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PORTABLE HAND SPRAY PUMP

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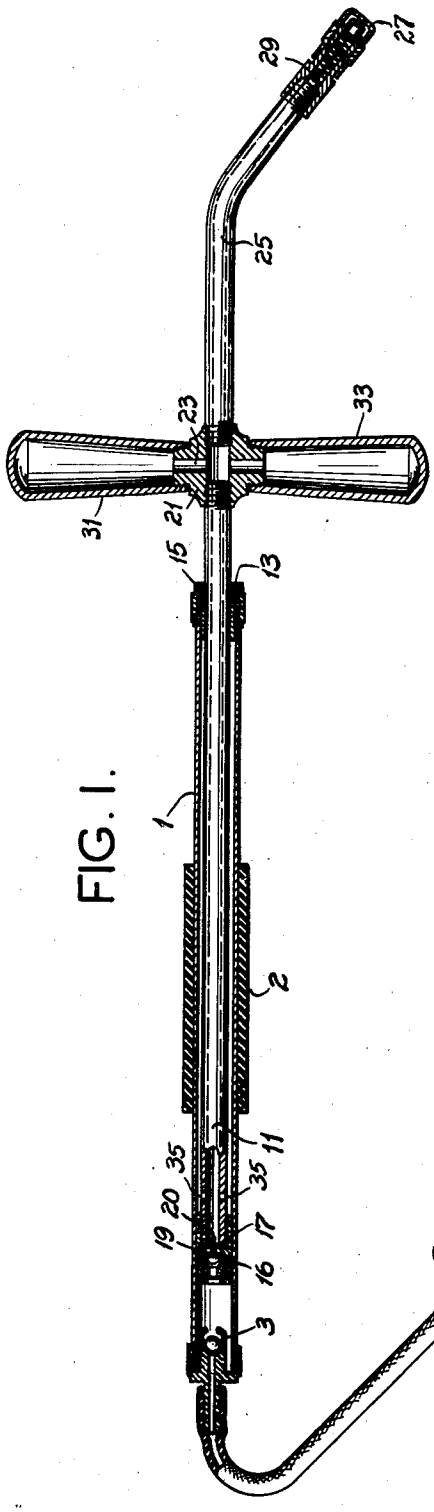


FIG. 1.

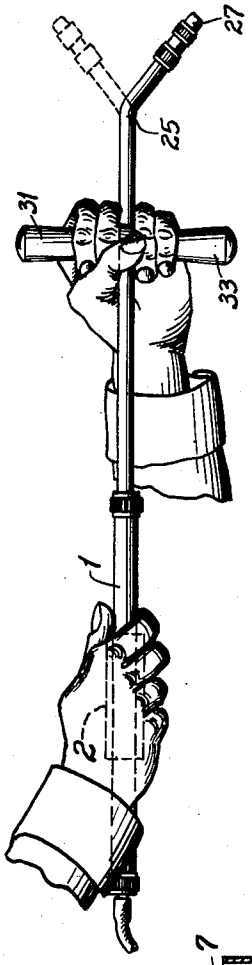
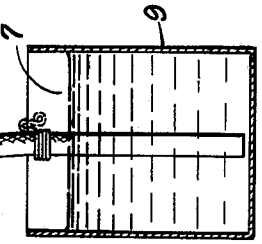


FIG. 2.



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PORTABLE HAND SPRAY PUMP

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2 Claims. (Cl. 299—97)

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This invention relates to hand spray pumps, and with regard to certain more specific features, to portable pumps of the type known generally as the reciprocating trombone type of pump.

Among the several objects of the invention may be noted the provision of a reciprocating hand spray pump incorporating an air expansion chamber for effecting a continuous spray during and between normal reciprocating movements; the provision of a pump of the class described wherein no appendage is required for incorporating the expansion chamber except such as serves an additional useful purpose, thereby simplifying the construction; and the provision of a pump of this class wherein the part providing the expansion chamber is normally held in a proper position to ensure satisfactory operation, thereby simplifying the operation. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a longitudinal section through a pump embodying the invention; and,

Fig. 2 is an elevation illustrating operation and showing in dotted lines an alternative spray position.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Reciprocating hand-operated sprayers for insecticides and the like should be as light and convenient as possible and should preferably produce a continuous spray with minimum effort. The production of a continuous spray, even in the case of a double-acting pump, requires an air expansion or air cushion chamber. These are often quite bulky and particularly so when one also forms a liquid sump carried with the sprayer. To lighten such pumps, particularly where any substantial amount of spray fluid is to be carried, the fluid spray chamber is separate from the pump but this requires an air-tight drum which is expensive.

A so-called trombone style of pump receives its fluid through a suction tube inserted into a separate liquid sump (an open bucket, for example). No air cushion chamber has been used

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heretofore because of the bulk. Consequently, the flow is uneven, being in proportion to the instantaneous piston velocity. This is true despite the fact that this type of pump is double-acting. Thus the flow is zero at the ends of the stroke when the piston is stationary for an instant. An important advantage of the trombone style of pump is that the parts are arranged for comfortably effecting long, powerful strokes. The present invention makes available on such a pump a reliably operative air expansion chamber for producing a continuous spray without undesirable structural or functional complications.

Referring now more particularly to the drawings, numeral 1 shows the barrel or cylinder of a trombone style of pump, at one end of which is a suction inlet, ball check valve 3. This check valve is in communication with a flexible suction hose 5 which leads to a supply 7 of insecticide (for example) in a separate container 9, which may if desired be open or without super-atmospheric pressure. The barrel 1 carries an external grip 2. A reciprocative hollow pump rod 11 passes through packing 13 in the head 15 of the cylinder 1.

At the rear of the hollow pump rod 11 is carried a suitably packed sliding piston 17. The packing is indexed as 16. Associated with the piston 17 is an inlet ball check valve 19 for admitting fluid to the hollow rod 11 upon a back stroke, and trapping the fluid ahead of the piston upon a forward stroke. Ahead of the check valve 19 is a strainer 20. There are also communications 35 in the wall of the pump rod 11 extending between the interior of the rod and the interior of the barrel 1.

The front end of the rod 11 is in communication with a hub 21 in which is a cross passage 23. On the opposite side of the hub 21 (beyond the piston rod 11) is an angled outlet pipe 25 at the end of which is a suitable spray nozzle 27. At the nozzle 27 is an outlet check valve 29. Alternative downward and upward directed positions which the spray nozzle may assume are shown by solid and dotted lines, respectively, in Fig. 2.

In order to reciprocate the rod 11 with respect to the cylinder 1, oppositely directed coplanar hollow handles 31 and 33 are attached to the hub 21. These form a cruciform relationship with the piston rod. Thus the interiors of the handles 31 and 33 are in communication with one another only through the cross passage 23; that is to say the chambers which they form have sep-

arate communications with the inside of the piston rod and with the nozzle 27. Also, both the piston rod 11 and the pipe 25 are in communication with each of the hollow handles 31 and 33 through said cross passage 23. The handles 31 and 33 are of generally cylindric shape, each being closed at one end and attached at the other end to the hub 21 so as to open into the hub. Together, the handles may be considered an elongated hollow member joined in cruciform relation with the piston rod.

The mode of operation of the device is shown in Fig. 2, wherein it will be seen that one arm of the operator (a left arm in the illustration) is extended so that he may grasp the handle 31, 33. The normal natural grasping position for a hand so extended is vertical, as shown. This leaves the other hand for gripping the cylinder 1, the other arm being near the body. By relative motion between the hands (like a motion applied to a trombone), pumping action is brought about. Thus long, powerful and effective strokes are easily accomplished.

Operation is as follows:

Assume that the pump has been primed by initial operation to expel air. Upon a forward stroke of the piston 17 (away from valve 3), liquid will flow from the supply 7 in the container 9 through the suction hose 5 and in through the check valve 3. Upon a backward stroke, the charge in the barrel 1 is trapped by the check valve 3 and under compression flows through check valve 19 and ahead of the piston 17. Since the hollow rod 11 and the barrel 1 ahead of the piston are already full by reason of the communications 35 and prior priming operation, the equivalent of the transferred liquid proceeds out through the pipe 25, outlet check valve 29 and through the nozzle 27 as a suitable spray. This accomplishes the rearward spraying stroke. Upon the next forward stroke, another charge is introduced behind the piston 17 and the charge in the barrel 1 ahead of the piston is forced out through the communications 35, rod 11, pipe 25 and nozzle 27.

Thus it will be seen that a double-acting pumping operation occurs. Only the lower half of the handle 31, 33 will fill with liquid while the upper half will have air trapped in it to function as a compressive cushion for maintaining continuous pressure and flow between reciprocations. In other words zero values in the pressure surges are eliminated so as to obtain a continuous spray.

Since the normal position of the hand for holding the handle 31, 33 is more or less upright, it will be certain that at least one of the handle elements 31 or 33 will always be directed upward, so that such element may properly function as an air expansion chamber. When the parts are held in the solid-line position, the spray is directed downward. If it is desired to direct the spray upward, the handle 31, 33 is rotated through 180° for a new hand grip thereon, thus placing the outlet nozzle in the dotted-line position.

Practically never, or at least seldom, will the handle be placed exactly horizontally, since a horizontal position of the hand is not a convenient one for pumping. Thus not only is the handle used as an air compression chamber, but one is assured that it will always be in proper position for proper air-cushioning effect, and this without the requirement of any additional complicating part or parts to be used as an air chamber.

One or another member 31 or 33 is effective as an air cushion chamber when it is substantially above the other (not horizontal). The term "upright" as used in the following claims is therefore intended to be construed broadly to refer to all operating positions of the handle 31, 33 which are substantially removed from the horizontal.

It may be noted that the common plane of the handle parts 31 and 33 includes the central directional line of the pipe 25 and nozzle 27. Thus it is easy to direct a spray up or down without destroying the air cushion which will automatically form in one or another of the members 31 or 33.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions, without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a double-acting hand spray pump of the trombone type which includes a cylinder and a relatively reciprocal hollow piston rod extending from the one end of the cylinder and having a nozzle rigidly attached thereto; the provision of an elongate hollow handle member affixed to the piston rod where the piston rod extends from the cylinder, the elongate handle member being affixed in cruciform relation with the piston rod, and a passage connecting the inside of the piston rod with the inside of the handle member at their points of intersection.

2. A double-acting hand spray pump as set forth in claim 1 wherein the nozzle is rigidly attached to the piston rod by means of an angled pipe member beyond the handle member and in a position so that a common plane includes said angled member and said elongate handle member.

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