June 18, 1968 C. M. HART 3,388,834

SPRAY DISPENSER

Filed March 20, 1967 2 Sheets-Sheet 1

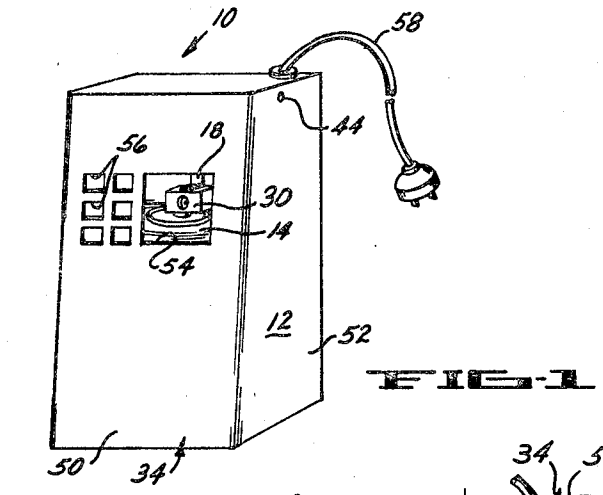


FIG-1

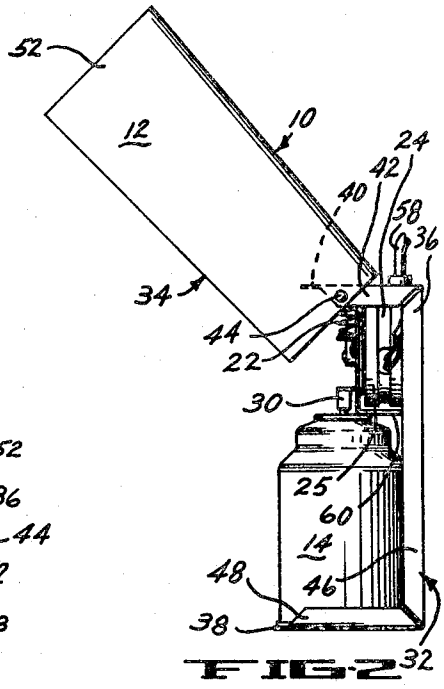


FIG-2

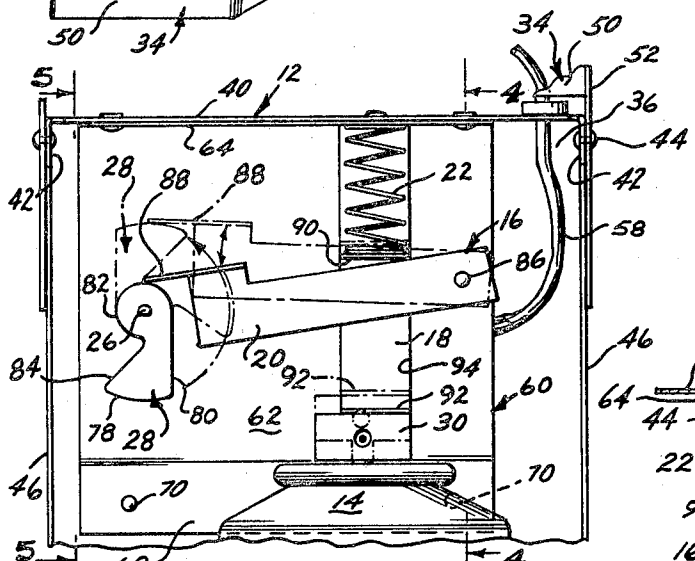


FIG-3

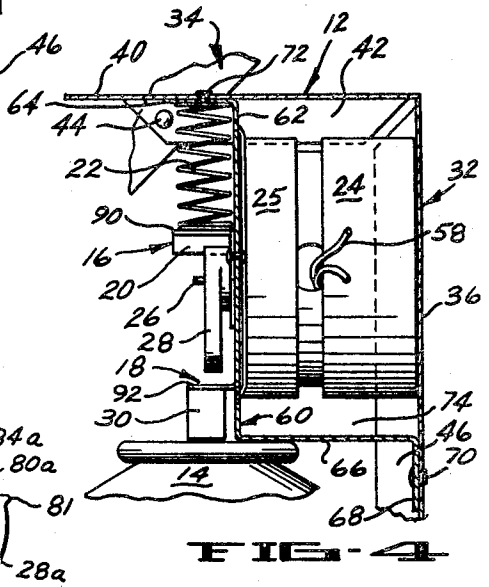


FIG-4

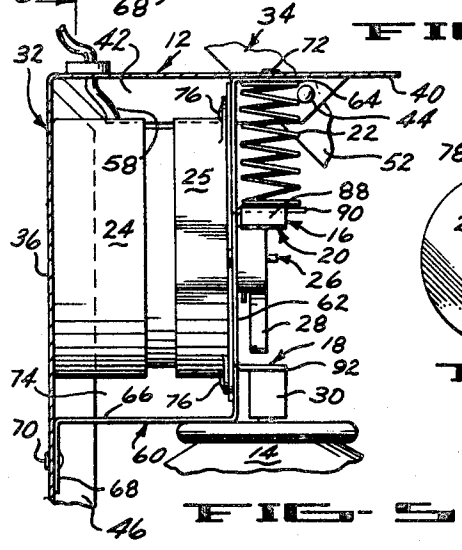


FIG-5

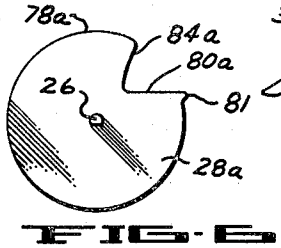


FIG-6

INVENTOR.
CHARLES M. HART

BY Fulwider, Patton, Rieber, Lee & Utecht

ATTORNEYS

June 18, 1968 C. M. HART 3,388,834

SPRAY DISPENSER

Filed March 20, 1967 2 Sheets-Sheet 2

FIG. 7

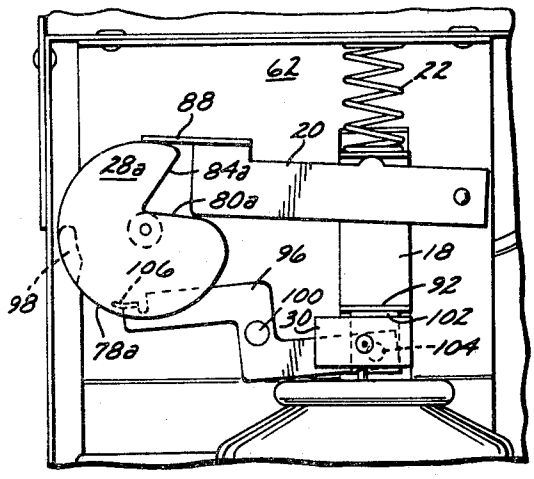
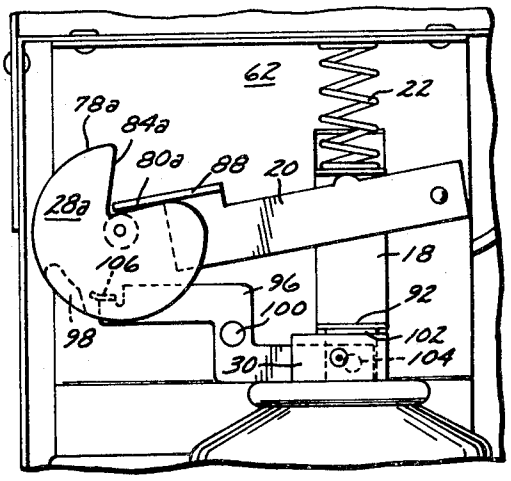


FIG. 8



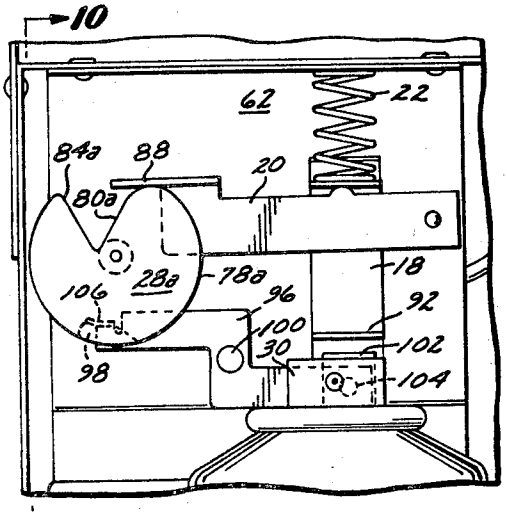


FIG. 9

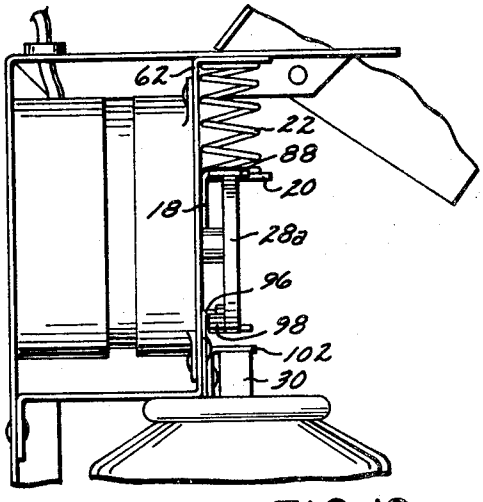


FIG. 10

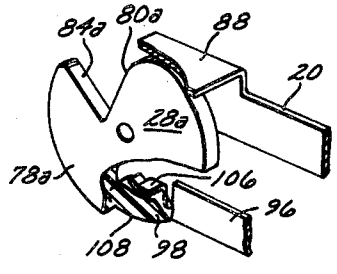


FIG. 11

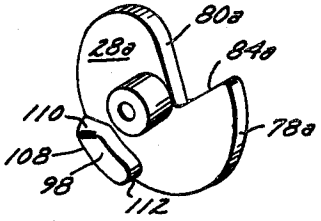


FIG. 12

INVENTOR.
CHARLES M. HART
BY Fulwider, Patton, Rieber, Lee and Utecht
ATTORNEYS

United States Patent Office 3,388,834 Patented June 18, 1968

3,388,834

SPRAY DISPENSER

Charles M. Hart, 7737 Florence Ave., Apt. D, Downey, Calif. 90240

Continuation-in-part of application Ser. No. 455,469, May 13, 1965. This application Mar. 20, 1967, Ser. No. 644,741

4 Claims. (Cl. 222—70)

ABSTRACT OF THE DISCLOSURE

A spray dispenser for use with an aerosol spray container of the type in which the container valve is a metering valve operative to release only a short burst of spray during each actuation, the spray dispenser including a drive motor geared down to slowly drive a cam having a cam fall for suddenly releasing an actuator for sudden depression of the container valve, one version of the dispenser using an abrupt rise to thereafter raise the actuator, and another version utilizing a hold-down trigger to hold the valve down until the actuator is raised, with a secondary cam thereafter abruptly releasing the trigger to allow the valve to suddenly raise.

This application is a continuation-in-part of my application Ser. No. 455,469, filed May 13, 1965, and entitled "Spray Dispenser," now abandoned.

The present invention relates to a spray dispenser and more particularly to a continuously operable dispenser adapted to automatically release a burst of spray from an aerosol container at regular, timed intervals.

Deodorizing, germicidal, and medicinal materials are best dispersed into the atmosphere of a room or similar enclosure by incorporating such materials in aerosol cans or containers along with a pressurized, liquefied gas for common release in spray form. Such containers are normally provided with a valve having a projecting, axially slidable stem carrying a spray nozzle which serves also as a finger piece or actuator button for inwardly moving or depressing the valve stem. The valve is normally spring biased to a raised, closed position and is operated to release spray by manually or automatically depressing the spray nozzle.

For many applications manual actuation of the valves of such aerosol containers is entirely satisfactory. However, there are also many situations in which the dispersion of materials in spray form within an enclosed area must be uniform and closely controlled, such as in public restrooms, restaurants, and hospital sickrooms. In the past, this need for precise spray dispersion has been met by a variety of automatic spray dispensers using synchronous motors or similar slow-speed drive units to operate a mechanism which periodically engages the spray nozzle of the aerosol container for actuation of the valve at regular, predetermined intervals. Most of these prior art devices are of the type which accommodate an aerosol container having a valve providing a continuous spray during continued depression of the valve. Such devices have generally proved to be unsatisfactory because the continuous spray type of valve is extremely difficult to control well enough to precisely regulate the quantity of spray material dispersed into a room over an extended period of time. Moreover, many of the existing spray dispensers, regardless of the aerosol valve type with which they cooperate, are relatively expensive and are characterized by annoying clanking, clicking and related noises which are sometimes very annoying, as when the dispensers are used in dispensing germicidal sprays in hospital rooms.

Accordingly, it is an object of the present invention to

provide a spray dispenser which is relatively inexpensive to manufacture, reliable in operation, characterized by long service life, and which permits rapid removal and substitution of aerosol containers for various materials, thereby adopting the dispenser for multipurpose use. Thus, for example, the present dispenser can be used in the home to provide automatic spray dispersion of deodorants, medicinal preparations such as methols, germicides, and insecticides, depending only upon the nature of the contents of the aerosol container inserted in the dispenser.

Another object of the invention is the provision of a spray dispenser particularly adapted for use with an aerosol container of the type having a metering valve mechanism which includes a valve biased toward a closed position and movable from the closed position to a depressed position for releasing a single spray burst during the course of such movement. In one form, the dispenser utilizes a particular form of valve-actuating mechanism and a bias means to constantly bias the mechanism against the valve whereby the annoying noises characterizing the valve impact operation of previous dispensers is virtually eliminated. That is, the metering valve, which is internally spring biased to an outward or projected position, is in one embodiment of the invention maintained in its inward or depressed position by the bias means of the dispenser during the greater part of the cycle of operation of the dispenser and is only allowed to rise under its own spring bias just prior to that sudden depression of the valve which releases the spray. With this arrangement, the valve is movable inwardly and outwardly, but always under the bias action of the aerosol container and the dispenser, respectively, so that relative movement or noisy "play" of the dispenser components does not exist. Moreover, the continuous engagement of the container valve by the valve operating mechanism eliminates damaging impacts against the container valve during operation of the dispenser.

A further object of the present invention is the provision of a spray dispenser of the aforementioned character which includes a housing having a forwardly projecting base for supporting an aerosol container, and which also includes a valve mechanism continuously engaged with the spray nozzle or actuator button of the aerosol can to maintain the spray nozzle in a depressed position whereby the aerosol container is biased against the base to securely maintain it in position within the dispenser housing.

Yet another object of the invention is the provision of a spray dispenser of the aforementioned character in which the valve-actuating mechanism is operated by a cam which is coupled to the driven shaft of an electric motor and which is out of engagement or only lightly engaged with the valve mechanism during the major portion of the operating cycle. The electric motor is therefore subjected to little or no load except immediately prior to and during the operation of the valve.

An additional object of the invention is to provide a spray dispenser of the aforementioned character which includes a hold-down trigger for holding the aerosol can actuator button down for a short time after actuation, and a secondary cam for thereafter suddenly releasing the button.

A further object of the invention is to provide a spray dispenser of the aforementioned character which is constructed of relatively inexpensive sheet metal components and a readily available electric motor, thereby reducing its price and enhancing its market appeal, particularly to homeowners and the like.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a spray dispenser according to the present invention, the cover or front portion of the dispenser housing being pivoted shut to its closed position;

FIG. 2 is a side elevational view of the spray dispenser, the cover being illustrated in its raised or open position;

FIG. 3 is an enlarged front elevational view of the upper portion of the spray dispenser, the cover being removed for clarity;

FIG. 4 is a view taken along the line 4—4 of FIG. 3;

FIG. 5 is a view taken along the line 5—5 of FIG. 3;

FIG. 6 is a detail elevational view of a different cam;

FIG. 7 is a front elevational view of a different cam in combination with a hold-down trigger for maintaining the aerosol container valve down for a short period of time and thereafter suddenly releasing the valve, FIG. 7 particularly illustrating the positions of the components just prior to depression of the aerosol container valve spray nozzle;

FIG. 8 is a view similar to FIG. 7, but illustrating the components immediately after depression of the spray nozzle;

FIG. 9 is a view similar to FIG. 7, but illustrating the components just prior to release of the hold-down trigger;

FIG. 10 is a view taken along the line 10—10 of FIG. 9;

FIG. 11 is a perspective view of the cam of FIG. 7 and its relationship to the actuator and hold-down trigger; and

FIG. 12 is a perspective view of the rear side of the cam of FIG. 7, particularly illustrating the secondary cam.

Referring now to the drawings, and particularly to FIGS. 1 through 5, there is illustrated a spray dispenser **10**, according to the present invention, which comprises, generally, a two-part frame or housing **12** which supports an aerosol can or container **14** having a metering valve **15**; an actuator mechanism **16** having an actuator **18** continuously engaged with the valve **15** and further having an arm or lever **20** operative upon the actuator **18** to operate the valve **15**; a bias means or spring **22** urging the actuator **18** against the valve **15**; a drive means or synchronous electric motor **24** having a driven shaft **26**; and a cam **28** mounted to the driven shaft **26** and engageable with the lever **20** to effect periodic operation of the aerosol container valve **15**.

The spray dispenser **10** is particularly adapted for use with an aerosol container having the metering valve **15**, which is of that particular type having an internal spring or bias which always urges the valve **15** toward an outward or closed position. The valve is movable from its closed position to a depressed position for releasing a single spray burst during the course of such movement. For this purpose, the valve **15** includes an elongated, projecting discharge valve stem which mounts an actuator button or spray nozzle **30** at its outer end, the outer end being upwardly oriented in the drawings.

The container **14** and the valve **15** are well-known to those skilled in the art and therefore only the general nature and function thereof will be described.

A common form of metering valve mechanism, and which operates satisfactorily with the present dispenser **10**, includes a trap chamber past which the discharge valve stem moves during the course of its inward slidable movement when the spray nozzle **30** is depressed. Upon alignment of an inlet opening in the valve stem with the trap chamber, spray material in the trap chamber is driven under pressure through the hollow valve stem and out of the spray nozzle **30** in a fine mist or atomized spray. The quantity of such spray is controlled or metered because of the fixed volume of the trap chamber. For each depression of the valve stem, only the quantity within the trap chamber is discharged through the nozzle **30**. This feature broadly distinguishes the metering valve aerosol containers from the aerosol containers having discharge valves in which a continuous spray is emitted from the spray nozzle as long as the valve stem is maintained in a depressed or inward position.

Another important characteristic of the conventional metering valve mechanism just mentioned is that such mechanism includes an internal spring or bias means which always tends to urge the valve stem and nozzle **30** to an outward, closed position.

The dispenser housing **12** is of two-part construction, including a back portion **32** and a cover or front portion **34** which are both preferably fabricated of sheet metal. The back portion **32** includes a normally upstanding or vertical back **36**, a forwardly projecting base **38** which supports the aerosol container **14**, and an upper wall or shelf **40** which includes depending side flanges **42**, as best viewed in FIG. 3.

Referring now to FIG. 2, the pair of side flanges **42** carry a pair of rivets **44** which pivotally mount the cover **34** to the housing back portion **32**. Similar side flanges **46** and **48** are provided on the housing back portion **42** and the base **38**, respectively, to structurally stiffen the housing **12** and also to afford outward faces against which the cover **34** slidably seats when the cover moves from its open position, as viewed in FIG. 2, to its closed position, as viewed in FIG. 1.

The cover **34** is channel-shaped, including a sloping front wall **50** and rearwardly extending side walls **52** which slidably seat against the flanges **42**, **46** and **48** of the back portion **32** when the cover **34** is moved to its closed position. The front wall **50** of the cover **34** includes a rectangular aperture **54** aligned with the spray nozzle **30** when the cover **34** is closed to carry emitted spray outwardly of the housing **12**. A number of additional apertures **56** are provided adjacent the aperture **54**, but merely for aesthetic purposes.

The shelf **40** includes an opening to receive a grommet through which a line cord **58** is disposed for carrying current to the motor **24**, as will be seen.

A substantially rectangular bracket **60** is secured to the upper portion of the housing back **32**. For this purpose, the bracket includes a rectangular mounting plate **62**, as best viewed in FIG. 4, having a forwardly extending flange **64** at its upper extremity and a rearwardly extending leg **66** at its lower extremity. The rearward extremity of the leg **66** includes a downwardly oriented flange **68** which is secured to the housing back **36** by a plurality of rivets **70**. The upper flange **64** is similarly secured by rivets **72** to the underside of the shelf **40**.

The bracket mounting plate **62** and the housing back **36** define a space **74** within which is disposed the motor **24** and its associated speed reduction mechanism **25** for providing a desired rate of rotation for the driven shaft **26**. The motor **24** is preferably a synchronous motor adapted for energization by the usual 60-cycle alternating current provided in the average home, and its substantially constant motor speed is reduced by the speed reduction mechanism **25** to the desired rate so that, for example, the driven shaft **26** is rotated once every five minutes. However, the rate of rotation can be predetermined at other rates, depending upon the synchronous motor and speed reduction mechanism selected.

The particular construction of the motor **24** and its associated speed reduction mechanism is conventional, and the details are not illustrated since such details do not form a part of the invention. Any of a variety of similar motors and mechanisms will operate satisfactorily with the dispenser **10**.

The motor **24** and speed reduction mechanism **25** are secured to the rear face of the mounting face **22** by a plurality of rivets **76**, as best viewed in FIG. 5, so that the driven shaft **26** is positioned for rotation within and projection through a suitable opening provided in the mounting plate **62**.

The shaft **26** mounts the cam **28** at its forward or projecting extremity for counterclockwise rotation, as viewed from the front of the dispenser, and preferably includes a

flat which mates with a complemental flat portion provided in the shaft-receiving opening of the cam **28** to prevent relative rotation between the cam and the shaft.

The cam **28** is preferably made of a wear-resistant material such as nylon or the like characterized by a degree of resilience, as compared to metal. The plastic material is preferred because it substantially eliminates clicks and like noises characterizing metal-to-metal contacts. The cam **28** includes a central portion **82** and a radially projecting portion defined by a cam rise **78**, a substantially radially oriented leading edge **80** and a trailing edge **84**.

The central cam portion **82** is in light engagement with the lever **20** during the major portion of each rotation of the cam **28**. At those periods when the abrupt leading edge **80** engages the lever **20**, the lever **20** is initially raised comparatively rapidly to a position of engagement with the cam rise **78**, as indicated in phantom outline in FIG. 3. The trailing edge **84** provides a sudden terminus of the cam rise **78** to permit the lever **20** to rapidly drop off the cam rise **78** and pivot in a counterclockwise direction.

The lever **20** is an elongated sheet metal part pivotally mounted to the mounting plate **62** at one extremity by a rivet **86**. The opposite or free extremity of the lever **20** includes a right-angular flange **88** whose undersurface normally engages some portion of the cam **20**. In addition, the upper edge of the lever **20** engages an upper flange **90** of the actuator **18** between the opposite extremities of the lever for upward movement of the actuator **18** upon pivotal movement of the lever **20** in a clockwise direction. The lower extremity of the actuator **18** includes a similar right-angular flange **92** which rests upon the upper surface of the spray nozzle **30**.

In its movement under the action of the lever **20**, the actuator **18** slides vertically within a vertically elongated slide or track **94** integrally formed in the mounting plate **62**. More particularly, the material of the plate **62** is vertically slit and rearwardly deformed to provide an elongated strap located behind the plate and remaining attached to the plate at its upper and lower extremities. The rearward deformation is just sufficient to accept the actuator **18** and orient the front surface thereof flush with the front surface of the plate **62**. The lever **20** is thereby adapted to rest against and pivot over the flush surfaces of the actuator **18** and the plate **62**. The lever **20** thus serves not only to raise the actuator **18** under the agency of the cam **28**, but also to retain the actuator **18** in position within the track **94**.

The actuator **18** is normally biased downwardly by the spring **22**, as best viewed in FIG. 3. The spring **22** is a compression spring having its upper extremity in engagement with the bracket upper flange **64**, and its opposite or lower extremity in engagement with the actuator upper flange **90**. The bias of the spring **22** is much stronger than the valve spring of the aerosol container **14** so that normally the bias of the valve spring is overcome by the bias of the spring **22** and the spray nozzle **30** is maintained in its depressed position. Consequently, the actuator **18** is always in engagement with the spray nozzle **30**. Moreover, its movement upwardly and downwardly is occasioned by the bias of either the spring **22** or the valve spring of the aerosol container **14**, as will be seen.

The normal biased depression of the spray nozzle **30** tends to firmly maintain the aerosol container **14** in engagement with the housing base **38** during operation of the spray dispenser **10**. The container **14** is also maintained in position by engagement of the upper portion of the container with the underside of the bracket leg **66**, as best viewed in FIGS. 4 and 5.

In operation, the line cord **58** is connected to a suitable source of 60-cycle alternating current. This energizes the motor **24** for rotation of the driven shaft **26**. The cam **28** is rotated in a counterclockwise direction until the cam leading edge **80** engages the underside of the lever flange **88**. The lever is then relatively suddenly raised against the bias of the spring **22**, and the bias of the valve spring of the container **14** raises the spray nozzle **30** to its projected or valve closed position. This abrupt raising of the spray nozzle **30** is preferred to prevent possible dribbling of spray material through the nozzle opening during its upward movement.

Continued counterclockwise rotation of the cam **28** brings the cam fall or trailing edge **84** into position adjacent the free edge of the lever flange **88**, whereupon the lever **20** abruptly drops off the cam rise **78** under the bias of the spring **22**. This same bias drives the actuator **18** downwardly to effect sudden depression of the spray nozzle **30**. During this movement of the spray nozzle **30** from its projected position to its depressed position, a single, metered spray burst is released from the aerosol container **14**.

As the counterclockwise rotation of the cam **28** continues, the lever **20** lightly rides upon the cam circular portion **82** and therefore imposes only a very slight frictional load upon the motor **24**. The spray nozzle **30** is maintained in its depressed position by the bias of the spring **22** until the lever **20** is again raised for engagement with the cam rise **78** to repeat the cycle of operation.

Continuous operation of the dispenser **10** releases a metered burst of spray into the room or enclosure at predetermined intervals so that closely regulated dispersion of spray material is provided over prolonged periods. The aerosol container **14** is easily removed for replacement by merely grasping the cylindrical body of the container and pulling outwardly to disengage the container from the actuator flange **92** and the bracket leg **66**.

There are certain metering valve mechanisms which do not operate properly when they are maintained in a depressed position for prolonged periods. The present invention is also adapted for operation with metering valves of this type by merely substituting a different form of cam **28***a*, as best illustrated in FIG. 6. Cam **28***a* is characterized by a cam rise **78***a* which extends over the major portion of the circumference of the cam. The cam rise **78***a* includes a substantially radially oriented leading edge **80***a* and a trailing edge **84***a*.

The operation of the dispenser **10** with the cam **28***a* is substantially similar to the operation of the dispenser with the cam **28** except that the spring **22** is compressed over the major portion of the operating cycle, thereby permitting the internal bias means or spring of the aerosol can valve to maintain the spray nozzle **30** in its upward or projecting position. More particularly, as the cam **28***a* is rotated in a counterclockwise direction, the lever **20** is maintained in its raised position during its engagement with the cam rise **78***a*. In this position, as above indicated, the spray nozzle **30** is in its raised or projected position. On continued counterclockwise rotation of the cam **28***a* the lever encounters the trailing edge or cam fall **84***a* and drops off the cam rise **78***a* and into engagement with the leading edge **80***a*. At this time the spray nozzle **30** is moved from its projected position to its depressed position and releases a metered spray burst.

Immediately after release of the spray burst, continued rotation of the cam **28***a* effects an abrupt raising of the lever **20** by virtue of the engagement thereof with the cam leading edge **80***a*, a projection **81** on the cam rise **78***a* further contributing to the abruptness of such raising of the lever. The lever **20** then rides on the cam rise **78***a* so that the spray nozzle **30** is permitted to rise and stay in its projected position during the major portion of the rotation of the cam **28***a*.

Referring now to FIGS. 7 through 12, there is illustrated another form of spray dispenser which is identical to that previously described, except that the valve actuator means also includes a hold-down trigger **96** used in combination with a secondary cam **98** which forms an integral part of a cam which is essentially identical to the cam **28***a*. As will be seen, the trigger **96** and cam **98** cooperate to hold the spray nozzle **30** in a depressed position for a

short period of time after its actuation and thereafter suddenly release it.

The hold-down trigger **96** is an elongated lever arm which is pivoted at its mid portion to the mounting plate **62** by a rivet **100**. One extremity of the trigger **96** extends behind the spray nozzle **30** and includes a pivotable angle bracket **102**. One flange or leg of the bracket **102** is pivotally secured to the main body of the trigger **96** by a rivet **104**, while the other leg of the bracket overlies and engages the upper surface of the spray nozzle **30**. It is particularly noted that the trigger **96** is thus interposed between the nozzle **30** and the actuator **18**, whereas in the embodiments previously described the actuator **18** was in direct contact with the nozzle **30** at all times.

The opposite extremity of the trigger **96** is outwardly offset from the mounting plate **62**, and is bent to provide a generally arcuate cam engaging portion **106** which is adapted to ride behind the cam **28***a* and upon the curved peripheral surface of the secondary cam **98**.

The secondary cam **98** is preferably integrally molded as a part of the rear face of the cam **28***a*, the cam **98** being located substantially diametrically opposite the intersection of the cam rise leading edge **80***a* and the cam rise trailing edge **84***a*. The cam **98** projects outwardly of the cam **28***a* and is characterized by a relatively short cam rise **108** having a relatively gradual leading surface or edge **110** and a relatively abrupt trailing surface or edge **112**.

In operation, the cam **28***a* is rotated in a counterclockwise direction, as before, until the lever flange **88** abruptly moves from the cam rise **78***a*, FIG. 7, onto the leading edge **80***a*, FIG. 8. When this happens, the actuator flange **88**, under the bias of the spring **22**, presses the trigger flange **92** downwardly and also depresses the spray nozzle **30**. This releases a quick, short burst of spray, and without the dribbling or leaking of spray material which is sometimes occasioned by a relatively slow depression of the nozzle **30**.

At this time the secondary cam **98** is not quite engaged by the trigger **96**.

Next, as seen in FIG. 9, the lever **20** is relatively abruptly raised on the cam rise **78***a* as the cam **28***a* continues to rotate counterclockwise. This in turn raises the actuator **18** against the bias of the spring **22**. Substantially simultaneously, the trigger **96** is engaged by the secondary cam **98** so that its bracket **102** is maintained pressed downwardly against the spray nozzle **30**. Thus, the nozzle **30** is maintained in a depressed position until the actuator flange **92** is spaced above the trigger bracket **102** a distance approximating the normal travel of the spray nozzle **30** between its upper and lower positions.

Thereafter, the trigger **96** abruptly drops off the secondary cam rise **108**, leaving the trigger **96** free to pivot. The bias of the spray nozzle valve abruptly moves the spray nozzle **30** upwardly with the trigger bracket **102**, again without the undesirable dribbling or leaking of spray material which often occurs when the spray nozzle **30** is allowed to rise relatively slowly.

From the foregoing, it is apparent that a spray dispenser has been provided which is adapted to effect uniform spray dispersion of material over a prolonged period of time. The dispenser is relatively inexpensive to manufacture, is characterized by reliable, trouble-free, and noise-free operation, and is adapted to quickly accept different aerosol containers for spraying any of a variety of materials.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. A spray dispenser for use with an aerosol container having a metering valve mechanism which includes a valve biased toward an upward, closed position and movable from said position to an actuated position for releasing a single short spray burst during the course of such movement, said dispenser comprising:

a frame for supporting an aerosol container and including means defining a vertically oriented track;

actuator means carried by said frame and having an actuator portion movable along said track for engagement with the aerosol container valve;

bias means for continuously urging said actuator means downwardly toward said valve;

cam means including a first cam having a first cam rise and an abrupt cam fall;

an elongated lever pivotably mounted to said frame, extending across said actuator means for engagement therewith, and in engagement at one extremity with said cam means; and

drive means coupled to said cam means and operable to rotate said cam means whereby said first cam rise effects pivotal movement of said lever and consequent raising of said actuator means against the bias of said bias means to enable the aerosol container valve to move to its upward position, and whereby said cam fall thereafter enables said lever and said actuator means to abruptly and forcibly move said valve to said actuated position to release a single short spray burst, said cam means also including a secondary cam rotatable with said cam means and having a secondary cam rise, said actuator means also including an elongated hold-down trigger pivotally mounted to said frame and having a first extremity positioned adjacent the aerosol container valve and its other extremity positioned for engagement with said secondary cam rise, said engagement maintaining the valve in an actuated position for a short interval subsequent to said release of said single short spray.

2. A spray dispenser according to claim **1** wherein said lever is pivotably mounted to said frame at the extremity of said lever opposite said extremity in engagement with said cam means.

3. A spray dispenser according to claim **1** wherein said first extremity of said trigger is located between the valve and said actuator portion.

4. A spray dispenser according to claim **1** wherein said secondary cam rise is relatively short and located substantially diametrically opposite said cam fall of said cam means.

References Cited

UNITED STATES PATENTS

2,967,643	1/1961	Edelstein et al.	239—70 XR
2,971,382	2/1961	Harris	239—70 XR
3,018,056	1/1962	Montgomery	239—70
3,107,821	10/1963	Lambert	222—70
3,187,948	6/1965	Hunt	222—70
3,214,062	10/1965	Mahon	222—70
3,216,618	11/1965	Hunter	222—182

WALTER SOBIN, *Primary Examiner.*