Nov. 27, 1956 H. A. ROSELUND 2,772,031

FLUID GUN

Filed Dec. 2, 1952 2 Sheets-Sheet 1

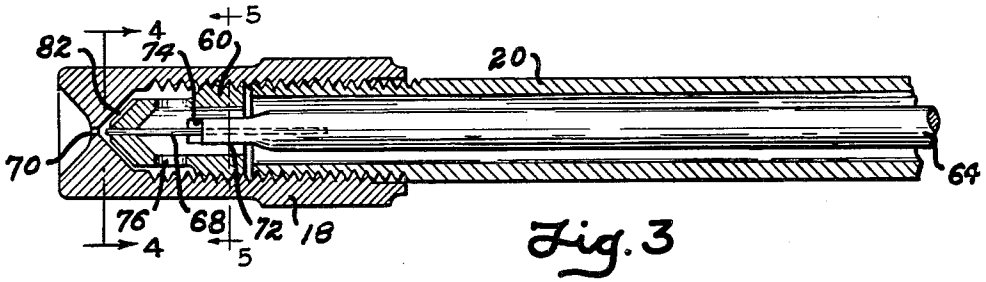

Fig. 3

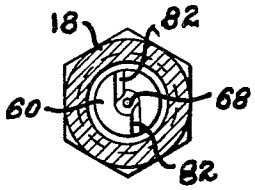

Fig. 4

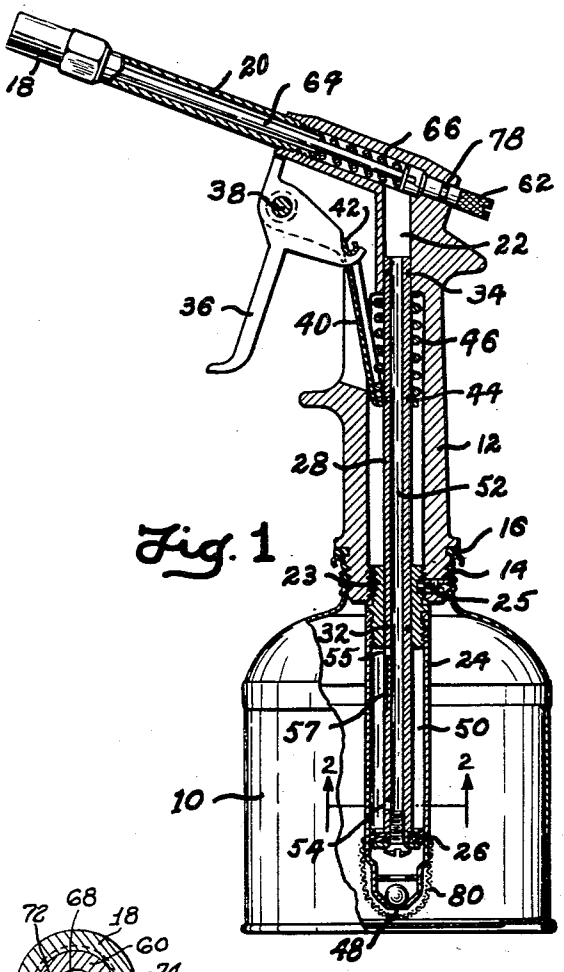

Fig. 1

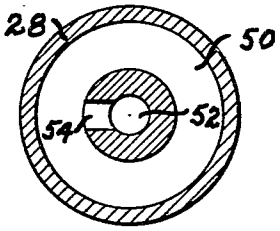

Fig. 2

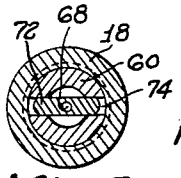

Fig. 5

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FLUID GUN

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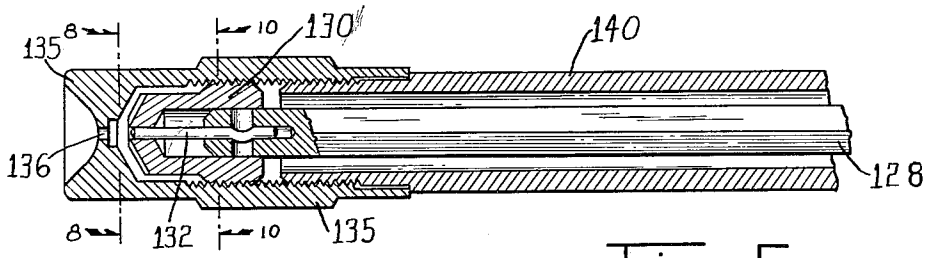

Fig. 6

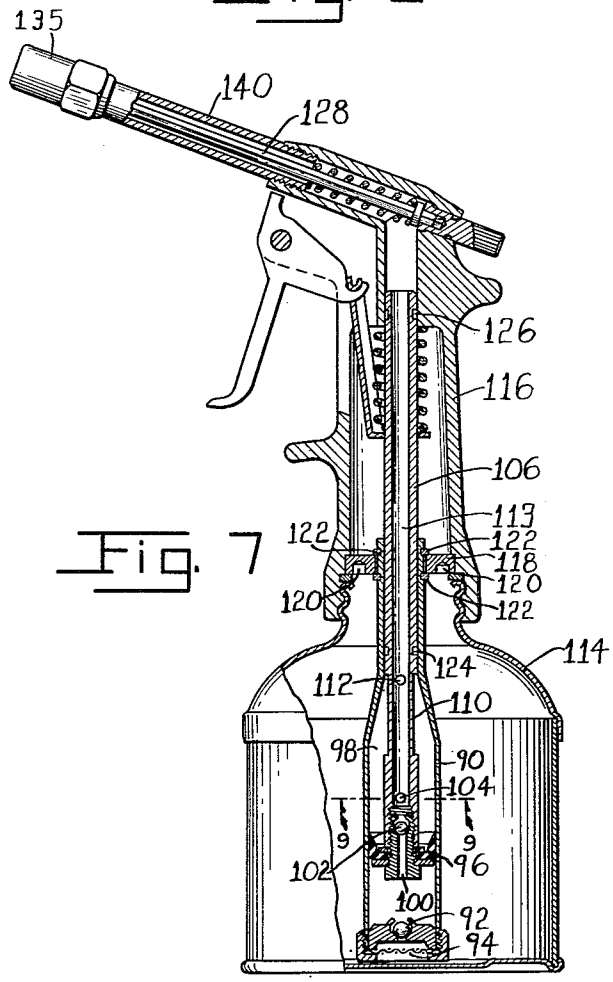

Fig. 7

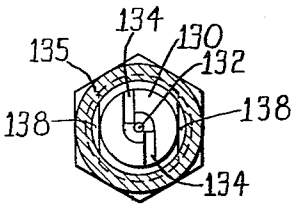

Fig. 8

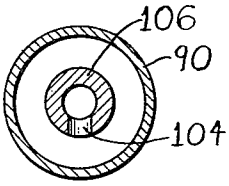

Fig. 9

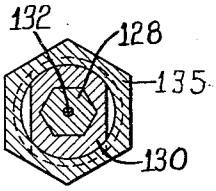

Fig. 10

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FLUID GUN

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Application December 2, 1952, Serial No. 323,636

12 Claims. (Cl. 222—324)

This invention relates to a fluid stream and spray gun of the general type used for dispensing liquids of various kinds and represents an improvement over the gun shown in my earlier Patent No. 1,900,668. This application is a continuation-in-part of my copending application Serial No. 117,461, filed September 23, 1949, now Patent No. 2,626,185.

Guns of this type are frequently used in places where they are given very rough treatment and therefore must be designed to withstand much abuse and at the same time must be made to sell in competition with low cost inferior designs. It is an object of this invention to eliminate the need for using a large number of precision parts or parts which are quick to bind if not assembled with care.

Another object of this invention is to provide a low cost dispenser having a very simple and handy means whereby the fluid may be dispensed either in the form of a fine spray or in the form of a fluid stream.

More particularly, it is an object of this invention to provide a spray gun in which operation of a single button is used for either cleaning the nozzle or for changing the characteristics of the fluid stream leaving the nozzle.

Other objects and advantages reside in the construction of parts, the combination thereof and the mode of operation, as will become more apparent from the following description.

In the drawings, Figure 1 is a vertical sectional view showing the general construction and arrangement of the parts.

Figure 2 is a sectional view on an enlarged scale taken substantially on line 2—2 of Figure 1.

Figure 3 is a sectional view on an enlarged scale showing the nozzle construction.

Figure 4 is a sectional view taken substantially on line 4—4 of Figure 3.

Figure 5 is a sectional view taken substantially on line 5—5 of Figure 3.

Figure 6 is a sectional view on an enlarged scale showing the nozzle construction of a preferred modification of the invention.

Figure 7 is a vertical sectional view showing the general construction and arrangement of parts in the preferred modification.

Figure 8 is a sectional view taken substantially on line 8—8 of Figure 6.

Figure 9 is a sectional view taken substantially on line 9—9 of Figure 7.

Figure 10 is a sectional view taken substantially on line 10—10 of Figure 6.

Referring now to the drawings wherein I have shown a preferred embodiment of my invention, reference numeral **10** designates the main liquid receptacle which is adapted to contain a supply of liquid to be dispensed. Reference numeral **12** designates a pistol grip type of handle which is provided with a conventional screw threaded connection **14** to the receptacle **10** as shown. A suitable gasket **16** is provided between the upper end of the receptacle **10** and the handle **12** so as to prevent the leakage of liquid at this point. The handle **12** is preferably in the form of a casting which serves not only as a handle but also serves as a support for the pumping mechanism and the dispensing nozzle and nozzle control mechanism. The nozzle **18** is screw threaded or otherwise secured to the outer end of the pipe **20** which in turn is supported adjacent the upper end of the handle **12** and which has its central passage communicating with a central passage **22** formed in the handle **12**.

A self aligning piston guide bearing **23** is loosely carried by the lower end of the handle, as shown. The connection between the bearing **23** and the handle is a threaded connection in which the pitch diameter of the threads on the bearing **23** is one to two hundredths of an inch less than the pitch diameter of the threads on the handle. The clearance between the threads constitutes a labyrinth passage through which air may freely enter to replace the oil dispensed but through which only a negligible amount of oil would ever pass. This clearance thus serves a multiple purpose. A set screw **25** is used to prevent unscrewing of the guide after the parts are once assembled.

A tubular extension **24** is threaded to the guide bearing **23** and this extension serves as a pumping cylinder in which a plunger **26** is adapted to operate. The plunger **26** is a conventional cup-shaped member as shown in the drawings and is carried by the lower end of a hollow rod **28** which is supported for sliding movement within the guide bearing **23** carried by the handle **12**, as shown. Upon downward movement of the plunger, the fluid being pumped rushes past the plunger, but upon upward movement of the plunger, the fluid above the plunger is forced upwardly ahead of the plunger in accordance with well-known principles.

Leakage of fluid between the rod **28** and the bearing **23** is prevented by means of a fluid seal **32** which is preferably in the form of an O ring disposed within a circumferential groove formed on the rod **28**. The upper end of the rod **28** slides within the central fluid passage and guide recess **22** formed in the handle **12**. A similar fluid seal **34** is provided at the upper end of the rod **28**, as shown, so as to prevent any leakage between the rod **28** and the walls of the fluid passage **22**. The clearance between the threads on the handle **12** and the guide bearing **23** eliminates the danger of binding between the rod and either the bearing **23** or the handle **12**.

Reciprocation of the piston **26** is produced by operation of the bell crank lever or trigger **36** which is pivotally supported on the handle **12** by means of a fixed pin **38**. When the operator applies pressure on the bell crank lever **36**, the piston rod **28** is pulled upwardly by means of the connecting link **40** which has its upper end journalled in the bell crank lever **36**, as indicated at **42**, and which has its lower end arranged to engage a shoulder **44** provided on the rod **28**. A coil spring **46** serves to bias the piston rod **28** downwardly at all times and consequently as the pressure on the trigger **36** is relieved, the piston rod **28** moves downwardly.

Fluid to be pumped enters the lower end of the pumping chamber **24** through a check valve **48** which allows free flow of fluid into the pumping chamber but prevents the escape of fluid therefrom when the piston **26** moves downwardly. As the piston **26** moves upwardly, the fluid which has entered the cylinder chamber **50** is forced through the aperture **54** into the hollow passage **52** provided in the piston rod **28**. As the piston rod continues to move upwardly, the fluid trapped in the chamber **50** is forced up through the passage **52**, the passage **22** in the handle **12**, the pipe **20**, and is discharged out through the nozzle **18**. Any air which may be trapped in the pumping chamber **50** may escape through

the hole **55** in the side wall of the piston rod **28**. A portion of the rod **28** is cut away directly beneath the hole **55** as indicated at **57**, so as to allow air to escape even after the hole **55** moves up into the bearing **23**.

In order to control the flow of fluid from the nozzle, there is provided a rotatable element **60** within the nozzle which is provided with a screw threaded connection to the inner wall of the main nozzle housing. The location of the member **60** within the nozzle may be changed by rotating the button **62** which is drivingly connected to the outer end of the plunger **64**. The plunger **64** may be either rotated or reciprocated. A spring **66** serves to bias it into the position in which it is shown in Figure 1 of the drawings. However, pressure on the button **62** serves to reciprocate the plunger **64** so that the projecting pin **68** carried by the plunger **64** enters the nozzle orifice **70** so as to clear out any obstructions that may be lodged therein. This reciprocation of the plunger **64** does not change the location of the element **60**, as the flattened end portion **72** of the plunger **64** is free to slide within the slot **74** which is provided in the end of the member **60**.

By turning the button **62**, the member **60** will be moved toward or away from the outlet orifice **70** in the nozzle, depending upon the direction of rotation of the button. The member **60** is provided with one or more grooves **82** adjacent the outer end which are so arranged that when the member **60** moves toward the orifice, the grooves cause the liquid passing between the member **60** and the nozzle wall to flow in a direction tangential to the walls of the orifice **70** so as to cause the liquid to leave the nozzle in the form of a fine spray. These grooves have no appreciable effect when the element **60** is moved toward the rear and consequently the liquid then leaves the nozzle in a solid stream or jet. Thus, when the member **60** is moved away from the outlet of the nozzle by rotation of the button **62**, the liquid will be delivered from the nozzle in a solid stream, whereas if the member **16** is moved up toward the nozzle outlet, the liquid will leave the nozzle in the form of a fine spray.

The member **60** is a hollow screw machine part which may be manufactured very cheaply and still have the necessary accuracy required. Apertures **76** are provided in the side walls of the member **60**, as shown, so that the liquid coming through the tube **20** can find its way to the orifice **70**. Both ends of the plunger **64** are flattened, as shown, and loosely fit within slots in the members **60** and **62**, as shown. By virtue of this construction, there is no trouble in obtaining proper alignment of the parts and all danger of binding has been eliminated. A suitable seal **78** has been provided on the shank of the button member **62** so as to prevent leakage between the member **62** and the opening in the handle **12** through which the member **62** slides.

A screen **80** has been provided at the inlet to the pumping chamber, as shown, so as to prevent dirt particles from entering the pumping chamber.

A preferred modification of the invention is shown in Figures 6, 7, 8, 9 and 10. Pumped fluid enters the lower end of a pumping chamber **90** through a check valve **92**. The check valve **92** and a screen **94** are constructed of two separate parts, thus permitting the removal of both the valve and screen or removal of either the valve **92** or screen **94**, if replacement becomes necessary.

As a piston **96** is reciprocated, fluid enters a cylinder chamber **98** through a passage **100** and a check valve **102**. The fluid then flows upwardly a short distance to an orifice **104** which allows the fluid to pass out of a piston rod **106** into the cylinder chamber **98**. The piston rod **106** is reduced in cross section at **110** to allow the escape of air from the cylinder chamber **98** during the first few reciprocations of the piston **96** as oil fills the cylinder chamber **98**. An orifice **112** at the upper part of this reduced section **110** permits the escaping air from the cylinder chamber **98** to pass upwardly along the reduced section **110**, thence through the orifice **112**, and upwardly through a passage **113** of the piston rod **106**. As the piston rod **106** moves upwardly, fluid in the cylinder chamber **98** is forced into the passage **113** through the orifices **104** and **112**.

Following the ejection of air from the cylinder chamber **98**, only fluid from a receptacle **114** will pass through the passage **113** of the piston rod **106**. As may be noted, the pumping chamber **90** is tapered down in diameter to fit closely over the piston rod **106** above the cylinder chamber **98**. The receptacle **114** is threadedly attached to a handle assembly **116**. A retaining flange **118** is threadedly attached in the handle assembly **116**. Cup-shaped openings **120** in the flange **118** are adapted to receive a spanner wrench to tighten the flange in the handle. The pumping chamber **90** is attached loosely to the flange **118** by means of two snap rings **122**. The loose fit of the pumping chamber **90** into the retaining flange **118** permits alignment of the piston rod **106** and also provides a vent to insure atmospheric pressure upon the fluid in the receptacle **114** at all times.

Leakage of fluid between the piston rod **106** and the upper portion of the pumping chamber **90** is prevented by means of a fluid seal **124**. Leakage of fluid between the piston rod **106** and the upper part of the handle assembly **116** is prevented by means of a fluid seal **126**.

A plunger **128** is similar to the plunger **64** shown in Figures 1 and 3 except that the plunger **128** as disclosed in Figures 6 and 7 is hexagonal in cross section throughout its entire length. A nozzle insert **130** is adapted to receive an end of the plunger **128**. The plunger **128** is used similarly to the plunger **64**. A projecting pin **132** is carried in the plunger **128**. The nozzle insert **130** is provided with one or more grooves **134**. The position of the nozzle insert **130** with respect to the nozzle **135** and the orifice **136** determines the pattern of the fluid as the fluid emanates from the nozzle **135**. The pattern may be changed from that of a stream to that of a fine spray.

Diametrically opposite portions of the essentially cylindrical nozzle insert **130** are flat to form openings **138** between the nozzle **135** and the nozzle insert **130** for the passage of fluid to the orifice **136**. Fluid moves upwardly from the piston rod **106** into the upper portion of the handle. The fluid then moves into a pipe **140** and continues within the pipe **140** flowing between the plunger **128** and the pipe **140**. Fluid then passes into the nozzle **135**, between the nozzle insert **130** and the nozzle **135**, and thence outwardly through the orifice **136**, as above described.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. In a device of the class described, a receptacle, a hollow handle member mounted in one wall of said receptacle and having an internal threaded portion at its lower end, pump means secured to said lower end, said pump means including a piston rod, a guide bearing for said piston rod, the piston rod being axially movable within said guide bearing said guide bearing having a threaded portion arranged in threaded engagement with said first named threaded portion, said threaded portion on said guide bearing having a smaller pitch diameter than said first named threaded portion whereby a labyrinth air passage is provided between said guide bearing and said handle member, and pump operating means supported by said handle member.

2. In a device of the class described, a receptacle, an elongate hollow handle member mounted in one wall of said receptacle and having an internal threaded portion at its lower end, pump means secured to said lower end, said pump means including a hollow piston rod, a guide bearing for said hollow piston rod, said guide bearing having a threaded portion arranged in threaded engagement with said first named threaded portion, said threaded portion on said guide bearing having a smaller pitch diameter than said first named threaded portion whereby a labyrinth air passage is provided between said guide bearing and said handle member, and pump operating means supported by said handle member, said pump operating means comprising a bell crank lever having one arm thereof serving as a pump operating trigger arranged adjacent one side of said handle member, and a link having one end operatively connected to said piston rod and having its other end operatively connected to the other arm of said bell crank lever.

3. In a device of the class described, a receptacle, a hollow handle member mounted in one wall of said receptacle and having a threaded portion at its lower end, pump means secured to said lower end, said pump means including a piston rod, a guide bearing for said piston rod, said guide bearing having a threaded portion arranged in threaded engagement with said first named threaded portion, said threaded portion on said guide bearing having a smaller pitch diameter than said first named threaded portion whereby a labyrinth passage is provided between said guide bearing and said handle member, and pump operating means supported by said handle member, the upper end of said piston rod being arranged to be guided within the upper end of said hollow handle member.

4. In a device of the class described, a receptacle having an opening, a pump supporting member mounted in said opening and having a passage formed therein, a hollow piston rod supported for reciprocation in said passage and having one end projecting down into said reeptacle, means forming a pump cylinder, piston means carried by the lower end of said piston rod for reciprocation within said cylinder, said cylinder having an inlet port, and a check valve in said inlet port, said hollow piston rod having an aperture connecting the interior thereof to said cylinder so as to form an outlet port for fluid within said cylinder, said aperture being located in close proximity to said piston means, said hollow piston rod having a second aperture spaced from said first aperture and having a portion of its outer surface cut away adjacent said second aperture so as to form an air vent for exhausting any air which may be trapped in the upper end of said cylinder pefore discharging liquid from said cylinder, upon any operation of the device.

5. In a device of the class described, a receptacle having an opening in one wall thereof, a pump supporting member mounted in said opening, a piston rod supported by said member and having one end projecting into said receptacle, a guide bearing for said piston rod, said guide bearing and said supporting member having complementary threaded portions whereby said guide bearing is threaded to said supporting member, the threads on said guide bearing having a smaller pitch diameter than the threads on said supporting member whereby a tortuous air passage is provided for admitting air into said receptacle so as to replace fluid dispensed from the receptacle, and pumping means including a pump cylinder supported by said guide bearing.

6. In a device of the class described, a receptacle, a pump supporting member mounted in one wall of said receptacle and having one end projecting into said receptacle, said end having an internal threaded bore, pump means secured to said projecting end, said pump means including a piston rod, a guide bearing for said piston rod, the peripheral surface of the guide bearing being threaded, the guide bearing being threadedly secured within the threaded bore of the end of the supporting member, the pitch diameter of the threads of the guide bearing being less than the pitch diameter of the threads of the threaded bore, thus forming a labyrinth passage between said guide bearing and said end of the support member through which passage air may pass but through which a negligible amount of oil may pass, said pump supporting member having a bearing aperture provided therein forming a second guide bearing for said piston rod.

7. In a device of the class described, a receptacle, a pump supporting member mounted in one wall of said receptacle and having one end projecting into said receptacle, pump means secured to said projecting end, said pump means including a piston road, sealing means for said piston rod, the sealing means being threadedly attached to said projecting end, the pitch diameter of the threads of the sealing means being slightly less than the pitch diameter of the threads of said projecting end so as to allow limited movement of said sealing means relative to said projecting end.

8. In a fluid dispensing device including a receptacle adapted to receive a pump means, the pump means having a hollow handle member, a pump cylinder attached to said handle member, a piston rod contained within said pump cylinder and said handle member, a piston at the lower end of said piston rod, a guide bearing for said piston rod, said guide bearing loosely and threadedly attached to the handle member, the pitch diameter of the threads of the handle member being slightly larger than the pitch diameter of the threads of the guide bearing, thus providing a labyrinth passage between the handle member and the guide bearing, whereby said guide bearing is allowed limited movement relative to said handle member, and pump operating means supported by said handle member.

9. In a fluid dispensing device including a receptacle adapted to receive a pump means, the combination including means forming a pump cylinder, the pump means having a hollow handle member having a hollow piston rod, a guide bearing for said piston rod, a piston means carried by the lower end of said piston rod for reciprocation within said cylinder, said cylinder having an inlet port, a check valve in said inlet port, said hollow piston rod having an aperture connecting the interior thereof to said pump cylinder so as to form an outlet port for fluid within said pump cylinder, said hollow piston rod having a second aperture spaced from said first aperture and having a portion of its outer surface cut away adjacent said second aperture so as to form an air vent for exhausting air trapped in the upper end of said pump cylinder before discharging fluid from said pump cylinder upon any operation of the dispensing device.

10. In a portable pump mechanism adapted for use with portable receptacles, the pump mechanism having a handle member including a pump cylinder containing a hollow piston rod, a piston attached at the lower end of said hollow piston rod, a guide bearing for said hollow piston rod, said pump cylinder having an inlet port, a check valve in said inlet port, said hollow piston rod having an aperture connecting the interior thereof to said pump cylinder, said hollow piston rod having a second aperture spaced from said first aperture and having a portion of its outer surface cut away adjacent said second aperture so as to form an air vent for exhausting any air which may be trapped in the upper end of said pump cylinder before discharging fluid from the cylinder upon any operation of the pump mechanism, a pump operating means comprising a bell crank having one arm thereof serving as a pump operating trigger adjacnt one side of said handle member, and a link having one end opratively connected to said hollow piston rod and having its other end operatively connected to the other arm of said bell crank.

11. In a pump mechanism having a handle member including a pump cylinder containing a hollow piston rod, a piston attached at the lower end of said hollow piston rod, a valve in the lower end of said piston rod permitting passage of fluid into the piston rod, a guide bearing for said hollow piston rod, said pump cylinder having an

inlet port, a check valve in said inlet port, said hollow piston rod having an aperture connecting the interior thereof to said pump cylinder so as to form an outlet port for fluid within said cylinder, said aperture being in close proximity to said piston, said hollow piston rod having a second aperture spaced from said first aperture and having a portion of its outer surface cut away adjacent said second aperture so as to form an air vent for exhausting any air which may be trapped in the upper end of said pump cylinder before discharging fluid from the cylinder upon any operation of the pump mechanism, pump operating means comprising a bell crank having one arm thereof serving as a pump operating trigger pivotally attached adjacent one side of said handle member, and a link having one end operatively connected to said hollow piston rod and having its other end operatively connected to the other arm of said bell crank.

12. In a fluid pump mechanism comprising a pump cylinder having an inlet port provided with a check valve, an elongate hollow handle member, a guide bearing joining the pump cylinder to the handle member, a hollow piston rod within the pump cylinder and extending through the guide bearing and into the handle member, a piston attached to the piston rod at the lower end thereof,

said hollow piston rod having an aperture at the lower end thereof connecting the interior of the hollow piston rod to the pump cylinder forming an outlet port for fluid within the cylinder, said hollow piston rod having a second aperture spaced above the first aperture, the hollow piston rod having a portion of its outer surface cut away adjacent the second aperture forming an air vent for exhausting air trapped in the upper end of said pump cylinder, pump operating means comprising a bell crank having two arms, one arm thereof serving as a pump operating trigger pivotally attached adjacent the handle member, and a link having one end operatively connected to said hollow piston rod and having its other end operatively connected to the second arm of said bell crank.

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