United States Patent

Korda

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[54] SPRAY CONTROL VALVE

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[52] **U.S. Cl.** **239/337,** 239/583

[51] **Int. Cl.** **B05b 7/32,** F23d 13/04

[58] **Field of Search** 239/578, 582, 583, 337

[56] **References Cited**

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[57] **ABSTRACT**

A hand operated sprayer includes a tank containing liquid to be sprayed under pressure connected to a flexible hose with an extension tube having a nozzle at its discharge end for controlling the spray pattern. A leakproof control valve is interposed between the hose and extension tube to turn on and shut off the flow of liquid to the extension tube. Such valve embodies a valve body with the liquid flowing in at one end and out at the other end. A plunger slidable within the body can be moved either to seal off the outlet opening or to unseal such opening and permit liquid to flow through by-pass channels in the plunger. A thumb knob passes through a slot in the valve body and is affixed to the plunger for easy movement. The plunger is provided with an elliptical or rectangular channel holding an O-ring to prevent leakage around the slot and thumb knob.

8 Claims, 5 Drawing Figures

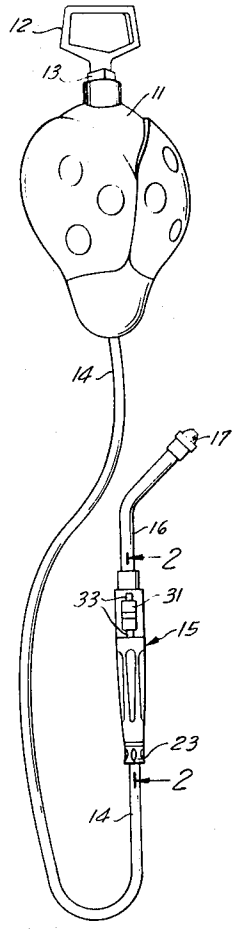


FIG. 1

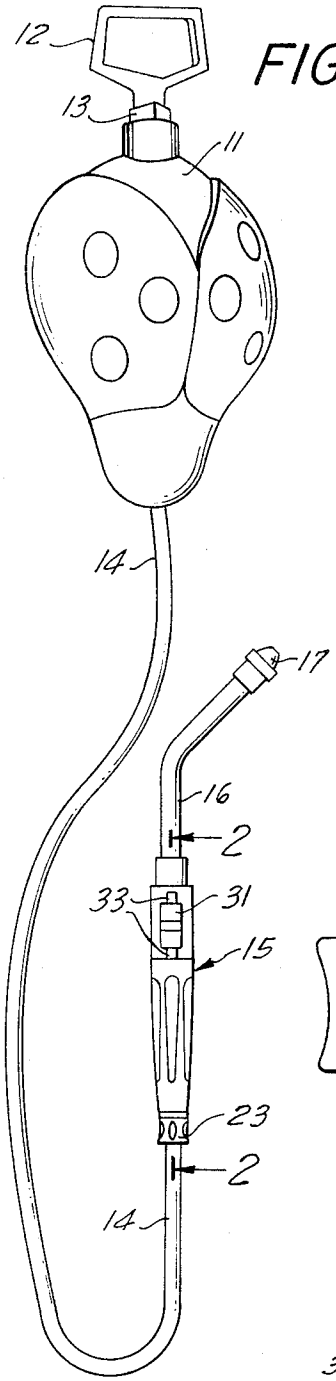


FIG. 3

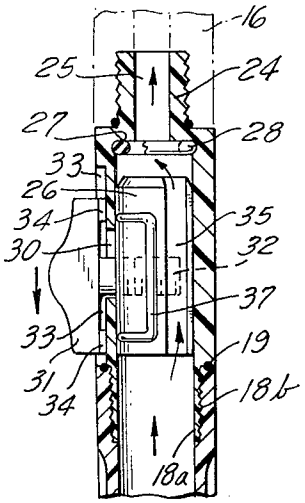


FIG. 4

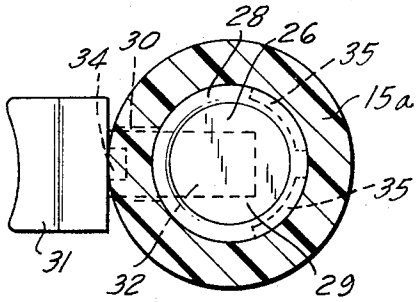


FIG. 2

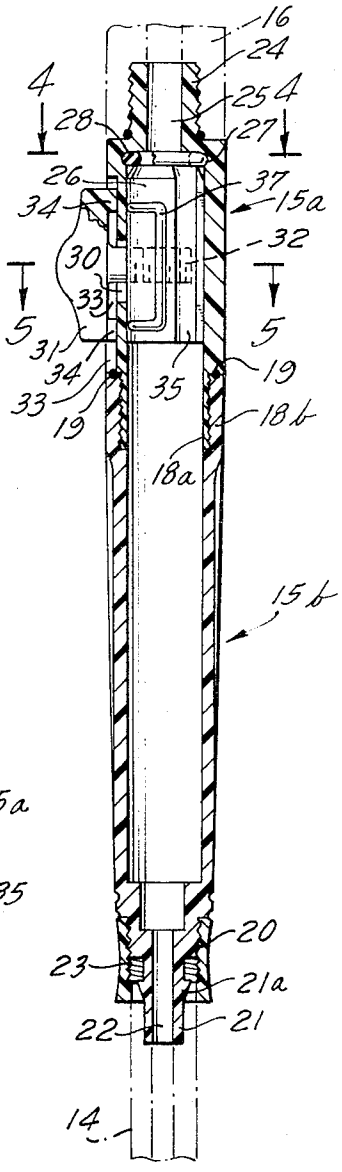
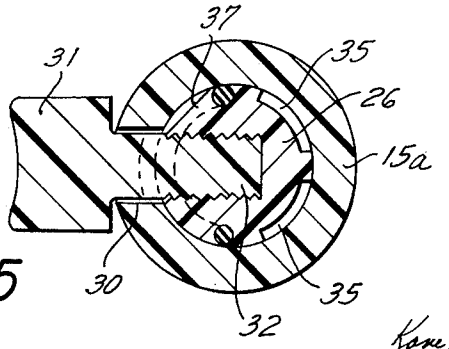


FIG. 5



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SPRAY CONTROL VALVE

BACKGROUND OF THE INVENTION

This invention relates to an improvement in spray control valves and, more particularly, to an improved control valve of the type ordinarily interposed between a conduit leading from a sprayer container containing liquid to be sprayed under pressure and a tube extension having a nozzle at its discharge end for controlling the spray pattern.

In conventional sprayers of the type using the control valve covered herein, such as compression sprayers for garden, household or industrial use, the control valve is threaded to the conduit and extension tube by means of fittings which require tools such as wrenches, etc. to connect the parts and seal the joints against leakage. Furthermore, it is common practice to couple the rear end of a valve stem to a pivotal thumb lever for purposes of unseating a valve against the bias of a compression spring to permit liquid flow. Such valve construction requires suitable packing or gasketing to prevent liquid under pressure from passing from the valve chamber around the valve stem. Frequently chemicals will leak around the valve and may contaminate the hand of the operator.

It is a principal object of this invention to provide an improved spray control valve which permits the valve to be affixed or removed from its adjacent parts manually and by simple finger action, thereby eliminating the necessity of tools for such purposes.

Another object is to provide a leak-proof control valve which eliminates springs entirely, uses a minimum of packing rings, requires the assembly of a minimum number of parts, each individually simple to construct, whereby the cost of the sprayers, control valves and replacement parts is greatly reduced.

Another object is to provide a leak-proof control valve which turns on and seals off the flow of liquid being sprayed effectively and positively, is simple to operate by thumb action, and has a compact control knob which projects a minimum distance from the control valve tube.

SUMMARY OF THE INVENTION

The present invention covers a thumb actuated, spray control which includes a valve body with an inlet opening at one end to receive the liquid from the tank and an outlet opening at the other end through which the liquid passes to the extension tube and through the spray nozzle. A movable plunger, frictionally fitted against the inner wall of the valve body, has a flat end which will rest against a seat or O-ring around the outlet opening and seal off the opening when the plunger is pushed to the closed position. The plunger is provided with channels running the length of the plunger to permit the liquid to by-pass the plunger when it is pushed to the open position. A thumb knob passes through a slot in the valve body into the plunger so that the plunger can be moved lengthwise of such body either to the open or closed position. A seal or O-ring fits into a rectangular or elliptical slot in the plunger of sufficient size to seal the area where the knob passes through the slot against leakage.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages will become apparent from the following detailed description which is to be taken in connection with the accompanying drawings illustrating a somewhat preferred embodiment of the invention in which:

FIG. 1 is a perspective view of a garden sprayer embodying therein the spray control valve of this invention;

FIG. 2 is a cross-sectional view along the line 2—2 of FIG. 1 with the thumb control and valve in the closed position;

FIG. 3 is a view similar to FIG. 2 showing the thumb control and valve in the open position;

FIG. 4 is a cross-sectional view along the line 4—4 of FIG. 2; and

FIG. 5 is a cross-sectional view along the line 5—5 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 of the drawings, a sprayer of the hand operated variety for the spraying of pesticides and similar liquid media, incorporating the control valve of this invention, is designated generally by the numeral **10**. The sprayer includes a tank **11** for the liquid to be sprayed, which tank embodies a conventional pump (not shown). A handle **12** at the top of the tank is connected to the pump and the top cap **13** for sealing the tank. Such handle **12** permits unthreading the cap and removing the pump for filling the tank and also serves as the means for pumping air into the tank and pressurizing the liquid contents of the tank. Connected to the bottom of the tank is a flexible hose **14** for conveying the liquid under pressure to the control valve **15**. After passing through the thumb operated control valve the liquid flows through a rigid tube **16** and out through a suitable spray nozzle **17** to the selected target area with the desired spray characteristics. The handle **12** on the top of the tank **11** can be grasped for easily carrying the tank while spraying.

The spray control valve **15** includes a cylindrical hollow body which can be divided into two halves **15*a*** and **15*b*** by means of threaded male and female portions **18*a*** and **18*b***. Such portions serve to secure the two halves together with a suitable O-ring **19** interposed. At the opposite end of the half **15*b*** is a threaded male portion **20** from which projects a hose stem **21** having a conical base **21*a*** with a passageway **22** into the hollow body **15*b*** so that liquid can pass through the flexible hose **14** into the control valve. Such flexible hose is fitted over the stem **21** against the conical base **21a**. A hose cap **23** with an opening through the center and with inner threads at one end to match the threaded portion **20** serves to apply pressure against the hose and make a leakproof connection of the hose to the stem when the cap is screwed onto the threaded portion **20**. At the opposite end of the half **15*a*** is a threaded portion **24** on which can be screwed the rigid tube **16**. A central passageway **25** through the threaded portion **24** permits passage of liquid from the control valve to the rigid tube **16** and the spray nozzle **17**.

Within the half **15*a*** of the control valve body is a movable plunger **26** which makes a friction fit against the inner wall of the tube. The end of the plunger adjacent the threaded portion **24** is flat and slightly tapered to ease sliding of the plunger within the body. The inner end of the body adjacent the threaded portion **24** has a flat shoulder **27** adapted to receive a seat or rubber O-ring **28** against which the flat end of the plunger can rest to seal the passageway **25** against leakage of liquid from the control valve to the rigid tube **16**. The plunger **26** has a threaded hole **29** which is aligned with a slot **30** through the wall of the body along the direction of movement of the plunger. A thumb control knob **31**, having an extended threaded rod **32** which passes through the slot **30** and screws into the hole **29** of the plunger, allows for movement of the plunger within the seat **28**. Extending beyond each end of the slot **30** on the outside of the body is a channel **33** adapted to receive pins **34** extending from the underside of the knob **31**. These pins **34** ride in the channel **33** and hold the knob **31** against turning when it is moved along the body. The plunger has channels **35** running the length of the plunger to permit passage of liquid between the side of the plunger and the wall of the body from the control valve to the rigid tube when the plunger is not in the closed position against the O-ring **28**. To prevent leakage around the thumb control knob where it is joined to the plunger, a channel **36** of rectangular or elliptical shape is cut in the face of the plunger around the hole **29**. A seal or O-ring **37** is placed in the channel **36** to make a tight fit against the wall of the body around the juncture with the control knob. Such channel **36** and ring **37** are of sufficient length and width so that they are outside the perimeter of the slot **30** when the thumb control knob is pushed to either end of the slot. The body of the control valve may be provided with suitable indentations or impressions **38** to facilitate gripping the body and moving the thumb knob to the open or closed position.

The operation of the control valve and the sprayer should be clear from the foregoing description of the device. Although the valve may be made of metal or other suitable material, the preferred material is a plastic which is tough, highly wear resistant and impervious to all known chemicals employed in the spraying field. The preferred material for the plunger is Teflon, otherwise known as polytetrafluoroethylene, because it has the qualities mentioned above and in addition is self-lubricating. The invention provides a valve which effectively and positively turns on and seals off the flow of liquid being sprayed, is simple to operate merely by thumb action, has a compact control knob which projects a minimum distance from the control valve tube, and is simple and economical to manufacture and assemble.

Thus, among others, the several aforenoted objects and advantages are most effectively attained. Although a single somewhat preferred embodiment of the invention has been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

Having thus described the invention, what is claimed is:

1. In a sprayer of the type having a container of liquid under pressure to be sprayed, a flexible conduit leading from the container and communicating with the interior thereof for passage therethrough of the liquid under pressure, and a tube extension extending from the conduit and having a nozzle controlling the spray pattern of the liquid at the discharge end thereof, and a spray control valve interposed between the conduit and the tube extension, said valve comprising: a valve body connected at one end to the conduit with an inlet opening to receive liquid from the container and at the other end to the tube extension with an outlet opening to pass liquid to the nozzle, said outlet opening having a seat around the opening, a movable plunger frictionally fitted against the inner wall of the body and having an end adapted to fit against the seat and seal the opening when the plunger is moved to the closed position, said plunger having channels running the length of the plunger to permit liquid to by-pass the plunger when it is moved to an open position, a slot through the body and running lengthwise thereof along the path of movement of the plunger, a thumb knob slidable along the outside of the body and affixed to the plunger for movement of such plunger to the open or closed position, and a seal in the plunger forming a perimeter outside the area bounded by the sides and ends of the slot, to prevent leakage of liquid through the slot.

2. The invention of claim 1 wherein the plunger is formed of polytetrafluoroethylene.

3. The invention of claim 1 wherein an O-ring is disposed around the perimeter of the outlet opening to provide a seat against which the plunger seals the opening.

4. The invention of claim 1 wherein the end of the plunger which seals the outlet opening is tapered around the outer edge of the end.

5. The invention of claim 1 wherein the thumb knob is affixed to the plunger by a threaded rod projecting from the knob which rod extends through the slot and is screwed into the plunger.

6. The invention of claim 5 wherein a groove in the outer surface of the valve body extends beyond each end of the slot in the said body and pins project from the underside of the thumb knob into the said groove whereby the knob is held against turning when moved along the body.

7. The invention of claim 1 wherein the valve body comprises two halves having threaded male and female portions joining such halves together and providing easy access to the plunger and cooperating parts for repair and replacement.

8. The invention of claim 1 wherein the seal in the plunger comprises a channel in the plunger along the said perimeter, said channel being filled with an O-ring forming a seal.

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