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3,497,108

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AUTOMATIC DISPENSER

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FIG. 1.

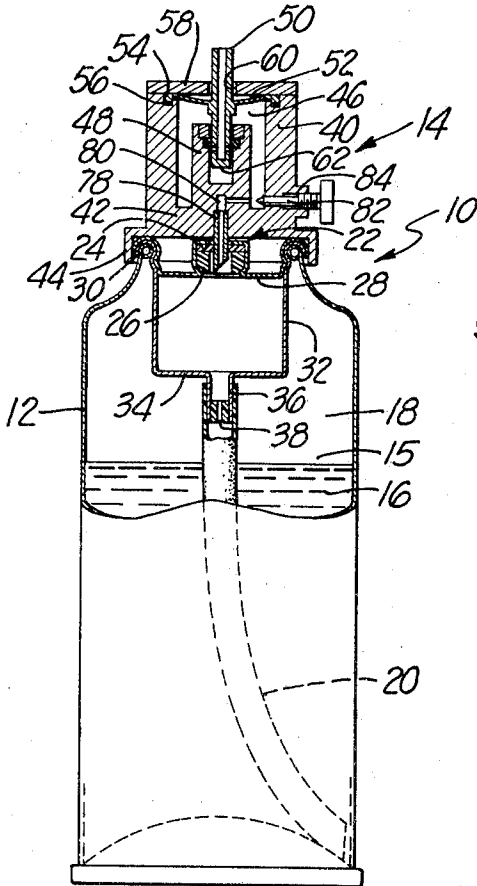


FIG. 3.

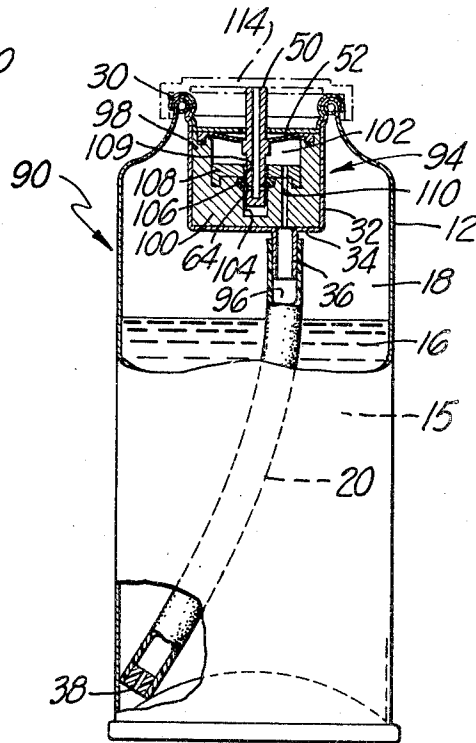
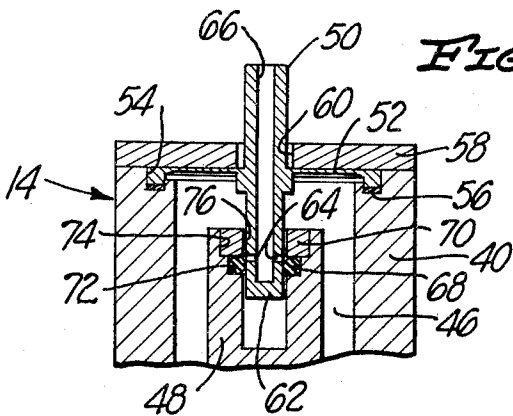


FIG. 2.



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FIG. 4.

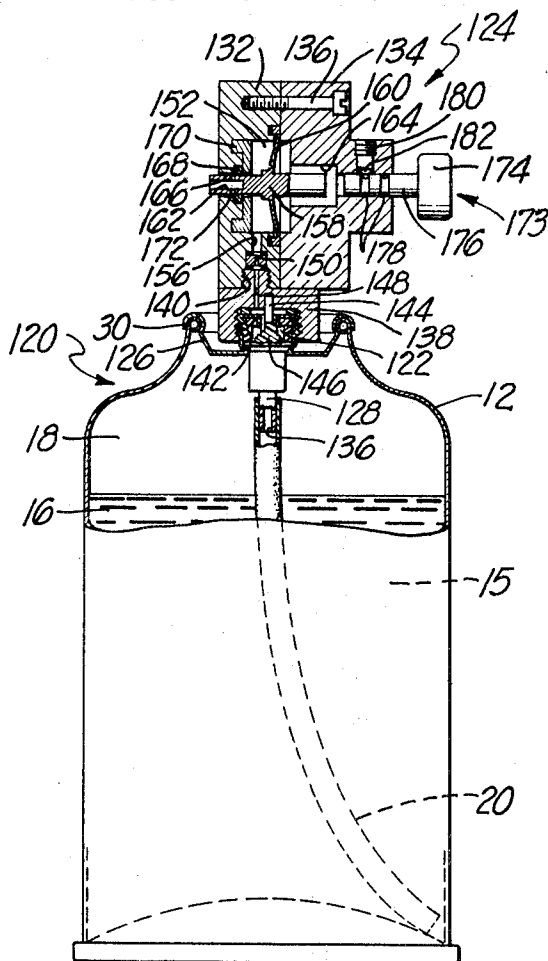


FIG. 7.

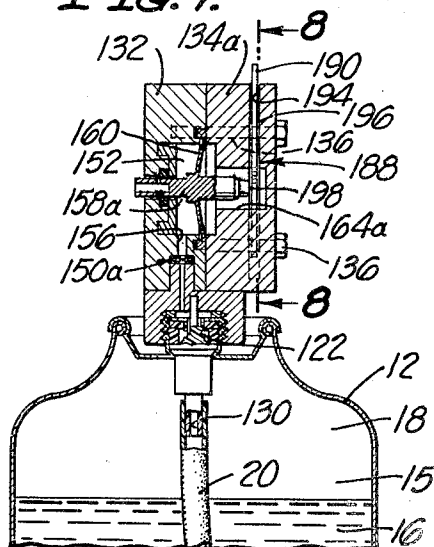


FIG. 8.

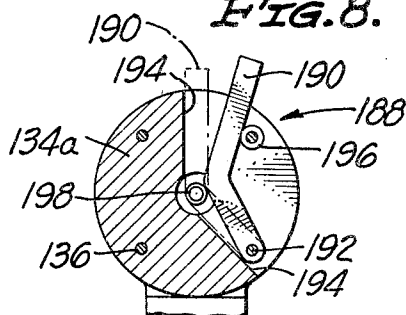


FIG. 9.

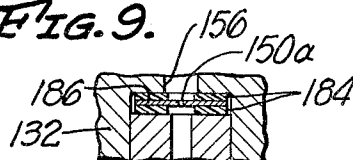
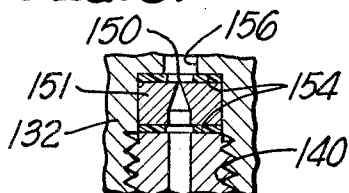


FIG. 6.



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FIG. 5.

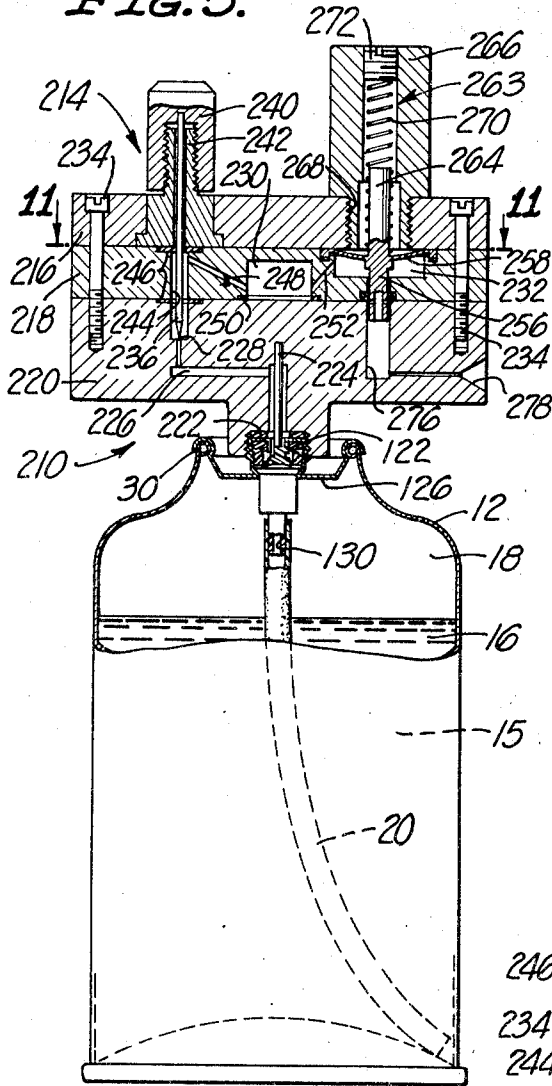


FIG. 10.

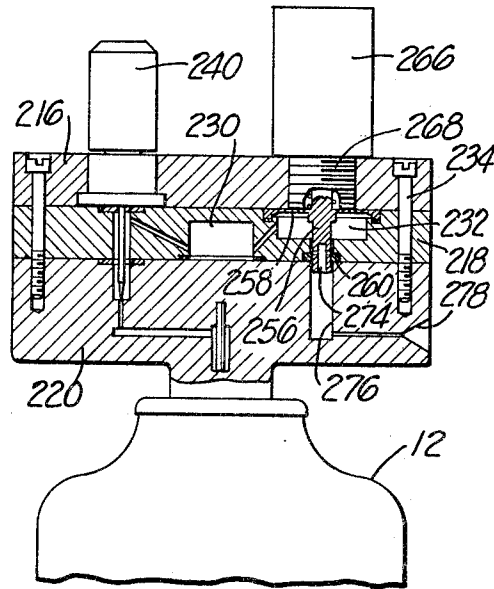


FIG. 11.

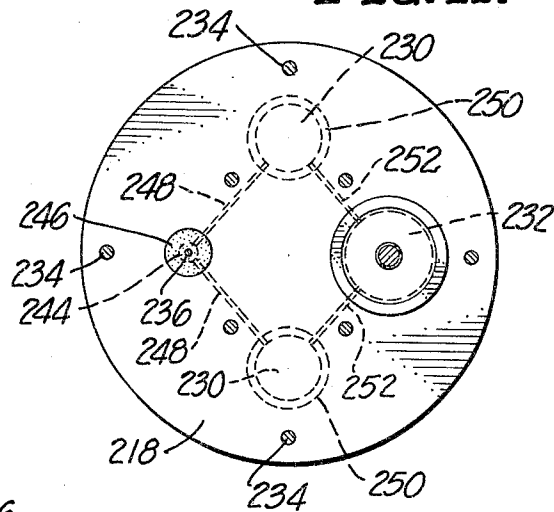
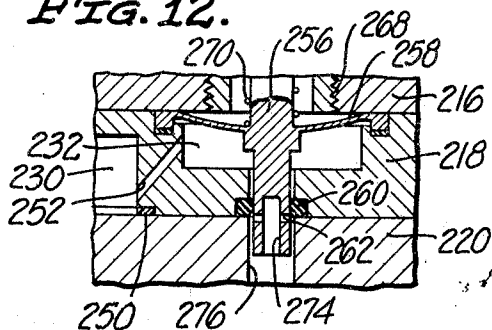


FIG. 12.



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AUTOMATIC DISPENSER

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Int. Cl. B05f 11/00; B65d 83/14

U.S. Cl. 222—61

16 Claims

ABSTRACT OF THE DISCLOSURE

An automatic dispenser including a storage capsule containing a dispensable substance and an assembly for automatically dispensing the substance at predetermined intervals from a reservoir. A movable discharge valve mechanism reciprocates between an open and a closed position due to pressure differentials in the reservoir caused by the accumulation and discharge of the substance. The dispensing assembly, or a portion of it, may be detachable and reusable.

This invention relates to automatic dispensers and more particularly to an automatic dispenser where a dispensable substance is retained under pressure or by suitable means for forcing flow of the substance. A common form of container for the substance is the aerosol container and such a form or method of packaging will be used throughout this specification as illustrative; however, types of containers employing other means for forcing flow of the substance are intended to be within the scope of the invention.

In a typical aerosol package, a capsule contains the dispensable substance, which may include a dispensable commodity such as an insecticide or deodorizing agent, under pressure from a propellant which forces the commodity into a standpipe which in turn lead to a manually operated nozzle and valve assembly. The propellant usually is a gas under pressure or a liquefied gas which has a pressure greater than atmospheric at ordinary temperatures. The dispensable substance, however, may be only the propellant itself which, upon discharge, would be used as a motive or drive force in the operation of some type of mechanism such as a toy steam engine or a whistle. Any such dispensable substance is intended to be within the scope of this invention. Manual pressure applied to the nozzle and valve assembly opens the valve to emit a mist or spray of the substance from the standpipe through the nozzle to the atmosphere. Oftentimes, however, it is necessary or desirable to emit the substance without the required manual operation, such as where the package is inaccessible or where periodic discharges are desired and the manual operation would be both vexatious and time-consuming.

Dispensing containers have been developed where the dispensing operation is automatic rather than manual, or both, and certain of these devices include means for regulating the time intervals between successive discharges. These automatic dispensers, however, are quite intricate and expensive to manufacture and usually the entire device must be discarded when the supply of the stored substance is exhausted from its container. Typically the discharge mechanism and the actuation mechanism are separate complex assemblies functioning apart from one another, which results in problems of maintenance of the parts and error in the proper time intervals between successive discharges.

I have developed a novel automatic dispenser which will periodically dispense a stored substance at predetermined intervals, where the intervals are variable. A simple reciprocable discharge nozzle provides the dis-

charge valve for a relatively simple dispensing assembly. A toggle member attached to the nozzle provides an actuation mechanism so that the entire discharge assembly is a simple compact unit. The dispensing assembly, or a portion of it, may be detachable from the capsule containing the substance and the dispensing assembly may therefore be reusable where the capsule itself is the only item disposed of.

It is an object of this invention, therefore, to provide an automatic dispenser which is inexpensive to manufacture. Another object of this invention is to provide an automatic dispenser with a simple compact discharge assembly. A further object of the invention is to provide an automatic dispenser which periodically dispenses a substance from a container at predetermined intervals, where the intervals may be regulated.

It is another object of the invention to provide an automatic dispenser where the dispensing assembly may be detachable and reusable. Still another object of the invention is to provide in an automatic dispenser, the combination of a storage capsule; a reservoir, said storage capsule containing a dispensable substance including means forcing flow of said substance into said reservoir; and discharge valve means for dispensing said substance at predetermined intervals from said reservoir including a nozzle member and a toggle member forming a unitary mechanism, said nozzle member and toggle member being reciprocable between a first position wherein said discharge valve means is closed and a second position wherein said discharge valve means is open, and biasing means urging said toggle member toward said first position, said toggle member including means responsive to pressure in said reservoir urging said toggle member toward said second position.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings.

In the drawings:

FIG. 1 is an elevational, partly sectional view of a preferred embodiment of my automatic dispenser;

FIG. 2 is an enlarged sectional view of the discharge assembly of the embodiment of FIG. 1;

FIGS. 3, 4, and 5 are elevational, partly sectional views of other embodiments of my invention;

FIG. 6 is an enlarged sectional view of the fixed flow regulating orifice of the embodiment of FIG. 4;

FIG. 7 is a sectional, partly elevational view of the embodiment of FIG. 4 showing another form of shut-off mechanism and another form of fixed flow regulating orifice;

FIG. 8 is a sectional view of the shut-off mechanism of the embodiment of FIG. 7 taken along the line 8—8 in FIG. 7;

FIG. 9 is an enlarged sectional view of the flow regulating orifice of the embodiment of FIG. 7;

FIG. 10 is a partly sectional, partly elevational view of the embodiment of FIG. 5;

FIG. 11 is a sectional view taken along the line 11—11 in FIG. 5; and

FIG. 12 is an enlarged sectional view of the discharge assembly of the embodiment of FIGS. 5 and 10.

Referring to FIG. 1 of the drawing, an automatic dispenser 10 is shown with a container or capsule 12 and a dispensing assembly 14. For ease in illustration, the container or capsule 12 is shown as an aerosol type of container and is described as such throughout herein; however, other forms of capsules or containers for a dispensable substance are intended to be within the scope of the invention, where the containers include some suit-

able means or method of forcing the flow of the substance. A dispensable substance 15 is stored within the container 12 for periodic discharge into the atmosphere by the dispensing assembly 14. The dispensable substance 15 may consist of various elements, such as a liquid or gas propellant, or a dispensable commodity, or a combination of a propellant and a dispensable commodity, and all such elements or combinations thereof are intended to be included within the scope of the term "dispensable substance" when used throughout herein.

More particularly, and as illustrative of a form of my invention employing one such dispensable substance, the dispensable substance 15 includes a dispensable commodity 16, for example an insecticide or a deodorizing agent, under pressure from a typical liquefied propellant 188 for example the chorofluorohydrocarbons available under the trademark "Freon." The propellant 18 forces the commodity 16 downwardly in the capsule 12 and into the lower end of a standpipe 20, thence upwardly through the standpipe 20 to a normally closed release port 22. The release port 22 may include a self-sealing diaphragm cover 24 formed about a hollow seat support member 26 which in turn is attached to an upper retaining cup member or cap 28 of the capsule 12. The release port 22 may include a common form of release valve 122, as shown in FIGS. 4, 5, and 7.

The cup member 28 forms the upper portion of the capsule 12 and is attached to an upper circular rim or edge 30 of the capsule 12 by crimping or other suitable means. Similarly attached to the circular rim 30 of the capsule 12 may be a cylindrical member or lower cup 32 extending below the cap 28 and having a base portion 34 with a downwardly protruding, centrally positioned tube 36. The tubular protrusion 36 is sized to snugly fit within the upper end portion of the standpipe 20, and the lower cup 32 may serve as an accumulator for the commodity 16 forced through the standpipe 20 by the propellant 18. A fixed orifice 38 may be provided in the tubular protrusion 36 to regulate the rate of flow of the commodity 16 into the accumulator 32. The capsule or container 12, the standpipe 20, the accumulator 32, and the cap member 28 may be metallic or any suitable plastic material.

The dispensing assembly 14 includes a hollow housing or shell member 40 which may be cylindrical with a base portion 42, and the assembly 14 is preferably detachably connected to the capsule or container 12 by means of a hollow cylindrical cap member 44 beneath the base portion 42 where the cap member 44 is sized to snugly receive the outer perimeter portion of the upper rim 30 of the capsule 12. The friction force between the cap member 44 and the rim 30 preferably is quite small and may be approximately equal to the upward force on a needle 78 which punctures the self-sealing diaphragm cover 24. Other suitable means of detachably connecting the assembly 14 to the container 12 may be provided, such as a threaded or a snap-fit type of connection (not shown).

Referring now to FIGS. 1 and 2, the hollow interior of the housing 40 provides a reservoir or valve chamber 46 for the commodity 16. Extending upwardly within the reservoir 46 from the base 42 is a hollow cylindrical seat member 48 adapted to receive the lower portion of a hollow cylindrical nozzle member 50 which extends upwardly and outwardly to the atmosphere. Located approximately centrally of the nozzle member 50 is a circular peripheral toggle or diaphragm member 52 seated in a circular groove 54 in the upper end of the housing 40. The diaphragm member 52 may be formed from any suitable material, such as plastic, metal, metal coated plastic, or a laminate of the two materials. The diaphragm 52 may be formed as part of the nozzle member 50 or may be formed in two pieces with a stem attached to the nozzle and a separate flexing member seated on the

stem (not shown). Additionally, a spring (not shown) may be provided to bias the flexible toggle member.

An annular seal 56, for example neoprene, may be provided between the outer rim of the toggle member 52 and the housing 40 as shown. A circular seal or cap member 58 is attached, as by sonic welding, snap fitting, or bolting, to the outer end of the housing 40 and the seal cap 58 includes a central bore 60 to loosely receive the nozzle member 50. The nozzle 50 is capped at its base 62 and has one or preferably two opposed ports 64 adjacent the base 62 and opening outwardly from a nozzle discharge port 66 which opens to the atmosphere. An O-ring 68 and a retainer ring 70, retained in respective pockets 72 and 74 of the seat member 48, act as a guide and seal for the lower portion of the nozzle 50. A central bore 76 of the retainer ring 70 is sized to loosely receive the nozzle 50 and to allow passage of the commodity 16 therebetween.

A hollow needle member 78 is located centrally of the base 42 of the housing 40 and extends downwardly therefrom. A port 80 connects the needle member 78 with the reservoir 46. As the dispensing assembly 14 is attached to the capsule 12, the needle 78 punctures the diaphragm 24 allowing the commodity 16 to flow from the accumulator 32 or standpipe 20 into the reservoir 46. A needle valve 82 is screw-threaded into a side port 84 of the housing 40 and may be used to adjust the rate of flow of the commodity 16 from the port 80 into the reservoir 46. The needle valve 82 and the fixed orifice 38 beneath the accumulator 32 thereby provide two independent flow regulators for the commodity 16. The needle valve 82, being adjustable, may additionally completely block the flow of the commodity 16 into the reservoir 46, thereby serving as a means for shutting off the entire dispensing assembly 14.

As can be seen, the nozzle 50 and the toggle member 52 provide a discharge valve means for the commodity 16 accumulated within the reservoir 46. When the nozzle is in the position as shown in FIG. 1, the O-ring 68 prevents flow of the commodity from the reservoir 46 to the side ports 64 of the nozzle 50. When the nozzle 50 is in the position as shown by FIG. 2, the side ports 64 are raised above the O-ring 68 and the commodity 16 may flow into the nozzle port 66 to be discharged into the atmosphere. Discharge of the commodity 16 into the atmosphere is produced by the initial pressure of the propellant 18 in the capsule 12. The toggle or diaphragm member 52 is adapted to snap between the position in FIG. 1 and the position in FIG. 2 carrying with it the nozzle member 50, and therefore the nozzle 50 and toggle member 52 reciprocate between these two positions which constitute, respectively, the closed and open positions of the discharge valve means.

Initially, the toggle or diaphragm member 52 is self-biased due to its inherent construction into the position in FIG. 1 where the valve means is closed. A separate biasing means may be employed to bias the diaphragm member 52 into its said initial position, for example as shown by spring-biasing means 262 in FIG. 5. As the commodity 16 accumulates in the accumulator 32 from the pressure of the propellant 18 and flows into the reservoir 46, the accumulation of the commodity in the reservoir 46 exerts pressure on the diaphragm or toggle 52. When this pressure exceeds the preloading tension in the toggle 52, the toggle snaps upwardly into the second position in FIG. 2, or the open discharge valve position, where the commodity 16 in the reservoir 46 is discharged into the atmosphere. The amount of commodity 16 discharged is usually all or part of that portion of the commodity within the reservoir 46; however, some of the commodity within the accumulator 32 may be discharged as well under certain conditions. When sufficient commodity is so discharged, the pressure in the reservoir 46 recedes to below the prestressed tension or loading force of the toggle 52 and the toggle 52 snaps back to the closed valve

position where the nozzle 50 is reciprocated to its position as shown in FIG. 1. This procedure is automatically repeated until the supply of the commodity 16 in the capsule 12 is exhausted.

The time interval between successive discharges of the commodity 16 from the reservoir 46 is dependent upon the size of the orifice 38 as well as the position of the needle valve 82 with respect to the port 80. The accumulator 32 with the orifice 38 serves as one flow regulator and time interval control mechanism while the needle valve 82 and reservoir 46 serve as another such mechanism. Of course, orifice 38 or needle valve 82, or both, may be omitted. Adjusting the position of the needle valve 82 provides a means for varying the time interval between successive discharges of the commodity 16. When the supply of the commodity 16 is exhausted, the dispensing assembly 14 may be detached and reused on another similar capsule 12, and the depleted capsule may be disposed of. Because the diaphragm 24 is self-sealing, the dispensing assembly 14 may be removed prior to the exhaustion of the commodity 16, and the capsule 12 may be stored for reuse.

It is apparent, therefore, that the automatic dispenser of FIG. 1 provides a mechanically simple and inexpensive dispensing assembly for the stored substance. The dispensing assembly is detachable and reusable, and the capsule for the stored substance can be discarded when the supply of the substance is exhausted. A simple reciprocable nozzle member with its toggle diaphragm provides the discharge valve means for the dispensing assembly.

Referring now to FIG. 3 of the drawings, another embodiment 90 of an automatic dispenser is shown. In this embodiment, a dispensing assembly 94 is contained within the container or capsule 12 which is similar to the capsule of FIG. 1. The dispensing assembly 94 is suitably mounted within the lower cup member 32 which served as the accumulator in the embodiment of FIG. 1. The dispensable substance 15 is again shown as including a dispensable commodity 16 and a propellant 18, as exemplary. The commodity 16 is forced by the propellant 18 into the standpipe 20, thence through the tubular protrusion 36 of the base 34 of the cup member 32. By placing the orifice 38 at the base of the standpipe 20, an accumulation chamber 96 may be formed in the standpipe 20 beneath the dispensing assembly 94.

A hollow nozzle member 50 and a toggle diaphragm member 52, as in the embodiment of FIG. 1, reciprocate between a first and second position and constitute the discharge valve means. A hollow cylindrical member 98 with a base 100 forms the body or housing of the dispensing assembly 94 where a central reservoir 102 is formed about the base of the nozzle 50. The inner portion of the nozzle 50 is seated in a cylindrical bore 104 in the base 100 where a neoprene O-ring 106 is suitably retained by a circular retaining ring 108.

The retaining ring 108 has a central opening 109 sized to loosely receive the inner portion of the nozzle 50 and allowing the commodity 16 to pass therebetween to the side ports 64 of the nozzle 50. A port 110 leads from the reservoir 102 through the retainer ring 108 and the base 100 to the tube member 36 and the accumulation area 96 of the standpipe 20. An upper retaining cup or seal member 112 is provided at the top of the dispensing assembly 94 and is suitably attached to the upper rim portion 30 of the capsule 12. The retaining cup 112 is centrally bored to receive the upper portion of the nozzle 50 as it reciprocates between its first and second positions, which correspond to the closed and open positions of the discharge valve means.

The periodic discharge of the commodity 16 again results from the pressure differentials between the self-biased toggle or diaphragm member 52 and the pressure from the accumulation of the commodity 16 in the reservoir 102. The rate of flow of the commodity 16 is regulated by the fixed orifice 38 in the base of the stand-

pipe 20. A cap member 114 (shown by dotted lines in FIG. 3) may be attached at the top of the capsule 12 and prevents the nozzle 50 from moving from its first position to its second position. The cap member 114 may therefore shut off operation of the dispensing assembly 94. When the supply of the commodity 16 is exhausted, the entire dispenser, including the capsule 12 and the dispensing assembly 94, may be discarded.

Another embodiment of the invention, as indicated by 120, is shown in FIG. 4. A preferably detachable and reusable dispensing assembly 124 is shown secured to a typical aerosol capsule 12 with a dispensable substance 15 including a commodity 16 under pressure from a propellant 18 forcing the commodity 16 up through the standpipe 20, as with the embodiment of FIG. 1. A typical release valve mechanism 122 is shown at the top of the capsule 12 and is suitably attached to a cap member 126 which in turn is secured to the upper peripheral rim 30 of the capsule 12. A tube member 128 protrudes beneath the release valve mechanism 122 where it is received by the upper portion of the standpipe 20. The tube member 128 may include a fixed orifice 130 to regulate the flow of the commodity 16 into the valve mechanism 122 which is normally closed before the dispensing assembly 124 is attached to the capsule 12. The cap 126 may be threaded about the upper portion of the valve mechanism 122, or is otherwise suitably formed for attachment of the dispensing assembly 124.

The dispensing assembly 124 includes two body members 132 and 134 which are attached together, for example, by set screws 136 to form the housing. A base member 138 is suitably attached to the member 132, for example by the threaded bore 140 in member 132. The base member 138 has a threaded bore 142 which receives the threaded portion of the cap 126 about the valve mechanism 122. A pin 144 in the base member 138 protrudes downwardly within the bore 142 and applies pressure to a spring-loaded valve member 146 of the valve mechanism 122 as the dispensing assembly 124 is attached to the capsule 12, thereby opening the valve mechanism 122 allowing the commodity 16 to flow into a port 148 of the base member 138 and through an orifice 150 and thence into a reservoir 152 in the dispensing assembly 124. The orifice 150 regulates flow of the commodity 16 into the reservoir 152. As shown by FIG. 6, the orifice 150 is formed in an orifice assembly 151 sandwiched between two annular seals 154 of neoprene or any suitable material, and the orifice itself may be of quite small diameter, for example .004 inch at its narrowest point. From the orifice 150 a port 156 leads to the reservoir 152.

The discharge mechanism of the dispensing assembly 124 is similar to that shown in the embodiment of FIG. 1 and includes a nozzle member 158 with a toggle diaphragm member 160 suitably received in the member 132, as shown in FIG. 4. A nozzle port 162 in the outer portion of the nozzle member 158 leads to the atmosphere and the inner portion of the nozzle member 158 moves or reciprocates within a bore 164 in the member 134. The outer portion of the nozzle member 158 is loosely received by a circular hole 166 in the member 132 where the nozzle member 158 is retained by an O-ring 168 and a retainer ring 170 suitably seated in the member 132 as shown. The toggle diaphragm member 160 is self-biased into its first position as shown in FIG. 4, constituting the closed position of the discharge mechanism, where the O-ring 168 prevents flow of the commodity 16 into one or preferably two opposed nozzle ports 172 leading to the nozzle discharge port 162. Pressure from the commodity 16 accumulating in the reservoir 152 snaps the diaphragm member 160 rearwardly moving the nozzle member 158 to its second position where the commodity 16 flows past the retainer ring 170 and into the side ports 172 and the nozzle discharge port 162 and thence into the atmosphere. When the com-

modity 16 from the reservoir 152 is dispensed, the pre-tensioning force on the toggle diaphragm member 160 snaps the discharge mechanism back into its first position. The nozzle and toggle members, therefore, form a simple unitary discharge valve mechanism for the dispensing assembly 124.

A shut-off device 173 is provided for the dispensing assembly 124 and includes a pin 174 with a shank 176 having two peripheral grooves or races 178. The shut-off device 173 is a ball-detent spring-loaded system where a spring plunger 180 biases a ball or ball detent 182 into one of the grooves 178. The spring plunger 180 is adjustably attached to the member 134, for example, by screw threading as shown. Normally the shut-off device 173 is in the open position, as indicated, and the dispensing assembly 124 will operate continuously until the commodity 16 is exhausted from the capsule 12. By pressing the pin 174 inwardly, the shaft 176 moves inwardly to abut against the rear face of the nozzle member 158 where the spring-loaded ball detent 182 is biased into the outer groove 178 to lock the pin in position. The nozzle member 158 is thereby prevented from moving from its first position to its second or open-valve position, and the dispensing assembly is effectively shut off. To reset the dispensing assembly for automatic operation, the pin 174 is pulled outwardly until the ball detent 182 is biased into the inner groove 178 of the shaft 176.

When the supply of the substance 15 is exhausted, the dispensing assembly 124 may be detached from the capsule 12 and reused, and the capsule 12 may be discarded. The base member 138 of the dispensing assembly 124 may also be detached from the dispensing assembly 124 and discarded or may be reused as well.

FIG. 7 shows a dispensing assembly 124a similar to the embodiment shown in FIG. 4, but including another form of shut-off device 188 and a different form of fixed orifice 150a. The remainder of the dispensing assembly 124a and its supply capsule 12 are similar to that shown and discussed in connection with FIG. 4. The fixed orifice 150a, as shown in FIG. 9, includes two circular gaskets 184 of neoprene or similar material which sandwich a thin piece of aluminum foil 186. The orifice 150a typically is formed by a needle hole, for example .004 inch in diameter, in the center of the aluminum foil 186, and the orifice 150a again opens to the port 156 which empties into the reservoir 152.

Referring to FIGS. 7 and 8, a shut-off device 188 is provided for the dispensing assembly 124a. The shut-off device 188 includes an arm 190 bent at an angle of approximately 130° where one end of the arm is rotatably attached to a pin 192. The arm 190 is adapted to pivot within a groove 194 in a body member 134a. Member 134a is preferably circular as shown in FIG. 8. During normal operation of the dispensing assembly 124a, the arm 190 rests against a pin 196 allowing nozzle member 158a to reciprocate within a bore 164a of the body member 134a. To shut off the dispensing assembly 124a, the arm 190 is pivoted counterclockwise to the position shown by the dotted lines in FIG. 8 where the arm 190 abuts against the inner face 198 of the valve member 158a thereby preventing movement of the valve member 158a from its first to its second position. When operation of the dispenser is again desired, the arm 190 is rotated clockwise to its position resting against pin 196 as shown in FIG. 8. In the preferred embodiment, pins 192 and 196 are portions of the shafts of the set screws 136 which attach the body members 134a and 132 of the dispensing assembly 124a.

Referring now to FIGS. 5, 10, 11 and 12, another embodiment 210 of an automatic dispenser is shown. A dispensing assembly 214 is preferably detachably connected to a capsule 12 similar to the capsule of the embodiment of FIGS. 1, 3, and 4. The dispensable substance 15 may again include a commodity 16 under pressure from a propellant 18 forcing the commodity 16 up through stand-

pipe 20 to a release valve mechanism 122 attached to cap member 126 where a fixed orifice 130 in the standpipe 20 regulates flow of the commodity 16. Again the cap member 126 may be screw-threaded about the upper portion of release valve mechanism 122.

The dispensing assembly 214 includes a top body member 216, an intermediate body member 218, and a base member 220 forming the housing, where the base member 220 includes a threaded bore 222 to receive the cap member 126 of the capsule 12. As the dispensing assembly 214 is attached to the capsule 12, a pin member 224 in the base member 220 opens the release valve mechanism 122 enabling the commodity 16 to flow through a port 226 past an adjustable orifice 228 to twin accumulation chambers 230 and thence to a reservoir 232. The three body members 216, 218 and 220 are suitably attached together, as for example by set screws 234.

The adjustable orifice 228 is formed by a needle valve 236 which projects into the end opening of the port 226. The needle valve 236 is adjustable and extends from a screw-threaded cap member 240 which seats on a threaded protrusion 242 on the body member 216. By adjusting the cap member 240, the needle valve 236 in turn adjusts the rate of flow of the commodity 16 from the port 226. The needle valve 236 may be used as a shut-off device for the dispensing assembly 214 when the needle valve 236 completely blocks the opening of the port 226.

A small chamber 244 receives the commodity 16 when it has passed the orifice 228. Two annular neoprene gaskets 246 seal the edges of the body members 216 and 218, and 218 and 220, respectively, as they abut and form the chamber 244. From chamber 244, flow of the commodity 16 is diverted into two ports 248 each leading to an accumulation chamber 230 in the intermediate member 218. Suitable sealing means 250 are provided between the base portions of the accumulation chambers 230 and the base member 220 which forms the bottoms of the chambers. The sealing means 250 may be annular diaphragm members as shown. Ports 252 leads from the accumulation chambers 230 to the reservoir 232.

The discharge mechanism for the commodity 16 within the reservoir 232 is similar to the discharge mechanisms previously discussed in connection with the other embodiments and includes a nozzle member 256 with a toggle diaphragm member 258 suitably seated in the intermediate body member 218 of the dispensing assembly 214. The nozzle member 256 reciprocates between a first and second position and constitutes the discharge valve means as previously discussed, where an annular O-ring 260 (FIG. 12) blocks flow of the commodity 16 to side ports 262 of the nozzle member 256 when the nozzle is in its first or valve-closed position as shown in FIGS. 5 and 12. The nozzle member 256 is biased into said first position by the self-biasing pretension force on the toggle diaphragm member 258 and also by a supplementary spring-biasing means 263.

The upper portion of the nozzle member 256 may form an elongated circular shaft 264 which reciprocates within a hollow cap member 266. The cap member 266 is suitably attached to the body member 216 as for example by the screw threads 268 as shown. A spring member 270 preferably surrounds the shaft 264 of the nozzle member 256 within the bore of the cap member 266 and abuts against the diaphragm member 258 at one end and against a screw insert member 272 of the cap member 266 at the other end, and acts to bias the diaphragm member 258 and the nozzle member 256 into the said first position. By adjusting screw insert member 272 or cap member 266, the biasing force applied by biasing means 263 is correspondingly adjusted, providing another means of varying the discharge cycle time.

As the commodity 16 accumulates in the reservoir 232, pressure against the toggle diaphragm 258 and the spring 270 increases until the diaphragm 258 snaps to its second position moving the nozzle member 256 upwardly allow-

ing the commodity 16 to flow into the side ports 262 of the nozzle member 256 and through a nozzle port 274 into a port 276 of the base member 220 and thence to the atmosphere through an opening 278. The second position of the diaphragm 258 and the nozzle member 256, or the open discharge valve position, is shown in FIG. 10. The pretension force from the diaphragm member 258 and the biasing force from the spring member 270 force the diaphragm to snap back to its first position when the commodity 16 has been discharged from the reservoir 232 and the accumulation chambers 230. This process is repeated until the commodity 16 is exhausted from the capsule 12, or until the needle valve 236 is adjusted to block orifice 228 to shut off the dispenser. When the commodity 16 has been exhausted from the capsule 12, the capsule 12 is detached from the dispensing assembly 214 and discarded, whereas the dispensing assembly 214 may be reused.

While the preferred structures of the various embodiments have been shown and disclosed, many changes, modifications, and substitutions may be made without departing from the spirit and scope of this invention.

I claim:

1. In an automatic dispenser, the combination of:
 - a storage capsule;
 - a reservoir, said storage capsule containing a dispensable substance including means forcing flow of said substance into said reservoir; and
 - discharge valve means for dispensing said substance at predetermined intervals from said reservoir, including a nozzle member and a toggle member forming a unitary mechanism and having a flow passage therethrough, said nozzle member and toggle member being reciprocable between a first position wherein said discharge valve means is closed and a second position wherein said discharge valve means is open, with said flow passage providing an outlet from said reservoir when said nozzle member and toggle member move to said second position, and biasing means urging said toggle member toward said first position, said toggle member including means responsive to pressure in said reservoir urging said toggle member toward said second position.
2. An automatic dispenser as defined in claim 1 including shut-off means for preventing movement of said nozzle member and toggle member from said first position to said second position.
3. An automatic dispenser as defined in claim 1 wherein said toggle member is self-biased toward said first position.
4. An automatic dispenser as defined in claim 1 wherein said toggle member is spring-loaded toward said first position.
5. An automatic dispenser as defined in claim 1 including means for varying the rate of flow of said substance into said reservoir.
6. An automatic dispenser as defined in claim 1 including an accumulation chamber for said substance communicating with said reservoir and a fixed orifice regulating flow of said substance into said chamber.
7. An automatic dispenser as defined in claim 1 wherein said reservoir, said discharge valve means, and said biasing means are housed within a dispensing assembly releasably attached to said capsule.
8. An automatic dispenser as defined in claim 1 wherein said reservoir, said discharge valve means, and said biasing means are housed within a dispensing assembly permanently affixed to said capsule.
9. An automatic dispenser as defined in claim 7 including a fixed orifice contained within said capsule regulating flow of said substance into said reservoir.

10. An automatic dispenser as defined in claim 7 wherein said capsule includes a release means normally in a closed position preventing flow of said substance from said capsule, said dispenser including flow control means responsive to said attachment for opening said release means to permit flow of said substance into said reservoir.

11. A dispensing assembly for a capsule containing a dispensable substance including means forcing flow of said substance, said assembly including:

a reservoir for receiving a portion of said substance; and

discharge valve means for dispensing said substance from said reservoir at predetermined intervals and including a nozzle member and a toggle member forming a reciprocable discharge mechanism having a flow passage therethrough, said discharge mechanism having a first position wherein said discharge valve means is closed and a second position wherein said discharge valve means is open, with said flow passage providing an outlet from said reservoir when said discharge mechanism moves to said second position, and biasing means urging said discharge mechanism toward said first position, said toggle member including means responsive to pressure in said reservoir urging said discharge mechanism toward said second position.

12. In an automatic dispenser for use with a container charged with a fluid under pressure, the invention comprising:

a housing for mounting to said container and including means defining a valve chamber;

flow means defining a continuously open flow passage between the interior of said container and said valve chamber; and

valve means including a flexible diaphragm carrying an outlet nozzle and mounted in said housing forming a wall of said valve chamber, said diaphragm and nozzle being movable between a blocking position blocking fluid flow through said nozzle and a discharge position permitting fluid flow from said chamber through said nozzle, and means for biasing said diaphragm toward said blocking position.

13. An automatic dispenser as defined in claim 12 in which said diaphragm is self-biased.

14. An automatic dispenser as defined in claim 12 in which said means for biasing includes a spring carried in said housing.

15. An automatic dispenser as defined in claim 12 wherein said flow means includes a rate of flow control restriction in said passage.

16. An automatic dispenser as defined in claim 15 including means for varying said rate of flow.

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