June 8, 1965 W. G. HUNT 3,187,948

TIMED FLUID DISPENSING DEVICE

Filed March 18, 1963 2 Sheets-Sheet 1

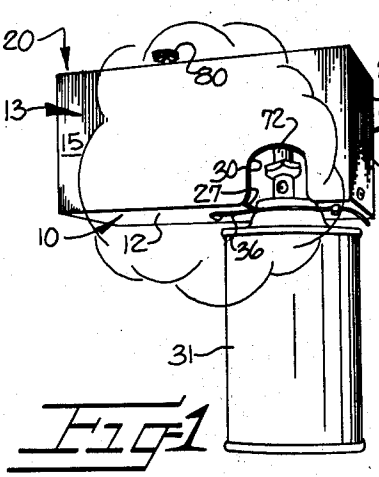

Fig-1

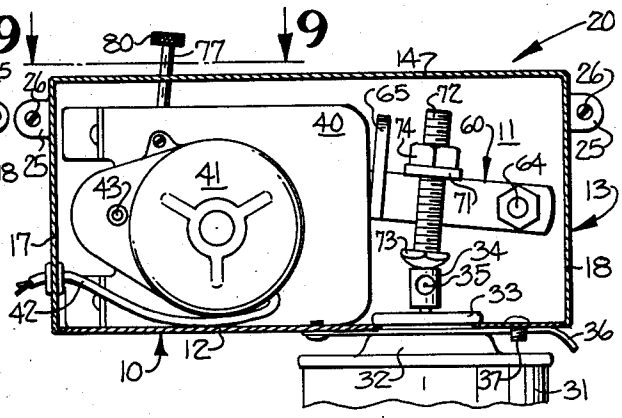

Fig-2

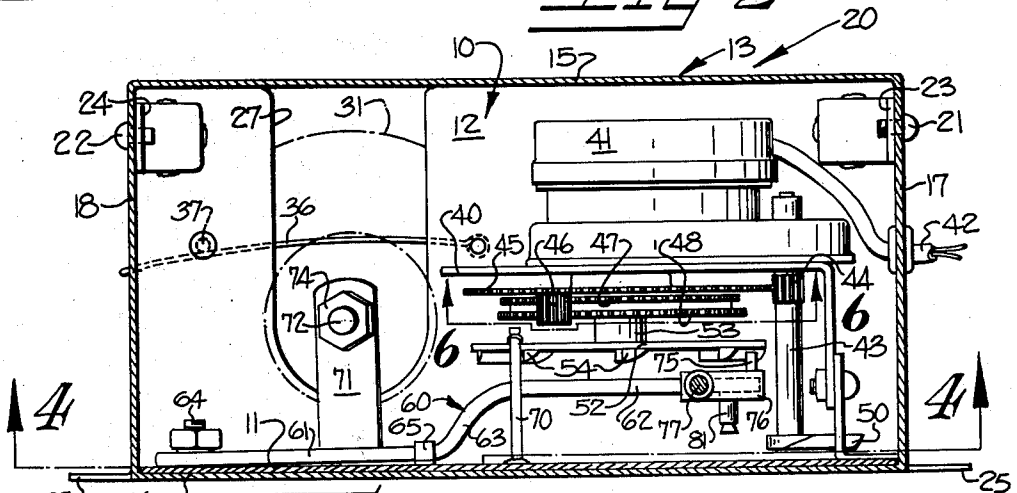

Fig-3

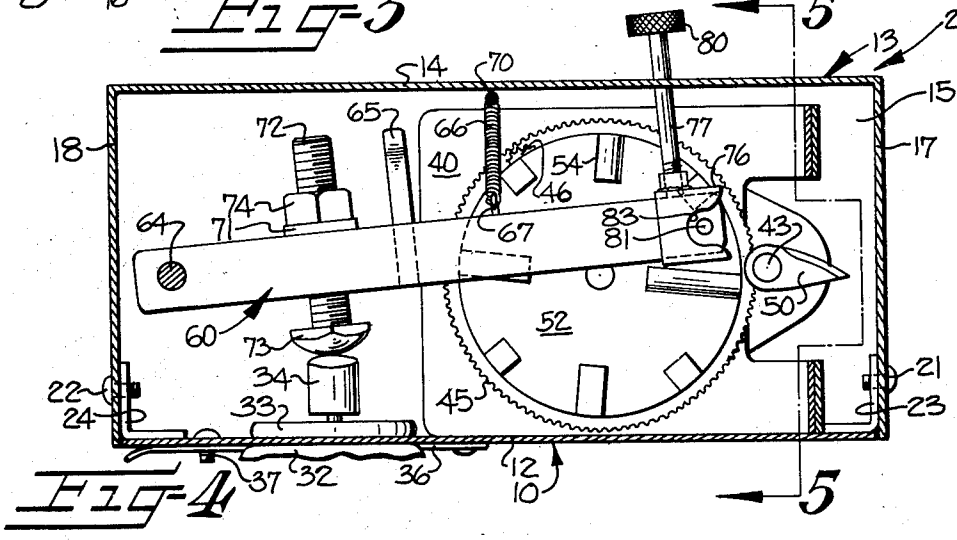

Fig-4

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TIMED FLUID DISPENSING DEVICE

Filed March 18, 1963 2 Sheets-Sheet 2

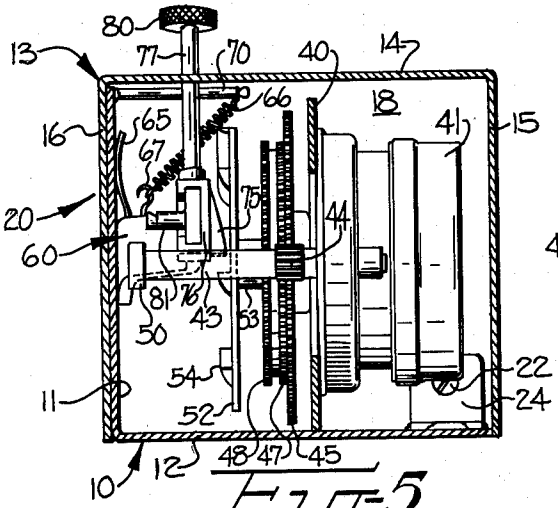

Fig-5

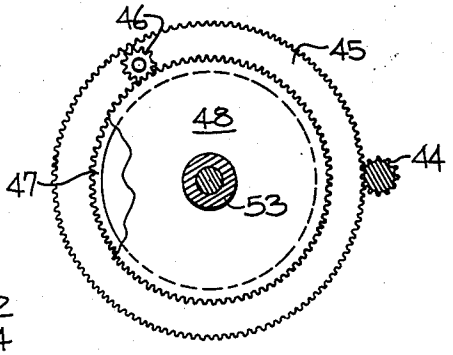

Fig-6

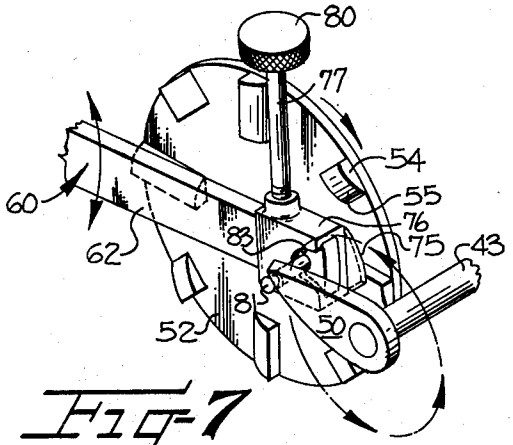

Fig-7

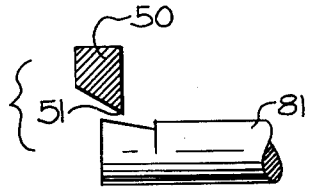

Fig-8

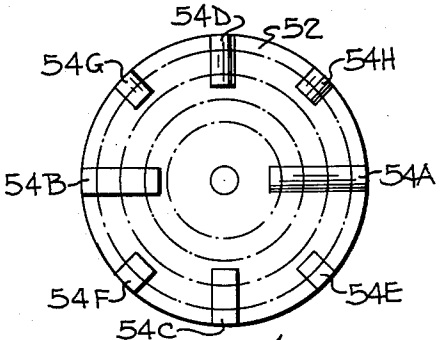

Fig-10

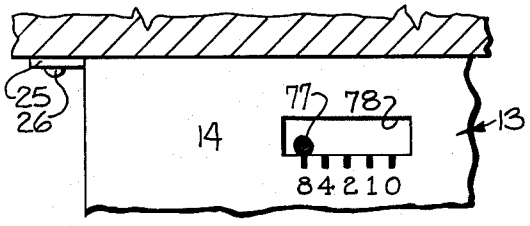

Fig-9

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3,187,948

TIMED FLUID DISPENSING DEVICE

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Filed Mar. 18, 1963, Ser. No. 265,724
13 Claims. (Cl. 222—70)

This invention generally relates to devices desired to be cyclicly operated such as a dispensing device for periodically dispensing fluid from a container by intermittently actuating a valve on the container for releasing fluid therefrom and to a novel actuator assembly for such cyclicly operated devices. More particularly, the invention is concerned with improvements in a dispensing device for automatically actuating a release valve on an aerosol container in a timed sequence with a predetermined time interval elapsing between successive actuations of the valve to periodically dispense fluid from the aerosol container.

Aerosol containers offering a wide variety of dispensable fluids therewithin combined with a suitable propellant fluid have steadily grown in popularity, since the initial introduction of an aerosol-type dispensing container. These aerosol containers are generally equipped with a depressible release valve which is normally maintained in a closed position and is adapted to be manually operated by depression thereof for dispensing an atomized spray of fluid which may be of various types suitable for specific purposes, such as air deodorants, insecticides, lubricants, etc. Under certain conditions, wholly manual operation of these aerosol containers may not be altogether desirable. This is especially true where the contents of the aerosol container are required to be dispensed for particular purposes at regular periodic intervals in order to achieve the most effective use of the contents of the container. In the latter instance, timed automatic operation of the aerosol container would tend to eliminate the "human error factor" with respect to the quantity of fluid to be dispensed at any one time and the timing between successive actuations of the release valve on the container for dispensing fluid therefrom.

Dispensing devices for automatically dispensing fluid from an aerosol container by periodically depressing the release valve on the container to dispense fluid from the container in a timed sequence are not unknown. While such dispensing devices have included various mechanisms for adjusting the period during which the valve on the aerosol container is actuated by its depression for dispensing fluid from the container, the time interval elapsing between successive actuations of the release valve on the aerosol container is predetermined by the timing mechanisms employed with the dispensing devices and cannot be readily changed to adjust the periodic dispensing of fluids from the aerosol container by the dispensing devices to accommodate varying conditions of use.

Commonly, dispensing devices of the character described for periodically depressing a release valve on an aerosol container are constructed to be used with an aerosol container of a particular size and are not capable of use with an aerosol container of a different size. One such dispensing device of which I am aware does provide for the adjustment of certain parts thereof supporting the aerosol container in order to accept aerosol containers of differing sizes over a limited range of size variations. Apart from the limited range of size variations in the aerosol containers which may be used with this latter dispensing device, this type of dispensing device suffers from the further disadvantage of requiring manual readjustment or removal of one or more of its parts for supporting the aerosol container before an aerosol container of a different size can be used with the dispensing device.

It is therefore an object of this invention to provide

a new and improved dispensing device for periodically actuating a depressible release valve for an aerosol container by depressing the release valve to dispense fluid from the container, wherein the time interval occurring between successive actuations of the release valve on the aerosol container can be readily adjusted to accommodate varying conditions of use.

It is another object of this invention to provide an improved dispensing device of the type for automatically actuating a release valve on an aerosol container at timed intervals to periodically dispense fluid from the container, wherein the predetermined time interval elapsing between successive actuations of the valve on the aerosol container can be readily adjusted with the adjustment means being so constructed as to provide for manual actuation of the valve on the aerosol container whenever desired to dispense fluid therefrom without affecting the time cycle between successive automatic actuations of the valve on the aerosol container.

It is another object of this invention to provide a novel actuator assembly for intermittently actuating a device desired to be cyclicly operated including a rotatable circular plate having a plurality of circumferentially spaced, radially arranged cam elements on one face thereof for selective actuation of a lever to place the lever in a position to be moved in a direction depressing the valve means to an open position in a timed sequence.

It is another object of this invention to provide an improved dispensing device which is so constructed as to be suitable for use in periodically dispensing fluid from aerosol containers of various sizes without requiring adjustment or removal of one or more parts of the dispensing device.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a dispensing device in accordance with the present invention, as associated with an aerosol container for periodically dispensing fluid therefrom;

FIGURE 2 is an enlarged fragmentary front elevational view, the front wall of the housing for the dispensing device being broken away for purposes of clarity;

FIGURE 3 is an enlarged top plan view turned 180° from FIGURE 2, the top wall of the housing for the dispensing device being broken away for purposes of clarity;

FIGURE 4 is an enlarged longitudinal sectional view taken along the line 4—4 of FIGURE 3;

FIGURE 5 is a transverse sectional view taken substantially along the line 5—5 of FIGURE 4, the aerosol container being omitted for purposes of clarity;

FIGURE 6 is a fragmentary sectional view taken along the line 6—6 in FIGURE 3 and partially broken away;

FIGURE 7 is a fragmentary perspective view of the timing cam mechanism for operating a lever which comprises part of the invention;

FIGURE 8 is a fragmentary enlarged elevational view of a rotatable cam blade and a prong projecting from the lever, the cam blade being adapted to contact the prong at periodic time intervals in accordance with the present invention;

FIGURE 9 is a fragmentary sectional view taken along the line 9—9 in FIGURE 2; and

FIGURE 10 is a diagrammatic view of a circular plate forming a component of the dispensing device and showing one face of the circular plate on which a plurality of cam elements of variant lengths are mounted in circumferentially spaced, radially arranged relationship.

Referring more specifically to the drawings, the dispensing device in accordance with my invention includes a

support for a container having dispensable fluid therein, such as an aerosol container. The support may take the form of a framework 10 having a vertical panel 11 and a horizontal platform or base 12 which is integrally joined to the vertical panel 11 along the lower margin thereof. The framework 10 fits within a cover member 13 which comprises interconnected walls including a horizontal top wall 14, vertical front and back walls 15, 16, and a pair of vertical end walls 17, 18. The framework 10 and the cover member 13 cooperate to define a composite housing 20 in which the operative mechanism of the dispensing device is contained and in which the aerosol container is partially received, with the platform or base 12 of the framework 10 forming the bottom wall of the housing 20. The cover member 13 is releasably attached to the framework 10 with the vertical back wall 16 and the vertical panel 11 thereof in juxtaposed relation, the attachment of the cover member 13 to the framework 10 being accomplished by suitable means, such as screws 21, 22 extending inwardly through the respective end walls 17, 18 of the cover member 13 and threadably received by the upstanding legs of right-angled brackets 23, 24 whose base legs are fixedly secured to the platform or base 12 forming the bottom wall of the housing 20 at the opposite ends thereof. The framework 10 can be readily removed from the cover member 13 to expose the vertical panel 11 and the base 12 of the framework 10 by disengaging the screws 21, 22 from the right-angled brackets 23, 24. The housing 20 is adapted to be mounted on a vertical planar surface, such as a building wall. To this end, a pair of apertured ears 25 extend from opposite ends of the back wall 16 of the cover member 13 for receiving fastener elements, such as screws 26, which penetrate into the building wall for mounting the housing 20 thereon.

The base 12 of the framework 10, hereinafter referred to as the bottom wall 12 of the housing 20, is provided with an elongated slot 27 which extends transversely thereof and opens onto the forwardly disposed edge thereof. The front wall 15 of the cover member 13 which is also the front wall of the housing 20 is provided with a dispensing outlet 30 which opens onto the lower edge thereof and communicatively adjoins the slot 27 in the bottom wall 12 of the housing 20.

A container 31 having dispensable fluid therein is adapted to be supported by the framework 10 in suspended relationship from the housing 20. The container 31 is preferably of the type referred to as an aerosol container in which liquid or fluid to be dispensed therefrom is contained therewithin under pressure and is combined with a propellant substance so as to be dispensed as an atomized spray. The container 31 includes an upper portion or neck 32 having a circular beaded collar 33 forming an enlargement with respect to the upper portion 32 of the container 31 immediately therebeneath. The container 31 is equipped with a depressible release valve 34, which upon being depressed to an open position release fluid from the container 31 through a dispensing aperture 35. The depressible valve 34 is normally biased upwardly to a closed position in which the dispensing aperture 35 is blocked to prevent inadvertent escape of the contents of the container 31. The structure of the container 31 is typical of the so-termed aerosol container.

In supporting the container 31 from the housing 20, the slot 27 in the bottom wall 12 of the housing 20 receives the upper portion 32 of the container 31 therethrough so as to dispose the valve 34 and the dispensing aperture 35 associated therewith within the housing 20 in alinement with the dispensing outlet 30 formed in the front wall 15 of the housing 20. The beaded collar or enlargement 33 on the upper portion 32 of the container 31 is disposed above the slot 27 and within the housing 20 in overlying slidable engagement with portions of the bottom wall 12 of the housing 20 bounding the opposite sides of the slot 27, thereby serving to retain the container 31 in suspended relationship from the bottom wall 12 of the housing 20.

The container 31 is held in a stationary position with its upper portion 32 extending through the slot 27 and disposed at the closed end thereof by a resilient clip or strap 36. The resilient clip 36 is pivotally secured at one end thereof to the bottom wall 12 of the housing 20 on one side of the slot 27 and is adapted to be pivoted so as to extend across the slot 27 where its free end may be forced behind a stud 37 which is provided on the bottom wall 12 of the housing 20 on the opposite side of the slot 27 and projects below the bottom wall 12. When the free end of the clip 36 is received behind the stud 37, the clip 36 will be drawn tightly against the upper portion 32 of the container 31 to clamp the container 31 between the clip 36 and the closed end of the slot 27. The container 31 may be readily released from its clamped position by pulling down on the free end of the clip 36 to clear the stud 37 and thereafter pivoting the clip 36 away from the slot 27 and the container 31 to allow the container 31 to be disengaged from the housing 20 by sliding the upper portion 32 thereof outwardly of the slot 27.

The dispensing device is equipped with a timing mechanism of a suitable type. The timing mechanism is mounted within the housing 20 on opposite sides of a vertical partition 40 which is disposed approximately intermediate the front and back walls 15, 16 of the housing 20 provided by the cover member 13. The partition 40 is itself secured to the vertical panel 11 of the framework 10 in spaced parallel relationship thereto by suitable bracing brackets. The timing mechanism, as shown, includes a synchronized electric motor 41 which is mounted on one side of the partition 40, the electric motor 41 being positioned in the space between the partition 40 and the front wall 15 of the housing 20. The motor 41 is connected to a suitable source of electric power by insulated electrical conductors or wires 42 which extend outwardly of the housing 20 through an aperture in the end wall 17. A drive shaft 43 extends from the motor 41 toward the vertical panel 11 of the framework 10, the drive shaft 43 being rotatable by operation of the motor 41 and including a drive pinion 44 intermediate the ends thereof. The drive pinion 44 is disposed on the opposite side of the partition 40 and meshes with an enlarged operating gear wheel 45 also on the opposite side of the partition 40. The operating gear wheel 45 is rotated by the drive pinion 44 and carries a pinion gear 46 for rotation about a fixed axle rigidly secured to the outer marginal portion of the enlarged operating gear wheel 45. The pinion gear 46 is in meshing engagement with a pair of gear wheels 47, 48 having the same diameter and being mounted in parallel coaxial relationship to the enlarged operating gear wheel 45 and each other. The gear wheel 47 which is adjacent the enlarged operating gear wheel 45 is fixed against rotation and is provided with a slightly larger number of gear teeth arranged about its circumference than the number of gear teeth arranged about the circumference of the gear wheel 48 which is mounted for relatively slow rotative movement. This particular type of timing mechanism corresponds to the timing mechanism disclosed in U.S. Patent 2,617,900 to Morrison issued November 11, 1952, and forms no part of the present invention, except insofar as it may be broadly characterized as a timing mechanism having a slowly rotatable gear wheel 48 which requires a significant time interval for completing one revolution thereof.

It will be observed that an eccentric member 50 is fixedly secured to the end of the drive shaft 43 adjacent the vertical panel 11 of the framework 10, the eccentric member 50 being adapted to be rotated with the drive shaft 43 in a circular path of movement and comprising a cam blade having a laterally extending blade portion

provided with a tapered surface forming a knife edge 51 (FIGURE 8).

A circular timing plate or disc 52 is arranged in spaced parallel relationship to the pair of gear wheels 47, 48 forming part of the timing mechanism previously described, the circular plate 52 being rigidly connected to the slowly rotatable gear wheel 48 by a shaft 53 extending therebetween so as to be rotatably driven by the slowly rotatable gear wheel 48. A plurality of cam elements 54 are mounted on the face of the circular plate 52 remote from the gear wheel 48 in radially arranged, circumferentially spaced relationship. Each of the cam elements 54 comprises a wedge-shaped block presenting an outer beveled surface 55 which is oriented as to its angle and direction of incline with the outer beveled surfaces 55 provided on the other cam elements 54.

It will be noted that the cam elements 54 on the circular plate 52 are of varying lengths. In this connection, the illustrated embodiment in the drawings shows a total of eight cam elements 54 on the circular plate 52— these cam elements 54 being independently identifiable in FIGURE 10 by reference characters A–H, inclusive. Thus, in the diagrammatic view shown in FIGURE 10, it will be observed that the length of cam element 54A is longer than the lengths of the remaining cam elements; cam element 54B, diametrically opposite from cam element 54A and together with cam element 54A dividing the circumference of the circular plate 52 into two equal arcs, has a length somewhat shorter than the length of cam element 54A, but longer than the remaining cam elements; cam elements 54C and 54D, which are diametrically opposite from each other and together with cam elements 54A and 54B divide the circumference of the circular plate 52 into four equal arcs, are equal in length, being shorter in length than either of cam elements 54A and 54B, but longer in length than the remaining cam elements; and cam elements 54E–54H, inclusive, which together with cam elements 54A–54D, inclusive, further subdivide the circumference of the circular plate 52 into eight equal arcs, are equal in length, but of shorter length than the cam elements 54A–54D, inclusive.

Also mounted within the housing 20 to extend between the vertical panel 11 of the framework 10 and the circular plate 52 with its plurality of cam elements 54 is a lever 60. The lever 60 comprises offset arms 61, 62 integrally joined by an intermediate angular connector portion 63. The lever 60 is mounted for vertical pivotal movement and lateral rocking movement. In the latter connection, the lever 60 is loosely pivotally secured at the free end of arm 61 to the vertical panel 11 of the framework 10 for vertical pivotal movement about a pin 64. The lever 60 is normally biased to a position in which the arm 61 thereof beginning at its pivotally secured end diverges inwardly from the vertical panel 11 of the framework 10 to allow for limited lateral rocking movement of the lever 60 about the end of arm 61 loosely anchored by the pin 64. The lever 60 is biased inwardly about the loosely anchored end of arm 61 with respect to the vertical panel 11 by resilient means which includes a leaf spring 65 rigidly affixed at one end to the lever 60 at the juncture between its arm 61 and the angular connector portion 63, the leaf spring 65 extending outwardly and upwardly from the lever 60 to resiliently engage the vertical panel 11 of the framework 10. The resilient means further includes a tensioned coil spring 66 attached at one end to a hook 67 projecting from the lever 60 at the juncture between its arm 62 and the angular connector portion 63 and at its other end to a horizontal bar 70 which is rigidly mounted on the vertical panel 11 of the framework 10 and extends inwardly thereof beyond the arm 62 of the lever 60.

The lever 60 is provided with a lateral extension arm 71 which is rigidly affixed to the arm 61 of the lever 60 and extends inwardly thereof so as to partially overlie the slot 27 in which the upper portion 32 of the container 31 is received. The extension arm 71 of the lever 60 carries a threaded bolt 72 having a downwardly disposed enlarged head 73 which is adapted to engage and depress the release valve 34 on the container 31 for dispensing fluid therefrom. The period of time during which the release valve 34 is held in a depressed position for dispensing fluid from the container 31 can be adjusted by manually rotating the threaded bolt 72 to raise or lower its enlarged head 73 with respect to the release valve 34 on the container, depending upon the direction of rotation imparted to the bolt 72. The bolt 72 is releasably maintained in a desired adjusted position by a nut 74 which is threadably received thereby and engages the upwardly disposed surface of the lateral extension arm 71 of lever 60.

The arm 62 of the lever 60 is provided with an inwardly projecting wedge-shaped cam element 75 opposed to the cam elements 54 on the circular plate 52 and having an inclined surface complementary to the outer beveled surfaces 55 formed on the cam elements 54. The position of the cam element 75 on the lever 60 can be adjusted lengthwise along the arm 62 of the lever 60. To this end, the cam element 75 is carried by a sleeve 76 to which it is rigidly secured, the sleeve 76 fitting about the arm 62 of lever 60 and being slidable therealong. A set screw 77 extending upwardly and outwardly of the housing 20 through an elongated slot 78 formed in the top wall 14 thereof is provided for the slidable sleeve 76. It will be understood that the set screw 77 may be tightened to secure the sleeve 76 against movement along the arm 62 of lever 60 for disposing the cam element 75 at a selected position on the lever 60. Should it be desired to adjust the position of the cam element 75, the set screw 77 is loosened and the sleeve 76 is slidably moved to another position on the arm 62 of lever 60, following which the set screw 77 is tightened to secure the sleeve 76 to the arm 62 of the lever 60 with the cam element 75 disposed in its new position. Preferably, the outer end of the set screw 77 extending above the housing 20 is provided with an enlarged knurled knob 80 to facilitate adjustment of the cam element 75.

The rearwardly facing side of the arm 62 of lever 60 is provided with a laterally extending prong 81 having a V-notch in its outer end portion for cooperation with the tapered surface and knife edge 51 of the cam blade 50. The sleeve 76 includes an elongated slot 83 in the rearwardly facing side thereof for receiving the prong 81 which also serves as a stop to limit further outward movement of the sleeve 76 along the arm 62 of lever 60. In the normal position assumed by the lever 60, the prong 81 is disposed inwardly of the circular path of movement taken by the cam blade 50 and out of alinement therewith.

Upon placing an aerosol container 31 in position with its upper portion 32 received through the slot 27 in the bottom wall 12 of the housing 20 and clamping the container 31 in place by the resilient clip 36 in the manner described, the dispensing device may be set for automatically actuating the release valve 34 on the container 31 in a timed sequence by positioning the sleeve 76 in any one of a plurality of positions on the arms 62 of lever 60 for selectively determining the time interval elapsing between successive actuations of the release valve 34 on the container 31. In this connection, the top wall 14 of the housing 20 preferably includes suitable indicia adjacent the elongate slot 78 through which the set screw 77 extends to indicate the number of actuations of the release valve 34 which will occur during one complete revolution of the circular plate 52. Thus, if it is desired to actuate the release valve 34 once during each complete revolution of the circular plate 52, the sleeve 76 is adjusted on the arm 62 of lever 60 so that the set screw 77 extending upwardly therefrom is alined with the indicia mark designating "1" on the top wall 14 of

the housing. This arranges the wedge-shaped cam element 75 on the sleeve 76 in a position where it will abut the beveled surface 55 of only the longest one of the cam elements 54 on the circular plate 52, or cam element 54A.

By moving the sleeve 76 outwardly along the arm 62 of the lever 60, the wedge-shaped cam element 75 is moved radially outwardly with respect to the circular plate 52 and may correspondingly engage the beveled surface 55 of one or more cam elements 54 of shorter length than the longest cam element 54A in addition to engaging the beveled surface 55 of the longest cam element 54A during each complete revolution of the circular plate 52. It will be therefore understood that the wedge-shaped cam element 75 may be so positioned on the arm 62 of the lever 60 to engage the beveled surface 55 of one, two, four, or all eight of the cam elements 54 on the circular plate 52 during each complete revolution thereof.

Each time the wedge-shaped cam element 75 abuts the beveled surface 55 of any one of the cam elements 54 on the slowly rotating circular plate 52, the lever 60 is forced laterally rearwardly about the end of its arm 61 loosely anchored by pin 64 against the biasing effect of leaf spring 65 and coil spring 66 to dispose the prong 81 within the circular path of movement taken by the eccentric cam blade 50 as the drive shaft 43 rotates. The prong 81 on the lever 60 is normally maintained out of alinement with the circular path of movement of the cam blade 50, but upon being moved into alinement with the circular path of movement of the cam blade 50 in response to the abutment of the cam element 75 with the beveled surface 55 of one of the cam element 54 conditions the lever 60 for effecting an actuation of the release valve 34 for the container 31 through the enlarged head 73 of the threaded stud 72 carried by the lateral extension arms 71 of the lever 60. As the cam blade 50 swings around in a circular arc, its tapered surface and knife edge 51 cam into the V-notch in the prong 81, and continued rotation of the cam blade 50 forces the lever 60 downward in a pivoting movement about the pin 64 to lower the enlarged head 73 of the threaded stud 72 for depressing the valve 34 to an open position, whereupon fluid is dispensed from the container 31 through the dispensing aperture 35 thereof and outwardly through the dispensing outlet 30 provided in the front wall 15 of the housing 20.

As the cam blade 50 continues its circular movement, the knife edge 51 thereof disengages from the prong 81 on the lever 60, and the lever 60 snaps back into a position with the wedge-shaped cam element 75 thereon riding past and out of engagement with the beveled surface 55 of the cam element 54 previously engaged thereby, this snap action of the lever 60 in returning to its normal position being encouraged by the biasing effect of the leaf spring 65 and the coil spring 66.

Should it be desired to manually actuate the depressible release valve 34 on the container 31 to an open position for dispensing fluid from the container 31 at random, the knob 80 of the set screw 77 exposed above the top wall 14 of the housing 20 may be pressed downwardly. The lever 60 is thereby caused to be pivoted downwardly about the pin 64 to actuate the release valve 34 by the lowering of the enlarged head 73 of the bolt 72 carried by the lateral extension arm 71 of the lever 60.

As one example of an operable embodiment of the invention, the electric motor 41 may be synchronized to operate components of the timing mechanism as follows:

	Rate of rotation (revolutions per minute—r.p.m.)
Drive shaft 43	3
Operating gear wheel 45	¼
Gear wheel 48	1/480
Circular plate 52	1/480

Thus, the operating gear wheel 45 completes one revolution every four minutes, and each of the gear wheel 48 and circular plate 52 completes one revolution every eight hours.

With the timing mechanism having such an operable cycle, the time interval elapsing between successive automatic actuations of the release valve 34 for the container 31 may be varied in accordance with the following schedule:

Indicia Setting for Set Screw 77	Cam Elements on Circular Plate 52 Engaged by Cam Element 75 carried on Lever 60	Periodic Time Interval Between Successive Actuations of Release Valve 34
0	0	0.
1	54A	8 hrs.
2	54A–54B	4 hrs.
4	54A–54D, incl.	2 hrs.
8	54A–54H, incl.	1 hr.

It will be appreciated that aerosol containers of different sizes may be employed with my dispensing device, since the upper portions 32 of such aerosol containers are usually identical even though there may be a significant difference in the overall size of the aerosol containers. In this respect, my dispensing device is so constructed as to provide for suspension of an aerosol container from the housing 20 to allow for size variations in the aerosol containers which may be used with my dispensing device without requiring manual adjustment or removal of parts of the dispensing device. My dispensing device provides for adjustment of the time interval elapsing between successive automatic actuations of the release valve on an aerosol container, as well as adjustment of the time period during which the release valve is maintained in an actuated position.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a dispensing device for periodically dispensing fluid from a container having an actuatable valve at its top for releasing fluid therefrom and a collar forming an enlargement extending at least partially about an upper portion thereof below the valve;

(a) a housing having top, bottom, front, and back walls and a pair of end walls forming an enclosure,

(b) the bottom wall of said housing having a transversely extending, elongate slot opening onto the forwardly disposed edge of the bottom wall,

(c) the front wall of said housing having a dispensing outlet extending into the lower edge thereof and communicatively adjoining the elongate slot in the bottom wall of said housing,

(d) the upper portion of said container being receivable within said housing and extending through said slot in the bottom wall to dispose said valve within said housing in alinement with said dispensing outlet in the front wall,

(e) the enlargement on said container formed by said collar being disposed above said slot and within said housing in overlying slidable engagement with portions of the bottom wall of said housing bounding the opposite sides of said slot to retain said container in an operative position depending from said housing, and

(f) valve actuator means carried by said housing for successively actuating said valve in a timed sequence when said container is disposed in operative position depending from said housing.

2. In a dispensing device for periodically dispensing fluid from a container having an actuatable valve at its

top for releasing fluid therefrom and a collar forming an enlargement extending at least partially about an upper portion thereof below the valve;

(a) a housing having top, bottom, front, and back walls and a pair of end walls forming an enclosure,

(b) the bottom wall of said housing having a transversely extending, elongate slot opening onto the forwardly disposed edge of the bottom wall,

(c) the front wall of said housing having a dispensing outlet extending into the lower edge thereof and communicatively adjoining the elongate slot in the bottom wall of said housing,

(d) the upper portion of said container being receivable within said housing and extending through said slot in the bottom wall to dispose said valve within said housing in alinement with said dispensing outlet in the front wall,

(e) the enlargement on said container formed by said collar being disposed above said slot and within said housing in overlying slidable engagement with portions of the bottom wall of said housing bounding the opposite sides of said slot,

(f) means on said housing releasably securing said container against movement in a direction outwardly of said slot to retain said container in an operative position depending from said housing, and

(g) valve actuator means carried by said housing for successively actuating said valve in a timed sequence when said container is disposed in operative position depending from said housing.

3. In a dispensing device as set forth in claim **2**, wherein said means on said housing releasably securing said container against movement in a direction outwardly of said slot comprises

(1) a resilient elongate clip pivotally secured at one end thereof to the bottom wall of said housing on one side of said slot, said clip being pivotable so as to extend across said slot, and

(2) a depending stud rigidly secured to the bottom wall of said housing on the other side of said slot;

(h) the other end of said clip being disposable behind said stud in frictional engagement therewith to releasably clamp the upper portion of said container between said clip and the portion of said bottom wall bounding the closed end of said slot.

4. In a valve actuator assembly for intermittently actuating a depressible valve means for an aerosol container by depressing the valve means to an open position for dispensing fluid from the container through the open valve means;

(a) lever means adapted to be operatively associated with the depressible valve means of an aerosol container,

(b) means mounting said lever means for movement in a direction to depress a valve means associated therewith to open position,

(c) an eccentric member mounted adjacent said lever means for rotation in an orbital path of movement,

(d) means operatively connected to said eccentric member for imparting rotation thereto,

(e) a rotatable circular plate mounted adjacent to said lever means,

(f) means operatively connected to said circular plate for rotating the same in a predetermined timed relationship,

(g) a plurality of circumferentially spaced radially arranged cam elements carried by said circular plate for rotation therewith,

(h) cam-actuated means carried by said lever means on the face thereof opposed to said plurality of cam elements on said circular plate and being disposed in the path of movement of at least certain of said cam elements so as to be successively engaged thereby,

(i) projecting means extending outwardly from the other face of said lever means, said projecting means being normally disposed out of alinement with the orbital path of movement of said eccentric member,

(j) said lever means being moved laterally outwardly in response to engagement of said cam-actuated means carried thereby with one of said cam elements on said circulate plate to move said projecting means on said lever means into alinement with the orbital path of movement of said eccentric member,

(k) said eccentric member contacting said projecting means during its rotation to move said lever means in a direction to depress the valve means to an open position, and

(l) said lever means being moved in a direction to depress said valve means whenever said cam-actuated means carried by said lever means engages any one of said cam elements on said circular plate to successively depress said valve means to an open position in timed sequence with a predetermined time interval elapsing between successive depressions of said valve means for periodically dispensing fluid from said container.

5. In a valve actuator assembly as set forth in claim **4**, wherein

(m) said plurality of cam elements are equally spaced about the circumference of said circular plate and extend radially inwardly thereon for varying distances to provide at least a pair of cam elements of unequal length, and

(n) means to adjust the position of said cam-actuated means carried by said lever means relative to said cam elements on said circular plate for selectively rendering said cam-actuated means operable to engage a lesser number of cam elements than the total number of cam elements on said circular plate, whereby the predetermined time interval between successive depressions of said valve means by movement of said lever means may be changed.

6. In a valve actuator assembly as set forth in claim **5**, wherein said means for adjusting the position of said cam-actuated means carried by said lever means relative to said cam elements on said circular plate comprises

(1) a sleeve slidably mounted on said lever means for movement therealong, said cam-actuated means being secured to said sleeve, and

(2) a set screw penetrating said sleeve and engageable with said lever means to releasably secure said sleeve in a fixed position on said lever means.

7. In a valve actuator assembly for intermittently actuating a depressible valve means for an aerosol container by depressing the valve means to an open position for dispensing fluid from the container through the open valve means;

(a) lever means movable in a direction to depress said valve means to an open position,

(b) a rotatable drive shaft,

(c) an eccentric member rigidly secured on said drive shaft and extending laterally thereof in offset relation, said eccentric member comprising a cam blade rotatable in a circular path of movement and having a tapered leading surface terminating in a knife edge,

(d) means imparting rotation to said drive shaft and said cam blade thereon,

(e) a rotatable circular plate adjacent to said lever means,

(f) means operatively connected to said circular plate for rotating the same in a predetermined timed relationship,

(g) a plurality of circumferentially spaced radially arranged cam elements on said circular plate,

(h) cam-actuated means carried by said lever means on the face thereof opposed to said plurality of cam elements on said circular plate,

(i) a prong projecting outwardly from the other face

of said lever means, said prong having an upwardly opening notch formed in its outer end portion and being normally disposed out of alinement with the circular path of movement of said cam blade,

(j) said lever means being moved laterally outwardly in response to engagement of said cam-actuated means carried thereby and one of said cam elements on said circular plate to dispose the outer end portion of said prong in alinement with the circular path of movement of said cam blade,

(k) the knife edge of said cam blade camming into the notch formed in the outer end portion of said prong to seat the tapered leading surface of said cam blade in said notch during rotation of said cam blade in its circular path to thereafter cause movement of said lever means in a direction depressing said valve means to an open position, and

(l) said lever means being moved in a direction depressing said valve means whenever said cam-actuated means carried by said lever means engages any one of said cam elements on said circular plate to successively depress said valve means to an open position in timed sequence with a predetermined time interval elapsing between successive depressions of said valve means for periodically dispensing fluid from said container.

8. A dispensing device for intermittently actuating a depressible valve means of an aerosol container by depressing the valve means to an open position for dispensing fluid from the container through the open valve means; said dispensing device comprising

(a) a housing for supporting the container with the depressible valve means located within the housing, said housing having a dispensing outlet adapted to be alined with the valve means of the container,

(b) lever means in said housing and movable in a direction to depress the valve means to an open position,

(c) an eccentric member within said housing and rotatable in an orbital path of movement,

(d) means imparting rotation to said eccentric member,

(e) a rotatable circular plate within said housing adjacent to said lever means,

(f) means operatively connected to said circular plate for rotating the same in a predetermined timed relationship,

(g) a plurality of circumferentially spaced radially arranged cam elements on said circular plate,

(h) said cam elements being equally spaced about the circumference of said circular plate and extending radially inwardly thereon for varying distances to provide at least a pair of cam elements of unequal length,

(i) a sleeve slidably mounted on said lever means for movement therealong,

(j) cam-actuated means secured to said sleeve and disposed in opposed relation to said cam elements on said circular plate,

(k) a set screw penetrating said sleeve and engageable with said lever means to releasably secure said sleeve and said cam-actuated means in a fixed position on said lever means, said set screw extending outwardly of said housing,

(l) a prong projecting outwardly from the other face of said lever means, said prong being normally disposed out of alinement with the orbital path of movement of said eccentric member,

(m) said lever means being moved laterally outwardly in response to engagement of said cam-actuated means and one of said cam elements on said circular plate to dispose said prong in alinement with the orbital path of movement of said eccentric member,

(n) said eccentric member contacting said prong during rotation of said eccentric member in its orbital path to move said lever means in a direction for depressing the valve means to an open position,

(o) said lever means being moved in a direction for depressing the valve means whenever said cam-actuated means engages any one of said cam elements on said circular plate to successively depress the valve means to an open position in timed sequence with a predetermined time interval elapsing between successive depressions of the valve means for periodically dispensing fluid from the container through the dispensing outlet in said housing,

(p) the position of said cam-actuated means relative to said cam elements being adjustable by moving said sleeve along said lever means upon loosening of said set screw for selectively rendering said cam-actuated means operable to engage a lesser number of cam elements than the total number of cam elements on said circular plate, whereby the predetermined time interval elapsing between successive depressions of the valve means may be changed, and

(q) said set screw comprising manually operable means for moving said lever means in a direction for depressing the valve means to an open position at random without disturbing the timed sequence of successive automatic depressions of the valve means.

9. An actuator assembly for use with a device desired to be cyclicly operated, said actuator assembly including

(a) an eccentric member mounted for rotation in a predetermined plane,

(b) a rotatable circular plate spaced from said eccentric member and adapted to be rotated in a predetermined timed relationship,

(c) a plurality of varying length, circumferentially spaced cam elements carried by said circular plate for rotation therewith and extending longitudinally radially of said circular plate,

(d) actuating means disposed between said circular plate and said eccentric member and being movable between a first position wherein the same is disposed in the path of rotation of at least one of said cam elements and out of the path of rotation of said eccentric member and a second position in the path of rotation of said eccentric member, said actuating means normally occupying said first position and being moved therefrom to said second position by said cam elements upon successive engagement therewith, said eccentric member engaging said actuating means when the same occupies said second position, and said actuating means being adapted to be operatively associated with a cyclicly operable device for intermittently operating the same, and

(e) adjustment means operatively associated with said actuating means and said cam elements for adjusting the relative positions thereof for varying the number of said cam elements which will engage said actuating means per revolution of said circular plate to thereby vary the interval between movements of said actuating means from the first position to the second position.

10. An actuator assembly for use with a device desired to be cyclicly operated, said actuator assembly including

(a) an eccentric member mounted for rotation in a predetermined plane,

(b) a rotatable circular plate spaced from said eccentric member and adapted to be rotated in a predetermined timed relationship and in a plane parallel to the plane of rotation of said eccentric member,

(c) a plurality of circumferentially spaced, varying length cam elements carried by said circular plate for rotation therewith on the side face thereof adjacent said eccentric member, said cam elements extending longitudinally radially inwardly from the periphery of said circular plate for varying distances depending upon the length thereof,

(d) actuating means disposed between said circular

plate and said eccentric member and being movable between a first position wherein the same is disposed in the path of rotation of at least one of said cam elements and out of the path of rotation of said eccentric member and a second position in the path of rotation of said eccentric member, said actuating means normally occupying said first position and being moved therefrom to said second position by said cam elements upon successive engagement therewith, said eccentric member engaging said actuating means when the same occupies said second position, and said actuating means being adapted to be operatively associated with a cyclicly operable device for intermittently actuating the same, and

(e) adjustment means operatively associated with said actuating means for adjusting said actuating means radially of said circular plate and longitudinally of said cam elements to vary the position of said actuating means relative to said varying length cam elements for varying the number of said cam elements which will engage said actuating means per revolution of said circular plate to thereby vary the interval between movements of said actuating means from the first position to the second position.

11. The structure recited in claim **10** wherein said actuating means (d) includes

(1) lever means movable between said circular plate and said eccentric member and being movable in response to engagement with said eccentric member, and

(2) adjustable means carried by said lever means and adapted to intermittently actuate a cyclicly operable device in response to movement of said lever means by said eccentric member and being adjustable for varying the interval of actuation of the cyclicly operable device.

12. A dispensing device comprising

(a) a support,

(b) a container carried by said support and having fluid under pressure therein,

(c) valve means on said container for opening said container upon actuation thereof for dispensing fluid therefrom,

(d) an eccentric member mounted on said support for rotation in a predetermined plane,

(e) a rotatable circular plate carried by said support and spaced from said eccentric member and adapted to be rotated in a predetermined timed relationship,

(f) a plurality of varying length, circumferentially spaced cam elements carried by said circular plate for rotation therewith,

(g) actuating means disposed between said circular plate and said eccentric member and being movable between a first position wherein the same is disposed in the path of rotation of at least one of said cam elements on said circular plate and out of the path of rotation of said eccentric member and a second position in the path of rotation of said eccentric member, said actuating means normally occupying said first position and being moved therefrom to said second position by said cam elements upon successive engagement therewith, said actuating means being operatively associated with said valve means on said container and being engaged by said eccentric member when said actuating means occupies said second position for movement of said actuating means in a direction to actuate said valve means to open said container for dispensing fluid therefrom, and

(h) adjustment means operatively associated with said actuating means and said cam elements for adjusting the relative positions thereof for varying the number of said cam elements which will engage said actuating means per revolution of said circular plate to thereby vary the interval between actuations of said valve means.

13. A dispensing device according to claim **12** wherein said actuating means includes

(1) lever means pivotally mounted on said support and being movable in response to engagement with said cam elements into the path of said eccentric member and being movable by said eccentric member about said pivot, and

(2) adjustable means carried by said lever means in operative association with said valve means for actuating the valve means in response to the pivotal movement of said lever means by said eccentric member and being adjustable for varying the interval of actuation of said valve means for varying the amount of fluid dispensed from said container.

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