Nov. 7, 1967 R. L. GRAY 3,351,240

AUTOMATIC AEROSOL DISPENSER

Filed Jan. 17, 1966 2 Sheets-Sheet 1

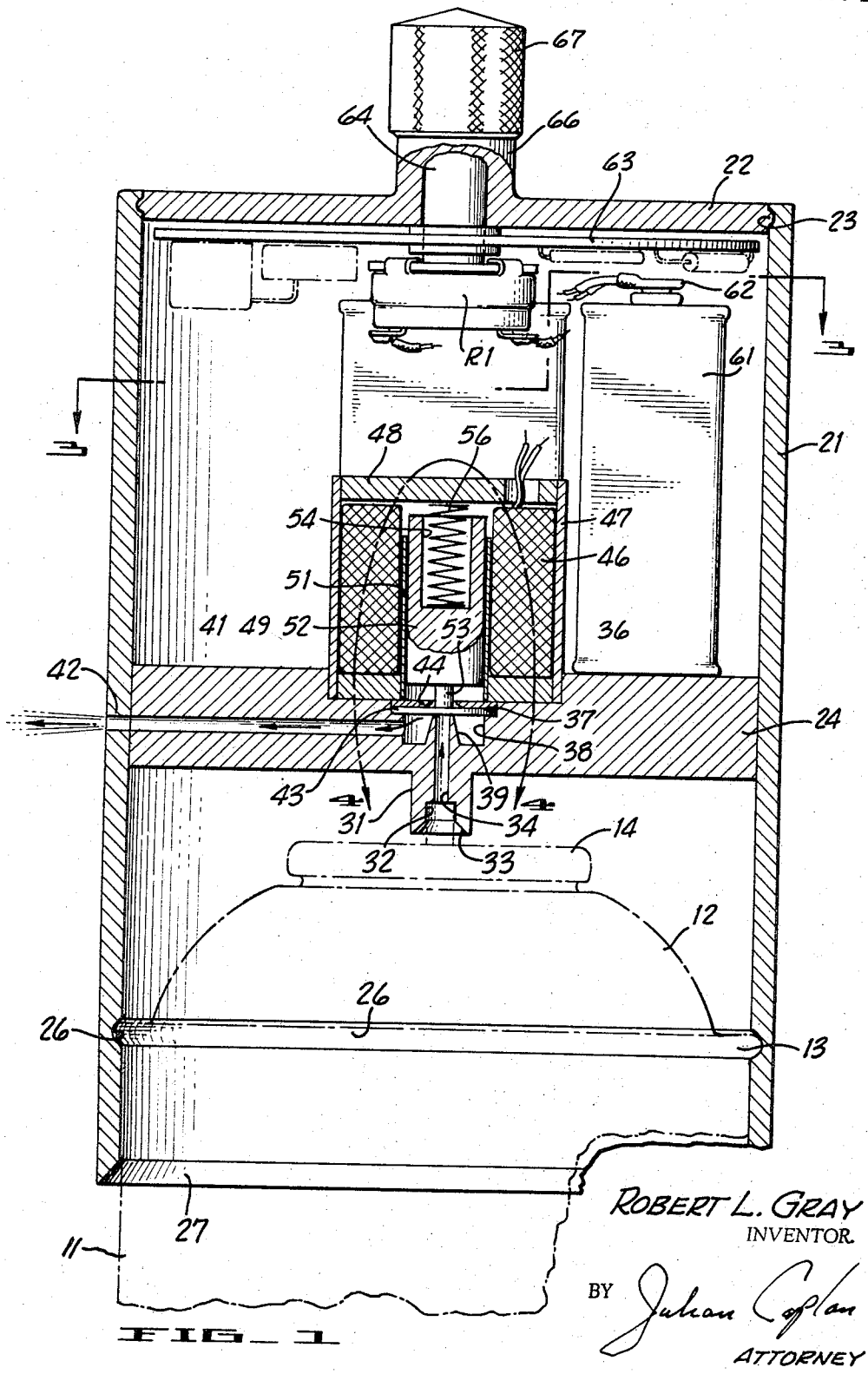


FIG. 1

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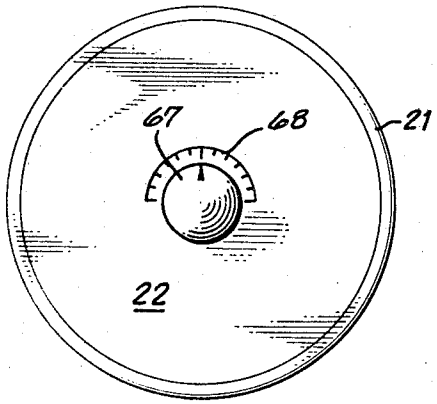


FIG_2

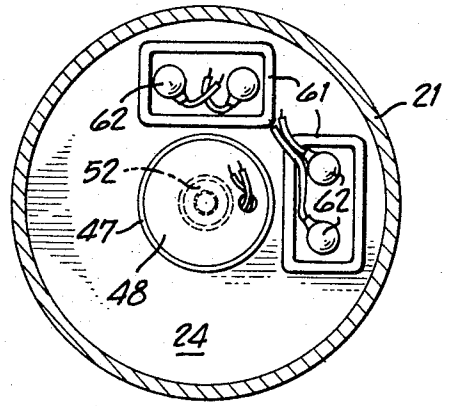


FIG_3

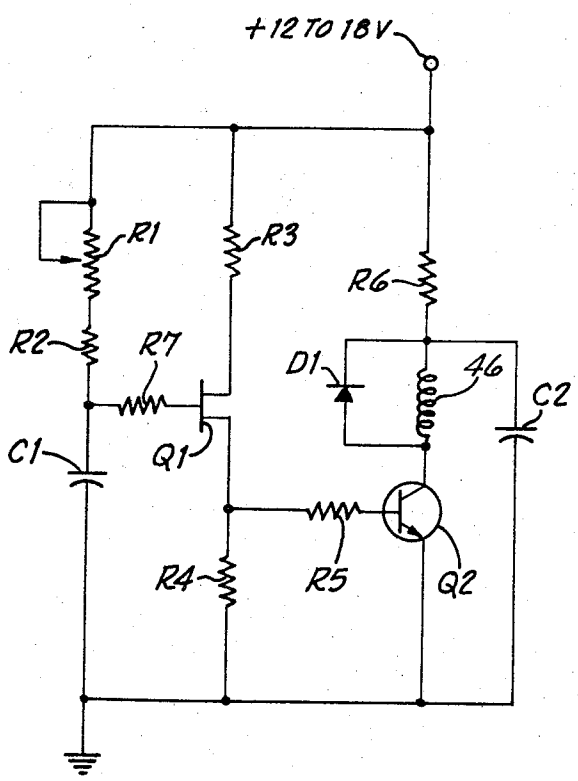


FIG_5

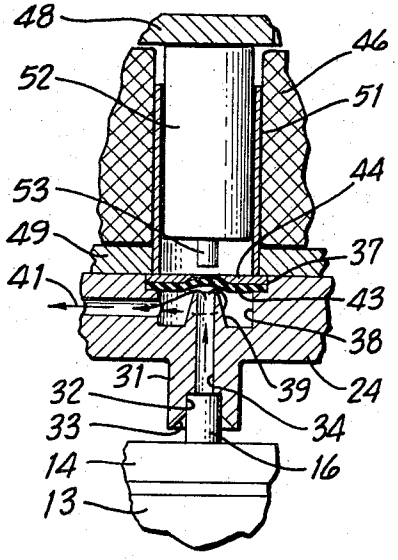


FIG_4

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AUTOMATIC AEROSOL DISPENSER

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3 Claims. (Cl. 222—70)

ABSTRACT OF THE DISCLOSURE

Aerosol dispensing apparatus including a housing, means for attaching the housing to an aerosol container and thereby opening and maintaining open the container's normally closed dispensing valve, a conduit system in the housing for conveying fluid from the container to atmosphere including a normally closed housing valve, and means including a solenoid and power and control means therefor in control relation to the housing valve.

This invention relates to an automatic aerosol dispenser wherein contents of a pressurized can such as a conventional aerosol can containing various liquids of the type of insecticides, medications and deodorizers is dispensed in short bursts at timed intervals. The invention has particular adaptation where small quantities of a vapor are emitted into a room to maintain a desired concentration of vapor within the room.

A feature of the invention is the provision of a housing which snaps over the upper end of an aerosol can and engages the valve stem of the can, supplanting the valving arrangement which is initially installed in such an aerosol can with the valving arrangement hereinafter explained in detail. The device hereinafter described opens the can to the atmosphere in short, timed bursts. In a preferred embodiment of the invention the interval between bursts and hence the quantity emitted may be adjusted.

In a preferred form of the invention, there is provided a battery powered circuit having a capacitor installed therein which discharges periodically to energize the coil of a solenoid controlling emission of vapor from the can through an aperture. The choice of the value of the capacitor determines the interval between bursts. A variable resistor may be incorporated in the electronic circuit to vary the timed interval.

The use of vaporized liquid for such purposes as insecticide, deodorizer, medication, and the like, is becoming increasingly common. However, heretofore convenient and practical means for dispensing the contents of the cans at intervals has not been achieved. Mechanical devices for such purposes are cumbersome, subject to mechanical failure, noisy and otherwise undesirable. The present invention eliminates the undesirable features of prior construction. In addition, the device is inexpensive to manufacture and maintain. Other advantages are its simplicity and freedom from problems of maintenance and its easy installation and removal.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a vertical sectional view through a device in accordance with the present invention showing the device installed on the upper end of a conventional aerosol can.

FIG. 2 is a top plan.

FIG. 3 is a section taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is a fragmentary sectional view of a portion of the structure of FIG. 1, shown with the valve in open position.

FIG. 5 is a schematic circuit diagram.

The present invention has particular application in conjunction with conventional aerosol cans as partially illustrated in FIGS. 1 and 4. Such a can has a cylindrical body **11** surmounted at its top with a breast **12** joined to body **11** at its periphery with a circumferential outward protruding bead **13** and having at its top a fitting **14** provided with an upward extending valve stem **16**. In normal operation, depressing stem **16** opens an internal valve structure to dispense contents. In accordance with the present invention the valve structure is replaced with the valve structure of this device and hence, when the device is installed on the can, the stem **16** is continuously depressed and the valve of the can is continuously open.

The device attached to can body **11** comprises an elongated cylindrical housing **21**, preferably cylindrical in shape and open at the bottom and closed at the top with top disc **22** which may be formed to snap into a groove **23** in the upper end of housing **21**. A partition **24** is disposed approximately midway of the interior of housing **21**. An internal groove **26** is formed spaced upwardly from the lower end of housing **21** and shaped to engage bead **13** of the can. The lower edge **27** of housing **21** is formed with a bevel. The material of construction of housing **21** may be a plastic of sufficient resiliency to enable the housing to slip over bead **13**. There is sufficient springiness in the material so that the housing cannot be dislodged from the assembled position shown in FIG. 1, except intentionally by the application of sufficient manual force. The beveled edge **27** facilitates seating of the housing on can **11**.

Partition **24** is formed on its bottom surface with a downward extension **31** formed on its bottom surface with a cavity **32** which receives stem **16**. The bottom edge **33** of protuberance **31** is beveled to facilitate seating of the stem **16** as is best shown in FIG. 4. When bead **13** is seated in groove **26**, stem **16** is forced downwardly to open the valve. Above recess **32** is an upward extending duct **34**. The upper surface of partition **24** is formed with a central recess **36** having progressively stepped recesses **37, 38**. A nozzle **39** projects up from the bottom of small-diameter recess **38** and terminates at the level of the bottom of recess **37**. The upper edge of nozzle **39** forms a valve seat as hereinafter described. A second or horizontal duct **41** is formed in partition **24** extending out from recess **38** and aligned with a hole **42** in casing **21**.

The valve arrangement for the device consists of an imperforate rubber disc **43** fitting into the bottom of recess **37** and held in place by a centrally apertured metal disc **44** of similar diameter. Coil **46** is disposed inside coil housing **47** which is disposed so that its lower end fits inside recess **36** and is closed at the top with a top **48** and at the bottom with an apertured bottom **49**. Disc **44** partially closes off the aperture in bottom **49**. A sleeve **51** is located inside coil **46** and fits against the top of apertured disc **44**. Reciprocating inside sleeve **51** is an armature **52**. At the lower end of armature **52** is a pin **53**. The upper end of armature **52** is formed with a recess **54** receiving helical spring **56** which bears against the underside of top **48** and the bottom of recess **54**. Thus spring **56** normally presses armature **52** downwardly so that pin **53** bears against the top surface of rubber disc **43** closing off the upper end of nozzle **39**. However, when coil **46** is energized, the force of spring **56** is overcome, lifting pin **53** and permitting the pressure within can body **11** to lift the disc to the position shown in FIG. 4 so that vapor is

dispensed from the can through duct **34** past the upper end of nozzle **39** into recess **38** and thence out through duct **41** and hole **42** into the surrounding room.

The power for coil **46** is supplied by a plurality of flashlight-type batteries **61** located in casing **21** above partition **24** and wired in series by means of fittings **62** engaging the terminals of the battery in a manner well understood in this art. A circuit board **63** is mounted inside the top of casing **21** immediately below cover **22** and various electrical components hereinafter described in detail are mounted upon and wired to said board in a manner well understood in the art. A principal component is variable resistor **R1** having an upstanding control stem **64** which projects up and through boss **66** on the top of cover **22**. A control knob **67** is attached to the upper end of stem **64** and by turning said knob the resistor **R1** may be adjusted. An off-on switch (not shown) may be incorporated in the circuit likewise controlled by knob **67**, as is well understood in the art. As scale **68** may be inscribed in proximity to knob **67** so that an indication of the setting of the resistor may be observed.

FIG. 5 is a schematic wiring diagram of a preferred circuit. It will be understood that other circuits may be substituted provided the same result is achieved. A table of values of the various components is hereinafter set forth, it being understood that the values also are merely representative.

Essentially, by adjustment of the setting of resistor **R1** the rate at which a charge builds up on capacitor **C1** is adjusted. The capacitor is quite accurate and its range of operation is such that the cycle of operation of the circuit may vary up to a 9-minute maximum. The operating time for holding plunger **52** open is 0.25 second. This time is, of course, electronically adjustable.

The use of resistor **R6** and capacitor **C2** is optional. When such elements are included in the circuit, the battery life is increased.

When capacitor **C1** discharges, unit junction transistor **Q1** functions as an amplifier and triggers transistor **Q2** so that current flows through coil **46**.

Energization of coil **46** raises core **52** and pin **53** from the rest position shown in FIG. 1, wherein pin **53** closes the opening in duct **34**. The pressure within can **11** raises the diaphragm **43** permitting discharge of the aerosol through duct **41** to the room or other enclosure in which the device is installed. Since the capacitor **C1** is discharged for only a short period of time, upon termination of discharge the coil **46** is de-energized.

A tabulation of component values is as follows:

R1	1M (variable).
R2	20K.
R3	150 ohm.
R4	75 ohm.
R5	1K.
R6	1K.
R7	200 ohm.
D1	Sil. diode 50 v breakdown.
Q1	2N2646.
Q2	2N3567.
C1	300 micro f., at 20 volts solid tant, leakage less than 0.5 microamp. at 10 v.
C2	300 micro f. elect.

Although the foregoing invention has been described in some detail, by way of illustration and example for purposes of clarity and understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A combination of means for effecting timed, power-actuated, periodic dispensing of fluid from an aerosol container, said container having a movable valve stem-conduit and a spring urging said valve stem-conduit outwardly of said container to a valve-closed position, whereby the power required to effect such periodic dispensing is minimized, comprising housing means having first conduit means adapted to interfit with and move said valve stem-conduit against the resistance of said spring inwardly of said container to a valve-open position; second conduit means adapted to effect communication between said first conduit means and the exterior of said housing means; movable valve means adapted in a first position to interrupt flow communication between said first and second conduit means and in a second position to effect flow communication between said first and second conduit means; power means adapted upon being activated to move said valve means from said first position to said second position and adapted upon being de-activated to move said valve means from said second position to said first position; timer means to activate and de-activate said power means; and means adapted to connect said housing means and said container together to effect, during the course of the making of such connection, the interfitting of said first conduit means with said valve stem-conduit and the movement of said valve stem-conduit against the resistance of said spring inwardly of said container to a valve-open position, thereby de-activating said spring and rendering the same non-opposing to activation of said power means.

2. A timed spray dispensing device for use with an aerosol container having a valve stem at its top and an internal valve opened by depressing said valve stem and first gripping means, said device comprising a casing shaped to fit over the top of said container and having second gripping means cooperably engageable with said first gripping means to hold said casing on said container, said casing having an internal partition, said partition being arranged to depress said valve stem and being shaped to establish fluid communication with said valve stem when said first and second gripping means are cooperably engaged, said partition being formed with a valve chamber, a first port in said partition adapted to receive fluid from said valve stem and to transmit fluid to said valve chamber, a second port in said partition adapted to receive fluid from said valve chamber and to transmit fluid to the exterior of said casing, valve means in said valve chamber normally closing off communication between said ports, and timer means arranged to operate said valve means at timed intervals to provide communication between said ports, said timer means comprising a solenoid controlling said valve means, a source of electric current, a capacitor, and an electric circuit arranged to charge said capacitor from said source and to energize said solenoid when the charge on said capacitor has built up to a predetermined value upon the elapse of a predetermined time interval, said valve means comprising a diaphragm disposed in said valve chamber across one of said ports, a pin on said solenoid, and resilient means biasing said pin against said diaphragm to normally close said one port.

3. A timed spray dispensing device for use with an aerosol container having a valve stem at its top and an internal valve opened by depressing said valve stem and first gripping means, said device comprising a casing shaped to fit over the top of said container and having second gripping means cooperably engageable with said first gripping means to hold said casing on said container, said casing having an internal partition, said partition being arranged to depress said valve stem and being shaped to establish fluid communication with said valve stem when said first and second gripping means are cooperably engaged, said partition being formed with a valve chamber, a first port in said partition adapted to receive fluid from said valve stem and to transmit fluid to said valve chamber, a second port in said partition adapted to receive fluid from said valve chamber and to transmit fluid to the exterior of said casing, valve means in said

valve chamber normally closing off communication between said ports, and timer means arranged to operate said valve means at timed intervals to provide communication between said ports, said timer means comprising a solenoid controlling said valve means, said valve means comprising a diaphragm disposed in said valve chamber across one of said ports, a pin on said solenoid, and resilient means biasing said pin against said diaphragm to normally close said one port.

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