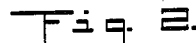
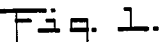


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INSECTICIDE DISPENSER

2 SHEETS--SHEET 1



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May 20, 1952

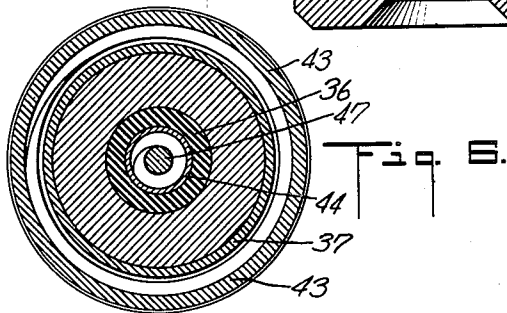
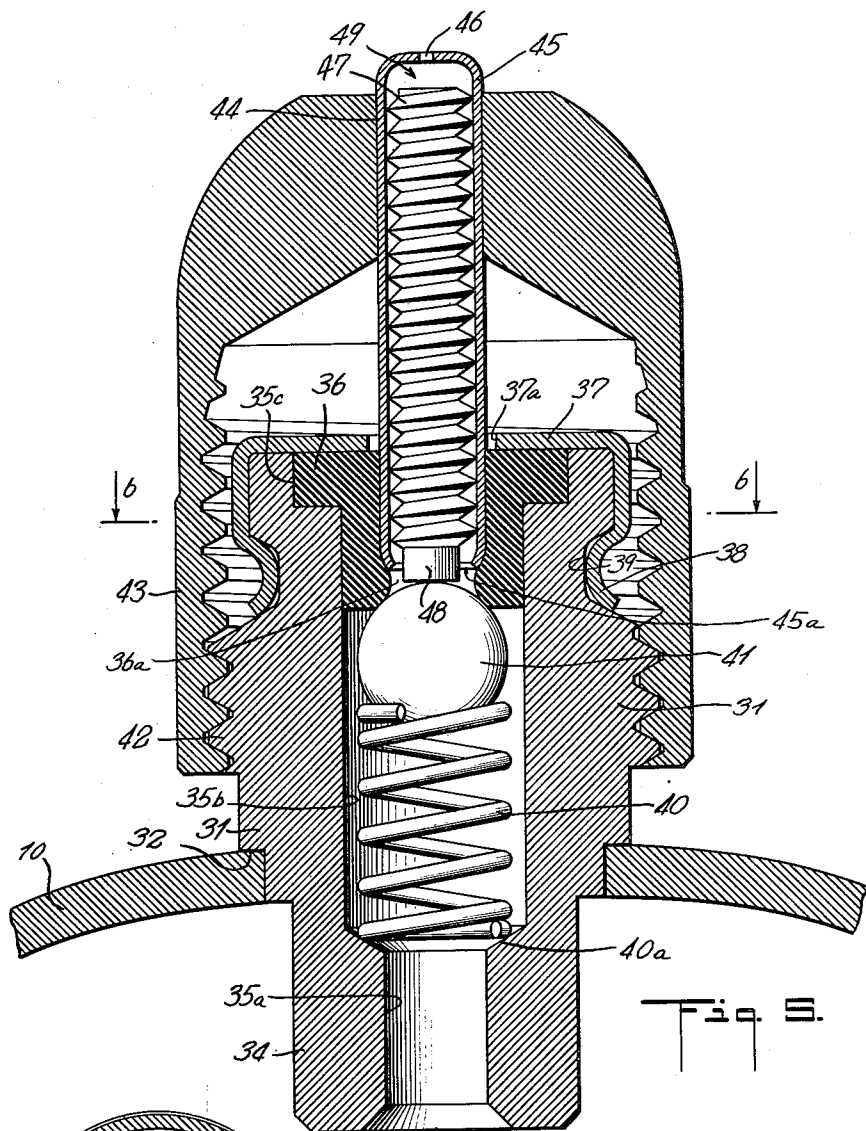
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INSECTICIDE DISPENSER

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2 SHEETS—SHEET 2



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INSECTICIDE DISPENSER

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3 Claims. (Cl. 299-118)

1

This invention relates to dispensing apparatus for use in connection with the distribution or dispersion of insecticides, fumigants, hormones and the like. It is a continuation-in-part of applicant's co-pending application, Serial No. 615,221, filed September 8, 1945 now Patent 2,594,539 dated April 29, 1952.

The patent to Goodhue et al., No. 2,321,023 discloses a method of producing insecticidal aerosol which involves confining in a receptacle under superatmospheric pressure a liquefied gas containing in solution a suitable insecticide and releasing the receptacle contents as desired through a discharge orifice into the atmosphere. The receptacle contents are forced out into the atmosphere by the high vapor pressure of the liquefied gas and the liquid solvent instantly evaporates into the atmosphere separating the solute into particles of colloidal dimensions and leaving them suspended in air in the form of an aerosol which is known as an aerosol.

An object of this invention is an inexpensive and highly efficient device for dispensing insecticides, fumigants and hormones, etc. in accordance with the Goodhue et al. method.

Another object of the invention is to provide a spray nozzle for such dispenser embodying means for retarding the rate of flow through the outlet orifice so as to produce the desired speed of dispensation. This is accomplished by providing means for effecting a tortuous path of considerable length for the flow of liquid from the container to the orifice.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawings, wherein:

Fig. 1 is an elevation of a device embodying the invention;

Fig. 2 is a section through one embodiment of valve mechanism for controlling discharge from the device;

Fig. 3 is a section on the line 3-3 of Fig. 2;

Fig. 4 is a fragmentary section of parts shown in Fig. 2 prior to complete assembly;

Fig. 5 is a view similar to Fig. 2 of a modified embodiment, and

Fig. 6 is a section on the line 6-6 of Fig. 5.

Referring now to the drawings and more especially to Figs. 1 to 3 inclusive, 10 is a generally

2

cylindrical metal receptacle with dome-like ends which is designed and adapted to receive under pressure a liquefied gas containing in solution an insecticide, fumigant, hormone, etc. The receptacle may be approximately 6" long and approximately 3" in diameter so that it may be readily held in a person's hand and directed as desired. At one end, the receptacle is provided with suitable means for discharging the receptacle contents into the atmosphere.

The discharge means, which forms the subject of this application, includes a tubular member 11, composed of two parts 11a and 11b. Part 11b is in the form of a sleeve having its upper or outer end portion of reduced diameter fitting into the bore 12 of the part 11a. Said part or sleeve 11b has a bore 13 communicating with said bore 12. The bore 13 constitutes a passageway having two sections 13a and 13b of progressively increasing diameter from the inner end outward of the part 11b. The tubular member 11 projects through an aperture in one end of the receptacle and preferably is formed with a shoulder 14 which engages the outer surface of the receptacle end. A gas-tight seal is established between the receptacle 10 and the member 11 by any suitable means. The inner end of the tubular member 11 is formed with a reduced diameter portion around which tightly fits one end of a tube 15 extending substantially to the opposite end of the receptacle.

An elastic ring 17 is provided or mounted in the bore of passageway section 12 above the part 11b. This ring is preferably composed of synthetic rubber such, for example, as neoprene, said ring being held in place by an inwardly projecting lip 18 formed or provided on the end of part 11a of member 11. The ring 17 is in gas-tight contact with the cylindrical surface of the passageway 12 and with the lip 18. A cap 19 has threaded engagement with the member 11 whereby rotation of the cap on the member 11 produces axial movement of the cap relative to the member. The cap 19 is provided with an extension 20 and with a bore having a cylindrical section 21 and a tapered section 22. An elongated sleeve or tubular element 23 is fitted in section 21 of the cap 19. This sleeve or element 23 is long enough to extend through the bore in ring 17 and is fixed or secured to the

3

cap 19 but is rotatable within the ring 17. The lower or inner end of the sleeve 23 is turned in as at 23a leaving a restricted opening 23b through which the extension 24a of rod 24 (hereinafter described) extends. As shown in Fig. 4, the ring 17 is molded with a slight inward bulge 17a in its bore. The maximum diameter of the bore of the ring slightly exceeds the diameter of the sleeve 23 while the minimum diameter of said bore is slightly less than said sleeve, thereby insuring a gas-tight fit of the ring around the sleeve. A threaded rod 24 is fitted into the bore of the sleeve 23 with the outer edges of its thread in gas-tight contact with the inner surface of the sleeve so that the rod and sleeve constitute in effect a unitary element. The depth of the thread is admeasured to provide a long, tortuous comparatively large cross-section helical channel 25 lengthwise of and through the sleeve 23 (Fig. 3).

A helical expansion spring 26 is positioned in the larger diameter section of the bore 13. One end of this spring supports a cup-shaped element 27 facing the ring 17. The cup element 27 has a bottom cylindrical recess 27a adapted to receive an extension 24a of the rod 24, which projects below the washer 17 a sufficient distance to enter the cup recess 27a which is of slightly larger cross-section than the extension of the rod so that the latter fits the former loosely. The rod serves to maintain the cup 27 always in axial relation to the ring 17 and the loose fit of the rod in the cup permits the cup to accommodate itself on the rod in proper position to insure tight engagement of the cup rim 27b with the lower surface of the ring 17. The arrangement of the rod 24 in the member 17 is such that when the cap 19 is screwed onto the member 11 less than the total extent of its possible travel, the end 24a of the rod 24 engages the bottom of the recess 27a of the cup 27. Thus, in one position of the cap 19, the rim 27b of the cup 27 is held in sealing engagement with the ring 17, but upon additional rotation of the cap 19, the rod 24 is projected inwardly to move the cup 27 out of engagement with the lower surface of the washer 17.

The outer end of the extension 20 of the cap 19 has a discharge orifice 28, the diameter of which is approximately 0.025", and which communicates with the narrower end of the tapered section 22 of the bore in cap 19. The sleeve or tubular element 23 does not extend to the outer end of the cylindrical section of the bore in cap 19 but terminates in said cylindrical section 21 of the bore short of the beginning of the tapered section 22 of the bore, thus providing a small chamber 29 between the end of the rod 24 and the discharge orifice 28.

With the cap 19 in the position shown in Fig. 2, the cup 27 forms a gas-tight seal with the washer 17 to prevent the discharge of the receptacle contents. When it is desired to discharge the receptacle contents, the cap 19 is properly rotated to move the rod 24 inwardly, thereby disengaging the rim 27b of the cup 27 from the washer 17. The receptacle contents flow by way of the tube 15 through the passageway 13 around the rim 27b of the cup 27 into the interior of the cup and thence through the tortuous path or channel 25 into the chamber 29 and through the chamber 29 to the discharge orifice 28 through which it escapes into the atmosphere. The liquefied carrier very greatly expands upon its release and changes in state from liquid to gas form with concomitant conversion of the solute

4

into an aerosol as described in the aforementioned Goodhue et al. patent. Reverse rotation of the cap 19 withdraws the rod 24 and permits return of the cup 27 into sealing contact with the washer 17 under the influence of the pressure existing within the receptacle 10 and the spring 26.

In practice, the threaded rod 24 has an overall diameter of approximately .109" which is slightly less than the original diameter of the inner surface of the tube 21. After assembly of the rod 24 in the tube 21, the latter is compressed by a circular die to engage its inner surface in gas-tight relation with the threads of rod 24. The several turns of the helical channel 25 are thus separated by a gas-tight joint between the threaded peaks and the tube. This forces the liquid from the dispenser 10 to follow the tortuous thread passageway 25 all the way through the tube 21 instead of leaking across the threads 24.

The principal advantage of the construction described is that a long tortuous path 25 of comparatively large cross-section is provided for the expulsion of the liquid and at the same time the flow friction in this path is such that the rate of flow is limited to that which is desirable. The practical benefit of this is that there is much less liability of clogging of the orifice 28 or the path 25 than would be the case if merely a dispenser orifice were used. Thus, many of the particles (impurities) which might cause clogging will freely pass through the path 25 and out of orifice 28. A whirling motion is given to the fluid as it flows along the tortuous channel 25, thereby adding to the friction by which the rate of fluid flow is controlled and also thereby improving the dispersion in the fluid as it leaves the orifice 28.

In order to charge the embodiment illustrated in Figs. 1 to 3 inclusive with liquefied gas containing in solution an insecticide, fumigant, hormone or the like, a suitable conduit is attached to the outer end of the member 11 with the cap 19 removed together with the sleeve 23 and rod 24 carried by the cap. The liquefied gas and its solute is then introduced under pressure by way of the conduit through the bore of the member 11 into the interior of the receptacle, the cup element 27 being moved out of sealing position by reason of the pressure applied thereto to allow free flow of the liquid into the receptacle. After the receptacle has been filled, the cap 19 is applied to the member 11 and the device is ready for operation. If desired, a vacuum may be drawn in the receptacle before introduction of the fluid thereto.

In the embodiment illustrated in Figs. 5 and 6, the discharge means includes a tubular member 31 projecting through an aperture in one end of the receptacle 10 and preferably formed with a shoulder 32 which engages the outer surface of the receptacle 10. A gas-tight seal is established between the receptacle 10 and the member 31 by any suitable means. The inner end of the tubular member 31 is formed with a reduced diameter portion 34 adapted to receive one end of a tube similar to the tube 15 of Fig. 2.

The passageway through the tubular member 31 is provided with three sections 35a, 35b and 35c of progressively increasing diameter from the inner end of the member 31 outwardly. In the passageway section 35c there is provided an elastic ring 36 preferably composed of synthetic rubber such, for example, as neoprene, and having a first portion of proper diameter to fit the passageway section 35c and a second portion of

proper diameter snugly to fit into the passageway section 35b. The outer end of the member 31 is of reduced diameter and on it is mounted a cap 37, a portion of which is spun inwardly at 38 into an annular groove 39 in the member 31 to secure the cap to the member. The cap 37 serves to maintain the ring 36 in the passageway section 35c and sufficiently compresses the large diameter portion of the ring to provide a gas-tight contact between the ring 36 and the surface of the passageway section 35c as well as between the outer surface of the ring 36 and the cap 37. The cap 37 is provided with a central aperture 37a, the purpose of which will be later described.

In the passageway section 35b there is arranged an expansion spring 40, one end of which bears against the shoulder 40a between the passageway sections 35a and 35b and the other end of which engages a ball 41 interposed between said spring end and the inner end of the small diameter portion of the ring 36. The length of the spring 40 is such as to press the ball 39 into sealing relation to the inner end of the ring 36 to close the passage 36a therethrough.

The member 31 is provided with an exterior screw thread 42, the pitch diameter of which is greater than the exterior diameter of the cap 37. A cap 43 has an interior screw thread engaged with the screw thread 42 whereby rotation of the cap effects longitudinal movement of the cap on the member 31. At its outer end, the cap 43 is provided with a bore 44 in which is tightly fitted a tube 45, the outer end of which is closed except for an orifice 46 of the same dimension as the orifice 28 of the embodiment of Figs. 1 to 4 inclusive. The inner end of the tube 45 extends through the cap aperture 37a into the bore 36a of the ring 36 and is in gas-tight relation therewith. The lower end of tube 45 terminates short of the lower or inner end of bore 36a in ring 36. An elongated threaded rod 47 is fitted into the bore of the tube 45 with its thread edges in gas-tight contact with the inner surface of the tube so that the rod and tube constitute in effect a unitary element. An extension 48 at the lower or inner end of the threaded rod 47 projects below the inner end of the tube 45 and through the opening 45a as provided by inturning the inner end of the tube 45. The rod 47 terminates short of the outer end of the tube 45 to form a small chamber 49. The tube 45 and threaded rod 47 are the counter parts in the modification of Figs. 5 and 6 of the sleeve 23 and threaded rod 24 of the modification of Figs. 1 to 4.

The arrangement of the tube 45 in the ring 36 is such that when the cap 43 is screwed onto the member 31 less than the total extent of its possible travel, the end 48 of the threaded rod 47 engages the ball 41 with the latter in sealing relation with the inner end of the ring 36. Further inward movement of the tube 45 and rod 47 by additional rotation of the cap 43 results in projection of the ball 41 inwardly out of sealing relation to the ring 36, thereby permitting escape of fluid from the receptacle 10 around the ball into the tortuous passageway formed by the threaded rod 47 and tube 45 with eventual discharge of the liquid through the orifice 46. Control of the flow of liquid is effected by rotation of the cap between positions in which the ball 41 is in sealing relation to the ring 36 and in which it is held out of sealing relation by the rod 47.

The above-described modification has the same advantages as previously set out in connection with the embodiment of Figs. 1 to 4 inclusive and the receptacle of the embodiment of Figs. 5 and 6 is filled in the manner described in connection with the embodiment of Figs. 1 to 4. The embodiment of Figs. 5 and 6 has the advantage over the embodiment of Figs. 1 to 4 inclusive of containing fewer parts which are more easily manufactured and assembled than the parts of the embodiment of Figs. 1 to 4.

In both modifications, the construction is such that if the tortuous path through the cap becomes clogged, the assembly of cap, tube and rod can easily be discarded and a new assembly substituted. This can be done at low expense and without in any way disturbing the remainder of the dispensing unit.

It is of course understood that various changes may be made in the structure above described, without in any way departing from the spirit of the invention as defined in the appended claims.

I claim:

1. A fluid dispensing valve including a flexible ring having a hole therethrough, a valve element seating on said ring's inner surface around said hole, means biasing said element towards said inner surface, a tubular element extending from said hole beyond said ring's outer surface and sealed fluid-tightly with said ring, and a stem engaging said valve element and extending through said hole and beyond said ring's outer surface and tightly fitted inside of said tubular element, said ring and said tubular element being constructed and arranged so that motion may be applied to said tubular element and said stem to unseat said valve element from said ring's inner surface to define a space therebetween, and said stem having a longitudinally extending passage groove in its outer surface, one end of said groove opening to said space and said tubular element having an opening beyond said ring's outer surface connecting said passage groove with the atmosphere.

2. A fluid dispensing valve including a flexible ring having a hole therethrough, a valve element seating on said ring's inner surface around said hole, means biasing said element towards said inner surface, a tubular element extending from said hole beyond said ring's outer surface and sealed fluid-tightly with said ring, and a stem engaging said valve element and extending through said hole and beyond said ring's outer surface and tightly fitted inside of said tubular element, said ring and said tubular element being constructed and arranged so that motion may be applied to said tubular element and said stem to unseat said valve element from said ring's inner surface to define a space therebetween, and said stem having a longitudinally extending passage groove in its outer surface, one end of said groove opening to said space and said tubular element extending outwardly beyond said stem and having a closed outer end defining a space beyond said stem and having a restricted opening from said space to the atmosphere, the other end of said passage groove opening to said space.

3. A fluid dispensing valve including a flexible ring having a hole therethrough, a valve element seating on said ring's inner surface around said hole, means biasing said element towards said inner surface, a tubular element extending from said hole beyond said ring's outer surface and sealed fluid-tightly with said ring, a stem engaging said valve element and extending through said

hole and beyond said ring's outer surface and tightly fitted inside of said tubular element, said ring and said tubular element being constructed and arranged so that motion may be applied to said tubular element and said stem to unseat said valve element from said ring's inner surface to define a space therebetween, and said stem having a longitudinally extending passage groove in its outer surface, one end of said groove opening to said space and said tubular element having an opening beyond said ring's outer surface connecting said passage groove with the atmosphere, a hollow fixture constructed and adapted for application to the dispensing opening of a fluid dispenser container and having a flange on which the periphery of said ring rests and a cup-like recessed portion extending inwardly therefrom and containing said valve element and said biasing means and having a fluid passage through said portion to said ring's inner surface, an outer flange clamping said ring fluid-tightly to the first named flange, and an outer cap covering the outside of said fixture and having a bore through which said tubular element extends and constructed to permit said opening of said element to connect with the atmosphere, said cap being movable relative to said fixture and said element

being connected with said cap so that motion of said cap is transmitted to said element.

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