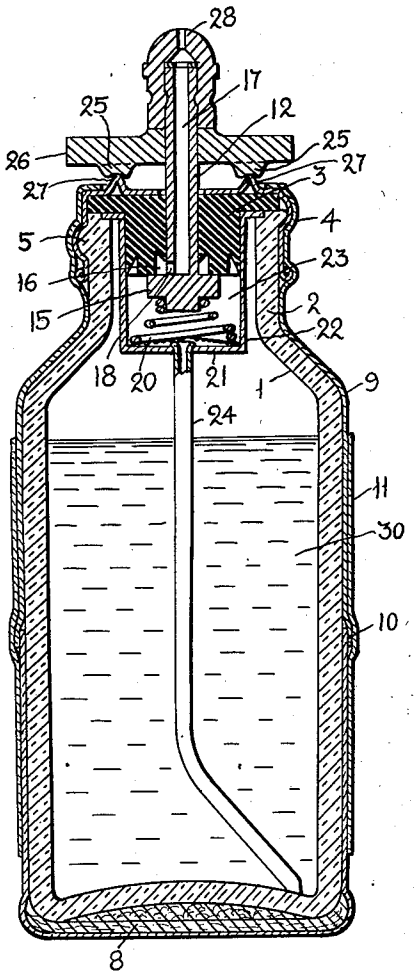
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LOW PRESSURE PROPELLED INSECTICIDAL AEROSOL COMPOSITION

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LOW PRESSURE PROPELLED INSECTICIDAL AEROSOL COMPOSITION

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1 Claim. (Cl. 167—39)

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My invention relates to fluids for insecticides and the like, and has particular reference to fluids which, when placed in a sealed container, remain in a liquid state at an ordinary or ambient temperature under pressure of their own vapors but become vaporized when the pressure is released.

One of the important applications of such fluids consists in their use in combination with substances which it is desired to spray in the form of a fine mist for disinfecting or sterilizing objects and air in hospitals, living quarters, etc., and particularly, for spraying insecticides. Such substances, when mixed or dissolved in the vaporizable fluids, can be held in a liquid state in a portable container with a valve to be manually released through a suitable nozzle to be sprayed in the form of a fine mist, extending through a relatively large volume of space. The spraying effect is accomplished by the pressure of the vapors in the container, which is constant for a particular room temperature and remains constant independently of the amount of the fluid used until the container is emptied. Such an arrangement has therefore a decided advantage over a provision in which the liquid is forced out by the action of a compressed gas in the space in the container above the liquid, which pressure progressively decreases as the liquid is being used up.

Fluids used for mist-spraying of insecticides and other substances usually consist of chemical compounds comprising a halogen such as chlorine or fluorine, the latter being preferred for its suitable properties. Certain of such liquids are now produced commercially, particularly a fluorine compound known as dichlorodifluoromethane (CCl_2F_2). This compound is also used extensively for refrigerating machines but it has a disadvantage in that its vapor pressure is relatively high, being about 70 pounds per square inch at 70° F. Such a high vapor pressure reduces the efficiency of automatic refrigerators in which an electric motor which operates a compressor for the fluid is automatically controlled by a thermostat, starting and stopping its operation as the temperature in the refrigerator varies. Due to the high vapor pressure, an excessive amount of power must be expended every time the motor starts to pump to build up the required pressure. In portable sprayers the high pressure has a disadvantage in that it increases the hazard of the container being broken or cracked, in which case a dangerous explosion may result. For this reason, all containers with a liquid at pressures

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greater than 25 p. s. i. are subject to special rules and regulations issued by the Interstate Commerce Commission for the protection of other goods transported with these containers and of the people who handle the containers. Gas at pressures not over 25 p. s. i., however, is considered liquid and is exempt from such regulations. However, there is no commercially available liquid capable of maintaining such vapor pressure at approximately 70° F. A commercially known compound, trichloromonofluoromethane (CCl_3F), remains liquid at atmospheric pressure and at room temperature, its vapor pressure under such conditions being approximately zero.

My invention has for its object to provide a vaporizable fluid having its vapor pressure not exceeding 25 p. s. i.

Another object of my invention is to provide a preparation having effective insecticidal properties and which is soluble in my low-pressure fluid.

Another object of my invention is to provide an effective spraying insecticidal solution of the foregoing general type, which is effective in its operation and non-inflammable, non-toxic to man or animals, and non-staining.

Another object of my invention is to provide an insecticide in which odors of the insecticide are substantially hidden by addition of a pleasant scent.

Another object of my invention is to provide a portable container with a manually operable valve containing my spraying solution under a substantially constant pressure not exceeding 25 p. s. i.

Another object of my invention is to provide a compact and convenient container for my insecticide, including a manually operable valve which is simple and inexpensive to manufacture so that it can be discarded when empty, and of a relatively small size, so that it will not be subject to restrictive regulations as to containers and shipment.

The foregoing and other objects, features and advantages of my invention are more fully described in the following specification and drawing, in which a single figure represents a container with my spraying solution.

In one form of my invention I employ a container shown on the drawing and more fully described as to its construction in my copending patent application having Serial Number 649,701, which was filed on February 23, 1946, now abandoned. This container comprises a bottle 1 made of glass or a plastic composition, the neck 2 of

the bottle being closed by a valve block 3 preferably made of rubber or similar elastic material. The valve block is held in place by a metal screw cap 4 threaded on a spiral groove 5 on the outer side of the neck 2. The bottom portion of the bottle is provided on the outside with a cushioning layer 8 preferably made of a yieldable material, such as cork, corrugated paper, etc. The bottle with the cap and bottom cushion is covered by a layer 9 of strong plastic composition to protect the bottle against breakage. The plastic envelope is preferably formed of two portions joined together in the middle by an overlapping seam 10 and covered on the outside by an additional enclosure 11, also of a plastic material and which may contain printed matter, such as instructions, etc.

A hollow valve stem 12 slides in a central bore in the valve block 3 and is provided with a valve head 15 resting against the under surface of the valve block, closing an annular chamber 16 in the block around the lower portion of the valve stem. The annular chamber 16 is in communication with the central bore 17 in the stem by means of a passage 18. The valve head 15 is normally urged into engagement with the valve block by a spring 20 whose lower end rests on the bottom wall 21 of a valve cage 22 extending from the valve block and forming a chamber 23. A pipe 24 extends from the chamber 23 to the bottom of the bottle.

The valve is normally held locked in its closed position by buttons 25, 25 extending from the under side of a manipulator disc 26 rotatably mounted on the outer portion of the valve stem, the buttons engaging projections 27, 27 on the upper side of the screw cap 4. By turning the manipulator disc 26 to one or the other side, the buttons are moved away from the projections 27, releasing the valve to be manually depressed for opening the same. A nozzle 28 is provided at the outer end of the valve stem 12. The nozzle may be secured in place after the bottle is filled with my spraying liquid, for which purpose the valve is released, as was explained above, and the end of the valve stem is connected to a source of a spraying mixture under suitable pressure so that it remains in a liquid state. The nozzle may be permanently secured on the stem as by crimping the same, so that the container will be practically non-refillable.

When filled with my spraying liquid 30, the bottle can be handled or shipped in any desired way. To simplify its handling, I prefer to make the bottles of a relatively small size, less than four ounces, so that such bottles are exempt from special I. C. C. regulations regarding shipment and handling of containers. For the same reason I prepare my spraying liquid of such a composition that the pressure of its vapors does not exceed 25 pounds per square inch (p. s. i.) at 70° F., or about 40 pounds absolute, in view of the fact that gases at such pressure are considered liquids, and containers with such liquefied gases are not subject to special regulations of the Interstate Commerce Commission. My containers of a small size, as indicated above (usually for about three liquid ounces), can be manufactured cheaply in quantities for general insecticiding and distinfecting purposes and are therefore expendable, so that the container, when empty, can be discarded.

To provide a vaporizable liquid whose vapor pressure will not exceed 25 p. s. i., I prepare a mixture of normally gaseous compounds containing halogens, selecting proper proportions of gases having relatively high and relatively low vapor pressure. I have found that satisfactory results can be obtained when mixing about four parts by volume of a fluorine compound known as trichloromonofluoromethane whose chemical formula is CF_1Cl_3, whose vapor pressure at 70° F. is zero, i. e., it remains in a liquid state, and about one part of a fluorine compound known as dichlorodifluoromethane of the chemical formula CF_2Cl_2, which is gaseous at the atmospheric pressure and 70° F. pressure, but is liquefied at a pressure of about 70 p. s. i. Such a mixture of the two compounds has a vapor pressure of less than 25 p. s. i. at 70° F.

I use the above mixture as a carrier for an insecticide preferably of the following composition:

	Per cent by weight
Benzene hexachloride, gamma-isomer, approximately $C_6H_6Cl_6$	1
Pyrethrum extract	1
Sesame oil extract, approx.	0.3
Carbon tetrachloride	2
Hydrocarbon oils (present in pyrethrum extract and added)	6

Benzene hexachloride is an insecticide which retains its lethal properties for an extended period of time. Pyrethrum extract is a powerful insecticide whose "knock-down" action is almost instantaneous. Sesame oil (or other suitable vegetable oils) enhances the insecticidal properties of the foregoing substances. Carbon tetrachloride serves as a solvent for the insecticides, being also soluble in the carrier fluid, and inhibits any danger of inflammability.

These compounds form a solution, 10% of which is mixed with 90% of the carrier gases. The resultant mixture is then placed in my container, as was described above. The vapor pressure of the mixture does not exceed 25 p. s. i., and this pressure is automatically maintained in the container until the last drop of the liquid is used up.

For operating the container, the manipulator 26 is turned into an open position and is manually depressed, releasing the pressure in the nozzle, whereupon the liquid in the nozzle will be gasified, entraining also minute droplets of the liquid of micron size, emerging from the nozzle in the form of a fine mist. Such a mist has powerful insecticidal properties, penetrating into fine folds and crevices in household furniture, clothing, beds, etc.

According to the tests of insect control laboratories, the insecticidal properties of my preparation are stronger than of other commercial compounds, and the toxicity to warmblooded animals is not more than one fifth of the toxicity of DDT.

The sprayed mist does not have any objectionable odors and has a rather pleasant pine scent due to the presence of the aromatic ingredients, and it does not leave any stains on clothing and furniture. Moreover, my fluid is non-inflammable and can be safely used under all ordinary conditions.

My fluid can be also used to advantage in refrigerators because of its low vapor pressure, thereby reducing the consumption of power for the motor.

It will be understood that various features and principles of each of the embodiments of the invention above described or referred to may be utilized or substituted in the other embodiments.

While the invention has been described in detail with respect to certain particular preferred examples, it will be understood by those skilled in the art after understanding the invention, that various changes and further modifications may be made without departing from the spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent is:

A self-propellant insecticidal composition comprising a toxic agent and an oily medium and a mixture of dichlorodifluoromethane and trichloromonofluoromethane having a combined vapor pressure of less than 24 pounds per square inch gauge.

JAMES L. ENDICOTT.

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