the action of the cylinder and piston unit.

Other objects of the present invention will become apparent as the following specification progresses, reference being had to the accompanying drawings, wherein:

FIGURE 1 is a side elevational view of the pump which is the subject of this invention, which pump includes a body adapted to be secured to a container and a cylinder and piston unit operably coupled to the body;

FIG. 2 is an enlarged, fragmentary, side elevational view of the body shown in FIG. 1 illustrating the interconnection thereof to the container and the valve and nozzle means operably coupled thereto;

FIG. 3 is a cross-sectional, end elevational view taken along line 3-3 of FIG. 2;

FIG. 4 is a cross-sectional, end elevational view taken along line 4-4 of FIG. 2;

FIG. 5 is a cross-sectional, end elevational view taken along line 5-5 of FIG. 2;

FIG. 6 is an enlarged, end elevational view of the notched disc which is inserted within the nozzle means for equalizing the pressure of the liquid in the latter;

FIG. 7 is a cross-sectional, plan view of a portion of the body forming a part of the pump; and

FIG. 8 is a bottom plan view of the block forming a part of the valve means operably coupled to the body illustrated in FIG. 7.

The pump which is the subject of the present invention is broadly denoted by the numeral 10 and includes a body or housing 12, a tube 14 operably coupled to body 12 and adapted to be inserted within a liquids-carrying container 16, valve means 18 disposed within body 12, a cylinder and piston unit 20, and nozzle means 22 operably coupled with body 12. Container 16 is adapted to contain liquids to be dispensed such as disinfectants, bug sprays or the like. Container 16 is provided with a top 24 closing the normally uppermost end of the latter and a spout 26 secured to top 24 in surrounding relationship to an opening 28 in the latter proximal to one end thereof. Spout 26 is usually of a standard size for containers of the type for containing liquids of the aforesaid character and extends upwardly and terminates at a point in spaced relationship to top 24.

Body 12 includes a pair of sections 30 and 32 which

are interconnected in a manner hereinafter set forth. Sections 30 and 32 are preferably of a plastic material and molded in any suitable manner, section 30 being the normally uppermost section, and section 32 being the normally lowermost section of body 12.

Lower section 32 is provided with a continuous side wall 34 which is substantially cylindrical, an end wall 36 integral with wall 34, and annular flange means 38 integral with wall 34 at the end thereof opposite to the end integral with end wall 36, it being clear that end wall 36 closes one end of side wall 34 and the opposite end thereof being open.

By virtue of the material forming sections 30 and 32, side wall 34 is yieldable and is adapted to be yieldably disposed over spout 26 in closing relationship thereto. Flange means 38 engage top 24 when section 32 closes spout 26 so as to properly support section 32 on top 24. By virtue of the press fit of section 32 on spout 26, liquids are precluded from leaking between the engaging surfaces of spout 26 and section 32. End wall 36 is provided with an aperture 40 centrally disposed therein, and is further provided with an annular protuberance 42 extending toward the center of aperture 40 and intermediate the opposed faces 44 and 46 of end wall 36. Since section 32 is formed from a yieldable material, protuberance 42 is substantially yieldable for a purpose to be set forth.

Section 30 is provided with an elongated bore 48 therein, a pair of projections 50 and 52, and an extension 54 thereon. Bore 48 is adapted to receive therein, valve means 18 so as to control the flow of liquids into and out of bore 48. Section 30 is provided with a lowermost surface 56 which is engageable with the upper face 44 of section 32 when the first of the projections, namely projection 50, is inserted within aperture 40 as is clear in FIG. 2. First projection 50 is provided with an annular recess 58 therein which is aligned with protuberance 42 for receiving the latter when surface 56 of section 30 engages upper face 44 of section 32. Thus, sections 30 and 32 are effectively interlocked and are removable, due to the yieldability of protuberance 42.

First and second projections 50 and 52 are provided with fluid passages 60 and 62 respectively, extending therethrough and into fluid communication with bore 48. Projection 50 is provided with an extremity which is spaced below the lowermost face 46 of end wall 36 when projection 50 is inserted within aperture 40. Tube 14 is secured to projection 50 by press fitting the same over the latter, and tube 14 is adapted to extend to a point proximal to the bottom of container 16 so as to maintain tube 14 within the liquids carried by container 16 substantially at all times. Thus, bore 48 is in fluid communication with the interior of container 16 to permit the passage of liquids from the latter into bore 48.

Valve means 18 includes an elongated block or core 64 having a pair of parallel, longitudinally extending fluid ducts 66 and 68 therethrough, and a pair of ball elements 70 and 72 for ducts 66 and 68 respectively. The ends of block 64 are counterbored to permit all elements 70 and 72 to be carried in the respective ducts and, as is clear in FIG. 2, the counterbores provide beveled, annular surfaces 74 and 76 respectively for the corresponding ducts 66 and 68.

Ball elements 70 and 72 are formed from a lightweight material such as plastic or the like, and are movable into and out of engagement with the corresponding surfaces 74 and 76 with a portion of the external surfaces extending into the corresponding ducts so as to seal the latter. Surfaces 74 and 76 thus provide valve seats for ball elements 70 and 72 to seat the latter to prevent the flow of liquids through ducts 66 and 68. Bore 48 extends outwardly from section 30 and through extension 54 and terminates at the extremity of the latter. Block 64 extends outwardly from the extremity of extension 54 and terminates in spaced relationship to the latter to provide an annular bearing surface 78 against which the cylinder and piston unit abuts in a manner to be described.

Section 30 is provided with a shoulder 82 extending into bore 48 proximal to the end thereof remote from the open end thereof. Block 64 is provided with an edge 84 transversely disposed relative to the longitudinal axis thereof, and spaced from the latter, which edge 84 is engageable with shoulder 82 when block 64 is inserted within bore 48. Edge 84 is the extremity of a V-shaped notch 86 formed by removing a portion of block 64 and presenting a region 88 in fluid communication with first fluid passage 60 in first projection 50 and first duct 66. It is, therefore, clear that block 64 is precluded from rotating about the longitudinal axis thereof within bore 48 when edge 84 engages shoulder 82.

Second fluid passage 62 is disposed in section 30 so that the longitudinal axis thereof is offset from the longitudinal axis of second duct 68 in block 64 when the latter is inserted within bore 48. Thus, section 30 provides an abutment 90 substantially aligned with second duct 68 and providing a surface against which ball element 72 is engageable. Ball element 72 is, therefore, precluded from being removed from the counterbored end of duct 68 and the same is loosely restricted within the counterbore.

Extension 54 is externally threaded and threadably mounts one end 92 of an elongated cylinder 94 forming a part of unit 20. O-ring 80 seals the interconnection of extension 54 with end 92 to preclude the passage of fluid between the latter. Cylinder 94 extends outwardly from extension 54 and terminates at a point thereon proximal to the end of container 16 opposite to the end thereof carrying spout 26. A knurled nut 96 is threadably mounted on the opposite end of cylinder 94 and is provided with an aperture therethrough for receiving an elongated rod 98 having a piston 100 at one end thereof shiftably mounted within cylinder 94.

A handle 102 is secured to rod 98 and is adapted to be grasped by the user of pump 10 for shifting piston 100 between the ends of cylinder 94. An annular limiting surface 104 within cylinder 94, limits the movement of piston 100 toward extension 54. The annular surface 106 opposed to surface 104 provides an abutment for ball element 70 for limiting the movement of the latter and to prevent the same from being removed from the counterbored end of duct 66. Furthermore, surface 106 engages surface 78 of block 64 when the same is inserted within bore 48. It is evident, therefore, that block 64 is firmly disposed within bore 48 and is precluded from movement relative to section 30.

Nozzle means 22 includes a nozzle member 108 having a neck portion 110 threadably mounted on second projection 52 proximal to the interconnection of the latter to section 30, and a converging portion 112 having an orifice 114 therein for passing liquids issuing from second fluid passage 62. Nozzle 108 cooperates with an insert carried by projection 52 and made up of a stem 120 and a disc 118. Converging portion 112 is provided with a frustoconical, inner surface 116 which is engageable with the beveled, peripheral edge of the notched disc 118 disposed within member 108 and spaced from the extremity of second projection 52 by means of the stem 120. Disc 118 is provided with a plurality of notches 122 in the peripheral edge thereof for passing liquids toward orifice 114 of member 108.

Stem 120, rigid disc 118, extends into passage 62 and includes a plurality of interconnected plates or ribs 124, each having a longitudinal edge engageable with the second projection 52 within the second fluid passage 62 thereof. Thus, fluid is permitted to pass through second fluid passage 62 in the regions between the adjacent plates 124 and into a chamber 126 formed between the extremity of second projection 52 and the proximal face of disc 118.

Plates 124 are provided with a discontinuity at the edges thereof engageable with the second projection 52 so as to provide shoulders 128 which abut against the extremity of second projection 52 to limit the inward

travel of stem 120 relative to the second fluid passage 62. It is, therefore, evident that disc 118 is spaced from the extremity of second projection 52 remote from section 30 at all times. Further, since member 108 is shiftable relative to second projection 52, the fluid issuing from second fluid passage 62 is permitted to flow between plates 124, into chamber 126, and through notches 122 of disc 118 toward orifice 114. As member 108 is shifted outwardly away from the section 30, fluid also is permitted to flow into the space thus formed between the frusto-conical surface 116 of member 108 and the peripheral edge of disc 118, to thereby vary the spray pattern of the liquids issuing from orifice 114.

By virtue of the spacing of disc 118 from projection 52, chamber 126 provides a region for equalizing the pressure of the liquids therewithin prior to the passage thereof through notches 122, or through the spaces formed by the shifting of member 108 away from section 30. It is evident, therefore, that by virtue of this construction, a more uniform spray pattern is obtained due to the equalization of the fluid pressure prior to the issuing thereof through orifice 114.

To support cylinder 94 when section 32 is disposed over spout 36, a U-shaped support 130 of yieldable material, is provided, which support 130 is provided with a pair of sides 132 adapted to be secured to top 24 in any suitable manner and a bight 134 interconnecting sides 132. Bight 134 is transversely arcuate and provided with a concave surface facing outwardly relative to top 24 when support 130 is secured to the latter. When side wall 34 of section 32 is press-fitted over spout 26, cylinder 94 is disposed in cradled relationship to bight 134 and, due to the yieldability of the latter, cylinder 94 is substantially clamped, while at the same time being cradled in bight 134. Thus, cylinder 94 is precluded from lateral, as well as vertical, movement during the operation of pump 10. Second projection 52 is provided with an annular depression 136 therein proximal to the end thereof remote from section 30. Depression 136 receives an annular O-ring 138 in sealing relationship to member 108 when the latter is threadably mounted on second projection 52.

In operation, side wall 34 is press-fitted over spout 26 and cylinder 94 is clamped by bight 134. The user of pump 10 may thus move container 16 by grasping bight 134 to move the unit, including container 16 and pump 10 to the desired point of use. Thereupon, by the shifting action of piston 100 within cylinder 94, liquids within container 16 are raised and are dispensed from pump 10 through orifice 114.

As piston 100 moves to the extremity of cylinder 94 remote from body 12, a suction is created within cylinder 94 and thereby second duct 68. Ball element 72 then moves into engagement with beveled surface 76 to close off the proximal end of second duct 68 to prevent the flow of air into the latter. Simultaneously, first ball element 70 is moved in the direction of motion of piston 100 and, therefore, is unseated from beveled surface 74 to permit air, and thereby liquids, to flow through first duct 66 in the direction of movement of piston 100. Due to the atmospheric pressure exerted above the fluid in container 16, fluid is forced upwardly through tube 14, first fluid passage 60, and first duct 66 by virtue of the suction created by piston 100. Thereupon, liquids from container 16 move into cylinder 94 until piston 100 is stopped at the end of cylinder 94 proximal to nut 96.

As piston 100 is shifted in the opposite direction toward section 30, ball element 70 is moved in the same direction to engage beveled surface 74 and thus close first duct 66. The liquids in cylinder 94 are thus forced into second duct 68, unseating ball element 72, passing through second fluid passage 62 and into chamber 126. The liquids then pass into notches 122 of disc 118 and through orifice 114 of member 108. Since sufficient fluid pressure is exerted

by means of piston 100 to force the liquids through orifice 114, the liquids issue from the latter in the form of a spray directed toward the area in which nozzle means 22 is pointed. Liquids continue to issue from orifice 114 so long as piston 100 moves toward the opposite end of its path of travel. Thereafter, the reciprocation of piston 100 alternately forces liquids up tube 14 and into cylinder 94 and thence into second duct 68 and into nozzle means 22 prior to issuing from the latter through orifice 114.

By virtue of the construction hereinafter above set forth, liquids are more effectively dispensed from a container, thus providing more positive assurance of delivery of the liquids to a point of use.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a fluid dispenser, a housing having a bore therethrough, presenting a fluid outlet at one end of the bore, there being a fluid inlet in the housing communicating with the bore and extending laterally therefrom; pump means coupled with the housing in register with the opposite end of the bore; an elongated core in the bore having a pair of longitudinally extending fluid ducts therethrough both communicating at one end thereof with said pump means, the opposite end of one of the ducts being remote from said one end of the bore and in communication with said inlet, the opposite end of the other duct being in communication with said outlet; a check valve at said one end of said one duct for blocking flow of fluid in the latter toward the inlet; and a check valve at said opposite end of the other duct for blocking flow of fluid in the latter toward said pump means.

2. The invention of claim 1, each valve being a sphere, the ducts being counterbored to receive the valves and having seats at their inner ends engageable by the valves.

3. The invention of claim 1, said core having a notch at said opposite end of said one duct in alignment with the inlet and the one duct.

4. Spray control structure for fluid dispensers of the kind having a housing projection provided with a fluid outlet passage, said structure including an insert including a stem having a number of ribs and extending into said passage, the insert being provided with a frusto-conical disc on its outermost end spaced from the projection; and a nozzle on said projection housing the disc, said nozzle being provided with a discharge orifice and an inner surface adapted to mate with the disc, the nozzle being shiftable on the projection to move said surface toward and away from the disc, said disc having a notch for flow of fluid from the passage to the orifice when said surface engages the disc.

5. The invention of claim 4, said ribs being radially disposed on the stem and being enlarged between the disc and the projection, presenting shoulders abutting the outermost end of the projection.

6. In a hand pump, a housing having an elongated bore therethrough and a projection at one end of the housing provided with a fluid outlet passage registering with the bore, there being a fluid inlet in the housing communicating with the bore and extending laterally therefrom; pump means coupled with the housing in register with the opposite end of the bore; an elongated core in the bore interposed between the projection and the pump means, overlapping the inlet and in end-to-end relationship with said projection and said pump means, said core having a pair of fluid ducts therethrough parallel with the longitudinal axis of the bore, one of the ducts placing the pump means and the passage into communication, the other duct placing the inlet and the pump means into communication; valve means for controlling the flow of fluid through the ducts; and structure on the projection controlling the flow of fluid from the latter, said structure including an orificed nozzle shiftable on the projection, and an insert within the nozzle secured to the projection, said nozzle and said insert having cooperating parts for controlling the spray

3,092,330

7

pattern of the fluid emanating from the nozzle as the
nozzle is shifted on the projection.

References Cited in the file of this patent

UNITED STATES PATENTS

852,065	Keller	Apr. 30, 1907
1,861,190	Robertson	May 31, 1932
1,869,869	Smith	Aug. 2, 1932

5

2,016,400
2,753,578
2,753,804
3,002,699

218,773
416,937

8

Tear	Oct. 8, 1935
Lebet	July 10, 1956
Goss	July 10, 1956
Pinke	Oct. 3, 1961

FOREIGN PATENTS

Great Britain	July 17, 1924
France	Oct. 18, 1910