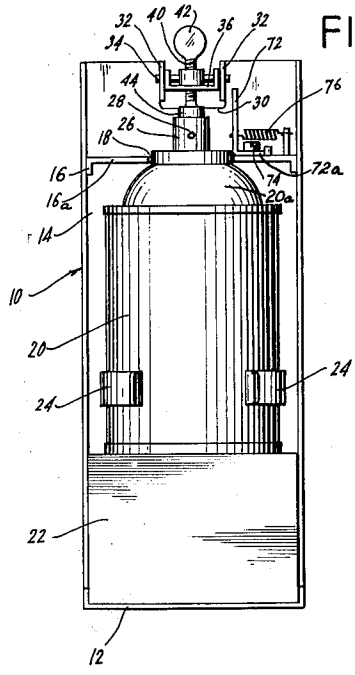
Jan. 10, 1961 A. L. EDELSTEIN ET AL 2,967,643

INTERMITTENT VALVE ACTUATING ASSEMBLY FOR ATOMIZING DEVICES

Filed Feb. 25, 1958

FIG. 2.



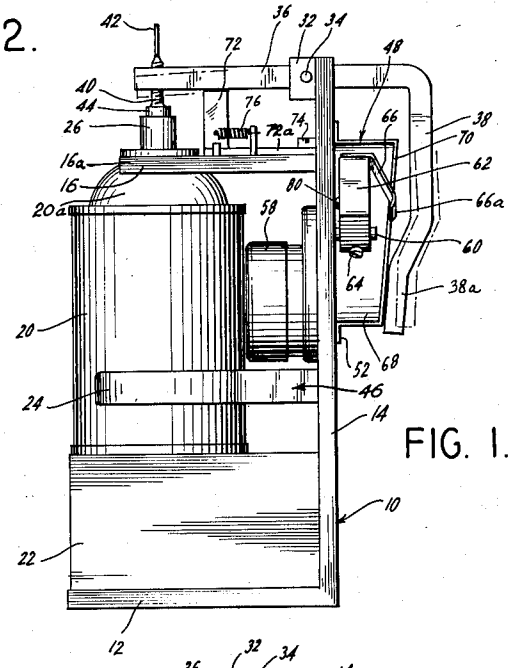


FIG. 1.

FIG. 4.

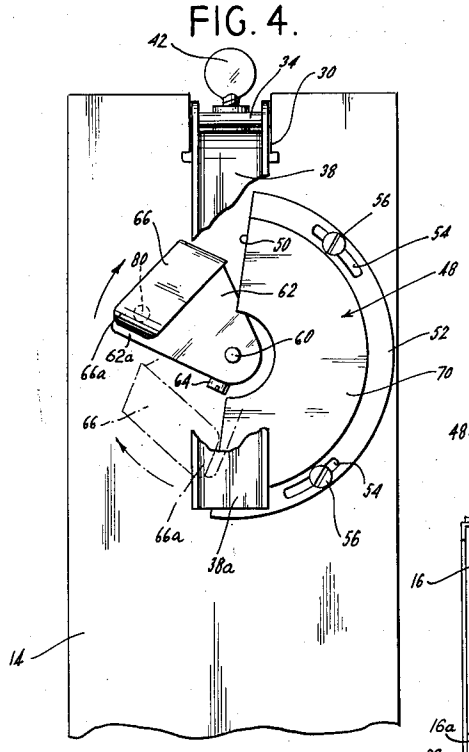
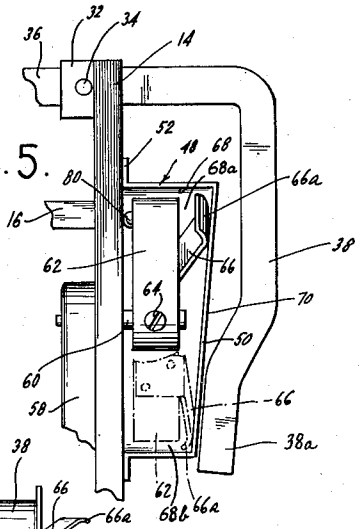


FIG. 5.



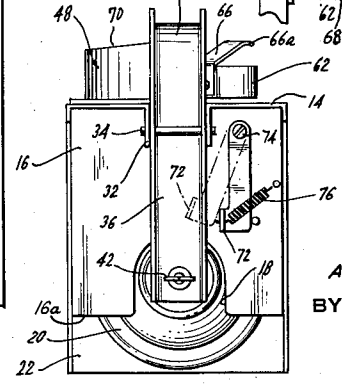


FIG. 3.

INVENTOR
ALBERT L. EDELSTEIN
JOSEPH GLICKSTEIN
BY
Amster + Savy
ATTORNEYS

United States Patent Office 2,967,643 Patented Jan. 10, 1961

2,967,643

INTERMITTENT VALVE ACTUATING ASSEMBLY FOR ATOMIZING DEVICES

Albert L. Edelstein and Joseph Glickstein, New York, N.Y., assignors to Syncro-Mist Controls, Inc., New York, N.Y., a corporation of New York

Filed Feb. 25, 1958, Ser. No. 717,405

10 Claims. (Cl. 222—70)

The present invention relates to improvements in fluid spray assemblies and more particularly relates to a motor-driven valve actuating device for automatically and periodically actuating the outlet valve of a spray atomizer.

During recent years, the use of pressurized containers containing fluids for spray application has become increasingly prevalent, there being presently marketed a wide variety of aersol containers adapted to emit a fine fluid spray upon depression of a valve member at the top of the container.

Such atomizing containers are normally operated manually whenever desired to produce the fluid spray. For many applications, however, it is desirable to have the container valve automatically actuated at periodic intervals so that fluid is dispensed continuously into the room air during the entire day or portion of a day. For example, it may be desired in the home, in theatres, restaurants, or other places of assembly to introduce a short jet spray of an air deodorant or room freshener into the air or into an air conditioning system at intervals of about five minutes. Similarly, it may be desired to dispense a spray of germicide continuously at periodic intervals in hospitals, or insecticides over long periods at various locations, such as in sealed bars, etc. Further applications of such periodic atomization will be readily appreciated.

A device for the periodic actuation of atomizer valves is known, being disclosed in U.S. Patent No. 2,613,108. The device shown therein is operable for its purpose, but has the disadvantage of requiring a large number of movable parts including a coiled tension spring, a screw and nut release mechanism, and various stop members which are subject to breakage. In addition, the device is operable to give only a momentary actuation of the container valve and has no means for regulating the length of time during which the valve may be depressed.

It is an object of the present invention to provide a valve actuating device having only a few movable parts, a flat leaf spring being drawn through a housing of constantly decreasing width to compress the spring and then being released to strike and move a valve-actuating lever.

Another object of the present invention is the provision of a valve actuating device of the character described in which the housing is movable for selectively adjusting the period during which the container valve is actuated and spray is released.

A further object of the invention is the provision of a valve actuating device of the character described which is adjustable to accommodate pressure containers of various sizes and having valve buttons of various lengths.

Additional objects and advantages of the invention will become apparent during the course of the following specification when taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevational view of an automatic valve actuator device made in accordance with the invention, with a spray dispenser can shown mounted therein;

Fig. 2 is a front elevational view thereof;

Fig. 3 is a top plan view thereof;

Fig. 4 is a rear elevational view thereof shown on an enlarged scale, with portions broken away to reveal inner structural detail; and

Fig. 5 is a partial side elevational view of the rear portion of the assembly shown on an enlarged scale.

Referring in detail to the drawings, the valve actuator device includes a body frame **10** having a base **12** and an upstanding rear wall **14**. Mounted on the rear wall **14** and projecting forward therefrom is an upper support plate **16** having a central aperture **18** extending inwardly from its front surface **16***a*. The aperture **18** is adapted to recive and hold the neck **20***a* of a container **20** which is mounted on the body frame **10**. Removably mounted on the base **12** is a wooden support block **22** which is employed when a small size container is mounted in the valve actuating device and is sized to serve as a platform upon which the container **20** rests in its mounted position. Also secured to an intermediate portion of the rear wall **14** is a bracket **46** having a pair of spring arms **24** which embrace the body of the container **20** for removable mounting of the container on the valve actuating device, the container resting upon the support block **22** with its neck received in and supported by the aperture **18** in the support plate **16**. If a longer container is used in the device, the block **22** can be removed, the container then resting directly upon the base **12**.

The container **20** is the usual aerosol container containing liquid to be dispensed in atomized form under pressure and a liquid carrier contained under a pressure greater than atmospheric pressure. The liquid carrier escapes as gas when the container valve is operated, carrying with it the liquid to be dispensed in fine spray form. The container **20** is hermetically sealed and has at its top end a valve (not shown) operable by a valve release member in the form of an actuator button **26** which is depressible into the body of the container **20** to release a fine atomized spray through an outlet opening **28**. The actuator button **26** is spring biased to a raised position in which the outlet opening **28** is closed by the aforementioned valve, and said actuator button **26** is depressible against said spring tension. The structure of the container **20** is conventional and forms no part of the invention herein.

The rear wall **14** has a cut-away portion **30** bordered by a pair of forwardly-extending ears **32**. Mounted on the ears **32** and extending therebetween is a cylindrical shaft **34** on which is rockably mounted an actuator lever **36**. As shown in Fig. 1, the rear portion of the actuator lever **36** extends a substantial distance behind the rear wall **14** and has at its end a depending extension bar **38** which is integral therewith. The extension bar **38** is perpendicular to the axis of the actuator lever **36** and extends downwardly substantially parallel to the plane of the rear wall **14** when the actuator lever is in its normal horizontal position of Fig. 1. At the end of the actuator lever **36** an adjustment screw **40** is turnably mounted, the adjustment screw **40** having at one end a flat head-piece **42** for manual turning thereof, and an abutment member **44** of enlarged diameter at the other end. The abutment member **44** is positioned to engage the top surface of the container valve actuator button for depressing the same when the actuator lever **36** is rocked.

Mounted on the rear surface of the rear wall **14** is a semicircular housing **48** having an open end **50** located directly forwardly of and in alignment with the extension bar **38**. The semicircular housing **48** has a laterally projecting peripheral flange **52** containing two or more slots **54** through which extend screws **56**. The screws **56** extend turnably through the body frame rear wall **14**

for mounting the housing 48 thereupon. The slots 54 provide means for adjusting the position of the housing 48 upon the rear wall 14 for a purpose which will be presently explained.

Mounted on the front surface of the rear wall 14 is a synchronous motor 58 of the conventional and well-known type which contains its own step-down gearing. The motor 58 has a rearwardly projecting drive shaft 60 which extends through the body frame rear wall 14 and into the housing 48. The drive shaft 60, as shown in Fig. 4 is located at the center of the open end 50 of the semicircular housing 48, so that said drive shaft 60 is concentric with the housing. The motor 58 is the usual synchronous type which produces a very slow rate of revolution of the drive shaft. For example, in a commercial motor actually used in the invention herein, the drive shaft was rotated at the rate of 1/15 revolution per minute.

Eccentrically mounted on the end of the drive shaft 60 is a carrier member in the form of heavy metal plate 62. The carrier plate 62 is rigidly mounted at one end on the shaft 60 as by a set screw 64, in the manner shown in Fig. 4, such that the main body portion of the plate 62 rotates about the central axis of said shaft 60. This rotating movement carries the free end 62*a* of the carrier plate 62 in a circular path through the houing 48.

Fixedly mounted at one side of the free end portion of the plate 62 is one end of a flat leaf spring 66 which serves as an actuating spring for the lever 36. The actuating spring 66 is made of a relatively thick metal so that it has a strong spring action and upon being compressed exerts considerable tension. The body of the actuating spring 66 overlies the free outer end of the plate 62 with its free end 66*a* spaced rearwardly of the outer surface of the plate 62 as shown in Figs. 1, 3 and 5.

The interior of housing 48 forms a hollow passageway 68 which provides a path for the travel of the plate 62 and the actuating spring 66 carried thereby. This passageway 68 is formed by the rear wall 14 and by the side wall 70 of the housing 48. As can be clearly seen in Fig. 5, the housing side wall 70 is inwardly inclined from top to bottom so that the passageway 68 is wider at its top end 68*a* than at its bottom end 68*b* and gradually and continuously decreases in width as it approaches the bottom end 68*b*. The passageway 68 and the inclined housing side wall 70 act as cam means to compress the spring 66, as will now be described.

As the motor 58 is operated, the drive shaft 60 rotates in a clockwise direction as indicated by the arrow in Fig. 4. Consequently, the plate 62 carried by the drive shaft 60 is also rotated in a clockwise direction and from the position shown in Fig. 4 it will be carried into the top portion 68*a* of the housing passageway 68. Since this portion is the widest part of the housing 48, the plate 62 and the spring 66 carried thereby may freely enter therein. As the plate 62 continues to rotate in a clockwise direction it will be carried through the housing 48 toward the bottom end 68*b* of passageway 68. Since the width of the passageway 68 is continuously decreasing, the spring will be gradually depressed so that its free end 66*a* will be pressed toward the plate 62 and will gradually be brought under considerable tension. For this purpose, the inclined housing side wall 70 acts as a cam surface to compress the spring 66. This is possible because of the slow rate of movement of the plate 62. When the plate 62 reaches the bottom open end 68*b* portion of the passageway 68, the spring 66 is under its maximum degree of compression, and upon the plate 62 leaving the housing 48, the free end 66*a* of the spring 66 will snap outwardly, striking the bottom end portion 38*a* of the actuator extension bar 38, and causing the actuator lever 36 to pivot downwardly depressing the container valve actuator button 26 to release a spray of fluid from the container. It will be observed that the bottom free end portion 38*a* of the extension bar 38 is bent inwardly so that while the upper end of the extension bar is spaced rearwardly of the wide upper portion of housing 48, the free end portion 38*a* is located close to the narrow bottom portion of the housing.

As long as the spring 66 is in engagement with the end of the extension bar 38, the valve actuator button 26 will be depressed and a fluid spray will be emitted from the outlet opening 28. To regulate the length of time in which the button 26 is depressed and the spray is emitted, the screws 56 may be loosened and the housing flange 52 turned through the limit allowed by the slots 54 to locate the bottom portion of the open end 50 of housing 48 close to or spaced inwardly from the left hand edge of the extension bar 38, as viewed in Fig. 4. If the housing 48, for example, is turned in a clockwise direction so that its bottom open end is located close to the left hand edge of the extension bar 38, the spring 66 upon leaving the housing 48 will engage only a small portion of the extension bar 38 and the valve actuator button 26 will be depressed only for a short time, for example one or two seconds. On the other hand, if the housing 48 is turned in a counter-clockwise direction so that its bottom open end portion is located near the right hand end of the extension bar 38, the spring 66 upon leaving the bottom open end of the housing 48, will have to traverse nearly the entire width of the extension bar 38 and the valve actuator button 26 of the container will be depressed for a relatively long period, for example 15 seconds. In addition, wider variations in the time period of each spray can be obtained through increasing or decreasing the width of the extension bar 38.

When the container 20 is placed in its mounted position, the screw 40 is turned downwardly by its headpiece 42 until its terminal abutment member 44 comes into light contact with the top of the valve actuator button 26. To insure that the actuator lever 36 at this time is in its proper substantially horizontal position, an upstanding guage bar 72 is provided, the guage bar having a horizontal bottom extension 72*a* which is pivotally mounted on the upper support plate 16 by a pivot 74. A coiled tension spring 76 normally maintains the guage bar 72 in a rearwardly-pivoted position in which it is clear of the actuator lever 36. When it is desired to adjust the screw 40, the guage bar 72 is pivoted forwardly until it is located beneath the actuator lever 36 and the actuator lever is pivoted downwardly till it touches the top of the guage bar 72 and is limited from further downward movement thereby. The screw 40 is then adjusted to its proper position for engagement of its abutment member 44 with the valve actuator button 26.

In order to prevent undue strain on the free end of the plate 62 while the spring 66 is being compressed within the housing 48, a circular button 80 made of a tough, anti-friction material such as nylon, "Teflon" or the like, is mounted on the plate 62 adjacent the free end 62*a* thereof. The button 80 bears upon the rear surface of the frame rear wall 14, as shown in Fig. 5, sliding along said rear wall 14 as the plate 62 rotates, and maintains the plate 62 perpendicular to the motor drive shaft 60, preventing bending of the shaft by deflection of the plate 62.

It is to be understood that instead of the synchronous electric motor 58, any equivalent slow-moving drive means may be substituted, for example, a spring-actuated clockwork mechanism.

While a preferred embodiment of the invention has been shown and described herein, it is obvious that numerous additions, changes and omissions may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, a valve

actuator mechanism for periodically and successively actuating said atomizer device, said mechanism comprising a carrier mounted on said frame for movement through an operating cycle, drive means on said frame operatively connected for moving said carrier continuously through successive operating cycles, actuating means including a spring mounted on said carrier in a position to be translated along a selected path in response to the movement of said carrier through said operating cycle and movable relative thereto from a normal position to a stressed position, and cam means mounted along a prescribed portion of said selected path and engageable with said spring for moving said spring from said normal position to said stressed position and positively latching said spring therein and then releasing said spring for return movement thereof to said normal position, said actuating means being arranged relative to said mounted atomizer device to operatively engage and actuate said valve release member in response to said return movement.

2. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising an actuator member mounted on said frame for movement to actuate said valve release member, a carrier mounted on said frame for movement through an operating cycle, drive means on said frame operatively connected for moving said carrier continuously through successive operating cycles, an actauting spring mounted on said carrier in position to be translated along a selected path in response to the movement of said carrier through said operating cycle and movable relative thereto from a normal position to a stressed position, and cam means mounted on said frame along a prescribed portion of said selected path and engageable with said spring for moving said spring from said normal position to said stressed position and positively latching said spring therein and then releasing said spring for return movement thereof to said normal position, said cam means being so positioned relative to said movable actuator member as to release said spring at a point in alignment with said actuator member whereby said spring moves said actautor member during said return movement to actuate said valve release member.

3. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the support frame with one end positioned to engage and actuate the valve release member of the mounted container in response to rocking of said lever, a carrier mounted on said frame for movement through a circular operating cycle, drive means on said frame operatively connected for moving said carrier continuously through successive operating cycles, an actuating spring mounted on said carrier and movable relative thereto from a normal uncompressed position to a compressed position, and cam means mounted on said frame along a prescribed portion of said operating cycle and engageable with said spring for moving said spring from said non-compressed position to said compressed position and then releasing said spring at a point along said operating cycle for return movement thereof to said non-compressed position, said lever being positioned with its other end in alignment with said release point, whereby the compressed spring, on being released engages and rocks said lever to actuate said valve release member.

4. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the support frame with one end positioned to engage and actuate the valve release member of the mounted container in response to rocking of said lever, a carrier mounted on said frame for movement through a circular operating cycle, drive means on said frame operatively connected for moving said carrier continuously through successive operating cycles, an actuating spring mounted on said carrier and movable relative thereto from a normal uncompressed position to a compressed position, cam means mounted on said frame along a prescribed portion of said operating cycle and engageable with said spring for moving said spring from said non-compressed position to said compressed position and then releasing said spring at a point along said operating cycle for return movement thereof to said non-compressed position, said lever being positioned with its other end in alignment with said release point, whereby the compressed spring on being released engages and rocks said lever to actuate said valve release member, and means for adjusting said cam means along the operating cycle to vary the position of the release point relative to the lever.

5. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the support frame with one end positioned to engage and actuate the valve release member of the mounted container in response to rocking of said lever, a carrier plate mounted on said frame for movement through a circular operating cycle, drive means on said frame operatively connected for moving said carrier plate continuously through successive operating cycles, an actuating spring mounted at one end on said carrier plate with its other end normally spaced outwardly from said carrier plate, and cam means mounted on said frame along a prescribed portion of said operating cycle and engageable with said spring for compressing the latter by pressing its other end toward said carrier plate, said cam means being positioned to release the compressed spring when the plate is moved to a position along the operating cycle in which it is aligned with said lever whereby the free end of the spring is freed to strike and rock said lever to actuate said valve release member.

6. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the support frame, with one end positioned to engage and actuate the valve release member of the mounted container in response to rocking of said lever, a carrier plate mounted on said frame for rotary movement through a circular operating cycle, drive means on said frame operatively connected for moving said carrier plate continuously through successive operating cycles, an actuating spring mounted at one end on said carrier plate with its other end normally spaced outwardly from said carrier plate, and cam means mounted on said frame along a prescribed portion of said operating cycle and engageable with said spring for compressing the latter by pressing its other end toward said carrier plate, said cam means also having a release portion for releasing said compressed spring, said release portion being located on a point on said circular path in alignment with the other end of said lever, whereby the compressed spring on being released engages and rocks said lever for actuation of the valve release member.

7. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assemly includes a frame and means on the frame for mounting the atomizer device in a fixed position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the support frame with one end positioned to engage and actuate the valve release member of the mounted container in response to rocking of said lever, drive means having a continuously rotating drive shaft, a carrier plate eccentrically mounted on said drive shaft for movement in a circular path thereabout, a flat spring mounted at one end on said plate with its free end normally spaced outwardly from said plate, and a cam surface rigid with said frame and located along a portion of said circular path in a position to engage and press the free end of said spring against said plate as the latter is rotated in said circular path, thereby compressing said spring, the cam surface terminating at a release point on said circular path for releasing the compressed spring and causing said spring to expand outwardly away from said plate, the other end of said lever being located in alignment with said release point and in a position to be engaged and moved by the released spring whereby to rock said lever and actuate said valve release member.

8. In an automatic valve actuator assembly for an atomizer device having a valve release member, wherein said assembly includes a frame and means on the frame for mounting the atomizer device in an upright position, valve actuator means for periodically and successively actuating said atomizer device, said actuator means comprising a lever rockably mounted on the frame with one end substantially horizontally disposed and positioned to engage and actuate the valve release member of the mounted container and its other end depending along the rear of the frame, and means for periodically rocking the lever, said rocking means comprising a continuously operable motor, a plate operatively connected to be rotated by said motor and having a flat spring mounted at one end thereon for movement therewith and positioned to travel along a circular path in response to rotation thereof, the free end of said spring being spaced outwardly from the plate and facing the depending end of said lever, and cam means located along a portion of said circular path for compressing said spring by pressing the free end thereof inwardly toward said plate, said cam means having an end portion arranged to release said compressed spring, the depending end of said lever being located in alignment with said end portion of the cam means whereby the spring upon release from the cam means engages and moves said depending lever end, thereby rocking said lever and actuating said valve release member.

9. In a valve actuator assembly for periodically actuating a spray atomizer container having a valve releasable by a depressible release member, and wherein said assembly includes a support for mounting said spray atomizer; means for periodically depressing said release member, said depressing means comprising an actuator lever rockably mounted on said support with one end positioned to depress said release member, the other end of said actuator lever having a depending extension member, and means for periodically rocking said actuator lever for automatically and successively depressing said valve release member at spaced intervals, said rocking means comprising a motor having a drive shaft, a plate eccentrically mounted on said drive shaft for rotation about the axis thereof in a circular path, a flat spring mounted at one end on said plate, and a housing shaped to define a passageway located along the circular path traversed by said plate whereby said plate travels through said housing, said passageway having a wide open end portion and a narrow open end portion and decreasing progressively in width from its wide open end portion to its narrow open end portion, the motor being adapted to rotate in a direction to cause the plate to enter the passageway at its wide open end portion and leave the passageway at its narrow open end portion, the other end of the spring carried by the plate being positioned to be continuously compressed within the housing as the plate travels through said passageway, the depending extension of the actuator lever being located in alignment with the narrow open end of the passageway and in position to be engaged and moved by the compressed end of said spring when the compressed spring end leaves the housing.

10. In a valve actuator assembly for periodically actuating a spray atomizer container having a valve releasable by a depressible release member and wherein said assembly includes a support for mounting said spray atomizer, means for periodically depressing said release member, said depressing means comprising an actuator lever rockably mounted on said support with one end positioned to depress said release member, the other end of said actuator lever having a depending extension member, and means for periodically rocking said actuator lever for automatically and successively depressing said release member at spaced intervals, said rocking means comprising a motor having a drive shaft, a plate eccentrically mounted on said drive shaft for rotation about the axis thereof in a circular path, a flat spring mounted at one end on said plate, and a semi-circular housing shaped to define a passageway located along the circular path traversed by said plate whereby said plate travels through said passageway, said housing having an inclined side wall defining a wide open end entrance portion and a narrow open end exit portion with the passageway width decreasing progressively from its wide portion to its narrow portion, the motor being adapted to rotate in a direction to cause the plate to enter the housing at its wide open end portion and leave the housing at its narrow open end portion, the other end of the spring carried by the plate being positioned for engaging the inclined side wall and being continuously compressed thereby as the plate travels through the housing, the narrow open end portion of the housing being located in alignment with the depending extension of said actuator lever whereby the compressed end of the spring in leaving the housing is released to expand and strike the lever extension, rocking the lever and actutaing the valve release member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,534,464	Marini et al.	Dec. 19, 1950
2,613,108	Kraus	Oct. 7, 1952
2,662,547	Comeau	Dec. 15, 1953
2,666,452	Sheppard et al.	Jan. 19, 1954
2,734,770	Kurata	Feb. 14, 1956
2,795,799	Dickerman	June 18, 1957

FOREIGN PATENTS

717,884	Germany	Feb. 25, 1942