

Aug. 2, 1938.

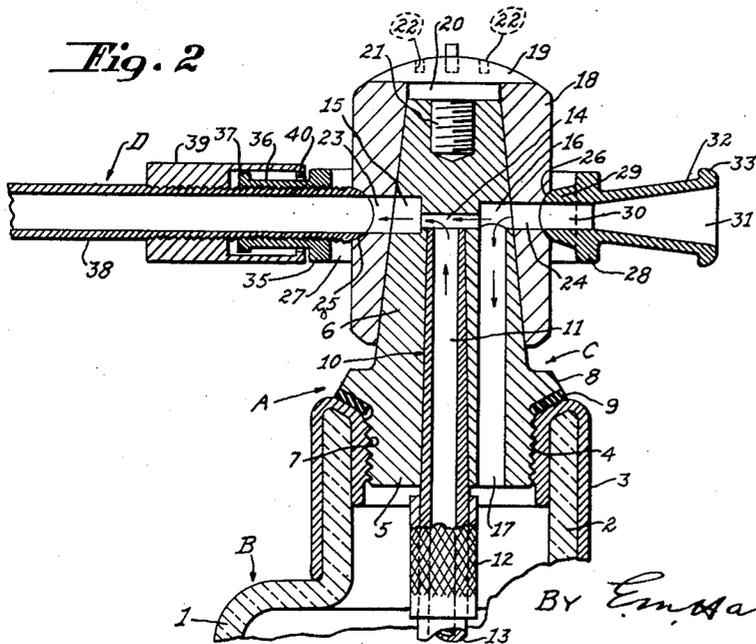
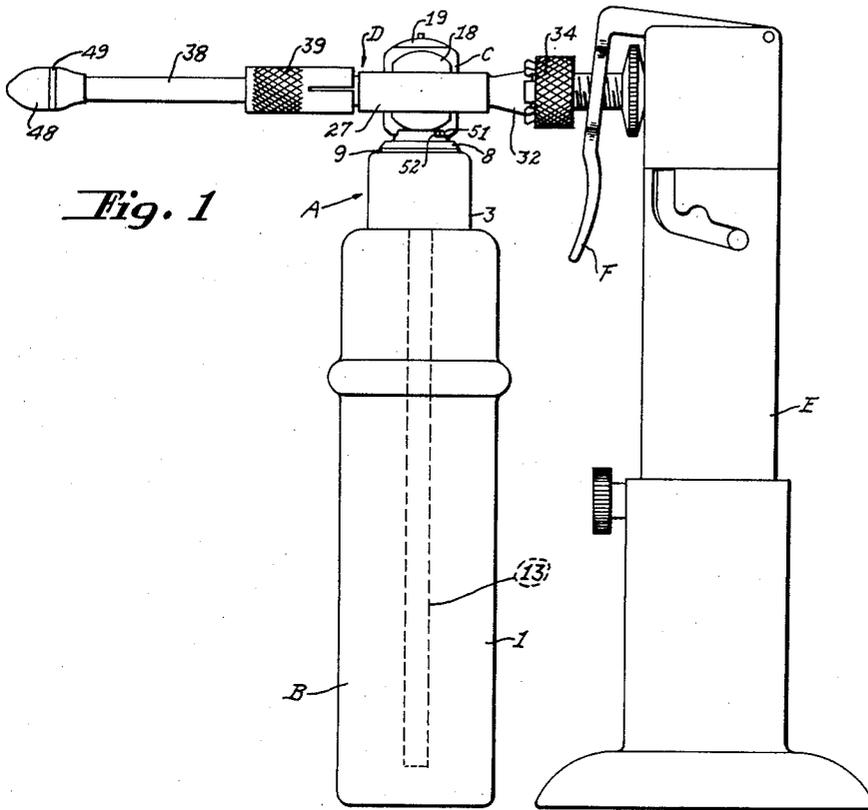
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2,125,573

ATOMIZER

Filed Aug. 10, 1936

3 Sheets-Sheet 1



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ATOMIZER

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3 Sheets-Sheet 2

Fig. 3

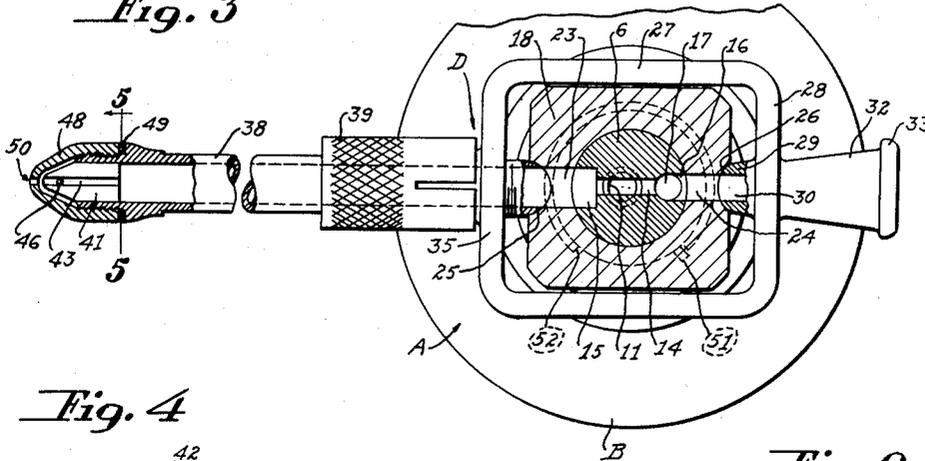


Fig. 4

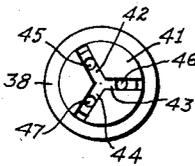


Fig. 5

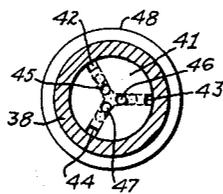


Fig. 6

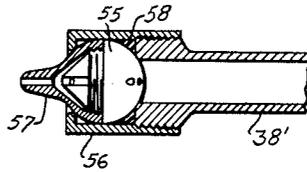


Fig. 7

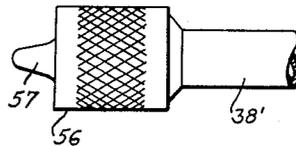


Fig. 9

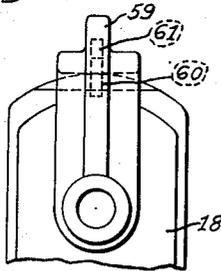
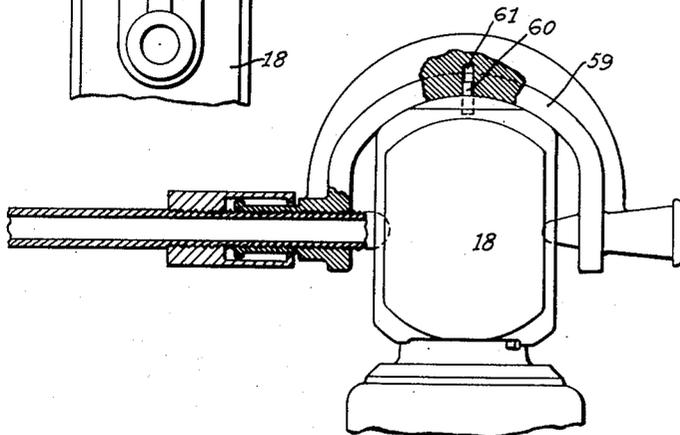


Fig. 8



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ATOMIZER

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3 Sheets-Sheet 3

Fig. 10

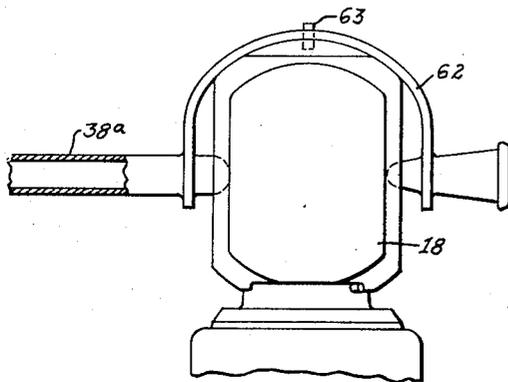


Fig. 11

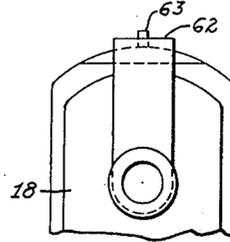


Fig. 12

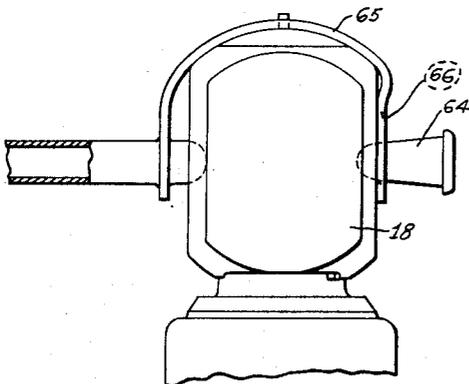
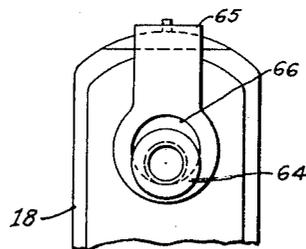


Fig. 13



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2,125,573

ATOMIZER

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Application August 10, 1936, Serial No. 95,147

7 Claims. (Cl. 299-89)

This invention relates generally to atomizers, and more particularly to atomizers of the type employed in spraying fluids, the predominant object of the invention being to provide an atomizer structure of such improved construction and arrangement that certain disadvantages present in connection with the use of atomizers of the types heretofore employed are eliminated.

Prior to this invention atomizers of the general type to which this invention relates comprised each a container for the fluid to be sprayed and an atomizing or spraying unit which was associated with the container in such manner that passage of air or gas into the atomizing or spraying unit caused fluid to be withdrawn from the container because of pressure or vacuum, or a combination of pressure and vacuum, created by such passage of air or gas. The fluid so withdrawn from the container commingled with the air or gas, or a part thereof, and the commingled fluid and air or gas was discharged from the atomizing or spraying unit in the form of a spray. In the case of atomizers of the types heretofore known, the atomizing or spraying units were permanently associated with the containers; that is to say, said units were detachable from the containers solely for the purpose of refilling the containers, and at all other times the atomizing or spraying units were permanently attached to the containers.

Several disadvantages resulted from the arrangement of providing the container of each atomizer with a permanently associated atomizing or spraying unit, one of such disadvantages being the expense incident to the provision of each atomizer container with an atomizing or spraying unit. Another disadvantage of the arrangement mentioned is the inconvenience of sterilizing the atomizing or spraying units after use thereof.

Still another disadvantage of the arrangement referred to arose from the fact that many of these previously known atomizers would leak when displaced from their normal, upright positions and this was highly inconvenient to users of the atomizers, especially in cases where the duties of such users required that atomizers be carried about from place to place.

In order to obviate the disadvantages referred to I have devised the improved atomizer disclosed herein which, briefly stated, comprises a container for fluid to be sprayed which is provided with an atomizing unit that includes an element which serves as a leak-proof closure element and as an atomizing means. The atom-

izing unit includes also a spraying arm which is capable of convenient attachment to and detachment from the element referred to, the cooperative arrangement of these parts being such that the leak-proof closure element may be moved to its open position when the spraying arm has been arranged in place whereby the atomizer is placed in the effective spraying condition.

Thus an individual whose duties require the use of a number of atomizers containing different fluids may in accordance with this invention have on hand a number of containers, each of which is provided with a leak-proof closure element to prevent accidental leakage of fluid therefrom. He would also have one, or if desired or required, several spraying arms adapted for application to the leak-proof closure element of any one of the containers. When, in accordance with this invention, it is desired to spray fluid from one of the containers, a proper spraying arm is applied to the closure element of such container in a simple and convenient manner, as will be hereinafter described, after which the closure element would be moved to its open position.

Fluid would then be sprayed from the atomizing or spraying unit as desired, and on completion of the spraying operation the closure element would be closed and the spraying arm would be removed and sterilized. It is obvious, therefore, that if desired the same spraying arm may be employed with a number of different containers, and after each use of the spraying arm it may be completely sterilized for future use.

It is clear, in view of the foregoing, that the disadvantages of the atomizers of the types heretofore employed are entirely eliminated; that is to say, the requirement for a separate atomizing or spraying unit for each container is done away with; the matter of leakage of fluid from the containers is eliminated; and higher sanitation requirements are met by providing spraying arms which may be conveniently sterilized after each use thereof.

Fig. 1 is a side elevation of one of the improved atomizers shown in association with a device for supplying air or gas under pressure to the atomizer.

Fig. 2 is an enlarged, fragmentary, vertical section of the upper portion of the atomizer illustrated in Fig. 1.

Fig. 3 is a view on the approximate scale of

Fig. 2, illustrating the improved atomizer partly in plan and partly in horizontal section.

Fig. 4 is an end elevation of the discharge tip of the atomizing or spraying unit with the end cap removed.

Fig. 5 is a section on line 5-5 of Fig. 3.

Fig. 6 is a fragmentary section of a modified form of discharge end for the atomizing or spraying unit of the invention.

Fig. 7 is a plan view of the structure illustrated by Fig. 6.

Fig. 8 is a modified form of the means for attaching the atomizing or spraying unit to the leak-proof closure element of the improved atomizer.

Fig. 9 is a fragmentary, rear elevation of the structure illustrated by Fig. 8.

Fig. 10 illustrates still another form of the means for attaching the atomizing or spraying unit to the leak-proof closure element of the improved atomizer.

Fig. 11 is a fragmentary, rear elevation of the structure shown in Fig. 10.

Fig. 12 illustrates yet another form of the means for attaching the atomizing or spraying unit to the leak-proof closure element of the improved atomizer.

Fig. 13 is a fragmentary, rear elevation of the structure shown in Fig. 12.

In the drawings, wherein are shown for the purpose of illustration, merely, several embodiments of the invention, A designates the improved atomizer generally. The atomizer A includes a container B for fluid to be sprayed, this container being formed of glass or any other suitable material. The improved atomizer includes also an element C which serves the dual purpose of a closure element for the container B and atomizing means for commingling fluid withdrawn from the container and air or gas introduced into the atomizer. This element C supports the atomizing or spraying arm D of the improved structure.

In Fig. 1 the improved atomizer is shown in operative association with a device E which serves to supply gas under pressure to the atomizer A, but as this device E does not form a part of the present invention it will not be described in detail herein. For the purpose of this application it will be sufficient to say that the device E encloses a gas container, and that the controlling element F controls passage of gas from said gas container to the atomizer.

While I have illustrated in Fig. 1 a particular type of device for supplying gas to the atomizer A, it is to be understood that the improved atomizer is in nowise dependent on such device, as the atomizer is capable of completely efficient operation with various other means for supplying air or gas thereto.

Referring now to the details of construction of the improved atomizer, the container B thereof includes a body portion 1 and a neck portion 2 of reduced diameter. Arranged in embracing relation with respect to the wall of the neck portion of the container B and secured thereto is a sleeve-like structure 3, which is internally screw-threaded, as indicated at 4 in Fig. 2.

The sleeve-like structure 3 supports the leak-proof closure element C of the improved atomizer, and to accomplish this end the lower portion 5 of the stationary core 6 of the leak-proof closure element is externally screw-threaded as indicated at 7 in Fig. 2 and the screw-threads thereof screw-threadedly engage the screw-threads of the

sleeve-like structure 3. The stationary core 6 of the leak-proof closure element C is provided with an outwardly extended flange 8, and a gasket 9 is interposed between the lower inclined face of said flange and a correspondingly inclined face of the sleeve-like structure. The portion of the stationary core of the leak-proof closure element C which extends upwardly from the flange 8 is of circular formation in horizontal section, and said portion tapers from a larger diameter at its lower end to a reduced diameter at its upper end, as shown to the best advantage in Fig. 2. The stationary core 6 of the leak-proof closure element C is provided with a vertically disposed, centrally located bore 10, in which a tube 11 is fixedly arranged.

The tube 11 extends downwardly into the container a short distance from the lower end of the core 6 of the closure element, and to the lower end portion of this tube 11 is secured, through the instrumentality of a suitable coupling element 12, a second tube 13 which extends downwardly into the container B and terminates a short distance above the bottom wall of said container, as shown in Fig. 1. At the upper end of the tube 11 which is located some distance below the top of the core 6 of the closure element a transversely extended passageway 14 is formed in said core 6. This transverse passageway communicates with the interior of the tube 11 and also it communicates at one of its ends with a large opening 15 and at its opposite end with an opening 16, which is larger than the passageway 14 but slightly smaller than the opening 15. The openings 15 and 16 are formed in the stationary core of the closure element, said openings being extended transversely in said core and being substantially circular in cross-section. Formed in the stationary core 6 of the closure element is a passageway 17 which parallels the bore 10 therein, said passageway communicating at its upper end with the opening 16 and being open at the lower face of the lower portion 5 of said core 6.

The leak-proof closure element includes also a head 18 which is provided with a bore formed therethrough, a portion of which is tapered to correspond with the taper of the upper portion of the core of the closure element and the tapered portion of said head receives the tapered upper portion of the core, as shown in Fig. 2. In order to maintain the head 18 in place on the tapered portion of the core 6 so that said head may be subjected to rotary movement about said core portion, a screw 19 is employed.

The screw 19 includes an enlarged head portion which overlaps the top face of the head 18 of the closure element, as shown in Fig. 2, and extended downwardly from an intermediate portion 20 of the screw 19 is a screw-threaded shank 21 which is screwed into a screw-threaded opening formed in the upper portion of the core of the closure element. The screw 19 preferably is provided with apertures 22 adapted to receive a suitable spanner tool for manipulating the screw. Formed in the head 18 of the closure element C at one side is an opening 23, and formed in said head at its opposite side is an opening 24. The openings 23 and 24 on rotation of the head 18 with respect to the core of the closure element are movable into and out of registration with the openings 15 and 16 of said core to open and close the closure element, and at the outer ends of said openings 23 and 24 curved seats 25 and 26 are provided.

Referring now in detail to the spraying arm D 75

of the improved structure, this arm comprises a yoke portion 27 (see Fig. 3), which embraces the head 18 of the closure element C. From the rear wall 28 of this yoke portion a forwardly projected extension 29 is extended, and this extension is provided with a rounded forward end which is seated in the curved seat 26 at the outer end of the opening 24. The extension 29 is provided with an opening 30 formed therethrough, and this opening communicates at its inner end with the opening 24 and at its outer end communicates with a divergent opening 31 formed through the flared extension 32 which is projected rearwardly from the rear wall 28 of the yoke portion 27. The flared extension 32 is provided with an annular flange 33 at its outer end, and this flange is engaged by a suitable coupling device 34 for operatively connecting the atomizer A to the device E which supplies gas under pressure to said atomizer.

Projected forwardly from the forward wall 35 of the yoke portion 27 is a tubular extension 36 which is internally screw-threaded, as shown in Fig. 2, and is provided with an annular flange 37 at its forward end. The extension 36 supports a forwardly extended tube 38 which is externally screw-threaded at its rear end portion, and the screw-threads on the tube screw-threadedly engage the screw-threads within the extension 36. The screw-threaded portion of the tube 38 screw-threadedly engages and supports an element 39 which is provided with a split rear portion that embraces the extension 36. By splitting or slitting the rear portion of the element 39 it is provided with resilient finger portions, each of which is provided with an inturned portion 40, and these finger portions may be spread when the parts of the atomizing or spraying unit are being assembled so they will pass over the flange 37 at the forward end of the extension 36. The inturned portions 40 at the rear ends of the finger portions of the element 39 serve as stops which engage the annular flange 37 at the forward end of the extension 36 and thus prevent the tube 38 from being unscrewed to the extent it will be entirely withdrawn from the extension 36.

At the forward end of the tube 38 a spray head 41 is provided, in which is formed a plurality, for instance, three, convergent grooves 42, 43, and 44, which meet at the forward end of the spray head (see Fig. 4), so that streams of fluid and air or gas passing through said grooves will be brought into sharp contact with each other at the point where said grooves meet. Also, the spray head is provided with angularly disposed passageways 45, 46, and 47 through which streams of commingled fluid and air or gas pass. The arrangement of the grooves and passageways in the spray head is such that the various streams of commingled fluid and air or gas cross each other and impinge against one another as they are discharged, whereby improved spraying action is obtained.

The spray head 41 is enclosed within a cap 48 which is screwed on a screw-threaded portion of said spray head, and a gasket 49 is interposed between faces of said cap and said spray head to provide a fluid-tight joint at that point. The cap 48 is provided with an aperture 50 through which the sprayed fluid is discharged.

When in accordance with this invention it is desired to use one of the improved atomizers, the particular container unit which holds the fluid to be sprayed is selected. At this time the closure element C of the selected container unit

is in a closed condition, so as to render the container unit leak-proof. The tube 38 of the spraying arm to be employed is then unscrewed so that it will move forwardly with respect to the extension 36 by rotating the element 39 which is tightly fixed to said tube. This increases the distance between the rounded, forward end of the extension 29 and the rounded, rear end of the tube 38. The yoke portion 27 of the spraying arm is then moved downwardly over the head 18 of the closure element of the container unit and the rounded, forward end of the extension 29 is seated in the curved seat 26 at the outer end of the opening 24, after which the tube 38 is screwed inwardly with respect to the extension 36 until its rounded, rear end is seated in the curved seat at the forward end of the opening 23. The spraying arm is then rotated slightly about the axis of the container to bring the openings 23 and 24 of the head of the closure element into registration with the openings 15 and 16 of the core of the closure element, when the atomizer is ready for use.

When a spraying operation has been completed the operations just described are reversed; that is to say, the closure element is closed by rotating the head portion thereof and the tube 38 is unscrewed to move same forwardly and unseat the rounded, rear end of said tube from the curved seat of the opening 23 of the closure element head portion. The rounded, forward end of the extension 29 is then freed from the curved seat 26 at the outer end of the opening 24, whereupon the spraying arm is lifted off of the head portion of the closure element and said spraying arm is sterilized. It is to be noted that the core of the closure element C is provided with a pin 51 which extends into an elongated notch 52 formed in the head portion of the closure element, and the ends of said notch contact with the pin to limit rotary movement of the head portion with respect to the core of the closure element.

During use of the improved atomizer and upon operation of the controlling element F, gas under pressure passes from the gas supply device E through the openings 31, 30, and 24 into the opening 16 of the core of the closure element. Most of this gas moves downwardly through the passageway 17 to place the fluid within the container B under pressure that forces fluid from the container through the tube 13, and the remainder of said gas passes forwardly through the restricted passageway 14. This forwardly moving or supplemental gas and the fluid drawn from the container are commingled in the passageway 14 and in the openings 15 and 23, and the commingled gas and fluid passes rapidly to the spraying head of the tube 38, where said fluid is discharged in the form of a spray.

It is plain, therefore, that a user of the improved atomizer may have on hand a number of container units holding different fluids to be sprayed, each of which is sealed by a leak-proof closure element. It is obvious, also, that a spraying arm may be applied to any one of said container units in the manner described, after which the closure element is moved to the open position and the atomizer used. It is likewise plain that after use of an atomizer the closure element may be closed and the spraying arm removed and 70 sterilized.

In Figs. 6 and 7 I illustrate a structure which involves providing an adjustable spray head 55, which is secured to the end of the tube 38' by a screw-threadedly attached cap 56 in such manner

that said spray head is movable after the fashion of a ball and socket joint. In this structure an outer, apertured discharge element 57 is screw-threadedly attached to the spray head 55 and a gasket 58 is provided to prevent leakage at the location of said gasket.

In Figs. 8 and 9 a modified form of the means for attaching the spraying arm to the closure element of the container unit is illustrated. In accordance with this form of the invention, an arcuate arm portion 59 extends over the top of the head 18 of the closure element and a pin 60 extends upwardly from said closure element head into an aperture 61 formed in the arcuate arm portion so as to stabilize the spraying arm and prevent rocking movement thereof with respect to the associated closure element.

In Figs. 10 and 11 another form of the means for attaching the spraying arm to the closure element is illustrated. This form of the invention closely resembles the arrangement shown in Figs. 8 and 9, with the exception that the arcuate arm 62 of Figs. 10 and 11 is formed of resilient material, so that the parts of the spraying arm may be sprung into place with respect to parts of the associated closure element to render unnecessary longitudinal adjustment of the tube 33^a in such application of the spraying arm to the closure element. In Figs. 10 and 11 a pin 63, which extends from the head of the closure element and passes through an aperture in the arcuate arm portion, is employed for stabilizing the spraying arm and preventing rocking movement thereof.

The form of the invention shown in Figs. 12 and 13 is the same as that shown in Figs. 10 and 11, with the exception that the element 64 is rigidly attached to the head of the closure element, and the rear end portion of the arcuate arm portion 65 is provided with an aperture 66 which is passed over said element 64 when the spraying arm is being applied to the closure element C.

I claim:

1. An atomizer comprising a container for fluid, a closure element for said container adjustable to open and closed positions and provided with passageways formed transversely there-through for the passage of fluid, said closure element including a portion fixedly mounted on said container and a portion supported by said fixedly mounted portion for rotary movement with respect thereto, and a spraying arm adapted for detachable attachment to the rotary portion of said closure element, said spraying arm including a portion so shaped that said closure element is disposed between parts of said spraying arm, and said spraying arm being provided with fluid passageways which are formed only in the parts of the spraying arm which are located at opposite sides of the closure element, the passageways of the closure element and of the spraying arm being adapted for communication with each other whereby fluid may pass through the passageways of the spraying arm and closure element.

2. An atomizer comprising a container for fluid, a closure element for said container adjustable to open and closed positions, said closure element including a portion fixedly mounted on said container and a portion supported by said fixedly mounted portion for rotary movement with respect thereto, and a spraying arm adapted for detachable attachment to the rotary portion of said closure element, said spraying arm including a portion so shaped that said closure element is disposed between parts of said spraying arm, and said spraying arm being provided with fluid

passageways which are formed only in the parts of the spraying arm which are located at opposite sides of the closure element, and a spraying head located at the discharge end of said spraying arm.

3. An atomizer comprising a container for fluid, a closure element for said container adjustable to open and closed positions, said closure element including a portion fixedly mounted on said container and a portion supported by said fixedly mounted portion for rotary movement with respect thereto, and a spraying arm adapted for detachable attachment to the rotary portion of said closure element, said spraying arm including a portion so shaped that said closure element is disposed between parts of said spraying arm, and said spraying arm being provided with fluid passageways which are formed only in the parts of the spraying arm which are located at opposite sides of the closure element, and an adjustable spraying head located at the discharge end of said spraying arm.

4. An atomizer comprising a container for fluid, a closure element for said container including an inner portion fixedly mounted on said container and an outer portion supported by and arranged for rotary movement with respect to said inner portion, said inner portion being provided with opposed openings and said outer rotary portion being provided with openings adapted on rotation of said rotary portion to be moved into and out of registration with the opposed openings of said inner portion so as to place the closure element of the atomizer in open or closed condition, a restricted passageway connecting the opposed openings of said inner portion of the closure element, a fluid conductor communicating at its upper end directly with said restricted passageway and communicating at its lower end with the interior of the container, said restricted passageway providing a mixing chamber wherein fluid withdrawn from said container through said conductor and air or gas introduced into the atomizer are commingled, means for preventing vertical movement of said outer rotary portion of the closure element of the atomizer with respect to said inner portion of said closure element, and a spraying arm adapted for detachable attachment to said closure element to and through which commingled fluid and air or gas are directed.

5. An atomizer comprising a container for fluid, a closure element for said container including an inner portion fixedly mounted on said container and an outer portion supported by and arranged for rotary movement with respect to said inner portion, said inner portion being provided with opposed openings and said outer rotary portion being provided with openings adapted on rotation of said rotary portion to be moved into and out of registration with the opposed openings of said inner portion so as to place the closure element of the atomizer in open or closed condition, a restricted passageway connecting the opposed openings of said inner portion of the closure element, a fluid conductor communicating at its upper end directly with said restricted passageway and communicating at its lower end with the interior of the container, a passageway for air or gas formed in said inner portion of said closure element, said passageway communicating at one of its ends with one of the opposed openings of said inner portion and communicating at its opposite end with the interior of the container, said restricted passageway providing a mixing

chamber wherein fluid withdrawn from said container through said conductor and air or gas introduced into the atomizer are commingled, means for preventing vertical movement of said outer rotary portion of the closure element of the atomizer with respect to said inner portion of said closure element, and a spraying arm adapted for detachable attachment to said closure element to and through which commingled fluid and air or gas are directed.

6. An atomizer comprising a container for fluid, a closure element for said container including an inner portion fixedly mounted on said container and an outer portion supported by and arranged for rotary movement with respect to said inner portion, means for limiting rotary movement of said outer rotary portion with respect to said fixedly mounted inner portion, said inner portion being provided with opposed openings and said outer rotary portion being provided with openings adapted in rotation of said rotary portion to be moved into and out of registration with the opposed openings of said inner portion so as to place the closure element of the atomizer in open or closed condition, a restricted passageway connecting the opposed openings of said inner portion of the closure element, a fluid conductor communicating at its upper end directly with said restricted passageway and communicating at its lower end with the interior of the container, a passageway for air or gas formed in said inner portion of said closure element, said passageway communicating at one of its ends with one of the opposed openings of said inner portion and communicating at its opposite end with the interior of the container, said restricted passageway providing a mixing chamber wherein fluid withdrawn from said container through said conductor and air or gas introduced into the atomizer are commingled, means for preventing vertical movement of said outer rotary portion of the closure element of the atomizer with respect to said inner portion of said closure

element, and a spraying arm adapted for detachable attachment to said closure element to and through which commingled fluid and air or gas are directed.

7. An atomizer comprising a container for fluid, a closure element for said container including an inner portion fixedly mounted on said container and an outer portion supported by and arranged for rotary movement with respect to said inner portion, said inner portion being provided with opposed openings and said outer rotary portion being provided with openings adapted on rotation of said rotary portion to be moved into and out of registration with the opposed openings of said inner portion so as to place the closure element of the atomizer in open or closed condition, a restricted passageway connecting the opposed openings of said inner portion of the closure element, a fluid conductor communicating at its upper end directly with said restricted passageway and communicating at its lower end with the interior of the container, a passageway for air or gas formed in said inner portion of said closure element, said passageway communicating at one of its ends with one of the opposed openings of said inner portion and communicating at its opposite end with the interior of the container, said restricted passageway providing a mixing chamber wherein fluid withdrawn from said container through said conductor and air or gas introduced into the atomizer are commingled, means for preventing vertical movement of said outer rotary portion of the closure element of the atomizer with respect to said inner portion of said closure element, and a spraying arm adapted for detachable attachment to said closure element to and through which commingled fluid and air or gas are directed, said spraying arm being provided with passageways adapted for arrangement in communication with the openings of the rotary portion of said closure element.

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