

[54] SPRAYING DEVICES

[76] Inventor: **Jean Charles Yves Brenez**, 149 Avenue du General-Leclerc 33, (Gironde) Pessac, France

[22] Filed: **Apr. 12, 1972**

[21] Appl. No.: **243,261**

[30] Foreign Application Priority Data

Apr. 5, 1971 France 7114241
Mar. 24, 1972 France 7210557

[52] U.S. Cl. **239/331, 222/398**

[51] Int. Cl. **B05b 11/00**

[58] Field of Search 239/329, 204, 331;
222/193, 195, 398, 373, 379; 128/266

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Primary Examiner—M. Henson Wood, Jr.

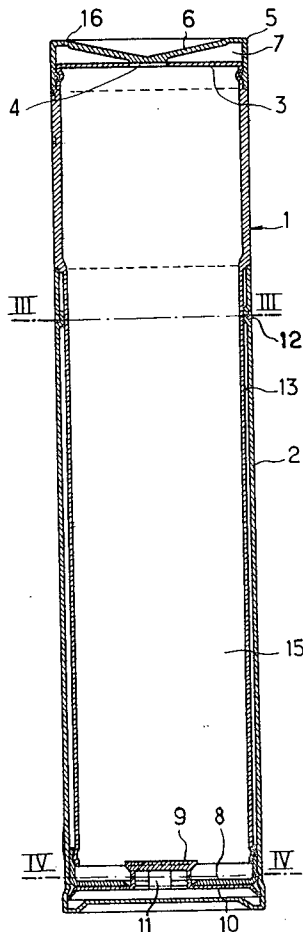
Assistant Examiner—Michael Y. Mar

Attorney—Louis E. Marn et al.

[57] ABSTRACT

A spray device for spraying any product and more particularly insecticides and germicides comprising two telescopic tubes of synthetic material, movable relative to each other in a reciprocating motion causing air to be sucked in and forced out in order to expel the product while atomizing it, the inner tube comprising at its upper part a removable spray jet and the telescopic tubes defining between them a clearance allowing air to be drawn in from the outside during the elongation movement of the spray device, which movement is limited by two pins integral with the outer tube moving in grooves provided in the inner tube and said pins contacting abutments at the end of the stroke, the gap between the tubes being made concentrically constant by means of longitudinal guide bosses regularly spaced on the outer skirt of the inner tube whereas the outer tube is closed at its base by a base made integral with it.

6 Claims, 6 Drawing Figures



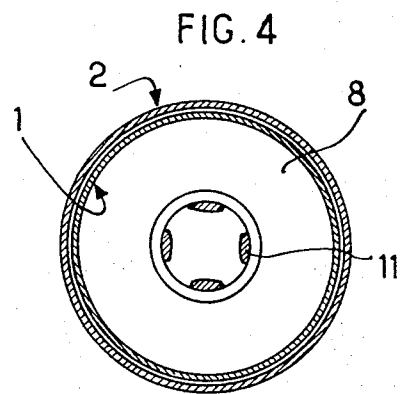
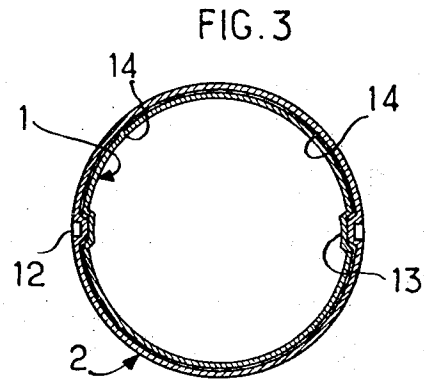
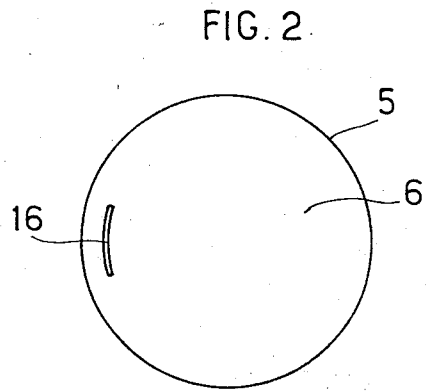
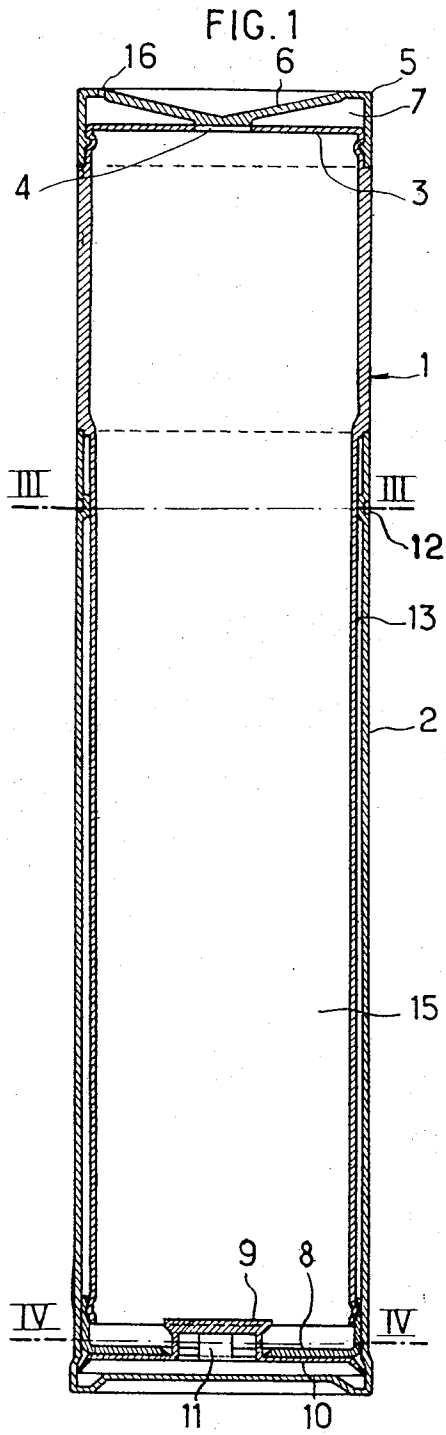


FIG. 5

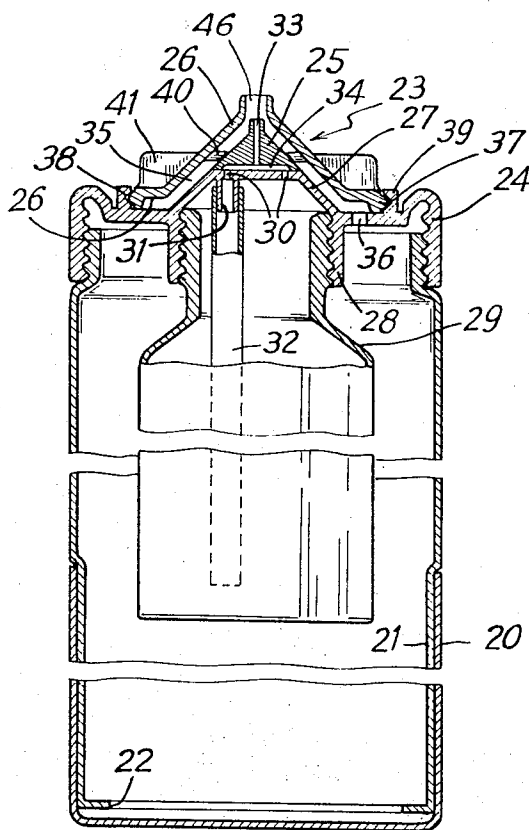
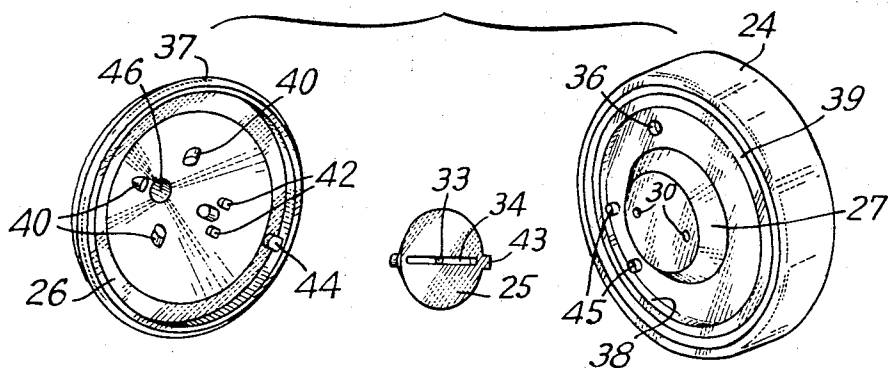


FIG. 6



SPRAYING DEVICES

This invention relates to spray devices for spraying any powder or liquid product, and more particularly all insecticides and chemical products used against insects and cryptogams of plants and shrubs.

It is known that such powder spray devices, known commercially by the name "Bazooka" are currently used to combat the insects and diseases of plants and shrubs in orchards. They are generally constituted by two telescopic cardboard tubes, the inner tube of which contains the product to be sprayed and the outer tube of which acts as a pulsating air pump; the lower part of the latter tube is provided with a valve and the lower part of the inner tube is also provided with a valve. During the extension stroke, the movement of the outer tube relative to the inner tube causes the valve of the outer tube to open and fill with air, whereas the valve of the inner tube is closed, confining the powder therein. In an inverse relative movement of the tubes, the valve of the outer tube closes and the valve of the inner tube opens to receive the air in pulses from the outer tube, which projects the powder into a chamber, a so-called diffusion space, and towards a spraying aperture and thence to atmosphere.

Such spray devices have never been used for spraying liquids and have numerous disadvantages, the most serious of which is that these devices are made of cardboard, the absorbent nature of which is well known; the tubes when they are wet or simply absorb moisture swell, become jammed, and after several applications cannot be used again.

Moreover, the valve of the outer tube is directly in contact with the atmosphere and consequently allows more humidity to pass therethrough.

Among the minor disadvantages, it may be pointed out that the reciprocating motion is not limited in the direction of extension of the "Bazooka" and that frequently the two tubes separate; it may also be pointed out that the jet of the product sprayed is perpendicular to the longitudinal axis of the spray device and that the efficiency of direction of the jet is uncertain.

To remedy these various disadvantages the present invention provides *inter alia* a spray device constructed entirely of synthetic plastics material, thus avoiding any deformation due to humidity; a combination of the valves in a single unit inside the tubes so that they are also protected from any humidity; the inner tube is provided with two diametrically opposed longitudinal grooves, receiving two pins supported by the outer tube thus providing upper and lower limits for the stroke of the reciprocating motion; an upper cover which is naturally deformable and closing a diffusion chamber during the elongation stroke and allowing pulsating air to pass during the reverse stroke to spray the product which escapes through a slot provided in the cover in the direction of the longitudinal axis of the spray device thus increasing the efficiency of direction of the jet.

A feature of the present invention is to make the spray device of synthetic plastics material in order to protect from humidity the contents and/or the parts of the device thus ensuring regular and constant operation.

Another feature of the invention is that the spray device is constituted by a hollow cylindrical body forming an inner tube sliding in another hollow cylindrical body forming an outer tube, the lower part of which is

closed, the telescopic tubes movable by a reciprocating motion.

Yet another feature of the present invention is to close the upper part of the inner tube by a membrane, save for a central perforation, the upper part of the tube being closed by a cover clipped in position, the central part of which cover is in the shape of a truncated cone and closes the central perforation of the membrane during the elongation stroke, which central part deforms, releasing the air in pulses during movement in the opposite direction, drawing the powder along with it for spraying purposes. The chamber between the membrane and the cover fulfils the function of a diffusion chamber, the latter being provided with a slot for the escape atmosphere in the direction of the longitudinal axis of the spray device of the product being sprayed.

Still another feature of the invention is to close the lower part of the inner tube by clipping thereto a part forming a valve seat which receives at its centre a valve, the lower part of which, on the other side of the seat, is provided with a membrane, in the form of a piston sliding inside the outer tube, the latter parts forming an arrangement which is completely protected from external moisture.

The skirt of the inner tube is preferably disposed with a certain clearance relative to the outer tube in which it slides, the skirt being provided with two diametrically opposed longitudinal grooves each receiving a pin supported by the skirt of the outer tube in order to limit the stroke of the reciprocating movement during the spraying operation.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a sectional elevation along the longitudinal axis of the spray device, showing the valve separated from its seat at the instant of the beginning of the extension of the spray device;

FIG. 2 is a plan view corresponding to FIG. 1;

FIG. 3 is a sectional plan view on the line III—III of FIG. 1;

FIG. 4 is a sectional plan view on the line IV—IV of FIG. 1;

FIG. 5 is an axial sectional view of a liquid spray device according to the invention; and,

FIG. 6 is an exploded view of the three parts forming the spray cap of the spray device illustrated in FIG. 5.

According to the present invention, the spray device illustrated in FIGS. 1 to 4 comprises an inner tube 1 sliding in an outer tube 2. A membrane 3 closes the upper part of the inner tube 1 save for a central perforation 4. A cover 5 clipped to the tube 1 and having a central part 6 in the shape of a truncated cone closes the perforation 4 and forms a diffusion chamber 7 with the membrane 3. A valve seat 8 clipped to the lower part of the tube 1 receives a valve 9 which is terminated at its base by a piston 10 connected to the valve 9 by lugs 11.

Pins 12 slide in grooves 13. Guide bosses 14 are provided on the inner tube 1. The inner part 15 of the tube 1 contains the powdered product to be sprayed (not shown). A slot 16 is provided in the cover 5 for the passage of the jet of sprayed powder. It can be seen that the inner tube 1 slides in the outer tube 2 and its stroke is limited by pins 12 sliding in grooves 13 and abutting in the upper position against the valve seat 8.

During the elongation movement of the spray device, the valve 9 is held against the seat 8, air is sucked in, passing through the gap between the tube 1 and the tube 2 and fills the cavity between the seat 8 and the base of the outer tube 2.

During the inverse movement, the compressed air lifts the valve 9 off the seat 8 and the piston 10 is applied against the inner edges of the tube 1; the air must pass between the lugs 11, carrying the powder contained in the tube 1 along with it and passes through the central perforation 4 thus deforming the central part 6 of the cover 5, the air and powder being diffused into the chamber 7 from whence it is ejected to atmosphere through the slot 16.

The liquid spray device illustrated in FIGS. 4 and 5 comprises an outer tube 20 closed at one end and inside which an inner tube 21 slides and is formed at its inner end with an aperture 22 and has at its outer end a cap 23 comprising the spray jet, the arrangement of these two tubes forming an air plunger pump.

The cap 23 is composed of three parts 24, 25 and 26. The first part 24 comprises at its periphery a means for attachment to the tube 21, in this case a screw thread which makes it possible to release the cap 23. At its centre this part 24 comprises a portion 27 in the shape of a truncated cone, the base of which is extended internally by a skirt 28 comprising an internal screw thread into which is screwed the end of a flask 29 forming a reservoir for the liquid product to be sprayed. Two holes 30 are provided at the top of this portion 27, one of which holes serves as a connection 31 for a tube 32 which extends into the flask, so that, whatever the position of the flask, one of the holes 30 will be connected to the liquid of the flask.

The second part 25 is of conical shape applied against the top of the portion 27, which part 25 comprises an axial conduit 33 opening into a diametric groove 34 in the base of the part 25, this groove being located opposite the two holes 30.

This portion 27 which is surmounted by the part 25 is covered by the third part 26 also of conical shape and providing between them a chamber 35 which is connected to the inside of the tube 21 by one or more holes 36.

This part 26 is mounted on the part 24 by means of a peripheral rib 37 which engages in a groove 38 provided in a ring 39 provided on the part 24 whereas projections 40 inside the part 26 keep the part 25 applied against the portion 27.

The part 26 which may be rotated by means of fins 41 is rotatably connected to the part 25 by means of two lugs 42 between which a lateral projection 43 of the part 25 is engaged.

In order to limit the relative rotation of the parts 25 and 26, the part 26 is provided with a pin 44 which abuts against two projections 45 of the part 24, one of these projections forming an opening abutment, a position in which the groove 34 is opposite to the holes 30 whereas the other abutment corresponds to the closed position, the groove 34 not being opposite the holes 30. The conical part 26 has at its point a spray aperture 46 through which the air forced out by the pump formed by the tubes 21 and 22 escapes after having passed through the hole 36 and the chamber 35. On escaping, the exhausted air carries along and sprays the liquid from the flask 29 passing through one of the holes 30, the groove 34 and the conduit 33.

What is claimed is:

1. A spray device which comprises:

an outer tube means having an end wall, the inner surface of said outer tube being provided with pin means;

an inner tube means disposed within said outer tube means in sliding and reciprocating relationship therebetween, the outer surface of said inner tube means being provided with groove means, abutment means, and longitudinal guide boss means, said groove means cooperating with said pin means of said outer tube means, said abutment means limiting the longitudinal displacement of said tube means and said guide boss means ensuring constant and concentric annular spacing of said tube means;

a membrane means having a central perforation disposed about an end of said inner tube means opposite the end wall of said outer tube means;

a truncated conically-shaped cap means including a slot disposed about said end of said inner tube means and extending towards said membrane means, said cap means forming a diffusion chamber with said membrane means and being deformable away from said membrane means under the action of the pressure of pulsated air; and

a spray jet means positioned about the capped end of said inner tube means.

2. A spray device according to claim 1 in which the inner tube has at its base a valve seat clipped to said tube for receiving a valve, the latter terminating at its lower part and on the other side of the seat in a piston movable inside the outer tube.

3. A spray device for spraying liquid according to claim 1, in which the spray device is constituted by a cap provided with a spray aperture, this cap comprising a conical chamber for the egress of air and provided at its top with an aperture into which there opens a conduit for the supply of liquid coming from a reservoir connected to the cap.

4. A spray device according to claim 3, in which the cap is formed of three parts, a first part screwed to the end of the inner tube and having at its centre a portion in the shape of a truncated cone, the top of which is provided with two holes, one of which serves as a communicating passage and which is extended by an inner skirt on or in which there is screwed the neck of a flask forming the liquid reservoir into which projects a tube secured to the passage, a second conical part mounted on the top of the first and which has an axial conduit connected to a groove in its base forming a collector for the two holes of the top, a third conical part mounted on the first and surrounding the portion in the shape of a truncated cone surmounted by the second part and provided at its point with a spray aperture, the space between this part and the two others forming the air supply chamber via one or more holes provided in the first part and permitting this chamber to communicate with the inside of the tube.

5. A spray device according to claim 4, in which the third part has internal projections forming spacing members with the second part which has a lateral projection between two lugs of the third part in order to connect these two parts in rotation, the third part being mounted on the first by engagement of a peripheral rib in a corresponding groove of the first.

6. A spray device according to claim 5, in which the third part comprises a pin which, due to rotation of the third part, abuts two projections of the first part, so as to have a position of abutment in which a collecting groove of the second part is disposed opposite to the two holes on the top of the first part.

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