July 24, 1956 J. C. ANDERSON ET AL 2,755,967

DISPENSING DEVICE

Filed Sept. 21, 1955 2 Sheets-Sheet 1

Fig. 1.

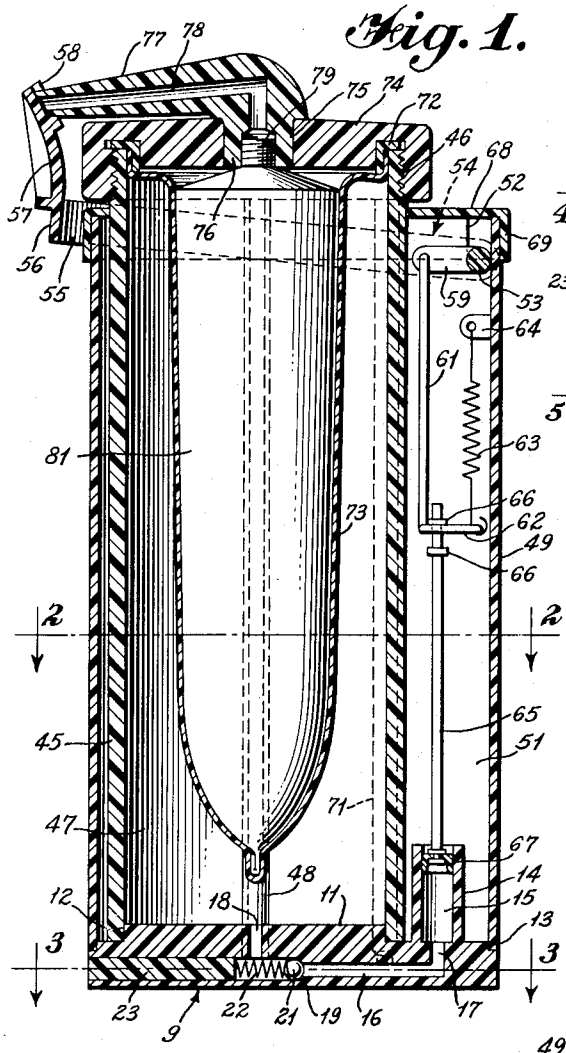


Fig. 3.

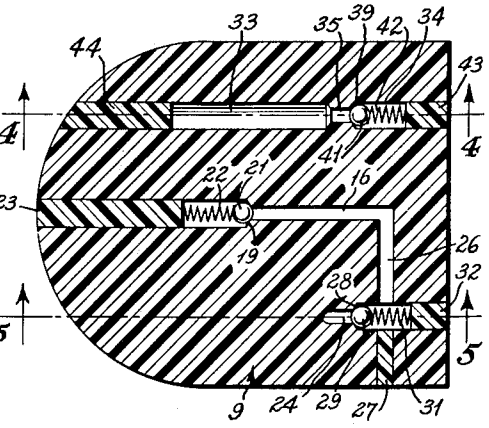


Fig. 4.

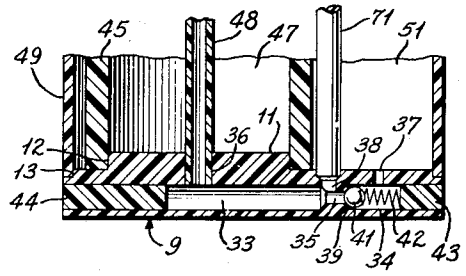


Fig. 5.

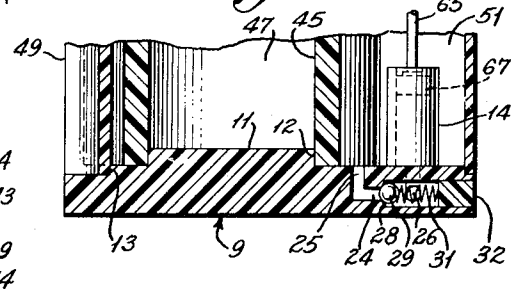
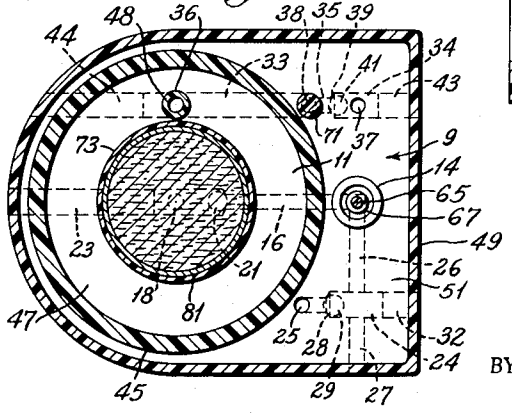


Fig. 2.



INVENTORS

Jack C. Anderson

and Robert L. Gouckenour

BY William Turner

ATTORNEY

July 24, 1956 J. C. ANDERSON ET AL 2,755,967

DISPENSING DEVICE

Filed Sept. 21, 1955 2 Sheets-Sheet 2

Fig. 7.

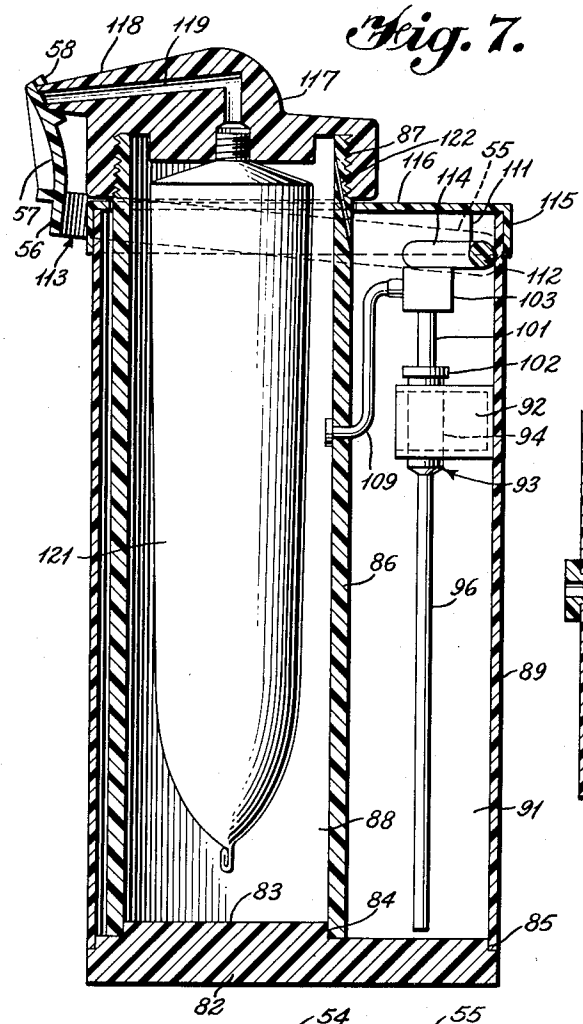
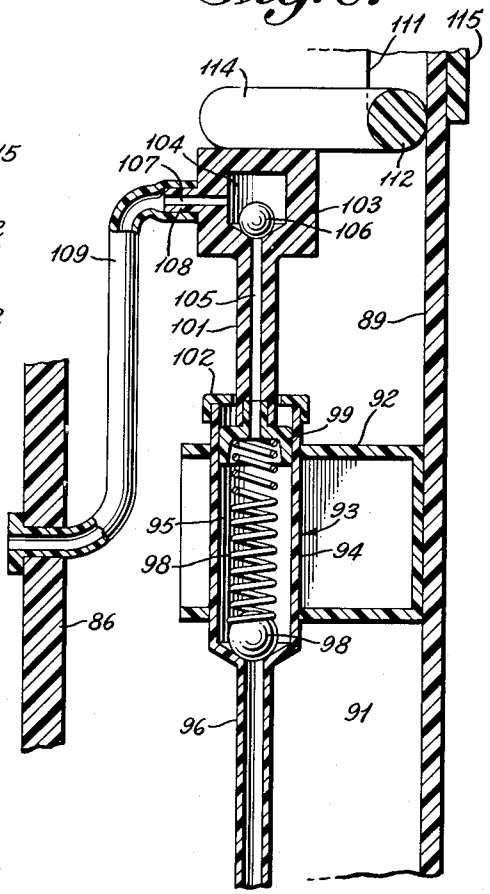


Fig. 8.



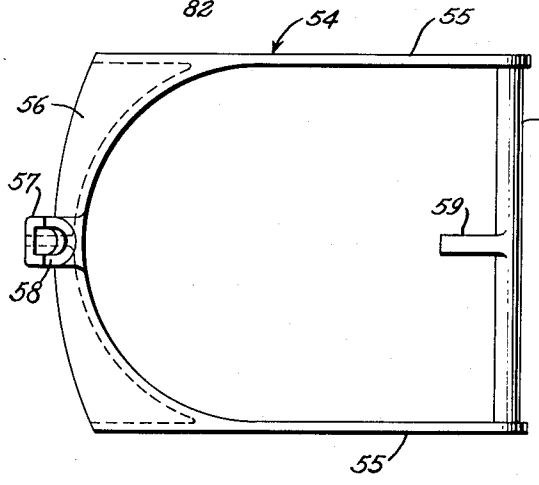


Fig. 6.

INVENTORS

Jack C. Anderson

and Robert L. Gouckenour

BY William Turner

ATTORNEY

United States Patent Office 2,755,967
Patented July 24, 1956

2,755,967

DISPENSING DEVICE

Jack C. Anderson and Robert L. Gouckenour,
Balboa Heights, Canal Zone

Application September 21, 1955, Serial No. 535,685

12 Claims. (Cl. 222—96)

This invention relates to new and useful improvements in dispensing apparatus and deals more particularly with apparatus for dispensing flowable material from flexible containers.

It is conventional practice to pack a wide variety of semiliquid or pastelike materials in collapsible tubes or other flexible containers. Many of these materials such as tooth paste, shaving cream, and various salves and ointments are employed for hygienic or cosmetic purposes and should be maintained in a sanitary condition. The containers for such materials, therefore, have been provided with removable caps or closures and the normal procedure for dispensing the material has been removal of the cap, manual compression of the container to squeeze a variable amount of material therefrom and subsequent replacement of the cap. This procedure has many disadvantages. For example, the handling of the container and cap is awkward and difficult if the material is to be dispensed onto the hand or a hand held implement; the manner in which container is compressed often causes pocket of material to be trapped in the closed portion of the container and wasted; and the quantity of material dispensed is often greater than the amount required so that a portion of the material dispensed is also wasted.

Attempts have been made to provide devices for mechanically dispensing material from containers such as those described above. Such devices, however, have been in the past expensive, not suitable for use with containers of various shapes and sizes, and have not been adapted for repeated operation to dispense like measured quantities of material. Further, these known dispensing devices either provided no closure for sealing the material from the atmosphere or provided a separate closure so that removal of the closure, operation of the device and replacement of the closure made the device difficult to use.

It is the primary object of this invention to provide a device for dispensing like quantities of material from a flexible container during each successive operation of the device.

A further important object of the invention is to provide a device for dispensing in equal increments substantially all of the material from a flexible container.

Another important object of the invention is to provide a dispensing device which will accommodate flexible containers of various shapes and sizes and will dispense, by repeated operation, substantially all of the material therefrom.

Still another object of the invention is to provide a device for dispensing material from flexible containers, the material being sealed from the atmosphere between successive dispensing operations and the sealing portion of the device being moved into an inoperative position by operation of the device to dispense material.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like reference characters are employed to designate like parts throughout the same,

Figure 1 is a vertical sectional view of a dispensing device embodying the invention,

Figure 2 is a horizontal sectional view taken on line 2—2 of Fig. 1,

Figure 3 is a horizontal sectional view taken on line 3—3 of Fig. 1,

Figure 4 is a fragmentary vertical sectional view taken on line 4—4 of Fig. 3,

Figure 5 is a fragmentary vertical sectional view taken on line 5—5 of Fig. 3,

Figure 6 is a top plan view of the operating lever employed in the device of Fig. 1,

Figure 7 is a vertical sectional view of a modified form of dispensing device embodying the invention, and

Figure 8 is an enlarged fragmentary sectional view of the pump employed in the device of Fig. 7.

In the drawings, wherein for the purpose of illustration are shown the preferred embodiments of the invention, and first particularly referring to Fig. 1 for a detail description of the modification of the invention illustrated therein, reference number 9 designates a base having a raised circular portion 11 on the top thereof, the edge surface of which provides an annular shoulder 12. A groove 13 is formed around the periphery of the top of the base 9 and an upwardly extending cylindrical projection 14 is formed on the top of the base between the shoulder 12 and the groove to provide a pump chamber 15.

As is best illustrated in Figs. 1 and 3, a passageway 16 is drilled into the edge of the base 9 and passes beneath the raised portion 11 to a point below the pump chamber 15. A vertical passageway 17 connects the pump chamber to the inner end of the passageway 16 and a second vertical passageway 18 extends from the top of the raised portion 11 to an intermediate point in the passageway 16. The diameter of the passageway 16 is reduced at a point inwardly of the passageway 18 to provide a valve seat 19 against which a ball check valve 21 is urged by the spring 22. The spring 22 is compressed between the valve 21 and a plug 23 that is fitted into and closes the outer end of the passageway 16.

As illustrated in Figs. 3 and 5, a passageway 24 is drilled into the edge of the base 9 and terminates at the vertical passageway 25 which is open at the top of the base between the shoulder 12 and groove 13. The inner end of the passageway 16 is connected to the passageway 24 by a passageway 26 which is drilled into one edge of the base 9 and has its outer end closed by a plug 27. Between the passageways 25 and 26, the diameter of the passageway 24 is reduced to provide a valve seat 28 against which a ball check valve 29 is urged by a spring 31. The spring 31 is compressed between the valve 29 and a plug 32 which is fitted into the outer end of the passageway 24.

Referring now to Figs. 3 and 4, it will be noted that two axially aligned passageways 33 and 34 are drilled into the edge of the base 9 and a passageway 35 of smaller diameter connects the inner ends of the aligned passageways. Passageway 33 extends beneath the raised portion 11 of the base 9 and a vertical passageway 36 extends upwardly from the passageway 33 to the top of the raised portion. The passageways 34 and 35 are also provided with vertical passageways 37 and 38, respectively, which extend upwardly to the top of the base between the shoulder 12 and groove 13. The reduced diameter of the passageway 35 provides a valve seat 39 for the ball check valve 41 which is urged against its seat by a spring 42 that is compressed between the valve and a plug 43 in the outer end of the passageway 34. The outer end of the passageway 33 is closed by a plug 44.

Mounted on the base 9 with its lower end portion fitted over the raised portion 11 in sealing relationship with the

shoulder 12 is a pressure cylinder 45 which projects upwardly from the base and has its upper end portion externally threaded at 46. The space within the cylinder 45 provides a pressure chamber 47 and a drain tube 48 for the chamber is fitted into the passageway 36 and extends upwardly therefrom to a position just below the top of the cylinder.

Fitted into the peripheral groove 13 of the base 9 and connected in sealing relationship to the base is an outer casing 49 which projects upwardly from the base in surrounding relationship with the cylinder 45. The top of the casing 49 is at a level just below that of the threaded upper end portion 46 of the cylinder 45 and the space between the casing and cylinder provides a reservoir 51 in open communication with the passageways 25 and 37 and in controlled communication with the passageway 38, as will be later described. The top edges at opposite sides of the casing 49 have notches 52 formed therein for receiving and supporting the opposite end portions of the pivot pin 53 of an operating lever 54, the pin being adjacent the back of the casing.

As illustrated in Fig. 6, the operating lever 54 includes parallel arms 55 which are connected to the opposite ends of the pin 53 and extend along and outwardly of the notched sides of the casing 49. The arms 55 are connected at the front of the casing 49 by a handle 56 the middle portion of which is provided with an upwardly and outwardly inclined closure projection 57 having an upwardly opening, U-shaped flange 58 on the inner side of its upper end portion. The function of the projection 57 and flange 58 will be later described.

Extending inwardly from the middle portion of the pin 53 is an arm 59 which, as illustrated in Fig. 1, is pivotally connected at its free end portion to a plunger rod 61. At the lower end of the rod 61, an arm 62 extends rearwardly and is connected to one end of a spring 63 which is stretched between the arm 62 and an overlying lug 64 on the inside of the back of the casing 49. The spring 63, therefore, urges the arm 62, rod 61 and arm 59 in an upward direction to cause pivotal movement of the operating lever 54 to lift the handle 56. The arm 62 at the lower end of the rod 61 overlies the pump chamber 15 and is provided with a vertical opening for receiving the piston rod 65. The rod 65 is movable relative to the rod 61 to the extent permitted by the spaced collars 66 which are carried by the rod 65 for engagement by the arm 62. The lower end of the piston rod 65 is connected to the piston 67 which is fitted into the bore of the cylindrical projection 14. Downward movement of the handle 56, therefore, will act through the operating lever 54, arm 59, and rod 61 to lower the arm 62 into engagement with the lower collar 66 and to thereafter effect downward movement of the piston 67. When the handle 56 is released, the spring 63 will lift the arm 62 into engagement with the upper collar 66 and will thereafter lift the piston 67 while returning the rod 61, arm 59, operating lever 54 and handle 56 to their original positions, as will be later described.

Fitted over the top of the outer casing 49 is a removable cover 68 having downwardly flanged edge portions 69 engaging the outer surface at the top portion of the casing. An opening is provided in the cover 68 through which the theaded upper end portion 46 of the cylinder 45 projects above the cover. Notches are provided in the flanged edge portions 69 of the cover 68 in alignment with the notches 52 of the casing 49 to hold the pin 53 of the operating lever 54 in its properly supported position on the casing. A small opening is also provided in the cover 68 adjacent the opening for the cylinder 45 and in vertical alignment with the passageway 38. Inserted through this small opening is an equalizer rod 71 the lower end of which is seated in closing relationship with the passageway 38 and the upper end portion of which projects slightly above the cover 68.

Positioned on the top edge of the cylinder 45 is a seal ring 72 having connected thereto a diaphragm 73 which is formed of resilient material and is of tubular construction with its open end connected to the ring 72. The ring 72 is held in sealing relationship with the top edge of the cylinder 45 by a cap 74 which is threaded onto the upper end portion 46 of the cylinder. The cap 74 also engages the upper end of the equalizer rod 71 to hold the rod in sealing relationship across the passageway 38.

The cap 74 is provided with a central opening 75 for receiving the mounting lug 76 of a nozzle 77 which projects laterally from the lug to a position at which the discharge end thereof abuts the closure projection 57 of the operating lever 54 and lies within the flange 58 when the handle 56 is in its uppermost position. A discharge passageway 78 extends through the lug 76 and nozzle 77 to the discharge end of the latter and is internally threaded within the lug for receiving the threaded discharge spout 79 of a conventional flexible tube or similar container 81 for flowable material.

Operation of the dispensing apparatus illustrated in Figs. 1 to 6, inclusive, will be described in detail as follows:

With the cap 74, ring 72 with its attached diaphragm 73, and cover 68 removed, the pressure chamber 47 is filled with water and the reservoir 51 is partially filled with water. The cover 68 and ring 72 with its connected diaphragm 73 are then returned to their respective positions. The lug 76 of the nozzle 77 having been positioned in the central opening 75 of the cap 74, the discharge spout 79 of a flexible container 81 full of flowable material is threaded into the passageway 78 of the nozzle. Equalizer rod 71 is inserted through the associated opening in the cover 68 and seated loosely across the passageway 38. The container 81 is then inserted slowly into the pressure chamber 47, the diaphragm 73 being thereby depressed and assuming a position around the container. During the insertion of the container 81, a portion of the water in the pressure chamber 47 will be displaced and will flow through the drain tube 48, passageway 33 and passageway 38 into the reservoir 51, the equalizer rod 71 offering little or no resistance to the flow of the displaced water. The cap 74 is thereafter screwed onto the threaded upper end portion 46 of the cylinder 45 with the discharge end of the nozzle 77 seated against the closure projection 57. When the cap 74 is secured in place, the ring 72 will be clamped between the cap and the top edge of the cylinder 45 and the equalizer rod 71 will be seated in sealing relationship with the passageway 38.

The dispensing apparatus is operated by depressing the handle 56. After a slight movement of the handle 56, the discharge end of the nozzle 77 will be uncovered and the piston 67 will be moved downwardly, as was previously described. Downward movement of the piston 67 will displace water from the pump chamber 15 through the passageway 17 and, since the check valve 29 is forced toward its seated position by the pressure of the water, the check valve 21 will be forced away from its seat 19 against the pressure of the spring 22. Water will thereupon flow through the passageways 16 and 18 into the pressure chamber 47. The water being incompressible, a quantity of material exactly equal to the quantity of water forced into the pressure chamber 47 will be displaced from the container 81 and will flow into the passageway 78 of the nozzle 77.

When the handle 56 is released, the piston 67 will be raised by the spring 63 and water will be drawn into the pump chamber 15 through the passageways 24, 25 and 26 past the check valve 29, the check valve 21 being closed by the spring 22. The water drawn through the passageway 25 flows from the reservoir 51 and sufficient clearance is provided between the cover 68 and the rod

71, cylinder 45 and pin 53 to avoid the creation of a vacuum in the upper portion of the reservoir.

The spring 42 associated with the check valve 41 is sufficiently strong to hold the valve in its closed position against normal operating pressures in the pressure chamber 47. Excessive pressures in the pressure chamber 47, as might result, for example, from operation after all the material has been displaced from the container 81, will cause the valve 41 to open so that water may flow from the pressure chamber to the reservoir 51 through the tube 48 and passageways 33, 34, 35 and 37. The valve 41, therefore, functions as a pressure relief valve.

To replace an empty container 81 with a full container, it is only necessary to remove the cap 74, replace the empty container and return the cap to its position on the cylinder 45. Removal of the cap 74, of course, releases the equalizer rod 71 to permit the flow of excess water from the pressure chamber 47 to the reservoir 51 when the full container is inserted into the pressure chamber.

Referring now to Figs. 7 and 8 for a detail description of the modification of the invention illustrated therein, the base 82 has a raised circular portion 83 on the top thereof to provide an annular edge surface 84. Extending around the periphery of the top of the base 82 is a groove 85.

A pressure cylinder 86 has its lower end portion fitted over the raised portion 83 and is connected to the base 82 in sealing relation ship with the surface 84. The upper end portion of the cylinder 86 is threaded at 87 and the space within the cylinder provides a pressure chamber 88.

An outer casing 89 is mounted on the base 82 with its bottom edge seated in and connected in sealing engagement with the groove 85. The space between the casing 89 and the cylinder 86 provides a reservoir 91.

On the inner surface at the back of the casing 89 there is provide a mounting bracket 92 for the pump 93. As is best illustrated in Fig. 8, the pump 93 has a cylindrical housing 94 the bore of which provides a pump chamber 95. Extending downwardly from the housing 94 to a point adjacent the bottom of the reservoir 91 is a dip tube 96 which opens into the pump chamber 95 at the bottom of the housing. A ball check valve 97 is positioned in the pump chamber 95 and is urged into its seated position across the inlet from the dip tube 96 by a spring 98 which is compressed between the valve and a piston 99 that is fitted into the bore of the housing 94. An operating plunger 101 is connected to the piston 99 and extends upwardly through and in loosely fitted relationship with the opening in the top cover 102 of the housing 94. At the upper end of the plunger 101, there is provided an enlarged head 103 having a valve chamber 104 formed therein. Leading from the bottom of the valve chamber 104 to the pump chamber 95 is an axially extending passageway 105 in the plunger 101 and the bottom of the valve chamber is conically formed to support a ball check valve 106 in closing relationship with the passageway 105. A second passageway 107 leads from the valve chamber 104 to a discharge spout 108 which is connected to one end of a flexible tube 109. The opposite end of the tube 109 passes through the cylinder 86 into the pressure chamber 88 and is arranged in sealing relationship with the cylinder.

The top edges at the sides of the casing 89 have notches 111 formed therein adjacent the back of the casing for receiving and supporting the opposite end portions of the pivot pin 112 of an operating lever 113. The operating lever 113 is identical to the operating lever 54, illustrated in Fig. 6, except that the arm 114 at the middle of the pin 112 is slightly longer than the arm 59 of the pin 53. The other parts of the lever 113, therefore, have been given the same reference characters as the corresponding parts of the lever 54. With the pin 112 in its properly seated position in the notches 111, the arm 114 overlies and engages the top of the head 103 of the plunger 101 so that downward movement of the handle 56 will cause pivotal movement of the arm to depress the plunger.

The pin 112 is retained in the notches 111 by the downwardly flanged edge portions 115 of the cover 116, the edge portions being notched for engagement with the pin. The cover 116 is in turn retained in its proper position on the casing 89 by the cap 117 which is threaded onto the upper end portion 87 of the cylinder 86 and overlies the portion of the cover immediately adjacent the cylinder. Projecting laterally from the cap 117 is a discharge spout 118 the outer end of which is seated against the closure projection 57 within the flange 58. A passageway 119 extends from the pressure chamber 88 through the cap 117 to the outer end of the discharge spout 118 and is internally threaded at the end portion thereof adjacent the pressure chamber for connection to the threaded discharge nozzle of a conventional flexible tube or container 121 for flowable material.

Extending downwardly and outwardly through the cylinder 86 from the top of the pressure chamber 88 to the upper portion of the reservoir 91 is a restricted passageway 122. The size of the passageway 122 is such that air trapped in the upper portion of the pressure chamber 88 will flow therethrough into the reservoir 91 and will be released through the clearance spaces around the pin 112 and cylinder 86. On the other hand, liquid in the pressure chamber 88 will flow through the passageway 122 at such a restricted rate that only a negligible amount of liquid will be released from the pressure chamber after the chamber has been filled with liquid.

The operation of the dispensing apparatus illustrated in Figs. 7 and 8 will be described in detail as follows:

With the cap 117 and cover 116 removed, the reservoir 91 is filled with water and the pressure chamber 88 is partially filled with water. The discharge nozzle of a flexible container 121 filled with flowable material is threaded into the inner end of the passageway 119 of the cap 117 and the container is inserted into the pressure chamber 88. The cap 117 is thereafter screwed onto the threaded upper end portion 87 of the cylinder 86 to a point at which the discharge spout 118 is seated against the closure projection 57 within the flange 58.

Movement of the container 121 into the pressure chamber 88 will cause the water therein to rise around the container to a level near the top of the cylinder 86. Any air remaining in the pressure chamber 88, however, is removed by operation of the lever 113 to cause pivotal movement of the arm 114 to depress the plunger 101. Downward movement of the plunger 101 and its attached piston 99 against the force of the spring 98 will hold the valve 97 in its closed position and will cause water in the pump chamber 95 to be displaced through the passageways 105 and 107 and the tube 109 into the pressure chamber 88, the valve 106 being opened by the flow of water into the valve chamber 104. The water level in the pressure chamber 88 will thereupon rise and air will flow out of the chamber through the restricted passageway 122.

When the lever 113 is released, the spring 98 will force the piston 99 and plunger 101 in an upward direction to return the lever to its original position and to draw water into the pump chamber 95 from the dip tube 96 past the valve 97. The valve 106, on the other hand, will be forced into its closed position by the tendency of the water in the valve chamber 104 to flow back into the passageway 105.

Repeated operation of the lever 113 will cause all but a very small amount of air to be displaced from the pressure chamber 88. Thereafter, each operation of the lever 113 will cause a quantity of material substantially equal to the quantity of water introduced to the pressure chamber 88 to be squeezed from the container into the passageway 119 and subsequently discharged from the spout 118. When the container is empty, it is removed and replaced in the same manner as described above.

The various parts of the two modifications of the invention described above may be formed of any suitable material. It has been found, however, that parts formed of suitable plastic material provide excellent operation and are easily assembled by cementing or fusing the engaging surfaces.

It is to be understood that the forms of this invention herewith shown and described are to be taken as preferred examples of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, we claim:

1. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, and means normally positioned to close said flow path at said discharge point and movable therefrom to operate said liquid displacing means.

2. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, closure means mounted for movement to open and close said flow path at said discharge point, means connecting said closure means to said liquid displacing means to cause operation of the latter when the closure means is moved to open the flow path, and means for returning said closure means to a position for closing said flow path.

3. A device for dispensing flowable material from a flexible container, comprising a cylinder having a chamber therein, a removable cap for said cylinder having a passageway therethrough adapted to be connected to said container to provide a flow path from the container to a discharge point, said container being positioned in said chamber and the remaining space in said chamber being substantially filled with liquid, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, and means normally positioned to close said flow path at said discharge point and movable therefrom to operate said liquid displacing means.

4. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, a pump for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from said container into said flow path, a closure mounted for movement to open and close said flow path, and an arm operatively connected to said closure for movement therewith to operate said pump when said closure is moved to open the flow path.

5. A device for dispensing flowable material from a flexible container, comprising a cylinder having a chamber therein, a removable cap for said cylinder having a passageway therethrough adapted to be connected to said container to provide a flow path from the container to a discharge point, said container being positioned in said chamber and the remaining space in said chamber being substantially filled with liquid, a casing surrounding said cylinder in spaced relationship to provide a reservoir therebetween for receiving a supply of liquid, a pump for displacing a fixed quantity of material from said reservoir to said chamber to force a like quantity of material from said container into said flow path, closure means mounted for movement to open and close said flow path at said discharge point, means connecting said closure means to said pump to cause operation of the latter when the closure means is moved to open the flow path, and means for returning said closure means to a position for closing said flow path.

6. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, a pump having a plunger movable in one direction to displace a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from said container into said flow path and for return movement, a lever mounted for pivotal movement from a normal position to effect movement of said plunger in said one direction, a spring urging said plunger in a direction to effect said return movement thereof and to return said lever to its normal position, and a closure carried by said lever and positioned in closing relationship with said flow path at said discharge point when the lever is in its normal position.

7. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, means forming a passageway from said chamber to said reservoir, and valve means associated with said passageway and responsive to the pressure of the liquid in said chamber to open the passageway only when said liquid pressure exceeds a value at which material in said container is forced into said flow path.

8. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, means forming a passageway from the upper portion of said chamber to said reservoir, said passageway having two branch passageways communicating with said reservoir, means for opening and closing one of said branch passageways to permit excess liquid to flow from the chamber to the reservoir when the container is placed in the chamber and to prevent the free flow of liquid from the chamber to the reservoir during operation of said liquid displacing means, and valve means associated with the other of said branch passageways and responsive to the pressure of the liquid in said chamber for movement to its open position only when said liquid pressure exceeds a value at which material in said container is forced into said flow path.

9. A device for dispensing flowable material from a flexible container, comprising a cylinder having a chamber therein, a removable cap for said cylinder having a

passageway therethrough adapted to be connected to said container to provide a flow path from the container to a discharge point, a flexible diaphragm extending across said cylinder adjacent said cap, said diaphragm being stretched into surrounding relationship with said container when the latter is positioned in said chamber and the cap is secured to said cylinder, the space within said chamber between the diaphragm and cylinder being filled with liquid, means providing a reservoir for receiving a supply of liquid, means for displacing a fixed quantity of liquid from said reservoir to said chamber to force a like quantity of material from the container into said flow path, and means normally positioned to close said flow path at said discharge point and movable therefrom to operate said liquid displacing means.

10. A device for dispensing flowable material from a flexible container, comprising a base, means mounted on said base and providing a chamber for receiving the container and a sufficient amount of liquid to substantially fill the remaining space in the chamber, means forming a flow path from said container to a discharge point outside of said chamber, means mounted on said base and providing a reservoir for receiving a supply of liquid, a pump mounted on said base, said base having a first passageway therein for admitting liquid from the reservoir to the pump and a second passageway therein for releasing liquid from the pump to the chamber, lever means normally positioned to close said flow path at said discharge point and movable therefrom to cause said pump to displace a given quantity of liquid through said second passageway to said chamber and to force a like quantity of material from said container into said flow path, and means for returning said lever means to its normal position to close said flow path and to cause said pump to withdraw liquid from said reservoir through said first passageway.

11. A device for dispensing flowable material from a flexible container, comprising means providing a chamber for receiving the container, means forming a flow path from said container to a discharge point outside of said chamber, means providing a reservoir for receiving a supply of liquid, means forming a passageway from the upper portion of said chamber to said reservoir, said passageway providing a restricted flow path for releasing gas from the upper portion of said chamber and for substantially preventing the flow of liquid from said chamber, and means for displacing a fixed quantity of liquid from said reservoir to said chamber, repeated operation of said displacing means substantially filling the space in said chamber around said container with liquid, the air in the upper portion of said chamber being released through said passageway, and subsequent operation of said displacing means forcing like quantities of material from the container into said flow path.

12. A device for dispensing flowable material from a flexible container, comprising a cylinder having a chamber for receiving said container, a removable cap for said cylinder having a passageway therethrough adapted to be connected to said container to provide a flow path from the container to a discharge point, means providing a reservoir for receiving a supply of liquid, said cylinder having a passageway therethrough extending from the upper portion of said chamber to said reservoir and the diameter of said passageway being limited to permit gas to flow from the chamber and to substantially prevent the flow of liquid from the chamber, a pump for displacing a fixed quantity of liquid from said reservoir to said chamber, a closure mounted for movement to open and close said flow path, and an arm operatively connected to said closure for movement therewith to operate said pump when said closure is moved to open the flow path, repeated operation of said pump substantially filling the space in said chamber around said container with liquid and forcing the gas in the upper portion of the chamber out through said passageway and subsequent operation of said pump forcing like quantities of material from the container into said flow path.

No references cited.