May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 1

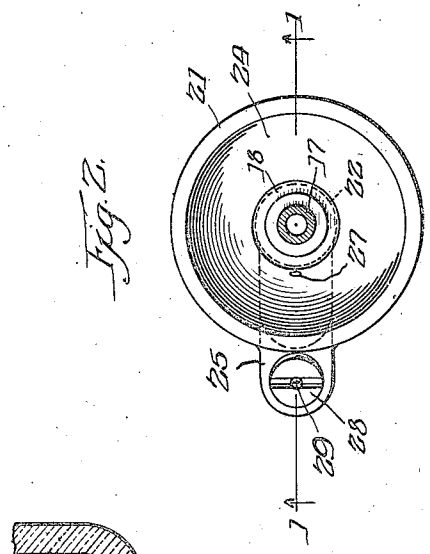


Fig. 2.

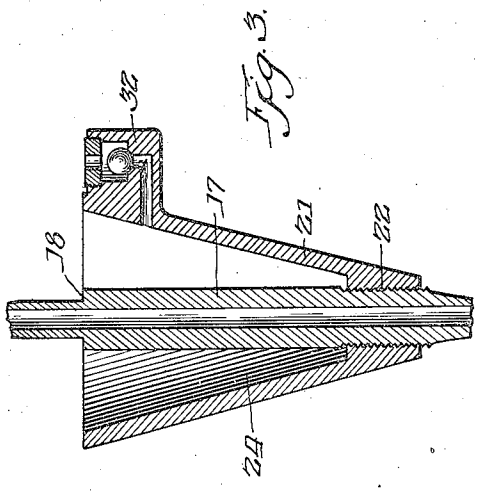


Fig. 3.

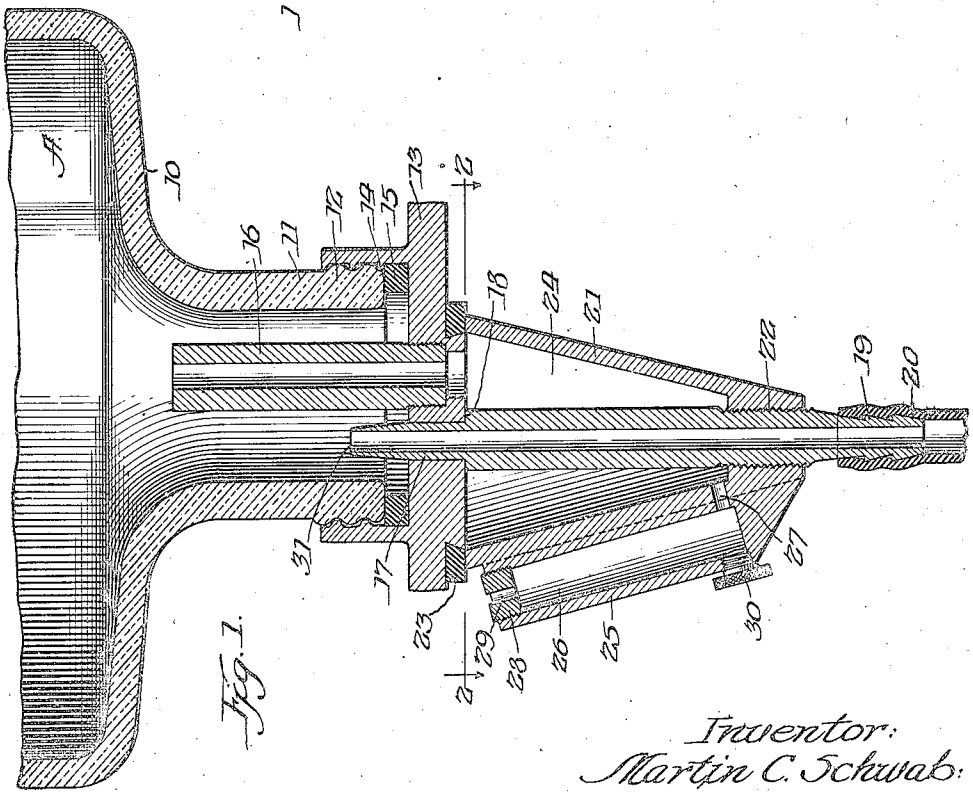


Fig. 1.

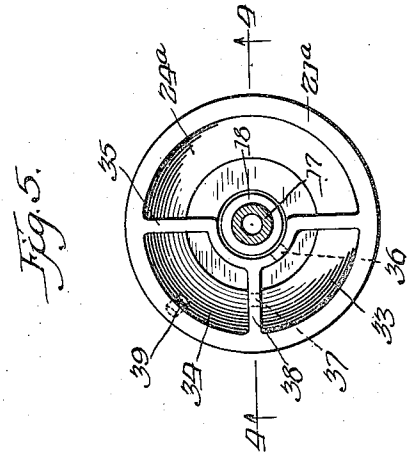
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By Paul Carpenter Atty.

May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 2

Fig. 5.



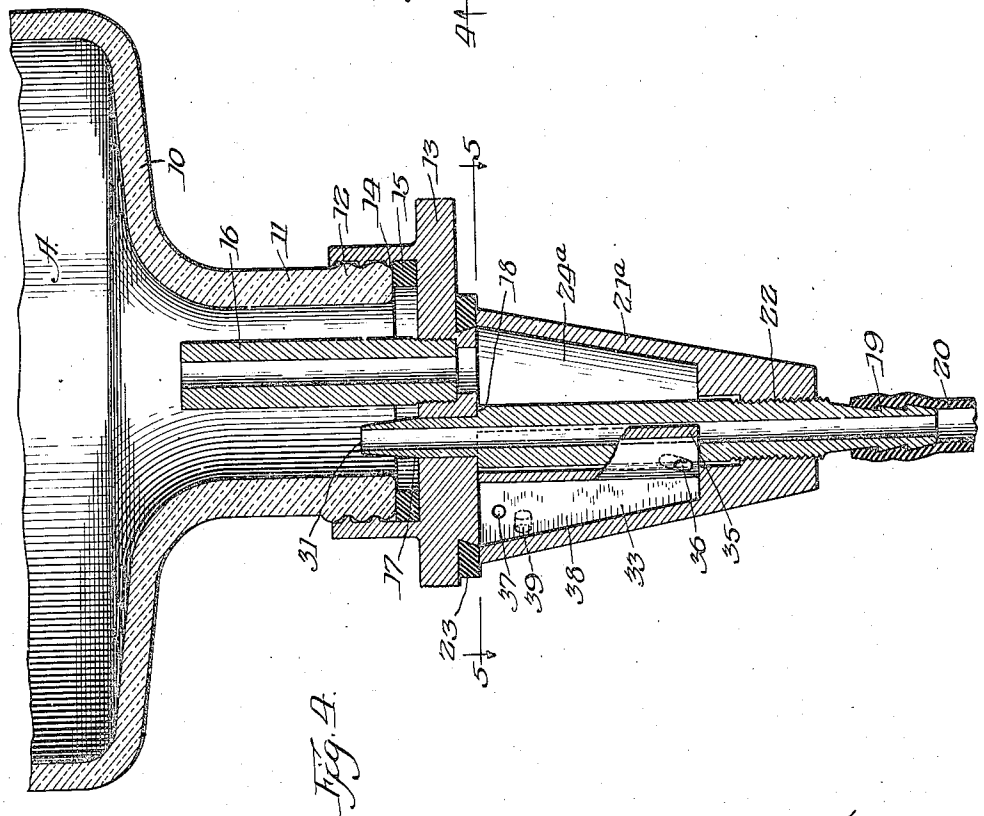


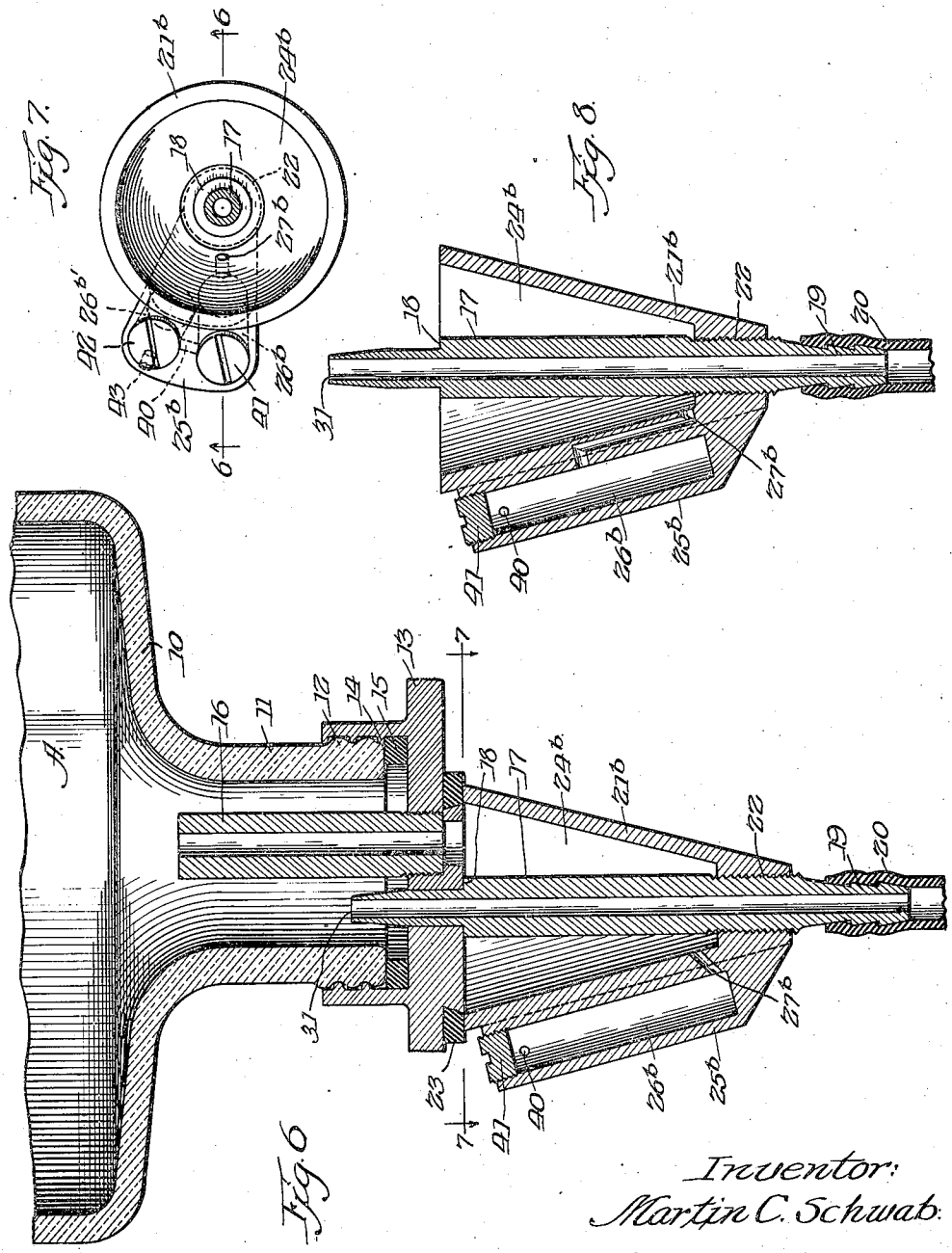
Fig. 4.

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May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 3



May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 4

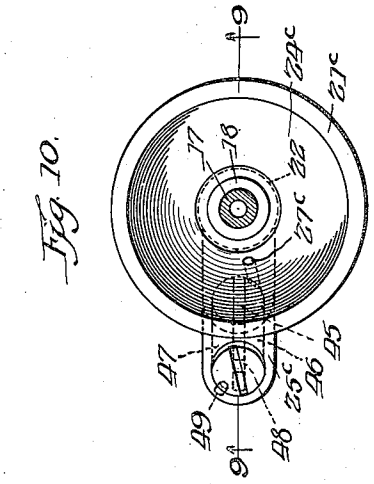


Fig. 10.

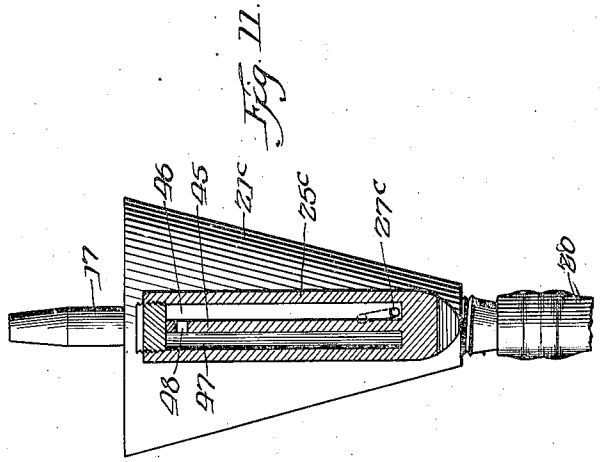


Fig. 11.

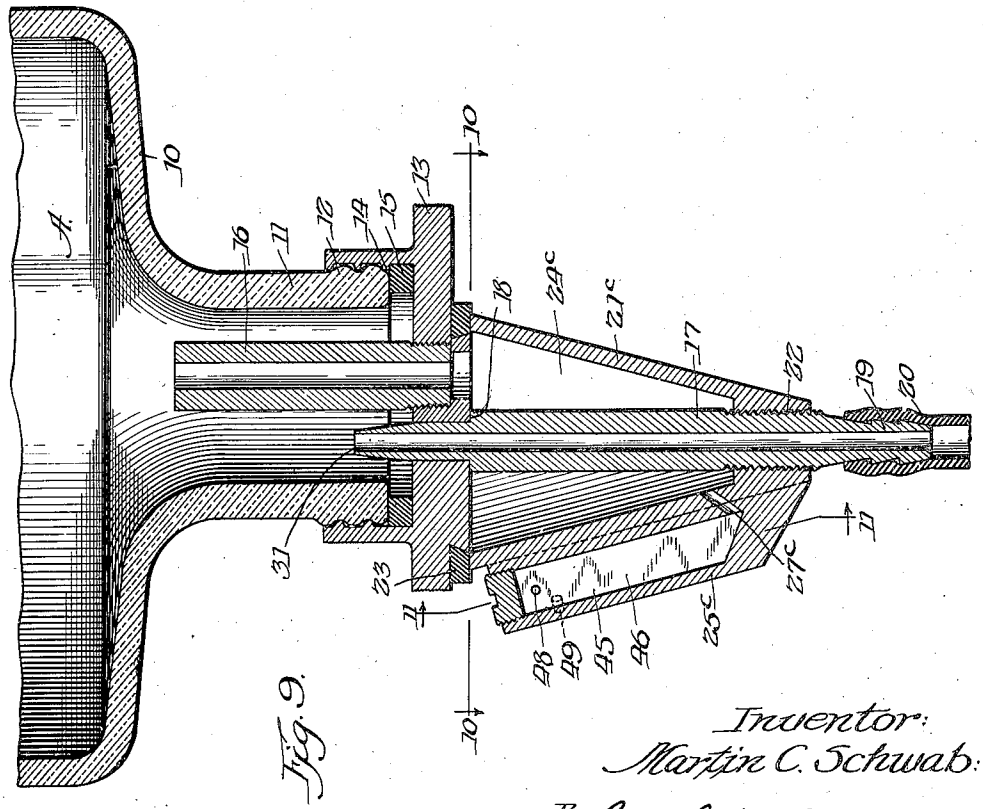


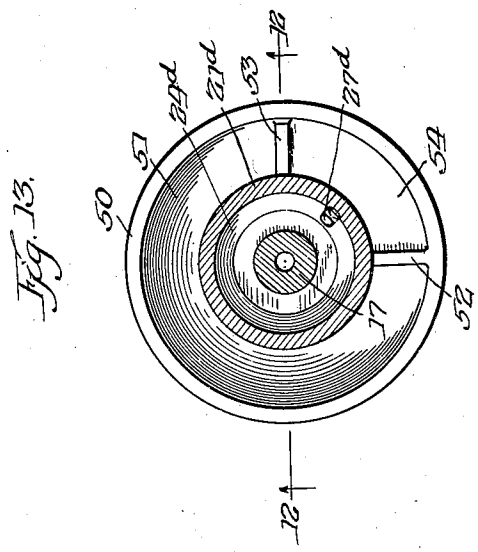
Fig. 9.

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May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 5



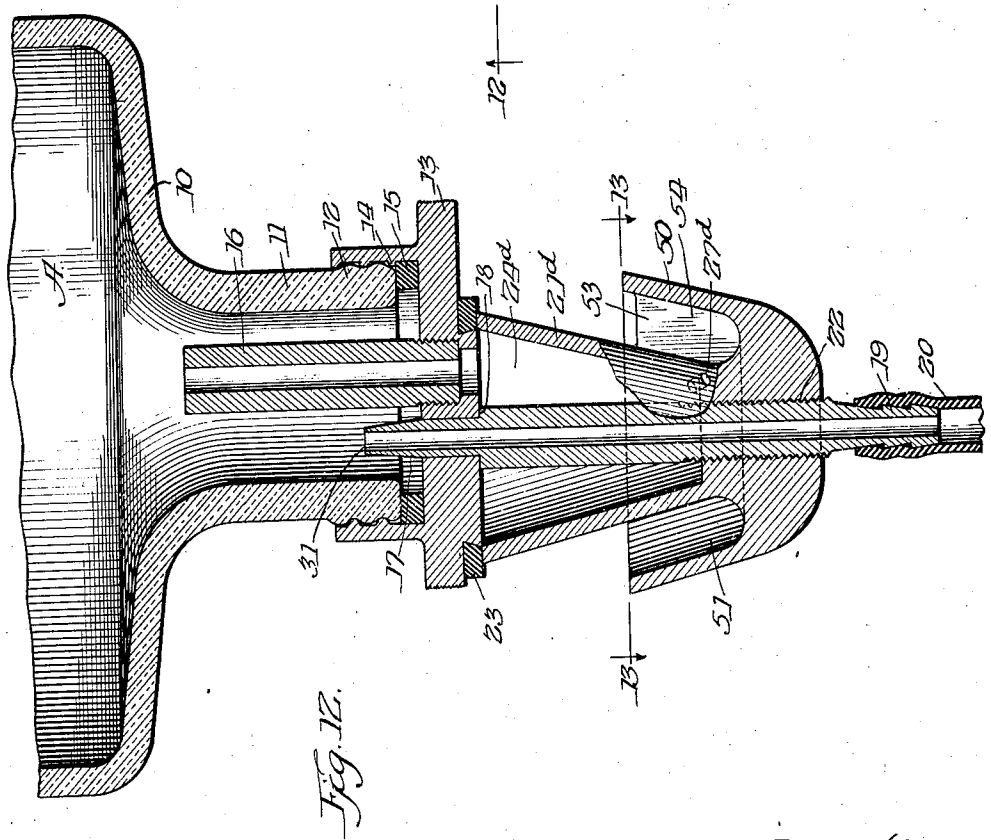


Fig. 12.

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May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 6

Fig. 14.

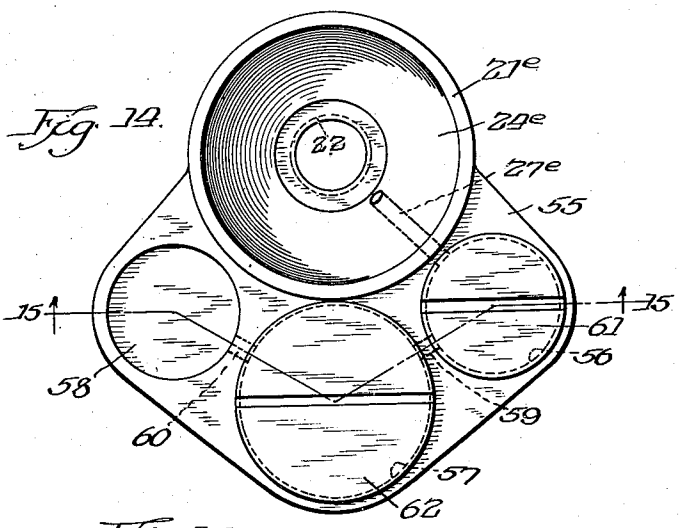
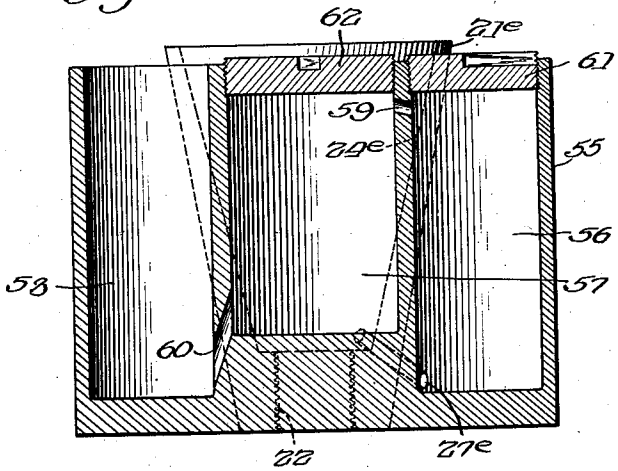


Fig. 15



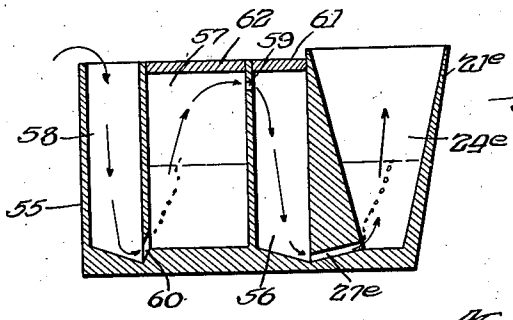


Fig. 16.

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May 2, 1939. M. C. SCHWAB 2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Filed March 17, 1936 7 Sheets-Sheet 7

Fig. 17.

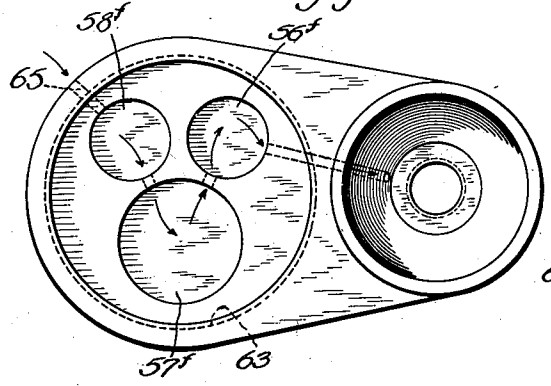


Fig. 18.

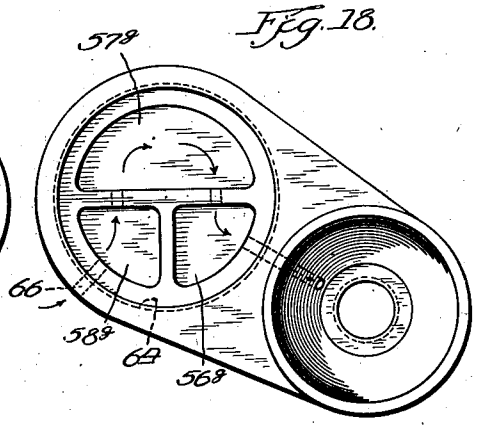


Fig. 19.

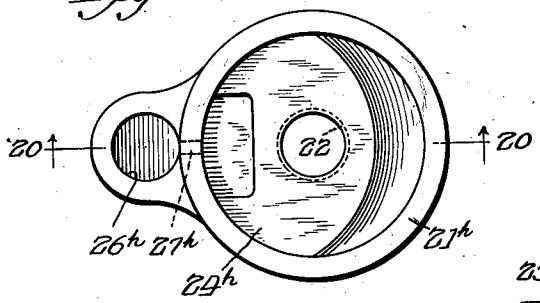


Fig. 20.

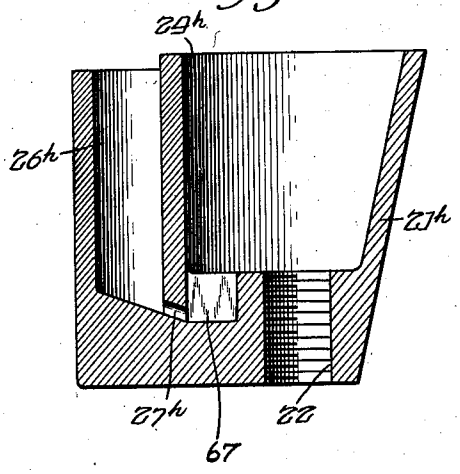
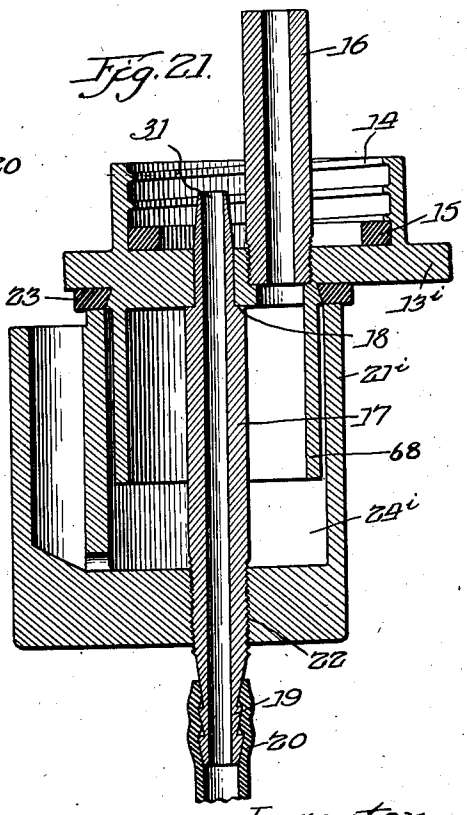


Fig. 21.



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Patented May 2, 1939 2,156,314

UNITED STATES PATENT OFFICE

2,156,314

STERILIZED LIQUID DISPENSING DEVICE

Martin C. Schwab, Chicago, Ill.

Application March 17, 1936, Serial No. 69,323

6 Claims. (Cl. 128—214)

This invention relates to liquid dispensing apparatus of the general character referred to in my application serially numbered 750,392, filed October 27, 1934, that of my application serially numbered 698,544, filed November 17, 1933, now Patent No. 2,010,417, granted August 6, 1935, and that of my application serially numbered 53,649, filed January 11, 1936, and is directed to certain improvements thereover.

This invention is particularly directed to the provision of a sterilized liquid dispensing apparatus having distinct advantages over my aforementioned applications and patent in that the present assembly is contrived to retain the liquid displaced from the final washing chamber at the time of first placing the assembly in position for use as well as liquid added thereto and to control the amount of liquid returned to the final washing chamber. All of the liquid used in the washing is permanently segregated from the liquid being dispensed. In addition, there is also the provision of a plurality of separate chambers either for additional washes or for medication and they may also be used as means of readily securing a sample of the washing liquid in order to determine the bacterial count thereof. The accessibility of individual chambers also permits the removal of any sedimentation.

The assembly of my present device is readily sterilized and is capable of portable use as well as being sold as a part of the container. Other advantages of my invention, including the features embodied in my prior applications, reside in the association of my invention, the dispensing assembly, and a container of sterilized liquid to be administered by subcutaneous or intravenous injections. Further objects are to provide a construction of maximum simplicity, economy and ease of assembly and such further objects, advantages and capabilities as will later more fully appear and as are inherently possessed thereby.

My invention further resides in the combination, construction and arrangement of parts illustrated in the accompanying seven sheets of drawings, and while I have shown therein a preferred embodiment together with other embodiments, it is to be understood that the same are capable of further modifications and changes as are comprehensive to the details and construction without departing from the spirit of my invention.

Referring to the drawings:

Figure 1 is a vertical section of one embodiment of my invention showing the dispensing device of my invention attached to a portion of a bottle.

Figure 2 is a plan view of my dispensing device taken on the line 2—2 of Figure 1, and looking in the direction of the arrows.

Figure 3 is a vertical section of an embodiment of my invention separated from the screw base which attaches it to the bottle, with the addition of a small ball relief valve.

Figure 4 is a vertical section of another embodiment of my dispensing device, the wash chamber being taken on the line 4—4 of Figure 5, and looking in the direction of the arrows. Also, it should be noted that a portion of the inner wall is broken away to make the construction clearer.

Figure 5 is a plan view of the wash chamber portion on the line 5—5 of Figure 4, looking in the direction of the arrows.

Figure 6 is a vertical section of my dispensing device assembled ready for use, the cap portion of which is taken on the line 6—6 of Figure 7, looking in the direction of the arrows.

Figure 7 is a plan view of the embodiment shown in Figure 6 of the cap portion only, taken on the line 7—7 and looking in the direction of the arrows.

Figure 8 is a vertical section of another embodiment of the cap portion only, with the dispensing tube in position.

Figure 9 is a vertical section of still another embodiment, the cap portion of which is taken on the line 9—9 of Figure 10, looking in the direction of the arrows.

Figure 10 is a plan view of the cap portion shown in Figure 9 taken on the line 10—10 and looking in the direction of the arrows.

Figure 11 is a vertical section of the overflow chamber taken on the line 11—11 of Figure 9 and looking in the direction of the arrows, and shows the overflow chamber attached to the cap portion.

Figure 12 is another embodiment of my invention in vertical section, taken on the line 12—12 of Fig. 13 and looking in the direction of the arrows, and further showing the overflow chambers in a cup-like formation and ready for use.

Figure 13 is a partial plan view taken on the line 13—13 of Figure 12, looking in the direction of the arrows.

Figure 14 is a plan view of another embodiment of the cap portion only, showing the plurality of chambers.

Figure 15 is a vertical section taken on the lines 15—15 of Figure 14.

Figure 16 is a schematic representation of the operation of the embodiment shown in Figures 14 and 15.

Figure 17 is a top plan view of another embodi-

ment of the cap portion with a plurality of chambers.

Figure 18 is a top plan view of another embodiment showing variations of the cap portion with respect to that of Figures 14 and 17.

Figure 19 is a plan view of another embodiment showing variations of the cap portion particularly with respect to Figures 1 and 2.

Figure 20 is a vertical section on the line 20—20 of Figure 19 looking in the direction of the arrows.

Figure 21 is a vertical section showing an embodiment with a variation in the base portion.

Like reference characters are used to designate similar parts in the drawings and in the description of the invention which follows.

Referring more particularly to the drawings, my invention is illustrated in Figures 1 and 2. The dispensing device of my invention comprehends the use of a bottle or container represented by the letter A which has the usual bottle-like body 10 and neck 11 which is provided with the conventional external screw threads 12. The container is shown inverted with my device in position thereon ready for the dispensing of the liquid. The device of my invention consists of a base portion 13, preferably formed of a moldable material which can be readily sterilized, such as metal, glass, hard rubber or the like, provided with internal screw threads 14 adapted to engage those on the neck of the bottle or other container 12 in order to provide ready and easy attachment. A gasket or washer 15 is generally provided to secure water and air-tight sealing, or any equivalent means may be used. Communicating between the liquid in the container A to be dispensed and the wash chamber, there is a stub tube 16 extending only a short distance up into the neck of the bottle. The stub tube 16 may be extended up into the interior of the bottle or container 10 to a height even above the liquid level when the container is inverted in position for dispensing. In this manner only the liquid then in the tube 16 will be delivered to the wash chamber 24 and so foreclose any possibility of additional liquid being passed into the wash chamber and flooding it. The stub tube 16 is always of a sufficient height above the entrance 31 of the dispensing tube 17 so that there is no possibility of air or gas being short-circuited or passing over to and being carried by the flow of liquid passing out through the dispensing tube 17. This stub tube is made of metal or any other suitable material which can be readily sterilized. The tube for conveying the liquid to be dispensed is indicated as 17. This dispensing tube extends into the neck of the bottle only a short distance and is secured to the base portion by a drive fit and aided by the shoulders 18, makes an air and water-tight joint. Obviously, this dispensing tube, which is made out of any suitable material which can be readily sterilized, may be inserted in the base portion by any other suitable means. At the outlet end of this dispensing tube, there are notches 19 which facilitate the air and liquid-tight attachment of the conveying tube 20. The cap portion 21 is screwed tightly to the base portion 13 by means of threaded aperture 22, a gasket 23 being interposed between the top of the cap and the base in order to secure an air and water-tight joint. Here again, equivalent means are fully contemplated. It will be noted that the dispensing tube 17 passes entirely through the cap portion 21.

The cap portion 21 being substantially hollow, there is provided an inner chamber 24 which I have termed the final wash chamber or wash chambers. Attached to and forming a part of the cap portion, there are one or more wing portions 25 provided with another chamber 26, which I have termed the overflow chamber. This overflow chamber communicates with the wash chamber through the port 27. At the top of this overflow chamber I provide, optionally, a cap 28 provided with an opening 29 which is open to the atmosphere, or I may leave the entire overflow chamber 26 open. It is to be understood throughout that the term air includes other gases, as any suitable gas may be used. Also, I provide, optionally, a cleanout vent which is made accessible by the screw plug 30.

With the device as described and provided, the liquid is to be dispensed from the container A in substantial accordance with the following description. The complete assemblage after sterilization may be attached and form the capping portion of the bottle as sold or it may be attached at the point of dispensing. In either event, the bottle is inverted and held in position by a suitable holder. The liquid in the container A is held against flow by any suitable flow control means (not shown) such as a thumb clamp, for example, attached conveniently on the conveyor tube 20.

Immediately upon the inversion of the bottle or other container A, some of the liquid will drip or flow from the tube 16 into the wash chamber 24 and thence through the port 27 into the overflow chamber 26 and will continue to do so until the atmospheric pressure exerted on the liquid in the overflow chamber 26, either through the open top or the vent 29 in the screw cap 28, equalizes the pressure built up in the wash chamber 24.

Upon releasing the flow control means (not shown) to convey the liquid to an injection needle, or for any other purpose, surgical, industrial, or otherwise, the liquid flows by gravity from the container A downwardly through the dispensing tube 17, thence to the conveyor tube 20. When the level of the liquid in the container A reaches the level of the opening 31 in the dispensing tube 17, the flow ceases. Thus, the last one-half or three-quarters of an inch of liquid remains in the neck of the bottle, and is not dispensed. This is arranged intentionally to prevent any sediment or other possible impurities from being carried to the patient.

As the bottle or other container empties, a partial vacuum is formed in the container in the space vacated by the liquid. Therefore, immediately upon the release of the flow control means, the pressures become unbalanced, and the atmospheric pressure in the overflow chamber 26 forces the liquid therein back through the port 27 and into the wash chamber 24 where it is trapped. The air bubbles up through this liquid and escapes upwardly through the stub tube 16, bubbling upwardly to the space vacated by the dispensing of the liquid. Of course, if the tube 16 extends to a point above the liquid level the air will be delivered without previous contact with the liquid being dispensed. The air coming in through the overflow chamber 26 bubbles rapidly up through the trapped liquid in the wash chamber 24 with considerable ebullition and so receives a thorough washing and cleansing. Thus, when the air escapes up through the sterilized liquid being dispensed from the container A or through the tube 16, it is free from dust, lint, foreign bodies or other material, including

bacteria which may be entrained in the air and so will not contaminate the liquid.

It will be observed that none of the liquid which drips into the wash chamber 24 upon inverting the container and placing the assembly in use, which liquid is in turn forced into the overflow chamber 26 through the port 27, is lost. This serves two useful and important purposes among others. The overflow chamber collects the liquid and prevents it from not only being lost but eliminates any difficulty of having the liquid spurt out into the open, or at least from wetting the floor. Also, by not losing this liquid a sufficient amount is thereby returned to the wash chamber 24 and so ensures a sufficient and satisfactory wash and purification.

In the event the pressure in the wash chamber builds up too fast, or is excessive so that the liquid in the overflow chamber 26 is forced to a level at which it will overflow, I have provided a relief valve 32 which is shown in Figure 3 as the conventional type of relief valve. It is, of course, understood that any suitable type of valve may be used for this purpose.

It should also be noted in connection with the amount of the liquid returned to the wash chamber 24, that there should be enough to secure the thorough washing and cleansing of the air but not too much so that the violent ebullition might by any chance cause a splashing up through the stub tube 16 and so contaminate the liquid being dispensed. This I control by the overflow chamber 26 so that only the proper amount of liquid is returned to the wash chamber 24. The overflow chamber 26 may be made to hold only the amount of liquid, or less, which is to be returned to the wash chamber 24 or, since this overflow chamber 26 is open and accessible, any excess liquid not desired for washing is easily removed by any suitable means and so the control of the proper amount of liquid returned to the wash chamber 24 is accomplished.

If, for any reason, during the process of administering or dispensing the sterilized liquids, the physician or attendant should wish to take a bacterial count of the liquid in the wash chamber 24, all that is required is to heat or expand the air at the top of the container. This can be conveniently done by placing a towel which has been wrung out in hot water, on the outside, and the resulting expansion of the air at the top on the inside of the container will force, by transmission of pressure, some of the liquid out of the wash chamber 24 through the port 27 and into the overflow chamber 26, from whence it can be removed by any convenient and well known means.

In Figures 4 and 5 I have illustrated a construction embodying all of the features of Figures 1 and 2, with this distinguishing characteristic that all of the chambers are included within the cap portion 21a. In this embodiment of my invention the container A may be of the same construction as that shown in fragment in Figure 1 as well as the base portion 13 and including the dispensing tube 17.

In this form of my invention the wash chamber 24a occupies only a little over one-half of the space available inside the cap portion 21a and is separated from two smaller chambers 33 and 34 by the baffle 35, which baffle extends from the top to the bottom of the chamber 24a. The operation is similar to that previously described, but has additional features which are highly desirable.

Using this embodiment, immediately upon inversion of the container A some of the liquid will drip or flow therefrom through the tube 16 and into the wash chamber 24a. This liquid passes through the port 36 at the lower portion of the washing chamber 24a and into the overflow chamber 33. As this overflow chamber 33 begins to fill, there is a port 37 in the baffle 38 which separates the two smaller chambers 33 and 34, by means of which excess liquid is passed to the chamber 34 where it is trapped and segregated during the remainder of the operation. The atmospheric pressure and the air to be cleansed in the washing chamber 24a is obtained through the port 39, passes through the chamber 34, through the port 37 in the baffle 38 into the first overflow chamber and thence through the port 36 and bubbles up through the liquid returned to be retained in the wash chamber 24a.

Upon releasing the flow control means (not shown), as before described, only the liquid which has been retained in the first overflow chamber 33 will be returned to the wash chamber 24a, as any excess has been carried through the port 37 into the second chamber 34 and there trapped. Thus it will be easily seen that the amount of liquid to be returned to the wash chamber 24a may be determined by varying the size of the chamber 33, the height of the port 37 and the place of entrance of the port 36. By varying any one of these elements, only a measured amount of liquid will be returned to the washing chamber 24a.

Referring now to the form of invention shown in Figures 6 and 7, all of the features are identical to those shown in Figures 1 and 2 except that the wing portion 25b has two separate smaller chambers 26b and 26b'. The chambers 26b and 26b' are connected by the duct 40. Both of the chambers 26b and 26b' have removable screw caps 41 and 42 respectively, and there is a vent or port 43 in the upper part of the outside wall of the chamber 26b'. In principle and in action this is identical with that described in connection with Figures 4 and 5 except that in the cap portion 21b the entire space of the chamber 24b is used for air filtering and washing.

In operation, immediately upon inversion of the container A a portion of the liquid therein flows or drips from the tube 16 into the wash chamber 24b and thence through the duct 27b into the overflow chamber 26b. As this chamber 26b fills, excess liquid will be transported through the duct 40 into the second chamber 26b' where it is trapped and retained until the end of the operation. As soon as the flow control means is released, only that portion of the liquid retained in the overflow chamber 26b will be returned via the duct 27b to the wash chamber 24b. It is obvious, therefore, that the amount of liquid returned from the chamber 26b to the wash chamber 24b may be controlled and regulated by varying any one of the following three elements, i. e., the height of the location of the conduit 40, the size of the chamber 26b and also the point of entry of the duct 27b. This last variant is more clearly shown by reference to Figure 8 wherein the duct 27b is shown leaving the chamber 24b at approximately the bottom thereof and entering the chamber 26b at a point approximately one-half of its length.

It will be easily seen also that by removing the screw cap 41 before liquid is returned to the air washing chamber 24b the attendant may withdraw any portion of a liquid retained temporarily therein and add medicaments or other anti-

septics for cleansing and purifying the air passing through the air filter and wash chamber 24b.

It will also be noted that in Figure 6 the conduit 27b does not enter the wash chamber at its lowermost portion. It may be in some instances desirable to provide a sedimentation space at the bottom of the air filter and wash chamber 24b which will not be disturbed by the ebullition caused by the air bubbling up from the conduit 27b through the liquid in the wash chamber 24b. This sedimentation space is provided by regulating the height of the point of entry of the conduit 27b to the wash chamber.

In the embodiment of my device shown in Figures 9, 10 and 11, the essentials are identical with the disclosures and descriptions previously given, particularly with reference to the Figures 1 and 4 except that in the wing portion 25c, only one chamber is provided. But this one chamber is divided by the baffle 45 into two separate and distinct compartments 46 and 47. Here again the cap portion, 21c, has the entire available space within it useful for the wash chamber 24c. In the top of the baffle 45 there is a port 48 which connects the two compartments and in the second compartment 47 on the outside wall thereof there is a port 49 through which the air to be washed is obtained.

In the operation of this embodiment of my invention, when the assembly is in place upon the outlet of the container with liquid to be dispensed, liquid flows or drips from the tube 16 into the washing chamber 24c and is transported therefrom through the conduit 27c into the first compartment 46. As this compartment fills, the overflow passes through the port 48 into the second chamber 47 where it is trapped and retained during the remainder of the operation. Immediately upon the release of the control means for regulating the flow of the liquid being dispensed, air is drawn in through the port 49 into the first compartment, through the port 48 in the baffle 45 down through the first compartment 46, thence through the conduit 27c into the washing and filtering chamber 24c, upwardly through the liquid returned thereto from the compartment 46 and thence upwardly through the tube 16. Here again the amount of liquid to be returned to the wash chamber 24c may be regulated by varying the size of the first compartment 46, their height of the port 48 and the point of entrance of the conduit 27c.

In Figures 12 and 13 I have illustrated another form of my said invention and it will readily be seen from the drawings that the cap portion 21d is the only element which is changed physically, the operation being identical with that already described. In this particular embodiment the cap portion 21d has been extended at the bottom portion thereof, and the annular wall 50 makes an open cup entirely surrounding the lowermost portion of the device. The outer annular wall 50 and the outer wall of the cap portion 21d form an open chamber 51, a portion of which is blocked off by baffles 52 and 53 to form a smaller open chamber 54. The baffle 52 is the same height as the annular wall 50, but the baffle 53 is lowered to permit the flow of liquid from the chamber 54 to chamber 51.

In the operation of this particular form of the invention, when the cap and base are placed in position on the container with liquid to be dispensed, again a portion of the liquid flows or drips down through the tube 16 into the wash chamber 24d and passes out through the conduit 27d into the chamber 54. This chamber 54 will fill up to the height of the baffle 53, and any excess liquid flows over into the open chamber 51 and is trapped there until the end of the operation, or may be readily removed. Upon releasing the flow control means, as before described, only the liquid which has been temporarily retained in chamber 54 will be returned to the air filter or wash chamber 24d. Obviously, the amount of liquid returned thereto can readily be regulated by varying the size of the chamber 54 and varying the height of the baffle 53.

In Figures 14 to 18, inclusive, I have illustrated my invention in various associated shapes showing multiple chambers. Multiple chambers often offer advantages such as multiple washings which cannot be had by single air filter and washing chambers. In Figures 14 and 15 the cap portion 21e has the usual full size air filter and wash chamber 24e. Attached to and forming a part of the cap portion 21e is an enlarged wing portion 55 in which there are three individual chambers 56, 57 and 58. All of these chambers are interconnected. The wash chamber 24e is connected to the overflow chamber 56 by conduit 27e near the bottom portion thereof. The overflow chamber is connected to the secondary wash chamber 57 by the conduit 59 near the top portion thereof, and the secondary wash chamber 57 is connected to the secondary overflow chamber 58 by conduit 60. Chambers 56 and 57 are each covered by screw caps 61 and 62 respectively. Chamber 58 is left open to the atmosphere. In this device the operator has an opportunity to secure an additional filtering and purifying of the air by utilizing the secondary wash chamber 57 in which may be placed a liquid to preliminarily filter and purify the air prior to the time it reaches the ultimate air filtering and wash chamber 24e.

In operation and practice, using this form of the invention the cap and base are attached to the container in the manner as hereinbefore described. Upon placing the container in inverted position a portion of the liquid to be dispensed flows or drips into the wash chamber 24e and thence is conveyed through the conduit 27e to the overflow chamber 56. If too much liquid flows into the chamber 56 it will pass through conduit 59 and into the secondary wash chamber 57 where it may be retained or removed as desired. However, only the liquid temporarily retained in the chamber 56 is returned to the wash chamber 24e. To make use of the secondary wash chamber 57 the liquid to be used is put in the open chamber 58. Immediately upon releasing the flow control means, as before described, the liquid in the chamber 56 is returned to the wash chamber 24e via the conduit 27e. The liquid placed in the open chamber 58 is forced by the incoming air into chamber 57. To illustrate the action which takes place in this form of the invention, I have shown schematically in Figure 16 the various chambers and indicated a typical path or movement of air through the device up to the point of delivery to the container through the tube 16 using the same reference numerals to indicate similar parts.

In operation, the air comes in through the open tube of the chamber 58, then passes through the conduit 60, up through the liquid in the preliminary wash chamber 57 and is washed and filtered in this passage. The air then proceeds through the conduit 59 into the overflow chamber 56 where it passes downwardly and is conducted

through conduit 27e into the liquid in the air filter and wash chamber 24e and receives a second and final filtering and washing therein.

In the multiple chamber form represented schematically in Figure 16, the overflow chamber 56 and the duct 27e may be eliminated so that the wash occurs only in the chamber 57. If this is done the liquid which drips or flows through the tube 16 will be retained in the cap portion 21e but will not be used in washing as the air will pass through the duct 59 into the top portion of chamber 24e.

In Figures 17 and 18 I have shown similar multiple-chambered cap portions in plan where the separate chambers 56f, 57f, and 58f in Figure 17 and 56g, 57g, and 58g in Figure 18 are covered with a single screw cap, the screw threads for which are indicated as 63 and 64, respectively. The chambers 58f and 58g, both being covered, an air intake is provided in the outer wall at 65 and 66, respectively.

In the embodiment shown in Figures 19 and 20 it will be seen that the sides of the chambers 24h and 26h have been straightened for aid in manufacture if this form is desired. This embodiment enlarges the liquid capacity of the lower part of the wash chamber 24h and if the volume of liquid, in operation, returned from the overflow chamber 26h does not bring the level of the liquid to a high enough point in the wash chamber to insure a thorough washing and filtering, a well 67 may be provided in the cap portion 21h at the point of entry of conduit 27h. The provision of this well 67 will give a sufficient column of liquid to give the necessary washing and filtering to the air or gas passing through.

It will be noted also in this embodiment that the bottom of the chamber 26h is slanted toward the conduit 27h. This has been done to secure fairly complete drainage of the chamber 26h upon the return of the liquid to the wash chamber 24h.

The figure 21 shows a variation of the embodiment of the base portion which has been unchanged in the other figures. It will readily be seen that the base portion 13i is similar to the other disclosures herein except that a skirt portion 68, integral therewith, has been added. The skirt portion 68 extends down into the wash chamber 24i about two-thirds of the distance. Above, the joints between the cap portion and the base portion have been described as air and water tight. This has been done to prevent the introduction of air or gas which has not been washed and filtered. As a further precaution the skirt 68 may be added as shown. Possible air leakage between the base 13i and the cap 21i would be deflected downward between the inner wall of the cap portion 21i and the outer wall of the skirt 68. Any air or gas so leaking in would be so carried to a point below the level of the washing liquid in the chamber 24i, and so would be washed and cleansed before escape upwardly into the container.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a container having an outlet and adapted to be inverted for discharging liquids therefrom, an air filter and fluid dispensing assembly comprising two or more interconnecting overflow chambers and an air washing and filter chamber connected to one of said overflow chambers, and means for returning a predetermined amount of liquid permanently excluded from the liquid to be dispensed.

2. In combination with a container having an outlet and adapted to be inverted for discharging liquids therefrom, an air washing assembly adapted to be removably secured to the mouth of said container and comprising a dispensing tube centrally located in said assembly, an air washing chamber unconnected to said dispensing tube, an overflow chamber separate from said dispensing tube, and a conduit connecting said air washing chamber and said overflow chamber, said conduit leading into the lower portion of said washing chamber and into an intermediate portion of said overflow chamber and adapted to return a predetermined amount of liquid to said air washing chamber upon dispensing of liquid in said container.

3. In combination with a container having a mouth and adapted to be inverted for discharging substantially pure liquids therefrom, an air washing and dispensing assembly adapted to be removably secured to the mouth of said container and comprising a dispensing duct centrally located in said assembly and extending into said container, an air washing chamber surrrounding said dispensing duct and separated therefrom, and an overflow chamber open to the atmosphere, separated from said dispensing duct, and a conduit connecting said overflow chamber and said air washing chamber at the lower portions of each chamber.

4. In combination with a container having an outlet and adapted to be inverted for discharging liquid therefrom, an air washing and dispensing assembly removably secured to said outlet and comprising a dispensing tube extending into said container, an air washing chamber separated from said dispensing tube, an overflow chamber open to the atmosphere and connected to said air washing chamber, and a second tube leading from said air washing chamber into said container and extending further into said container than said dispensing tube.

5. In combination with a container having an outlet and adapted to be inverted for discharging liquids therefrom, an air washing assembly adapted to be removably secured to the outlet of said container and comprising a cap portion and a wing portion, a dispensing tube centrally located in said cap portion, an air washing chamber in said cap portion unconnected to said dispensing tube, a plurality of interconnected overflow chambers in said wing portion, and a conduit leading from one of said overflow chambers to said air washing chamber adapted to return a controlled amount of liquid to said air washing chamber upon dispensing of the liquid in said container

6. In combination with a container having an opening and adapted to be inverted for discharging liquid through said opening, an air washing assembly adapted to be removably secured to said container and comprising a dispensing tube extending through said assembly and into said container, an air washing chamber separated from said dispensing tube, an annular overflow chamber, said overflow chamber being divided into a plurality of compartments by baffles, one of said baffles being lower than the other to permit flow of wash liquid thereover, and a conduit connecting said overflow chamber and said air washing chamber.

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