March 10, 1942. R. W. WILSON 2,275,666

ATOMIZER CLOSURE

Filed Dec. 1, 1938 2 Sheets-Sheet 1

Fig. 1

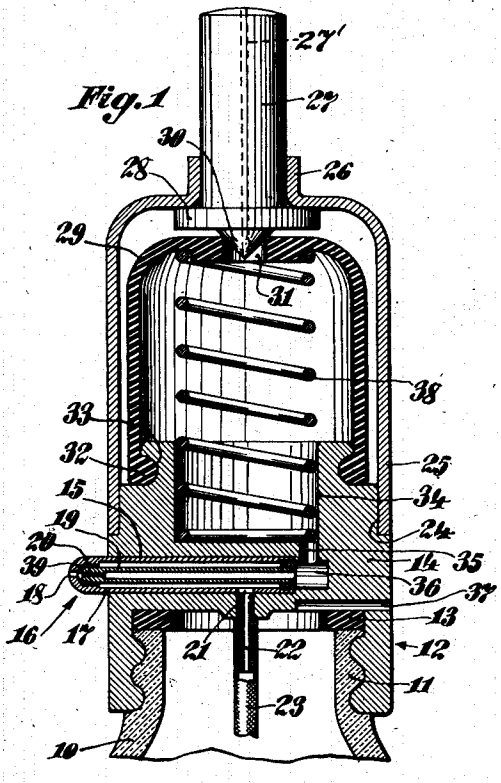


Fig. 2

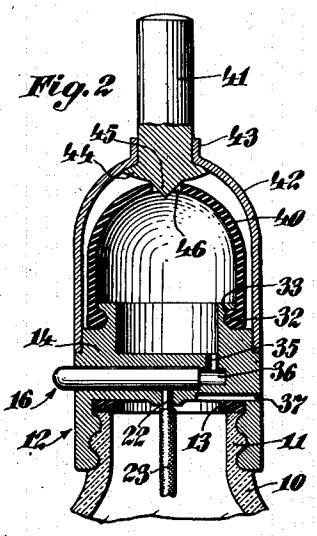


Fig. 3

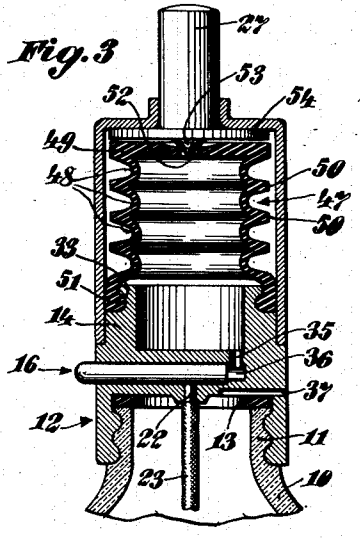
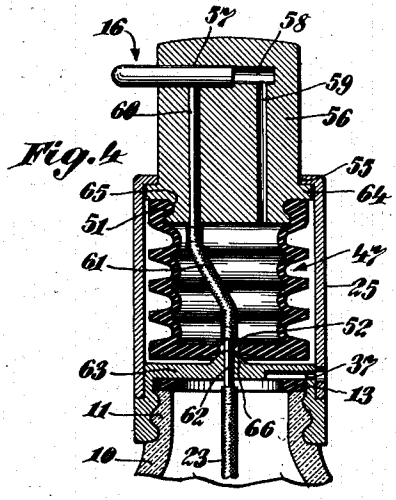


Fig. 4



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ATOMIZER CLOSURE

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Fig. 5

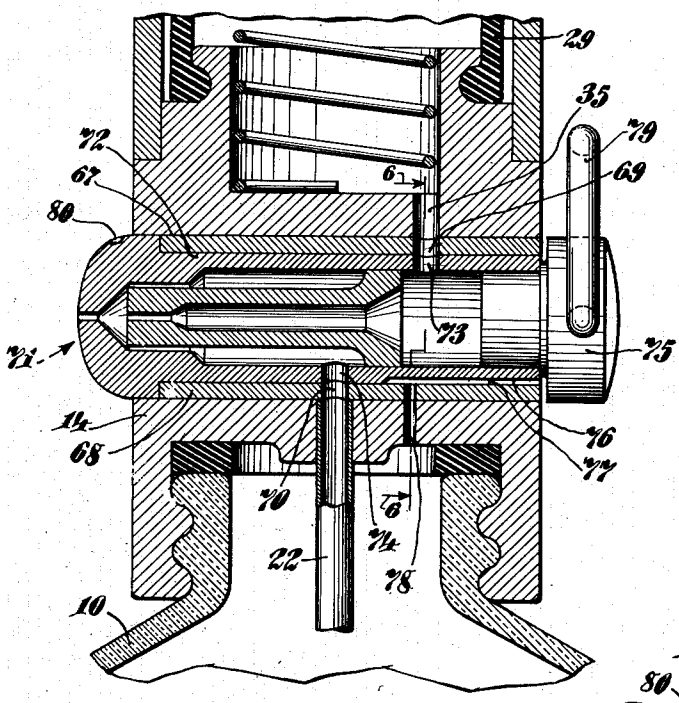


Fig. 6

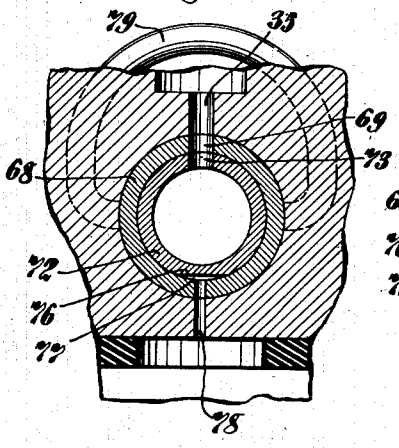


Fig. 7

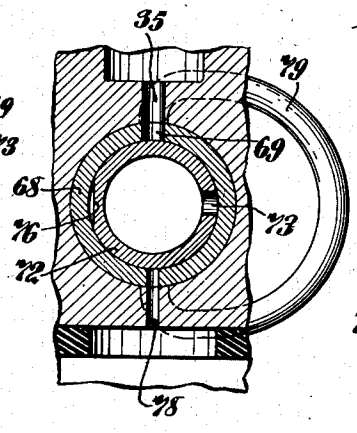


Fig. 8

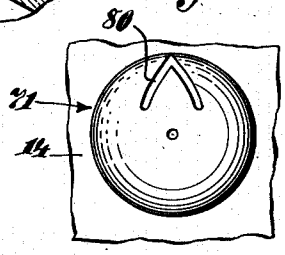
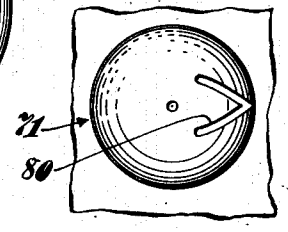


Fig. 9



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2,275,666

UNITED STATES PATENT OFFICE

2,275,666

ATOMIZER CLOSURE

Ralph W. Wilson, New York, N. Y.

Application December 1, 1938, Serial No. 243,480

10 Claims. (Cl. 299—88)

The present invention relates to atomizers, and more particularly to an improved closure atomizer for fluid containers of the type used in dispensing fluid toilet preparations, such as toilet water, perfume or brilliantine, for example, although it is not limited to such use.

This application is a continuation in part of application Serial No. 239,226 filed November 7, 1938.

Atomizers of the above character used heretofore ordinarily include a suitable atomizing nozzle connected to a separate compressor bulb. These devices have been found to be generally unsatisfactory in many respects. For one thing, it is impractical and in most cases impossible to ship filled fluid containers having the atomizer attached, because the atomizers used are bulky, difficult to seal and permit the fluid to escape from the containers during original shipment or in traveling. For this reason it is the current practice to provide a separate closure for the container which must be removed and replaced by the usual atomizer after shipment.

In prior type atomizers, moreover, the more volatile fluids such as expensive perfumes, for example, tend to evaporate through the atomizing nozzle and the air vent usually provided in such devices. Furthermore, it is usually necessary to use both hands to manipulate the atomizer, one to support the fluid container and the other to support the bulb.

The principal object of the present invention, accordingly, is to provide an improved atomizer closure which is free from the defects of the prior art outlined above, and which at the same time is highly effective in operation, always distinctive and pleasing in appearance, and less expensive to manufacture.

A further object of the invention is to provide an atomizer closure of the above character which may be readily and effectively sealed to prevent leakage during original shipment or in traveling, and evaporation of the fluid contents when not in use.

A further object of the invention is to provide an atomizer closure of the above character wherein the compressor bulb forms a unitary part of the closure whereby the atomizer may be manipulated with one hand.

Another object of the invention is to provide an atomizer closure of the above character in which the compressor bulb is entirely enclosed and is operated by a suitable actuating member.

A still further object of the present invention is to provide an improved atomizer closure of the above character in which the actuating member serves as an air check valve for the compressor bulb.

In accordance with the invention a container closure is provided having an atomizing nozzle of a well-known type therein. Formed within the container closure is a chamber having a compressor bulb therein, which is adapted to be compressed by a suitable actuating member for the purpose of supplying air under pressure to the atomizing nozzle for atomizing the fluid. The actuating member forms an air check valve as is described in greater detail below. The invention also provides means cooperating with the atomizing nozzle for effectively sealing the container to prevent leakage or evaporation of the fluid container therein.

Additional objects and advantages will appear from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a view in section illustrating an atomizer closure constructed in accordance with the present invention;

Figure 2 is a partial view in section of a modification of Figure 1;

Figure 3 is a partial view in section illustrating an alternate form of compressor bulb;

Figure 4 is a modification of Figure 3 in which the atomizing nozzle is located in the actuating plunger;

Figure 5 is a partial view in section similar to Figure 1, illustrating means for sealing the container to prevent leakage or evaporation;

Figure 6 is a partial view in section taken along line 6—6 of Figure 5 illustrating the relative positions of the sealing elements when the atomizer is ready for use;

Figure 7 is also a partial view in section similar to Figure 6 illustrating the relative positions of the sealing elements when the container is sealed;

Figure 8 is a view in front elevation of the atomizing nozzle illustrating the position of indicia thereon corresponding to the position of the nozzle shown in Figure 6; and

Figure 9 is a view in front elevation similar to Figure 8, illustrating the position of the nozzle indicia corresponding to the position of the nozzle shown in Figure 8.

Referring to Figure 1, a fluid container is shown at 10 having a neck portion 11 which may be threaded to receive the atomizer closure 12, although obviously the latter may be secured to the bottle in any known manner. A washer

13, of the conventional type, is provided for preventing leakage between the neck 11 of the container 10 and the threaded portion of the atomizer closure 12.

The atomizer closure 12 is provided with a closure portion 14 in which a narrow passage 15 is formed into which an atomizer nozzle 16 of the conventional type may be inserted. The atomizer nozzle 16, may comprise an outer hollow tube 17 in which an aperture 18 is formed through which the finely divided fluid may be dispensed. Within the tube 17 and spaced from the walls thereof is a coaxial hollow tube 19 in which is formed an aperture 20 through which air under pressure may be directed for atomizing fluid. The outer tube 17 is also provided with an aperture 21 communicating with a tube 22 mounted in the closure portion 14, which supplied fluid from the container 10 to nozzle 16. The tube 22 extends downwardly into the fluid or it may be connected to a tubular wick 23 immersed in the fluid.

The closure portion 14 of the atomizer closure 12 is provided with a shouldered portion 24 on which an upwardly extending cylindrical chamber 25 is adapted to be snugly received. At the upper portion of the chamber 25 is formed a short tubular portion 26 in which a plunger 27 is adapted to slide. The plunger 27 has a wide flange 28 at its lower extremity, which normally engages the upper surface of a drum-shaped compressor bulb 29 contained within the chamber 25. The bulb 29 is preferably made of a resilient material such as rubber, for example, although any other suitable material may be used. The flange 28 cooperates with an aperture 31, located in the upper surface of compressor bulb 29, to form an air check valve. A conical member 30 may be provided which is adapted to project into the aperture 31 for increasing the effectiveness of its operation. In some cases it may be desirable to provide a duct 27' of very small diameter in the plunger 27 and flange 28, as shown in Fig. 1 in order to relieve any vacuum which may be created in the bulb 29 at the instant the plunger is released.

At the lower edge of the bulb 29 is formed a circular inwardly extending flanged portion 32 which cooperates with a circular groove 33 formed at the upper edge of the closure portion 14 of the atomizer closure 12 to provide an air-tight joint at the point where the bulb 29 is secured to the closure portion 14 of the atomizer closure 12.

In the closure portion 14 is formed a recess 34 communicating with a narrow passage 35 and a second passage 36 through which air under pressure may be directed to the inner tube 19 of the atomizing nozzle 16. An air vent 37 is provided in the lower portion of the closure portion 14 for preventing the formation of a vacuum in the container 10.

Within the compressor bulb 29 is a resilient member which may be, for example, a coil spring 38 seated within the recess 34 in the closure portion 14 of the atomizer closure 12, and whose upper end normally urges the upper surface of the compressor bulb 29 against the lower face of the plunger flange 28. The spring 38 serves to restore the bulb to the normal expanded position shown in Fig. 1 when the plunger 27 is released.

In operation, the fluid container 10 may be held in one hand in such fashion that the index finger, for example, rests upon the plunger 27. The bulb 29 being in the normal expanded position contains air under atmospheric pressure, which when the plunger 27 is depressed by the index finger of the user, is forced through the passages 35 and 36 into the atomizer nozzle 16 for atomizing the fluid.

Filled fluid containers may be shipped with the atomizer closure 12 attached merely by closing aperture 18 in the atomizing nozzle 16 and the air vent 37 by means of any convention seal. When thus sealed, the filled containers may be shipped with commercial assurance against leakage of fluid therefrom.

When it is desired to use the fluid containers for dispensing highly volatile liquids, such as the more expensive perfumes, the modification illustrated in Fig. 5 may be used. This construction differs from that shown in Fig. 1 in that a tubular passage 67 extends through the closure portion 14 into which a sleeve 68 is adapted to be tightly fitted. In order to insure a very tight fit the outer surfaces of the sleeve 68 may be knurled before it is pressed into the passage 67. In the sleeve 68 is an aperture 69 which registers with the passage 35 communicating with the compressor bulb 29. A second aperture 70 is also provided in the sleeve 68 which registers with the tube 22 communicating with the fluid in the container 10.

The atomizing nozzle 71, similar to atomizing nozzle 16 shown in Fig. 1, is provided with a portion 72 of reduced diameter which is adapted to be snugly received within the sleeve 68, such that the apertures 73 and 74 formed therein register with the apertures 69 and 70 respectively. The atomizing nozzle 71 is provided with a flat portion 76 which cooperates with the sleeve 68 to form a passage 77 communicating at one end with a vertical duct 78 formed in closure portion 14. The duct 78 and the passage 77 cooperate to form an air vent for preventing the formation of a vacuum within the container 10. The atomizing nozzle 71 may be securely held within the sleeve 68 by means of a plug 75 which is adapted to be forced into the open end of atomizing nozzle 71. It will be evident that, if desired, sleeve 68 may be dispensed with, in which case nozzle 71 may be so formed as to be snugly received within the passage 67.

In operation the atomizing nozzle is in the position illustrated in Figs. 5 and 6, in which the apertures 73 and 74 register with apertures 69 and 70 respectively, and duct 78 registers with passage 77, so that both air from the compressor bulb 29 and fluid from the container 10 may be directed to the atomizing nozzle 71. When not in use, however, the atomizing nozzle 71 may be rotated through an angle of approximately 90° to the position shown in Fig. 7 by means of a handle 79 which may be secured to the plug 75 as shown, or to the front portion of nozzle 71. In this position, the apertures 73 and 74 are no longer in registry with apertures 69 and 70 respectively, nor is the passage 77 in atomizing nozzle 71 in registry with the duct 78 in the closure portion 14. It will be evident from an inspection of Figs. 5 and 7, therefore, that fluid cannot possibly leak from the container 10 because both the fluid pipe 22 and the air vent passage 77 are tightly closed. Moreover, the washer 13 prevents any possible leakage between the top of the container 10 and the threaded portion of the closure member 12.

The position of the atomizing nozzle 71 may be readily indicated by suitable indicia 80 as in

Figs. 8 and 9. Thus when the indicia 80 points upwardly as shown in Fig. 8, the user knows that the atomizer is ready for operation, whereas if it is 90° away in either direction, as shown in Fig. 9, he knows that the atomizer is closed and must be rotated back to the atomizing position before it can be used.

The nozzle 71 may be moved to the sealed position shown in Fig. 7, before shipment or in traveling, thus eliminating the necessity for any temporary seal or separate closure member. Moreover, the container 10 may be kept closed when not in use, thus preventing any evaporation of the fluid contents of the container.

If desired, the coil spring may be eliminated by using the dome-shaped compressor bulb 40 shown in Fig. 2. In this case the bulb 40, being made of flexible material such as rubber, for example, will, by reason of its inherent resiliency return to the normal expanded position when the plunger 41 is released.

As shown in Fig. 2, compressor bulb 40 may be enclosed within a chamber 42 of similar shape having at its upper extremity a tubular passage 43 in which the plunger 41 is adapted to slide. The plunger 41 is provided with a flange 44 which may be shaped to conform with the curved surface of the chamber 42 and which also serves as an air check valve. The flange 44 may also be provided with a central downwardly extending conical portion 45, which is adapted to extend into a circular aperture 46 formed in the upper portion of the compressor bulb 40 to further increase compression. The operation of this modification is essentially as described above in connection with Fig. 1.

In the modification illustrated by Fig. 3, an alternate form of compressor bulb is shown. This compressor bulb may be constructed in the form of a bellows 47 which may comprise a plurality of circular sections 48 of resilient material, such as, for example, rubber. The sections 48 of the bellows 47, being made of resilient material, maintain the bellows 47 in its normal fully expanded position without the necessity for a restoring spring.

In the bellows 47 an aperture 52 is formed which is adapted to cooperate with flange 54 to form an air check valve in the manner described. Its operation may be further assisted by a conical portion 53 on the under surface of the flange 54. This modification may be operated as described above in connection with Figs. 1 and 2.

As shown in Fig. 4, the atomizing nozzle 16 may be formed in the actuating plunger. In this case a circular aperture 55 is formed in the upper portion of chamber 25, in which a plunger 56 is adapted to slide. The plunger 56 is provided with a radially extending passage 57 into which the atomizing nozzle 16 may be inserted. Air is supplied to the atomizing nozzle 16 from the passage 58 which communicates with a vertically extending passage 59 within the plunger 56, and which in turn communicates with the bellows 47.

Fluid is supplied to the atomizing nozzle through the tube 60 which extends downwardly within the plunger 56 and to the lower end of which is fixed a flexible tube 61. The tube 61 is connected at its lower end to a vertical tube 62 which passes through the aperture 52 in the bellows 47, and which is mounted in the closure portion 63. The tube 62 extends through closure portion 63 into the fluid or is connected to a flexible tube or wick 23, which is immersed in the fluid within the container 10.

The plunger 56 has at its lower end an outwardly extending flange 64 which acts as a stop means for the plunger 56. Below the flange 64 is a circular groove 65 which cooperates with the inwardly extending lip portion 51 on bellows 47 to provide an air-tight joint between the plunger 56 and the bellows 47. It will be seen that the position of the bellows 47 is the reverse of that which obtains in Fig. 3. The closure portion 63 may be provided with a conical portion 66 surrounding the tube 62, which extends into the aperture 52 and serves as a check valve for the bellows 47 in essentially the same manner as described above.

In operation, the plunger 56 is depressed, thus forcing the lower surface of the bellows 47 upon the closure portion 63, forming an air check valve for compressing the air in bellows 47. Air under pressure is forced up the passages 58 and 59 to the atomizing nozzle 16 in the plunger 56 for atomizing the fluid.

The closure member, together with the compressor bulb chamber, are preferably made of a plastic material, although, obviously, any other suitable material may be used. Such materials are available in a wide variety of colors, so that atomizer closures may be provided in many different color combinations to harmonize with other toilet accessories. These materials, furthermore, are relatively inexpensive, and easy to fabricate.

The atomizer closure of this invention may be used for dispensing liquids other than toilet preparations. It may be used with equal success in dispensing medicinal preparations, cleaning fluids, and many other fluids and it is to be understood that the present invention comprehends all such uses. Moreover, it will be understood that the sealing nozzle illustrated in Fig. 5 may be used in any of the other modifications disclosed.

It will be evident from the foregoing that the invention provides a highly effective atomizer which may be easily operated by the same hand that holds the container, and in which the atomizer forms an integral part of the closure. By sealing aperture 18 in nozzle 16, and air vent 37 by easy conventional means, a commercial seal may be obtained insuring against leakage of the fluid during its original shipment.

By using the sealing nozzle shown in Fig. 5, leakage of the fluid may be prevented without the necessity for temporary seals or a separate shipping closure. Moreover, the sealing nozzle enables the container to be kept tightly closed when not in use, thus preventing any evaporation of fluid from the container.

While several specific embodiments have been described above, it is to be understood that the invention is to be in no way limited thereby, but is capable of numerous changes in form and detail within the scope of the appended claims.

I claim:

1. An atomizer closure for fluid containers comprising a closure member having a chamber portion therein, air compressor means within the chamber having an air inlet therein, manual means for actuating the compressor means, said manual means being adapted to rest freely on said air compressor means and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the manual means is depressed,

thereby forming an air check valve, an atomizing nozzle in the closure member, means communicating with the container for directing fluid to the atomizing nozzle, and means forming passages in the closure member communicating with said air compressor means for directing air to the atomizing nozzle.

2. In an atomizer having a closure member, an atomizing nozzle, means for directing fluid to the nozzle, and means for directing air to the nozzle, the combination of means forming a chamber on the closure member, air compressor means in the chamber having an air inlet therein, and manual means for actuating said air compressor means, said manual means being adapted to rest freely on said air compressor means and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the manual means is depressed, thereby forming an air check valve.

3. An atomizer closure for fluid containers comprising a closure member having a chamber portion therein, a normally expanded air compressor bulb in the chamber having an air inlet therein, a plunger for compressing the bulb to provide air under pressure for atomizing fluid, said plunger being adapted to rest freely on said air compressor bulb and having a portion associated therewith which is adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the plunger is depressed, thereby forming an air check valve, an atomizing nozzle, a conduit communicating with the container for directing fluid to the atomizing nozzle and a second conduit communicating with the air compressor bulb for directing air to the atomizing nozzle.

4. An atomizer closure for fluid containers, comprising a closure member having a chamber portion therein, a compressor bulb in the chamber portion having an air inlet therein, resilient means for maintaining said compressor bulb normally expanded, manual means for actuating said compressor bulb, said manual means being adapted to rest freely on said air compressor bulb and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the manual means is depressed, thereby forming an air check valve, an atomizing nozzle, means communicating with said container for directing fluid to said atomizing nozzle, and means communicating with said compressor bulb for directing air to said atomizing nozzle.

5. An atomizer closure for fluid containers comprising a closure member having a chamber portion therein, an air compressor bulb in the chamber having an air inlet therein, a recess in the closure member, a spring seated in the recess for maintaining the bulb normally expanded, a plunger for compressing the bulb and spring to provide air under pressure for atomizing fluid, said plunger being adapted to rest freely on said air compressor bulb and having a projecting portion associated therewith adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the plunger is depressed, thereby forming an air check valve, an atomizing nozzle in the closure member, a conduit communicating with the container for directing fluid to the atomizing nozzle, and a second conduit, communicating with the air compressor bulb, for directing air to the atomizing nozzle.

6. In an atomizer having a closure member, an atomizing nozzle, means for directing fluid to the nozzle and means for directing air to the nozzle, the combination of means forming a chamber on the closure member, air compressor means in the chamber and having an air inlet therein, manual means for actuating said air compressor means, said manual means being adapted to rest freely on said air compressor means and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the manual means is depressed, thereby forming an air check valve, and means forming a passage in the manual means for relieving any vacuum created in the air compressor means when the manual means is released after actuation.

7. An atomizer closure for fluid containers comprising a hollow casing terminating at its upper end in an aperture, and having a transverse partition therein, the lower portion of said casing and the transverse partition forming a closure for the neck of a fluid container, air compressor means in the casing, above the transverse member therein, a plunger extending through said aperture in the casing for actuating said air compressor means, an atomizing nozzle in said transverse partition, having a fluid inlet and an air inlet therein, means communicating with said air compressor means for directing air to said air inlet, means communicating with said container for directing fluid therefrom to said fluid inlet, and means for moving said atomizing nozzle to close both said inlets, whereby leakage and evaporation of fluid from said container may be prevented.

8. An atomizer closure for fluid containers comprising a cap adapted to be secured to the neck of a container and having an upwardly extending skirt portion forming a chamber therein above the cap, a substantially cylindrical air compressor bulb mounted over said chamber in the cap, a substantially cylindrical housing secured to the cap and enclosing the air compressor bulb, said housing terminating at its upper end in an aperture, a plunger extending through said aperture for actuating said air compressor bulb, a conduit communicating with said chamber in the cap, a second conduit communicating with the container, a duct also communicating with the container, an atomizing nozzle in the cap, having an air inlet therein adapted to register with said first conduit, means in the nozzle forming a fluid inlet adapted to register with said second conduit, means forming an air vent in the nozzle, communicating with said duct, and means for moving said nozzle to close said air inlet, fluid inlet and air vent, whereby leakage and evaporation of fluid from the container may be prevented.

9. An atomizer closure for fluid containers comprising a cap adapted to be secured to the neck of a container and having an upwardly extending skirt portion forming a chamber therein above the cap, a substantially cylindrical air compressor bulb mounted over said chamber in the cap and having an air inlet in the upper wall thereof, a substantially cylindrical housing secured to the cap and enclosing the air compressor bulb, said housing terminating at its upper end in an aperture, a plunger extending through said aperture for actuating said air compressor bulb, said plunger being adapted to rest freely on said air compressor bulb and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially airtight closure therefor when the manual means is depressed, thereby forming an air check valve,

an atomizing nozzle in the cap, a conduit communicating with said container for directing fluid to said nozzle, and a second conduit communicating with said chamber in the cap for directing air from the compressor bulb to the nozzle.

10. An atomizer closure for fluid containers comprising a cap adapted to be secured to the neck of a container and having an upwardly extending skirt portion forming a chamber therein above the cap, a substantially cylindrical air compressor bulb mounted over said chamber in the cap and having an air inlet in the upper wall thereof, a compression spring seated in said chamber for maintaining the compressor bulb normally expanded, a substantially cylindrical housing secured to the cap and enclosing the air compressor bulb, said housing terminating at its upper end in an aperture, a plunger extending through said aperture for actuating said air compressor bulb, said plunger being adapted to rest freely on said air compressor bulb and having a portion thereon adapted to be urged tightly against said air inlet to form a substantially air-tight closure therefor when the manual means is depressed, thereby forming an air check valve, an atomizing nozzle in the cap, a conduit communicating with said container for directing fluid to said nozzle, and a second conduit communicating with said chamber in the cap for directing air from the compressor bulb to the nozzle.

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