July 15, 1969 L. T. CROWNOVER 3,455,485

AUTOMATIC CYCLING MECHANISM

Filed March 20, 1967

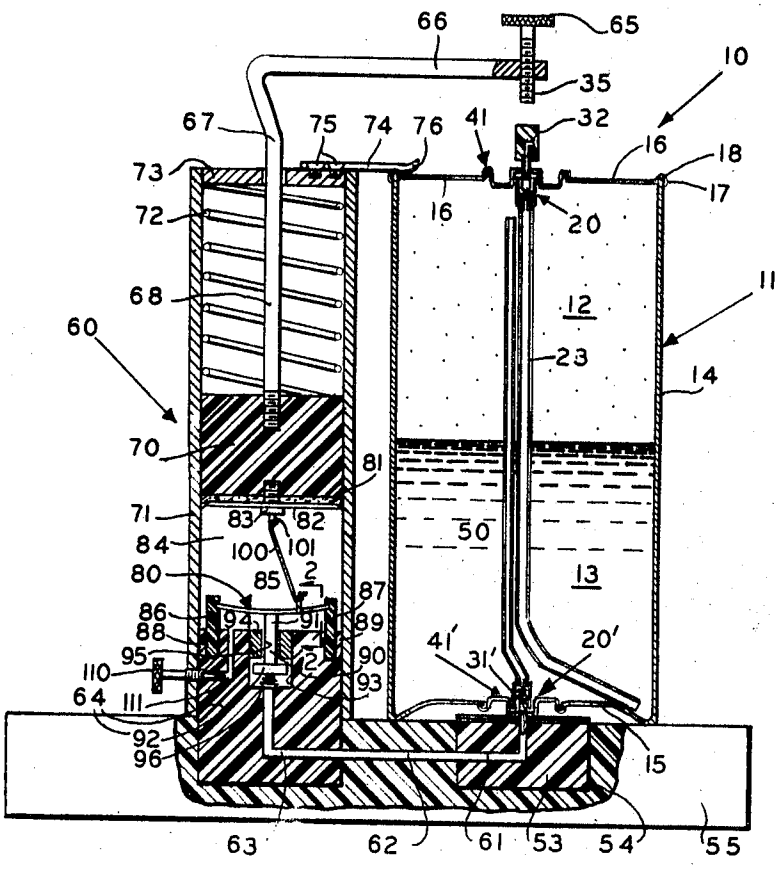

FIG. 1

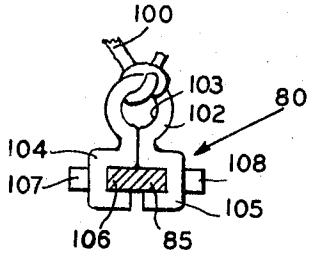

FIG. 2

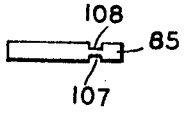

FIG. 3

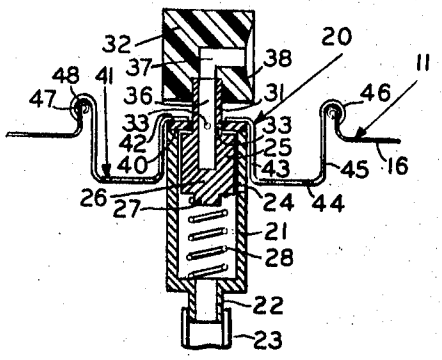

FIG. 4

INVENTOR.
LAWRENCE T. CROWNOVER
BY
Ronald W. Myers

United States Patent Office 3,455,485 Patented July 15, 1969

3,455,485

AUTOMATIC CYCLING MECHANISM

Lawrence T. Crownover, 942 Brown Thrush, Wichita, Kans. 67212

Continuation-in-part of application Ser. No. 541,939, Apr. 7, 1966. This application Mar. 20, 1967, Ser. No. 624,385

Int. Cl. B65d *83/14*

U.S. Cl. 222—70 24 Claims

ABSTRACT OF THE DISCLOSURE

This invention provides novel fluid operated automatic cycling means for periodically releasing a predetermined quantity of pressure fluid from a container, such as an aerosol can. The cycling mechanism comprises a compressed gas operated timing device and a quick acting valve device. The aerosol can may contain any suitable active and inactive ingredients that can be discharged through a spray nozzle. The inactive ingredient is usually the pressurizing fluid. The active ingredient may be aspirating fluids, germicides, medicines, pesticides, deodorants, insecticides, and so forth, that are desired to be automatically discharged from an aerosol can in selected quantities at predetermined intervals. For example, the mechanism can discharge fluid from an aerosol can for ten seconds every hour until the can is empty or until the cycling mechanism is deactivated.

This invention relates to automatic cycling mechanisms.

This is a continuation-in-part of pending, but now abandoned, United States patent application Ser. No. 541,939 filed Apr. 7, 1966, entitled "Compressed Gas Operated Bait Bucket Aerator" of Lawrence T. Crownover.

This invention provides novel fluid operated automatic cycling means for periodically releasing a predetermined quantity of the contents of a container. More particularly, the novel automatic cycling mechanism comprises a compressed gas operated timing device and a quick acting valve device. The container industry has recognized a need for suitable means for automatically releasing or discharging any contents of a container, such as an aerosol can, at selected and/or controlled intervals and in selected and/or controlled quantities. For example, aspirating fluids, germicides, medicines, deodorants, insecticides, and so forth, are desired to be automatically discharged in an atomized spray from an aerosol can at selected intervals and in selected quantities without any attention being required by the user once the invention has been set into operation. Another desirable feature is the elimination of electrical cords, batteries, spring motors, and/or escapement mechanisms that require winding.

An object of this invention is the provision of a novel automatic cycling mechanism.

Another object of this invention is the provision of a novel gas operated timing and/or metering device especially suitable for use with a pressure packaged container.

Another object of this invention is the provision of a novel pressure packaged container for use with an automatic cycling mechanism of the character described.

A still further object of this invention is the combination of a pressure packaged container, such as an aerosol can, with an automatic cycling mechanism of the character described for periodically releasing fluid from the aerosol can in the quantity desired.

A still further object of this invention is the provision of an automatic cycling mechanism packaged as a portable unit adapted to receive and operate an aerosol can that can be readily replaced when the contents of the can have been depleted.

Another object of this invention is the provision of a novel aerosol container especially adapted to supply pressure fluid for operating the automatic cycling mechanism set forth in the preceding paragraphs.

Yet another object of this invention is the provision of an automatic cycling mechanism having a timing and metering valve controlling a snap-action valve device. The snap-action valve, when open, admits fluid under pressure to drive an actuating mechanism in one direction for a predetermined distance. When the actuating mechanism forces the valve to snap into a closed position, a return spring means then automatically biases the actuating mechanism in a return direction along the same path at a rate determined by the timing and metering valve. When the actuating mechanism reaches the end of the return path, it bottoms against the closed snap-action valve device and causes the same to again snap into the open position to admit pressure fluid that drives the actuating mechanism back in the direction from whence it came. Thus the cycle automatically repeats itself so long as the timing and metering valve is open to some degree and there is an adequate supply of pressure fluid available to overpower the return spring means.

The invention further resides in certain novel features of construction, combinations, and arrangements of parts and further objects and advantages of the invention will be apparent to those skilled in the art to which it pertains from the following description of the present preferred embodiment thereof described with reference to the accompanying drawings, which form a part of this specification, wherein the same reference numerals indicate corresponding parts throughout the several views, and in which:

FIG. 1 is an elevational view of a device embodying the invention with a majority of the parts broken away and in cross-section for showing details of the invention;

FIG. 2 is an enlarged cross-sectional view along line 2—2 in FIG. 1;

FIG. 3 is a plan view of a leaf spring forming a part of snap-action valve means in FIG. 1; and

FIG. 4 is an enlarged view of a depressible nozzle and valve means of an aerosol can.

Referring to FIG. 1, reference numeral **10** indicates generally an aerating or atomizing device embodying the invention useful for discharging a prescribed quantity or dose of aerosol fluid into the atmosphere at selected time intervals. More particularly, reference numeral **11** indicates generally a pressure packaged or pressurized container referred to herein as an aerosol can. The aerosol can **11** may obtain any desired fluid such as a gas, a liquid, or a mixture of a gas and a liquid. Moreover, the can **11** may contain in addition to a pressure fluid, a finely particulated solid such as, for example, talcum powder. Most aerosol cans on the market today contain both active and inactive ingredients. The pressure fluid is usually designated as an inactive ingredient. Freon **12**, which is inert and relatively harmless, is a pressure fluid commonly used in aerosol cans now on the market. However, it is to be understood that other pressure fluids may be used as desired.

The active ingredients for use in the can **11** may be selected from a group that includes insecticides, deodorants, medicines, germicides, aspirating fluids, and so forth. It is to be understood that the selection of the active ingredient and the pressurizing fluid for use in the aerosol can **11** does not form a part of this invention. However, for this invention to work there must be a source of pressure fluid. It is preferred that the pressure fluid be provided by the aerosol can **11**.

AEROSOL CAN

The aerosol can **11** contains pressure fluid **12** and an

active ingredient **13**. The can **11** has a cylindrical side wall **14**, and a circular bottom or lower end wall **15** integrally connected to and forming the lowermost end of the cylindrical wall **14**. A circular upper or top end wall **16** is connected to the inner surface of the cylindrical side wall **14** and secured thereto in a manner to be described.

The top end wall **16** has a peripheral bead **17** that overlaps and is crimped over the upper peripheral end of the cylindrical wall **14**. A polymeric sealant **18** is interposed between the inner wall of the bead **17** and the upper end of the cylindrical wall **14** for providing a leakproof seal.

As best seen in FIGS. 1 and 4, the upper end wall **16** is provided at a central portion thereof with a nozzle and valve means indicated generally by reference numeral **20**. A cylindrical valve housing **21** has attached at a lower reduced end portion **22** thereof a tubular siphoning member **23** that extends to the bottom of the cam **11** and rests on the end wall **15** for siphoning active ingredient **13** therethrough into the valve housing **21**. The pressure fluid **12** is preferably Freon **12** gas and is referred to herein as an inactive ingredient. The pressure fluid **12** flows into the valve housing **21** via one or more horizontal peripheral ports **24** formed in the housing **21**, FIG. 4. A valve member **25**, preferably made of a polymeric plastic, has a cylindrical body portion **26** slideably disposed within the valve housing **21**. A lower end of the valve body **26** is provided with a cylindrical stud **27** for centering a resilient biasing means **28**. Preferably the resilient biasing means **28** is an helical spring preferably enclosed in a flexible impervious cover or jacket, not shown, for protecting the same from the contents of the can **11**.

The upper end of the valve body **26** is provided with a cylindrical plunger **31**. A finger engageable nozzle **32** is seated upon and secured to the outer end of the valve plunger **31**. The active ingredient **13** siphoned through the tubular member **23** by the pressure fluid admitted to the port **24**, into the valve housing **21** travels through an annular passage about the valve body **26** and within the inner wall of the valve housing **21**, through a closeable port **33** that is opened when the nozzle **32** and the valve member **25** are pressed downwardly either by an operator or a mechanically operated finger **35**, FIG. 1. The mixture of ingredients **12** and **13** passes upwardly into a vertical cylindrical passage **36** both in the valve body **26** and the plunger portion **31**, into an L-shaped passage **37** in the nozzle **32**, and thence into the atmosphere.

The L-shaped passage **37** is preferably cylindrical and terminates in a frusto-conical shaped port **38**. When the nozzle **32** and the valve member **25** are biased outwardly by the spring **28** as shown in FIG. 4, the port **33** is isolated from the inner chamber of the valve body **26** and sealed off by a washer-shaped packing member **40**. The packing member **40** is disposed about the outer plunger portion **31** of the valve **25** and is adapted to be engaged by and to cushion the upper shoulder of the valve body **26**. If desired, there can be more than one passage **33** as shown in FIG. 4. The packing member **40** is secured between the upper end of the valve housing **21** and a cup-shaped or doughnut-shaped annular closure member or insert indicated generally by the reference numeral **41**. The closure member or insert **41** permits the nozzle and valve means **20** to be secured as a unit in the aerosol can **11**.

More particularly, the packing member **40** is biased between the upper end of the valve housing **21** and a flat annular portion **42**. The outer periphery of the flat annular portion **42** is connected to a central cylindrical or tubular portion **43**, FIG. 4. The tubular portion **43** is integrally connected at a lower end thereof to an annular disk-shaped portion **44**. The annular portion **44** is integrally connected to a cylindrical portion **45** that extends parallel about the central portion **43**. The cylindrical portion **45** terminates in an U-shaped annular channel portion **46**. The channel portion **46** is adapted to seat over an annular or circular bead **47** formed at the inner periphery of the end wall **16** of the can **11**. A sealant **48**, similar to the sealant **18**, is interposed between the bead **47** and the bight of the channel-shaped portion **46** of the insert **41**.

The bottom end wall **15** of the aerosol can **11** is provided with an inverted nozzle and valve means **20'** that is opposed to the similar upper valve means **20**. However, the nozzle **32** has been removed from the valve means **20'**. Otherwise, the valve means **20** and **20'** are similar in every detail. The upper end of a valve housing **21'** is connected to a pressure fluid conduit or tube **50** that extends upwardly into the aerosol can **11** and terminates at a point adjacent the upper end **16** of the can **11**. The bottom end wall **15** is concave upwardly and is integrally formed with the lower edge of the cylindrical wall **14** of the can **11**. The lower valve means **20'** forms a part of an insert **41'** similar to the insert **41** described in connection with the top end wall **16** of the can **11**. The cylindrical plunger **31'** of the valve means **20'** extends downwardly and is fitted into an adapter block **53**. The adapter block **53** is cylindrical and seated in a similarly-shaped opening **54** in a rectangular pad or base **55** of the device **10**.

AUTOMATIC CYCLING MECHANISM

The device **10** is operated by the finger **35** depressing the nozzle **32** of the valve means **20** for discharging aerosol fluid to the atmosphere from the upper end of the can **11**. An automatic cycling mechanism, indicated generally by reference numeral **60**, is supplied with the pressure fluid **12** from the can **11** through the valve means **20'** and into an L-shaped passage **61** in the block **53**, an horizontal passage **62** in the base **55**, and an L-shaped **63** in a cylindrical member or block **64**. The block **64** is seated in the base **55** in a manner similar to the block **53**. Preferably, the blocks **53** and **64** are of a polymeric plastic and the base **55** is of a similar material.

The finger **35** comprises an adjustable set screw having a knurled head portion **65** for easy adjustment by an operator. The finger **35** is threaded into an outer end of an horizontal arm **66**. The arm **66** forms a part of an L-shaped actuating member **67** having a vertical push-pull rod portion **68**. The lower end of the rod **68** is threaded into a cylindrical piston **70**, preferably made of a polymeric plastic. The piston **70** is slideably disposed in a cylinder member **71**. The piston **70** is biased downwardly by resilient biasing means comprising an helical spring **72**. A lower end of the spring **72** bears against an upper surface of the piston **70**. An upper end of the spring **72** bears against a disk-shaped upper end member **73** closing the end of the cylinder **71**.

The end member **73** carries an aerosol can retainer member **74**. One end of the retainer member **74** is secured to the member **73** by means of two screws **75**. An outer end of the retainer member **74** is provided with a lip portion **76** for having the peripheral edge or bead **17** of the can **11** inserted therebeneath for holding the same securely against the base **55** of the device **10**. This is necessary because there must be sufficient reaction force to hold the can **11** down against the base **55** for depressing a valve plunger **31'** of the valve means **20'** in the bottom wall **15** of the can **11**. This is necessary to provide a continuous supply of pressure fluid **12** through the passages **61**, **62**, and **63** to snap-action valve means, indicated generally by the reference numeral **80** in the cylinder member **71**. The lower end of the cylinder member **71** is telescoped or press-fitted over the cylindrical block **54** for preventing the escape of pressure fluid therefrom. Moreover, the lower face or end wall of the piston **70** is provided with a suitable packing member **81** secured in place by a broad flat washer **82** and a cap screw **83** threaded into the piston **70**. The packing member **81** may be of leather or any other suitable material and is suitably dished and provided with a feathered peripheral edge for assuring an adequate seal for preventing the transgression of pressure fluid therepast from a pressure chamber **84** defined by the piston **70** and the upper surface of the block **64**.

SNAP-ACTION VALVE MEANS

The snap-action valve means **80** comprises a thin leaf spring **85** as seen in FIGS. 1, 2 and 3. It has the opposite ends thereof disposed in horizontal and opposed parallel slots formed in two laterally spaced posts **86** and **87**. The posts **86** and **87** are of a rectangular cross-section and are set in correspondingly-shaped slots **88** and **89** formed in the upper end of the block **64**. The posts **86** and **87** are spaced close enough together to require that the leaf spring **85** be bowed in a concave or convex direction by a suitable distance when inserted in place. When the leaf spring **85** is bowed downwardly as seen in FIG. 1, a midportion thereof bears against a T-shaped valve **90**, FIG. 1.

The valve **90** has an erect cylindrical stem or plunger portion **91** and a cylindrical or disk-shaped poppet valve portion **92**. The valve portion **92** is disposed in a cylindrical valve chamber **93** formed in the block **64** that is closed by an annular valve seat **94** preferably press-fitted into the upper end of the valve chamber **93** in the block **64**. The valve plunger **91** reciprocates freely in the seat **94**. The seat **94** has a central cylindrical opening **95** formed therein. The valve **90** is urged to a closed position with the seat **94** by a conically-shaped helical spring **96** seated on an annular bottom floor or surface of the valve chamber **93** in the block **64**.

So long as the valve **90** is held open by the leaf spring **85** as shown in FIG. 1, pressure fluid **12** escapes from the can **11** via the tube **50**, the passages **61**, **62**, and **63** into the valve chamber **93**. The fluid then escapes from the chamber **93** through the annular passage between the valve seat **94** and the central opening **95** into the chamber **84**. This causes the piston **70** to be driven upwardly against the resistance of the spring **72** and causes a flexible means **100** to be drawn taut. Preferably the flexible means **100** is a nylon cord suitably secured at the upper end thereof to a loop **101** connected to the head of the cap screw **83**. The lower end of the cord **100** is suitably secured to an eyelet member **102** clamped to the leaf spring **85**. When the cord **100** is drawn taut, the leaf spring **85** is snapped upwardly into a convex bowed position.

It has been found that by connecting the eyelet member **102** at a point midway between one end of the spring **85** and a center portion of the leaf spring **85** that the leaf spring **85** does not move in lost motion, hang, or reach a null point between the open and closed positions before the snap of the spring occurs. It has been found when the cord is connected to the center of the spring **85** that a null condition will occur and the valve will not promptly snap into an open or closed position in the manner desired. It is not desired for the spring **85** to partially open or close and then respectively snap to a closed or open position but it is desired that the spring **85** quickly move from a closed to an open position and then move from the open position to the closed position in one fast motion referred to herein as snap-action.

Referring to FIG. 2, the eyelet member **102** has an eyelet portion **103** and opposed parallel U-shaped clamping legs **104** and **105** that embrace a portion **106** of reduced width formed in the spring **85**. By reducing the width of the leaf spring **85** as shown in FIG. 2, the eyelet member **102** is prevented from slipping longitudinally of the leaf spring **85**. Accordingly, the leaf spring **85** is provided with a necked portion formed by U-shaped grooves **107** and **108**, as best seen in FIG. 3.

TIMING MEANS

The distance that the piston **70** will travel depends upon the length of the cord **100**. The length of time that is required for the piston to travel upwardly is dependent upon the helical spring **72** and the setting of a timing means indicated generally by the reference numeral **110**. This timing means **110** comprises a needle valve threaded into an horizontal opening in the cylinder member **71** and the block **64**. The needle valve **110** controls the escape of pressure fluid from the chamber **84** through an L-shaped passage **111**. The time it takes for the piston **70** to travel in a return or downward direction once the valve **90** has been snapped to a closed position depends primarily upon the setting of the needle valve **110** and only secondarily upon the size and strength of the spring **72** and the gage pressure of the fluid **12**.

When the piston **70** reaches the end of the downward stroke, the loop **101** on the cap screw **83** will engage a midportion of the leaf spring **85** and cause the spring **85** to snap into a valve opening position as shown in FIG. 1. As soon as the valve **90** is snapped open, the piston **70** is again forced upwardly by the pressure fluid **12** to cause the finger **35** to release the nozzle **32** and eventually permit the valve spring **28** to cause the valve **25** to close off the port **33** in conjunction with the packing member **40** of the valve means **20**. As soon as the piston **70** has reached the upper limit of its stroke as defined by the length of the cord **100**, the leaf spring **85** is snapped to a valve closing position and the timing means **110** defined by the needle valve controls the length of time it will take for the piston **70** to complete its downward stroke and cause the valve **90** to be again snapped into the open position.

As can be seen from FIG. 1, there may be a time lapse before the finger **35** engages the nozzle **32** of the valve means **20**. Moreover, the finger **35** will continue its downward stroke after engaging the nozzle **32** and thus release aerosol fluid into the atmosphere. Aerosol fluid will continue to be released into the atmosphere until the finger **35** reaches a point of disengagement on its return or upward stroke at which time the finger **35** loses contact with the nozzle **32** of the valve means **20**.

By properly adjusting the timer **110** and by adjusting the finger **35** so as to control the length of stroke and the time it takes to travel the length of the stroke for releasing aerosol fluid from the aerosol can, a prescribed quantity or dose or aerosol fluid can be discharged into the atmosphere at controlled time intervals.

What is claimed is:

1. An automatic cycling mechanism comprising, cylinder means adapted to be connected to a source of pressure fluid, piston means reciprocably disposed in said cylinder means, first valve means controlling the flow of the pressure fluid to said cylinder means for acting against said piston means and urging the same in one direction in said cylinder means, resilient means biasing said piston means in a return direction in said cylinder means, means for opening said valve means when said piston means have traveled a predetermined distance in said return direction, means for closing said valve means when said piston means have traveled a predetermined distance in said one direction, and second valve means for bleeding the pressure fluid from said cylinder means at a selected rate for controlling the rate said resilient means biases said piston means in said return direction.

2. An automatic cycling mechanism as set forth in claim **1**, further comprising means for controlling the rate of admission of the pressure fluid to said cylinder means past said first valve means.

3. An automatic cycling mechanism as set forth in claim **1**, wherein said second valve means is an adjustable needle valve.

4. An automatic cycling mechanism as set forth in claim **1**, wherein said first valve means comprises means forming an orifice, orifice valve means, spring means biasing said orifice valve means into closed relationship with said orifice means, and snap-action spring means comprising a leaf spring when bowed in one direction is adapted to hold said orifice valve means in an open position for admitting pressure fluid through said orifice means and when bowed in an opposite direction is adapted to permit said spring means to bias said orifice valve means to a closed position relative to said orifice means,

and flexible means of predetermined length connecting said leaf spring to said piston means for causing said leaf spring to be snapped from said bowed position in said one direction that holds said orifice valve means in an open position to said bowed position in said opposite direction that permits said orifice valve means to be biased to said closed position when said flexible means have been drawn taut by said piston means.

5. An automatic cycling mechanism as set forth in claim 4, wherein said flexible means is a cord that can have the length thereof increased to increase the cycling time, and decreased to decrease the cycling time.

6. An automatic cycling mechanism comprising, first means adapted to be connected to a source of pressure fluid, second means reciprocably disposed in said first means, third means controlling the flow of the pressure fluid to said first means for acting against said second means and urging the same in one direction in said first means, fourth means biasing said second means in a reverse direction in said first means, fifth means for opening said third means when said second means have traveled a predetermined distance in said reverse direction, sixth means for closing said third means when said second means have traveled a predetermined distance in said one direction, and seventh means for bleeding the pressure fluid from said first means at a selected rate for controlling the rate said fourth means biases said second means in said reverse direction.

7. An automatic cycling mechanism as set forth in claim 6, further comprising eighth means for controlling the rate of admission of the pressure fluid to said first means past said third means.

8. An automatic cycling mechanism as set forth in claim 6, wherein said seventh means is an adjustable needle valve.

9. In an automatic cycling mechanism of the character described means forming an orifice, orifice valve means, spring means biasing said orifice valve means into closed relationship with said orifice means, and snap-action spring means comprising a leaf spring, said leaf spring when bowed in one direction is adapted to hold said orifice valve means in an open position for admitting pressure fluid through said orifice means, and said leaf spring when bowed in an opposite direction is adapted to permit said orifice valve means to be moved to a closed position relative to said orifice means, and flexible means of predetermined length adapted to connect said leaf spring to a reciprocable member for causing said leaf spring to be snapped from said bowed position in said one direction that holds said orifice valve means is an open position to said bowed position in said opposite direction that permits said orifice valve means to be moved to said closed position when said flexible means have been drawn taut by the reciprocable member.

10. In an automatic cycling mechanism as set forth in claim 9, wherein said flexible means is a cord that can have the length thereof increased to increase the cycling time, and decreased to decrease the cycling time.

11. In an automatic cycling mechanism as set forth in claim 9, wherein said flexible means is connected to said leaf spring at a location between the midportion of said leaf spring and an end thereof.

12. An automatic cycling mechanism comprising, expansion chamber means adapted to be connected to a source of pressure fluid, valve means controlling the flow of the pressure fluid to said expansion chamber means for expanding the same, means for contracting said expansion chamber means, means for closing said valve means when said expansion chamber means have expanded a predetermined amount, means for opening said valve means when said expansion chamber means have contracted a predetermined amount, and means for bleeding the pressure fluid from said expansion chamber means at a predetermined rate for controlling the contraction of said expansion chamber means.

13. An automatic cycling mechanism as set forth in claim 12, further comprising means for controlling the rate of admission of the pressure fluid to said expansion chamber means past said valve means.

14. An automatic cycling mechanism as set forth in claim 12, wherein said valve means comprises means forming an orifice, orifice valve means, said orifice valve means being adapted to be biased into closed relationship with said orfice means by the pressure fluid, and snap-action valve operating means when in one position adapted to hold said orifice valve means in an open position for admitting pressure fluid through said orifice means, and when in another position adapted to permit said orifice valve means to be biased to a closed position relative to said orifice means, and flexible connecting means of predetermined length connecting said valve operating means to a portion of said expansion chamber means for causing said valve operating means to be snapped from said one position that holds said orifice valve means in an open position to said another position that permits said orifice valve means to be biased to said closed position when said flexible connecting means have been drawn taut by the expansion of said expansible chamber.

15. An automatic cycling mechanism as set forth in claim 14, wherein said flexible connecting means is a cord that can have the length thereof adjusted to increase the cycling time by an increase in the cord length, and to decrease the cycling time by a decrease in the cord length.

16. An automatic cycling mechanism comprising, expansible chamber means adapted to be connected to a source of pressure fluid, first valve means controlling the flow of the pressure fluid to said expansible chamber means for expanding the same, means for contracting said expansible chamber means, means for opening said first valve means when said expansible chamber means have contracted a predetermined amount, means for closing said first valve means when said expansible chamber means have expanded a predetermined amount, and second valve means for bleeding the pressure fluid from said expansible chamber means at a predetermined rate.

17. An automatic cycling mechanism as set forth in claim 16 further comprising, actuating means drivingly connected to said expansible chamber means adapted to actuate a valve of an aerosol can for releasing pressure fluid therefrom through a nozzle.

18. An automatic cycling mechanism as set forth in claim 17, wherein the source of fluid pressure for operating the automatic cycling mechanism is the pressure fluid from the same aerosol can actuated by said actuating means.

19. A mechanism of the character described in combination with a source of pressure fluid having a depressible nozzle and valve means for containing pressure fluid therein, comprising, first means for depressing the valve means and releasing fluid directly from the fluid source through the nozzle, second means operated by the pressure fluid source for operating said first means in such a manner as to cause said first means to periodically depress the valve means and to release the same after a predetermined length of time to discharge a predetermined amount of fluid from the fluid source, and third means for automatically recycling said second means and causing said first means to depress the valve means at predetermined intervals.

20. A container adapted to contain under pressure both active and inactive fluid means comprising, first end means, second end means, side wall means connected to said first end means and said second end means for forming a container, valve means disposed in said first and second end means, each said valve means comprising tube means extending substantially the length of the container, valve plunger means disposed in one end of said tube means and extending through one of said end means,

means in said tube means biasing said plunger means outwardly through said one of said end means, seal means disposed about said plunger means inside the container and sandwiched between said one of said end means and said tube means for preventing the transgression of the fluid means therepast, means forming a passage in said plunger means extending through an outer end thereof for admitting the fluid means therethrough from said tube means to the outside of the container when said plunger means are depressed inwardly of the container, and the inner end of said passage means being in sealing engagement with and sealed off by said seal means for preventing admission of the fluid means therethrough when said plunger means is not depressed.

21. A container as set forth in claim **20**, wherein each said valve means further comprises annular insert means carried by one of said end means and having a cup-shaped central portion disposed about an outer end of said tube means, and an outer end of said plunger means extends through the central opening of said insert means.

22. A container as set forth in claim **21**, wherein each said insert means has a channel-shaped annular periphery sealingly secured to a central circular bead of said end means.

23. A container as set forth in claim **20**, further comprising nozzle means carried by the upper end of said plunger means of one of said valve means.

24. In combination with an aerosol can having a valve for containing pressure fluid therein, means operated by pressure fluid from the aerosol can for automatically and continuously releasing at substantially equal intervals a predetermined amount of pressure fluid directly from the aerosol can by periodically opening and closing the valve of the aerosol can.

References Cited

UNITED STATES PATENTS

3,125,135	3/1964	Boyer et al.	222—482 X
3,200,998	8/1965	Mahar	222—482 X
2,613,108	10/1952	Kraus	222—70
2,695,766	11/1954	Peltz	222—70 X
2,751,114	6/1956	Greaves	222—70
2,864,534	12/1958	Wrenn	222—129 X
2,973,781	3/1961	Cadella	222—70 X
3,045,925	7/1962	Giangualano	222—129 X
3,182,857	5/1965	Bischoff et al.	222—70
3,326,418	6/1967	Kropp	222—70

ROBERT B. REEVES, Primary Examiner

H. S. LANE, Assistant Examiner

U.S. Cl. X.R.

222—335, 394, 504