Dec. 29, 1936. M. C. SCHWAB 2,065,829

LIQUID DISPENSING APPARATUS

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Fig. 6.

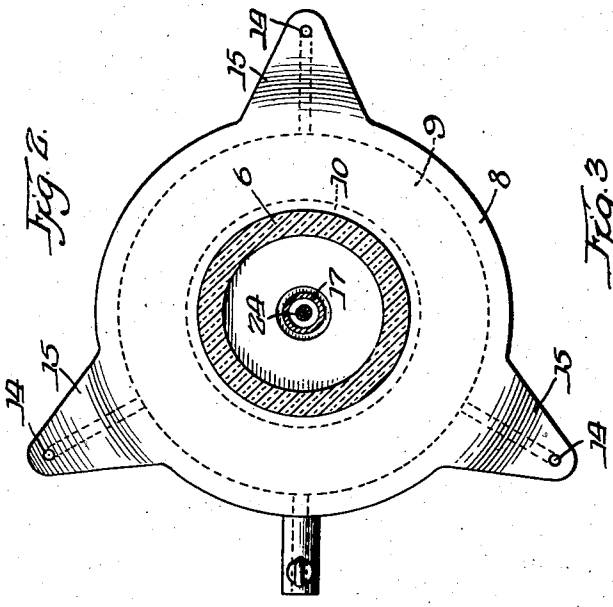
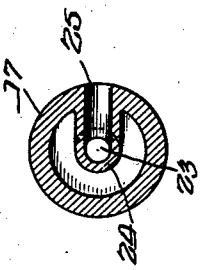


Fig. 3.



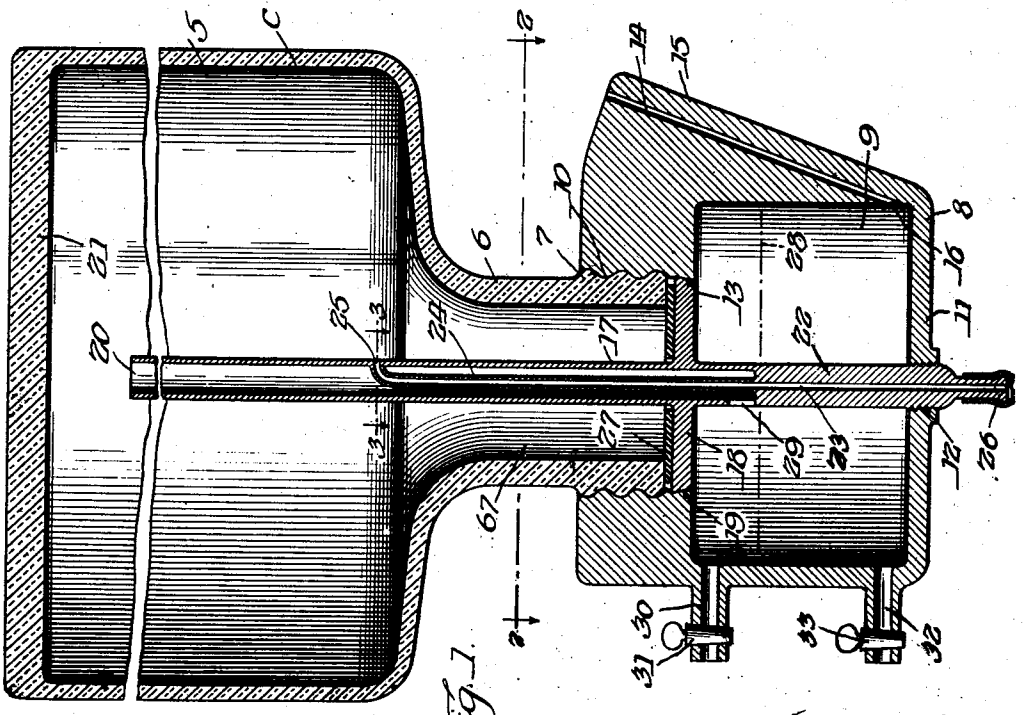


Fig. 1.

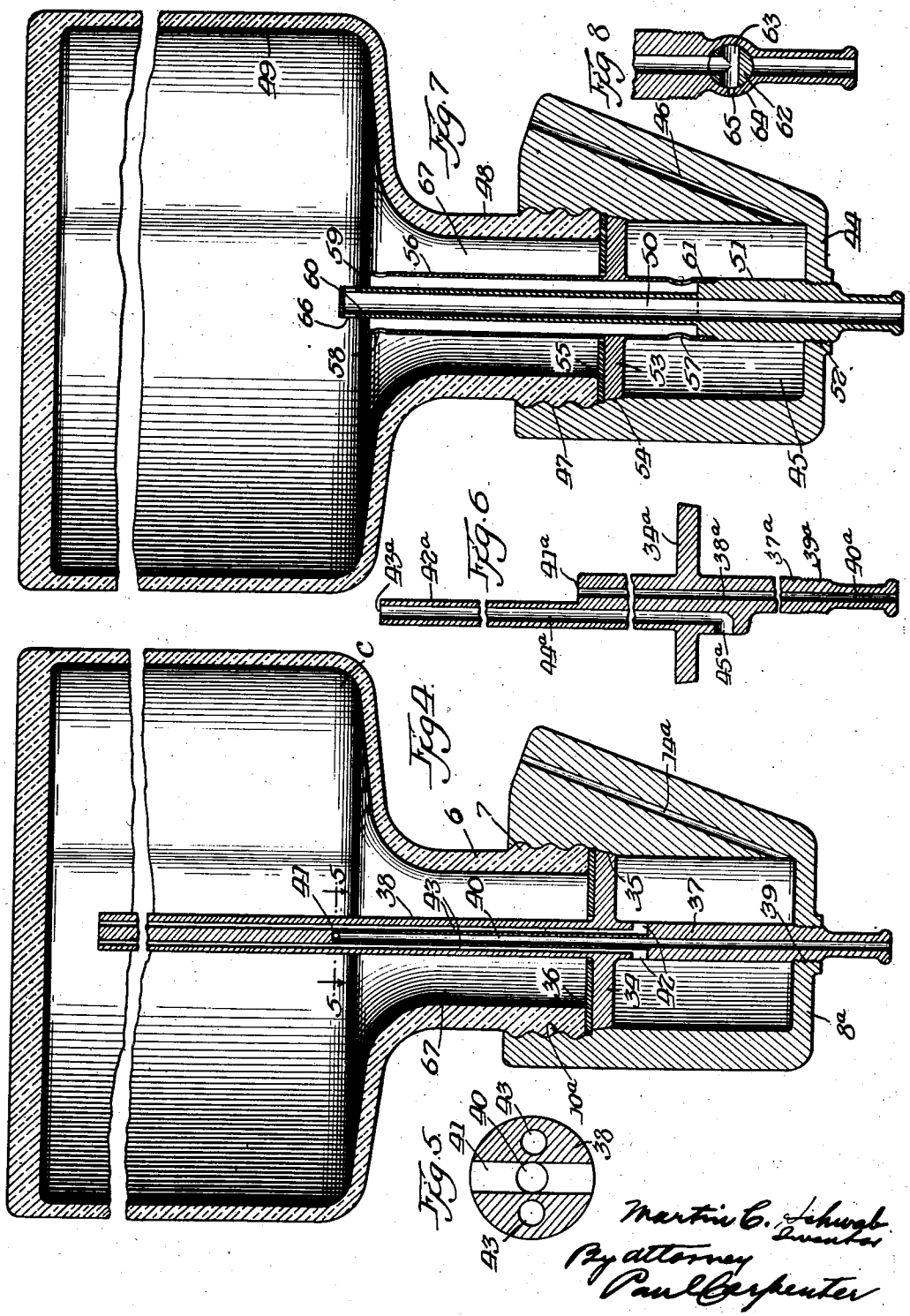
Martin C. Schwab
Inventor

By attorney
Paul Carpenter

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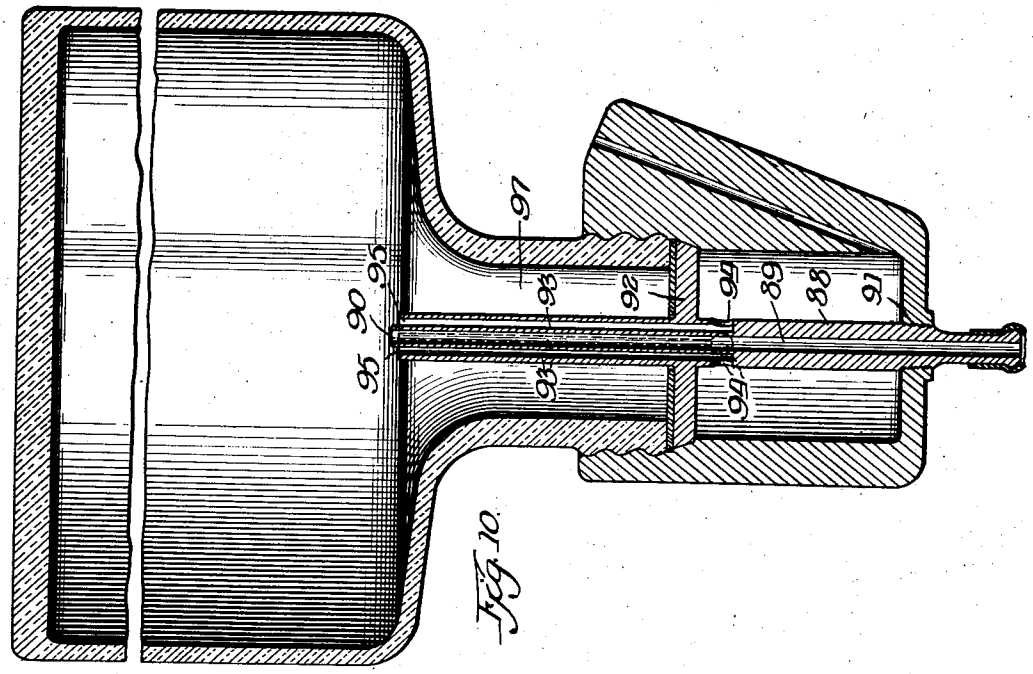


Fig. 10.

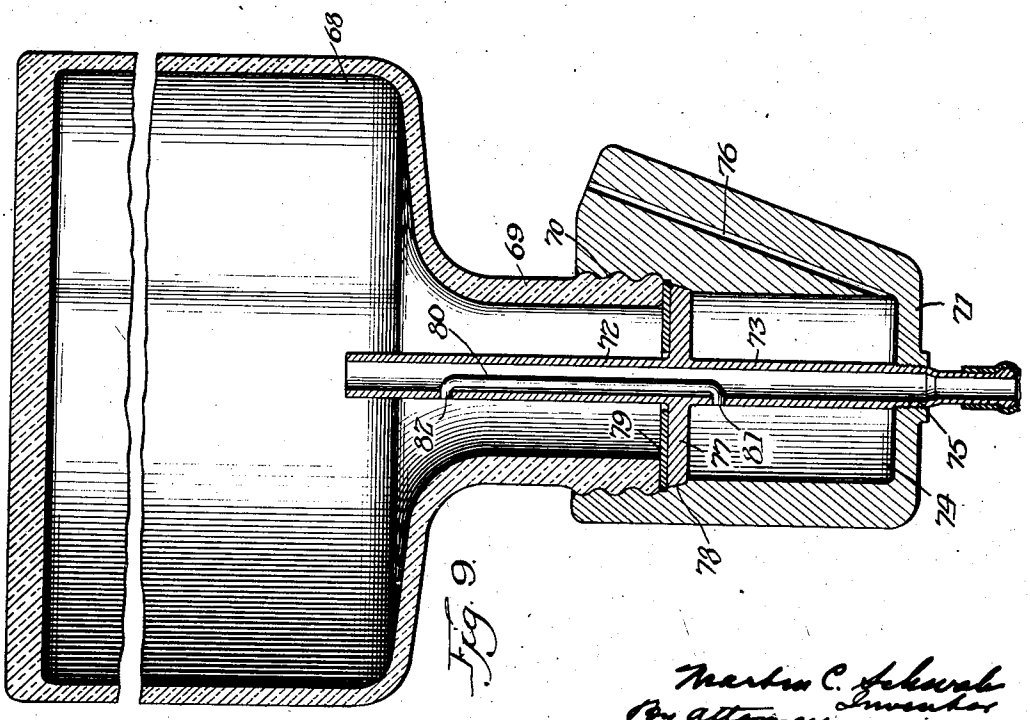


Fig. 9.

Martin C. Schwab Inventor
By attorney
Paul Carpenter

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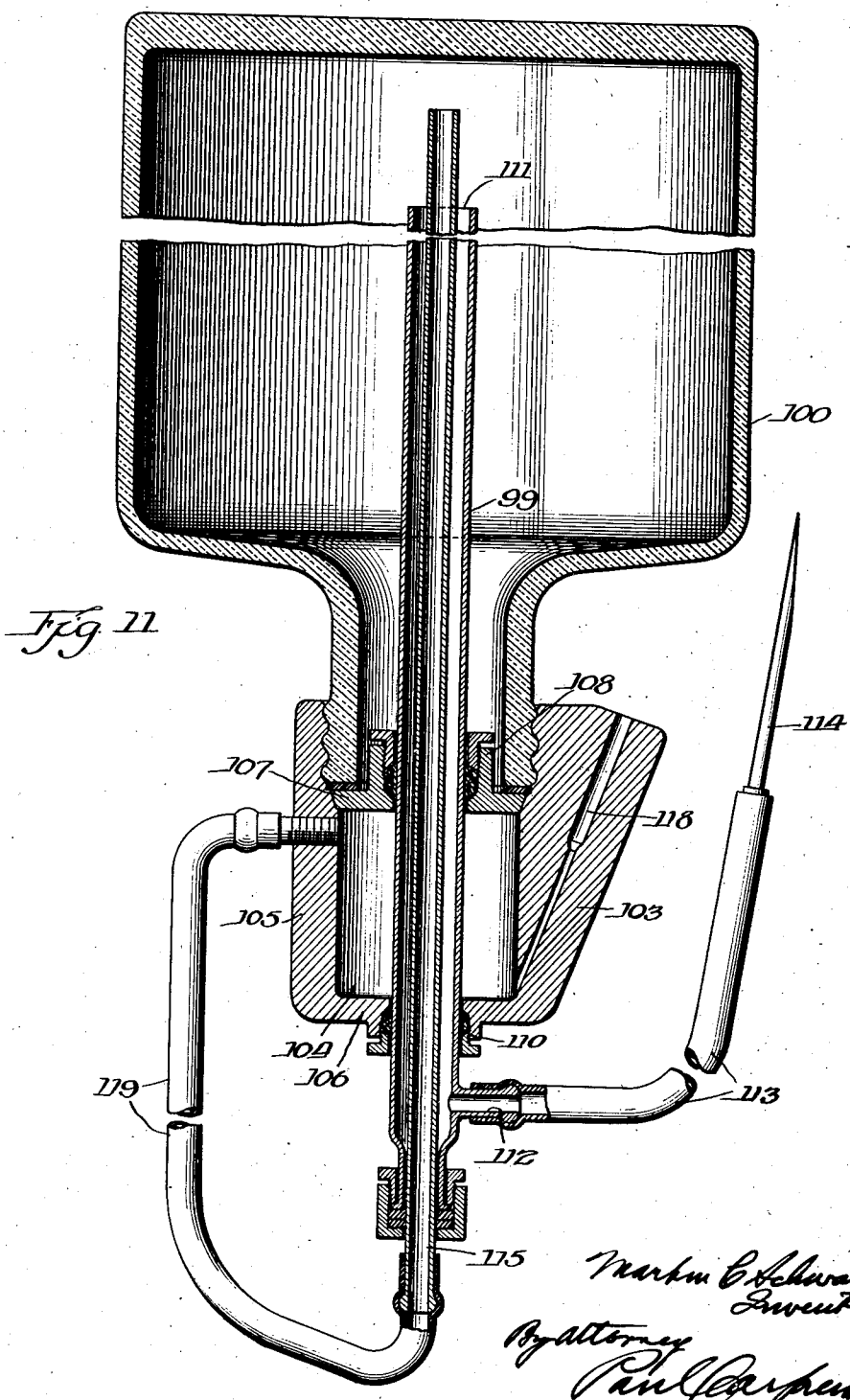


Fig. 11

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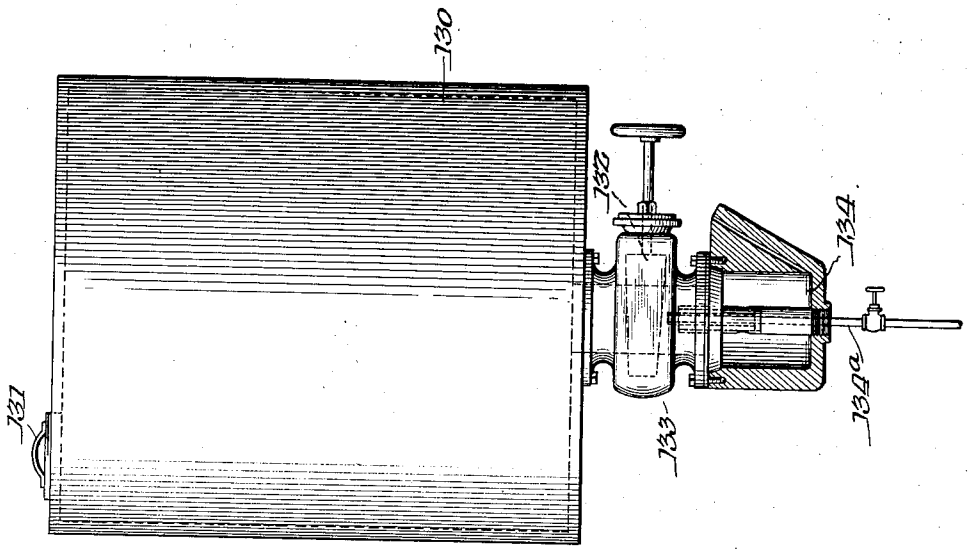


Fig. 13.

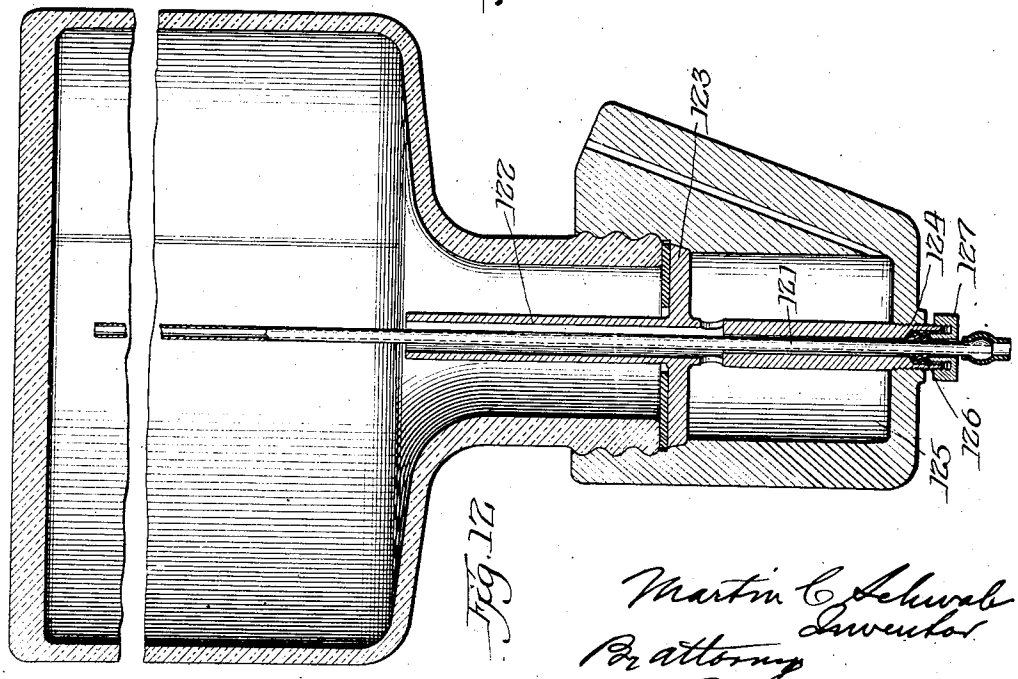


Fig. 12.

Martin C. Schwab
Inventor
By attorney
Paul Carpenter

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UNITED STATES PATENT OFFICE

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LIQUID DISPENSING APPARATUS

Martin C. Schwab, Chicago, Ill.

Application October 27, 1934, Serial No. 750,392

25 Claims. (Cl. 128—214)

This invention relates to improvements in liquid dispensing apparatus, and more particularly to improvements in such apparatus wherein liquids may be extracted from containers of various types without contamination from air or gas necessarily admitted to the container when extracting liquid therefrom, and, while the invention has been illustrated and described as incorporated in a structure for removing liquids from containers for the purpose of subcutaneous or intravenous injections, it will be understood that the invention may be employed in connection with other containers, and, therefore, finds a wide industrial field of utility.

It is well understood by those skilled in the art that in the treatment of various diseases by intravenous or subcutaneous injections, the introduction of liquids for this purpose is dangerous to the patient, owing to the possibility of foreign matter entering the liquid stream in its path from a container to the patient, and, in my co-pending application, Serial No. 698,544, filed November 17, 1933, now Patent No. 2,010,417, granted August 6, 1935 I have disclosed a number of devices which may be employed for extracting liquid from a container and, at the same time, permitting air, gas or other substances to enter or be introduced into the same through a portion of the liquid contents of the container so that this entering air, gas, or other substance is washed. However, inasmuch as the entering air is washed by a portion of the liquid of the container which is not excluded from the remaining portion of the liquid, there remains a danger of foreign particles, sediment and the like, being stirred up in the liquid and getting into the stream of liquid flowing from the container. In the present invention, I have provided an improved means which prevents the portion of the liquid which performs the washing function from coming into contact with the liquid being extracted from the container.

The principal objects and advantages of the present invention reside in the provision of an improved liquid flow apparatus which may be attached to liquid containers, glass bottles, jars and the like, such as are now commonly used on the market, for extracting the liquid contents of such containers; the provision of an improved liquid dispensing apparatus wherein means is provided for initially trapping a portion of the liquid contents of a container, excluding such liquid from further contact with the remainder of the liquid contents of the container so that air or gas may be admitted through the entrapped liquid before passing to the container, thus removing foreign bodies from the entering air and affording means whereby medicaments and antiseptics in either liquid or solid form may be introduced for sterilizing the washing liquid and the air passing therethrough; the provision of an improved liquid dispensing apparatus of the character described which is a unitary structure adapted to be secured to an opening of a container for liquid and including parts which may be readily separated for sterilizing the liquid dispensing apparatus after the same has been employed for draining a container; the provision of an improved liquid dispensing apparatus in which a washing chamber is provided for entrapping foreign bodies which may enter through an air stream to be washed; and the provision of such an apparatus which, when applied to a container, cooperates with a portion of the container to afford a sediment chamber in the container itself remote from the point of extraction of liquid from said container; and the provision of a liquid dispensing apparatus of the character referred to which is relatively simple in form and is capable of manufacture at a low cost.

The foregoing and such other objects and advantages as may appear or be pointed out as this description proceeds are illustrated in the accompanying drawings, in which:

Figure 1 is a fragmentary, vertical, sectional view of the device of this invention;

Figure 2 is a horizontal, sectional view taken on the line 2—2 of Figure 1, looking in the direction indicated by the arrows;

Figure 3 is a horizontal, sectional view taken on the line 3—3 of Figure 1, looking in the direction indicated by the arrows;

Figures 4, 6, and 7 are fragmentary, vertical, sectional views of alternative forms of this invention;

Figure 5 is a horizontal, sectional view, taken on the line 5—5 of Figure 4, looking in the direction indicated by the arrows;

Figure 8 is a sectional view of a valve member;

Figures 9 and 10 are sectional views illustrating further modifications of the invention;

Figures 11, 12 and 13 are fragmentary, sectional and elevational views, respectively, of further alternative forms of this invention.

Referring now more particularly to the drawings, and first to Figure 1, the liquid dispensing device of my invention is shown in position on a container C inverted and ready for extraction of liquid from the container. This container C has

a body portion 5, and a neck 6 having the conventional external screw threads 7 which, in shipment, serve to receive a screw cap, not shown, for sealing the container.

The dispensing apparatus includes a casing 8 preferably formed of a moldable material, such, for example, as metal, glass, bakelite, hard rubber or the like, and is formed, preferably, generally cylindrical, said casing having a chamber 9 for liquid, said chamber having an enlarged opening at one end formed with screw threads 10 complemental to the screw threads 7, so that the same may be applied to the neck of the bottle or other container 7. Where the device is to be applied to other containers, a suitable connection may be provided complemental to the particular type of container to be drained.

The wall 11 of the casing 8 is provided with a threaded aperture 12, and at the inner terminus of the screw threads 10 the opening defined by said screw threads is formed with a tapered portion 13.

The casing 8 is provided with one or more air inlet ports 14 formed in wing portions 15 which may serve the purpose of facilitating application of the casing and air-tight connection of the same with the container, the air inlet ports 14 admitting air to the casing at 16 adjacent to the wall 11.

The threaded opening in the casing 8 receives a liquid dispensing structure comprising an outer tubular member 17 having a partition 18 whose perimeter 19 is tapered so as to snugly fit the tapered portion 13 of the threaded opening in the casing 8, said tubular member 17 extending outwardly from said casing 8, and, when applied to a container as shown in Figure 1, the outer open end 20 of the tubular member 17 is located adjacent to the wall 21 of the container which, when the container is in an upright position, would be termed the bottom.

Within the chamber 9 on the partition 18 and extending axially thereof a tubular portion 22 is provided having an axial duct or passageway 23 communicating with an internal liquid discharge tubular member 24, the latter extending through the tubular member 17 and having an opening through the wall thereof as indicated at 25. This opening is adapted to receive liquid from the container for discharging the liquid therefrom and is located at a convenient point beyond the partition 18 so as to drain most of the contents of the container when in the position shown in Figure 1. It will be understood that, in the position shown in Figure 1, the opening 25 is a sufficient distance above the partition so that any sediment or foreign bodies which may collect above the partition in the neck 6 of the bottle or container C will not pass out through the opening 25.

It will be understood that the tapered portion 19 may be threaded, or, if desired, either this portion and the aperture 12 may be tapered, or either or both portions provided with threads.

However, in the arrangement shown in the drawings, the tubular portion 22 is externally threaded for engagement with the threaded opening 12 in the wall 11 of the casing 8, and the outer end of the tubular portion 22 is formed with a nipple 26 to which a rubber hose, metal pipe, or the like, may be attached for conveying liquid to an injecting needle or for any other purpose, surgical, industrial or otherwise.

Between the end of the neck 6 of the bottle or container and the outer surface of the partition 18 there is inserted a washer or gasket 27 so that, when the dispensing device is threaded onto the bottle, an air-tight seal will be formed between the neck of the bottle or other container and the dispensing apparatus and between the partition 18 and the casing 8.

In the operation of the device the container will be first opened by removing the conventional screw cap therefrom; thereupon the dispensing device, previously sterilized and in assembled condition, is applied to the bottle or container while the latter is in an upright position. Under these conditions the opening 20 in the tubular member 17 will be presented adjacent the bottom of the container. When the contents of the container are to be used, it is inverted to the position shown in Figure 1, whereupon some of the liquid contained in the container will flow downwardly through the tubular member 17 into the washing chamber 9. The tubular member 17 has its opening 20 presented at a point at a distance from the bottom wall 21 so that a predetermined amount of liquid will drain into the washing chamber 9 up to approximately the level indicated by the dotted line 28. The predetermined amount of liquid thus extracted from the container passes through the tubular portion 17 into the washing chamber 9 through a port 29 provided in the tubular member 17, this port being preferably located in a position substantially opposite to that of the air inlet discharge 16 in reference to the axial line through the tubular portion 22.

It will be understood that the rubber hose shown attached to the nipple 26 will have a flow control means, such, for example, as a clamp, or other means of controlling flow therethrough. Upon releasing such a clamp from the rubber hose, liquid flows by gravity through the inner tubular member 24, such liquid entering at the opening 25. When the level of the liquid in the container C falls below the opening 25, the flow of liquid through the tubular member 24 ceases, and, for the purpose of this invention, the container may then be considered as drained of its useful contents. Air, or, as the case may be, gas, passing through the inlet port 14 discharges into the liquid contained in the wash chamber 9, passes through this liquid and thus has foreign bodies removed therefrom, the air or gas thence passing through the aperture 29, into the tubular member 17, where it discharges and expands, or, as it may be termed, explodes at the opening 20 above the level of liquid in the container.

It will be observed that, for certain purposes, I may provide an auxiliary inlet 30 controlled by a valve 31 for introducing air, gas, or antiseptics into the chamber 9, and I also may provide a drain 32 provided with a valve 33. In normal operation, neither of these last mentioned auxiliary attachments are required, but may become useful in the event of the device becoming air-bound, where heavy or relatively viscous liquids are to be dispensed.

It will be observed that, in the event that it is desired to introduce a medicament, antiseptic or other material into the wash chamber 9, such, for example, as carbolic acid or bichloride of mercury, in liquid or solid form and in desired quantity, such material may be introduced through the inlet port 14.

Referring now to Figure 4, a modified form of the invention shown in Figures 1, 2 and 3 is illustrated, and, in the form of the invention thus shown in Figures 4 and 5, the container C having

the neck 6 and threads 7 is engaged with a casing 8a by screw threads 10a, said casing being provided with one or more inlet ports 14a, and, to this extent, said casing 8a is similar to the casing 8 shown in Figure 1.

To simplify the manufacture for commercial purposes, the liquid dispensing tubular member and air inlet portions thereof may be composed of the partition 34 wedgingly engaged with the casing 8a, as at 35, and secured in position by the engagement of the neck 6 with a washer 36, stem portions 37 and 38 extending from opposite sides of the partition, the stem 37 being in threaded engagement, as at 39, with a wall of the casing 8a, and the stem 38 extending into the container C similar to the tubular member 17 in Figure 1.

The stem portions 37 and 38 are provided with a central bore 40 which forms the liquid discharge passageway and communicates with the interior of the container by a transverse bore 41.

Air or gas is admitted through the wash chamber of the casing 8a from the discharge portion of the port 14a through one or more apertures 42 in the stem portion 37, said apertures 42 communicating with longitudinal bores 43 which extend from the apertures 42 to the outer free end of the stem 38, thus, as shown in Figure 4, establishing communication with the upper portion of the inverted container.

In the form of the invention shown in Figures 4 and 5 it will be observed that manufacturing of the same is conveniently performed by first molding the partition and stem portions as a unit and then drilling the various passageways. Both of the forms of the invention shown in Figures 1 to 5, both inclusive, are readily disassembled for the purpose of sterilizing the same. For example, if it is desired to sterilize these two forms of the invention, the partition and tubular members 17 and 22 of Figure 1 are removed by unthreading the tubular member 22 from the opening 12, and, similarly, the partition 34 and stem portions 37 and 38 are removed from the casing 8a. This permits these elements to be placed in a sterilizer and subjected to boiling water, or its equivalents, for cleaning. It will be observed that the absence of sharp corners and blind apertures facilitates the circulation of a cleaning fluid throughout the parts of the device during such sterilizing operation.

Referring now to the form of the invention shown in Figure 6, which is a modification of the form of the invention shown in Figure 5, the partition 34a is cast or otherwise formed with a stem 37a, the stem being relatively eccentric with respect to the partition and provided with a liquid discharge opening 38a which is substantially concentric with the axial line through the partition 34a and with respect to the axial line through the casing 8a of the wash chamber. The lower end of the stem 37a may be reduced in size, as indicated at 39a, and externally threaded, as at 48a, for engagement with the casing 8a.

The stem 37a is extended on the other side of the partition 34a and is formed with a shoulder 41a which terminates the liquid discharge opening 38a at the desired point in the container.

The stem 37a then extends, as indicated at 42a, to provide air discharge 43a above the level of the liquid in the container, the passageway 44a for air having a connection 45a with the wash chamber on the other side of the partition 34a. It will be seen that in this form of the invention the construction of the dispensing member is simplified so that it may be inserted or removed, as desired, and is a substantially unitary structure, the passageways therein being substantially uninterrupted so as to facilitate cleaning and sterilizing.

The forms of the invention shown in Figures 1 to 6 are suitable for use in bottles or containers which are in common use and on the market today, and these containers generally are of about a quart size. However, in some instances containers are of larger or smaller size, and I have, therefore, provided a modified form of this invention for employment in containers of any size.

One form of the dispensing apparatus which is adapted for use in containers, irrespective of size, but which ordinarily have the same neck size, is shown in Figure 7. In this form of the invention the casing 44 is provided with a wash chamber 45 to which air or gas may be admitted through the port 46 below the level of entrapped liquid in said wash chamber.

In this form of the invention the casing 44 may be in threaded engagement, or otherwise, as at 47, with the neck 48 of a container 49.

The dispensing conduit and the air or gas inlet conduit are arranged in substantially concentric relationship, the liquid discharging or dispensing conduit 50 being a substantially straight bore through a stem member 51 which may be in threaded engagement, as at 52, with the fixed wall of the casing 44.

A partition 53 is arranged to have wedging or other sealed engagement, as at 54, with the inner wall of the wash chamber 45, and a gasket 55 is interposed between the bottle neck and the partition 53 to form a seal at this point.

The partition 53 is carried by the outer tubular member 56 forming the air or gas inlet to the container from the chamber 45, said tubular member 56 being provided with apertures 57 adjacent to the stem 51 within the chamber 45, and further provided with apertures 58 at the outer end of said tubular member 56. The outer end of the tubular member 56 is provided with a wall 59 apertured to receive the projecting portion 60 of the liquid discharge tube 50, and has a wedging engagement at this point with said tubular member 56. The inner end of the tubular member 56 is in threaded engagement, as at 61, with the stem 51, so that these two members may be readily separated when removed from the casing for sterilizing.

In the operation of this form of the invention, when the casing 44 is first applied to the bottle, and the same is inverted, liquid completely fills the chamber 45 and tubular member 56, and enters the tubular member 50, the entrapped air in said tubular member 50, either escaping from the same into the container or bottle above the the liquid level therein, or being compressed in the discharge tubular portion 50. Ordinarily, it might appear that liquid will rise from the chamber 45 out of the port 46. However, inasmuch as the size of the tubular member 50 is such as to permit the exhaust upwardly of air, and the downward flow through the passageway 50 of the column of liquid, such liquid is of sufficient weight to overcome the inertia of liquid contained in the column defined by the space between the tubular members 50 and 56. Thus air entering the port 46 and passing through the liquid in the wash chamber 45 affords a continuing flow of liquid from the container downwardly through the tubular member 50.

Under some conditions, with relatively viscous liquids, trouble may be experienced in starting

fluid downwardly through the passageway 50, inasmuch as the air contained therein finds difficulty in getting past a viscous liquid attempting to flow downwardly through said passageway. In order to release entrapped air under these conditions and thus start the liquid column flowing downwardly in the passageway 50, I may provide a plug valve member 62 (shown in Figure 8) controlling the passageway 50, said plug valve member having a T-shaped passageway 63, and the casing 64 of said valve being provided with a bleed opening 65. When the valve is in the position shown in Figure 8, liquid entering the tubular member 50 at the top thereof, upon inverting the bottle, causes the air to escape at the bleed 65. As soon as liquid appears at this aperture, the operator rotates the valve to the right, as viewed in Figure 8, so as to close the bleed 65 and place the passageway 63 in position to discharge liquid from the lower end of the liquid discharge passageway 50. When flow of the liquid commences in the passageway 50, it will continue to flow until the valve is either closed by a complete rotation to close the passageway 50 or until the level of liquid in the container falls below the openings 66 in the outer end of the tubular member 50.

In all of the forms of the invention described, the spaces indicated at 67 between the tubular members and the neck of the bottle serve as sediment traps, it being observed that any liquid drawn off from the container is taken from such a distance above the bottom of the sediment trap that sediment cannot pass out of the trap into the liquid discharge conduit.

Referring now to the form of the invention shown in Figure 9, I provide the container 68 having a neck 69 and having threaded engagement at 70 with a casing 71 of the dispensing device.

The dispensing device comprises a tubular member having the portions 72 and 73, the former extending into the container, and the latter passing through the wash chamber 74 and having threaded engagement at 75 with an aperture in a wall of the casing 71. Air and/or gas is admitted to the wash chamber through the inlet port 76.

The tubular members 72 and 73 which are substantially in alignment are formed with a partition 77 having wedging engagement at 78 with the cylindrical wall of the casing 71, and a gasket 79 is interposed between the adjacent end of the neck 69 of the bottle and the partition 77 so as to form a seal at this point.

It will be observed that the tubular member 72 is provided with a by-pass 80 which lies within the tubular member 72 and is in communication with the wash chamber 74 at 81, and at its other end is in communication with the interior of the container to which the device is applied, as indicated at 82. It is preferred that the connection 82, when the container is inverted as shown in Figure 9, be below the inlet of liquid to the top of the tubular member 72 so that during dispensing of the liquid from the container the weight of liquid in said passageway 72 flowing out will overcome any tendency for liquid to flow back from the point 82 to the point 81.

Air entering the passageway 76 rises through the liquid contained in the wash chamber 74, thence through the by-pass 80 and into the container, permitting liquid to flow downwardly through the tubular members 72 and 73 for draining the container.

Referring now more particularly to Figure 10, there is provided the washing chamber 84 in the closing cap or casing 85, the closing cap having engagement with the neck 86 of a bottle 87, or the like, similarly to the other forms of the invention.

The liquid dispensing member is designated 88, and is provided with a central bore 89 which extends into the bottle and is provided with an opening 90 for receiving liquid from said bottle or other liquid container. The opposite end of the member 88 is in threaded engagement, as at 91, with a wall of the casing, and the partition 92 is provided for sealing the opposite end of the casing to form the wash chamber.

In order to permit air to pass from the wash chamber into the container, the member 88 is provided adjacent to the passageway 89 with one or more air ducts 93 which communicate at 94 with the interior of the wash chamber and discharge air at 95 adjacent to but below the opening 90 when the device is in the position shown in Figure 10. By arranging the relative sizes of the passageways 89 and 93 air does not become trapped in the passageway 89 but may pass upwardly into the container, thus allowing liquid to flow downwardly through the passageway 89. Air is thereupon drawn into the wash chamber from the air inlet 96 and passes through the ports 94 and ducts 93 into the container.

It will be observed that, similarly to the other forms of this invention, sediment or other foreign bodies present in the liquid of the container are allowed to settle in the space 97 between the neck of the bottle and the adjacent wall of the liquid dispensing device. Owing to the arrangement of the openings 93, it is impossible for foreign bodies to rise from the wash chamber into the container, and thus liquid discharged from the container will be found to be free of all contamination due to sediment or other foreign bodies.

Referring now more particularly to the form of the invention shown in Figure 11, I provide an adjustable liquid dispensing conduit 99 which extends into the container 100, whose neck portion 101 is connected at 102 to the casing 103 having a wash chamber 104 defined by the walls 105 and 106 and partition 107. The conduit 99 passes through the partition 107, a suitable gasket or packing 108 serving as a seal between the wash chamber 104 and the contents of the bottle or other container 100. Similarly a gasket or packing is provided at 110 in the wall 106. It will be observed that one may readily adjust the liquid discharge conduit axially of the casing 103 and container 100 for, as it may be said, raising or lowering the open end 111 of the conduit 99 in the container when the latter is inverted as shown in Figure 11.

Liquid entering the conduit 99 may be conveniently discharged therefrom through an outlet 112 located exteriorly of the casing 103, thence to a flexible conduit 113 and an injection needle 114.

Within the liquid discharge conduit 99 and arranged substantially axially thereof, I provide an air inlet conduit 115, whose lineal dimension is such that it may extend beyond the opening 111 and beyond the opposite end of the liquid discharge member 99. A suitable packing member 116 and retaining nut 117 therefor may be provided, which permits relative axial adjustment of the members 99 and 115.

It will be understood that axial relative ad-

justment of the members 99 and 115 is thus permissible, or independent axial adjustment thereof with respect to the casing 103 and container 100 as desired.

If desired, a suitable washing fluid may be introduced through air port 118 into the wash chamber 104. Air or gas admitted through said port 118 may, where desired, pass through a connection 119, preferably flexible, between said chamber to the air inlet conduit 115. Under these circumstances, any air or gas entering port 118 becomes thoroughly washed before reaching the container 100 through passageway 115.

If desired, upon first inverting the container, a predetermined quantity of the contents thereof may be introduced into the chamber 104 as the washing fluid by inserting the needle 114 into the port 118, it being understood that air entering with such liquid is washed and passes out at the port 120, the flexible connection 119 being temporarily disconnected.

When the desired quantity of liquid is trapped in chamber 104, the connection 119 is again applied, and upon extraction of liquid, the air, to satisfy the withdrawal of liquid, enters at port 118, passes through liquid contents of chamber 104, is washed, thence passes through connection 119 and passageway 115 and to the container. However, by lowering the conduit 115, if this member has not entrapped enough liquid upon inversion of the assembly, liquid may be discharged therethrough to the chamber 104 through the connection 119 and the port 120, discharging the air through the port 118. When the chamber 104 has been filled, the conduit 115 may be raised again.

Referring now more particularly to the form of this invention shown in Figure 12, it will be observed that the tubular liquid discharge conduit 121, corresponding to the liquid discharge member 50 of, say, Figure 7, is axially adjustable within the air inlet conduit member 122, which latter, while having partition 123, and being sealed at 124 in wash chamber 125, yet is provided with a packing 126 and packing nut 127, thus permitting adjustment of the liquid discharge conduit 121 within a container 128, for controlling the quantity of liquid discharged therefrom through said conduit 121.

For industrial purposes, the various forms of my invention may be installed as desired, one structural embodiment for such purposes being illustrated in Figure 13.

In Figure 13, a container 130 for liquids from which it is desired to exclude impurities, foreign bodies, dust and the like, is provided at 131 with a filling opening, which latter is normally sealed when the container has liquid therein to be eventually dispensed therefrom.

The container 130 is provided with a main outlet control valve 132 of any conventional form, either of the plug or gate type. The casing 133, however, of said control valve 132, is so constructed as to permit of attachment thereto of the various liquid washing devices of the present invention, generally indicated at 134 in Figure 13, having liquid drain conduit 134*a*. For example, should the form of the invention shown in Figure 11 be employed, of course, when the casing 103 is secured to valve casing 133, the tubular members 99 and 115 are retracted until the plug or gate valve 132 is moved to open position, whereupon the tubular members 99 and 115 may be extended into the container 130 to the desired position through the open valve.

It will be understood that the other forms of the invention shown may be similarly applied. Drainage of the liquid contents of the container, after reopening valve 132, occurs in a manner similar to that disclosed in the other forms of the invention.

It will be understood that a choice of materials is available for construction of the wash chamber and/or the liquid discharge passageways in all of the forms of the invention shown; that is to say, if desired, where certain liquids are to be handled, the inner and/or outer surfaces of the tubular members may be lined with acid-resisting material, such, for example, as a glass lining or the like, so that while ordinarily the employment of a glass tube may be undesirable because of its fragileness, it can be employed where reinforced by a tubular or other wall member constructed of bakelite, metal, or the like.

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

1. In a liquid dispensing device for combination with a primary liquid container, a casing having means for attaching the same to said container and affording a chamber for liquid, said chamber having an air inlet at one end below the normal level of the liquid in said chamber which is positioned for directing and, during operation, discharging the air through the liquid in said chamber and a partition at the opposite end thereof, a conduit extending from said chamber through and having an opening beyond said partition, and a second conduit passing through said chamber and partition.

2. In a liquid dispensing device for combination with a primary liquid container, a casing having means for attaching the same to said container and affording a chamber for liquid, said chamber having an air inlet at one end below the normal level of the liquid in said chamber which is positioned for directing and, during operation, discharging the air through the liquid in said chamber and a partition at the opposite end thereof, a conduit extending from said chamber through and having an opening beyond said partition, and a second conduit passing through said chamber and partition, and means on said container adjacent an opening of the container for attaching said casing.

3. In a liquid dispensing device for combination with a primary liquid container, a casing affording a chamber for liquid, said chamber having an air inlet at one end below the normal level of the liquid in said chamber which is positioned for directing and, during operation, discharging the air through the liquid in said chamber and a partition at the opposite end thereof, a conduit extending from said chamber through and having an opening beyond said partition, and a second conduit passing through said chamber and partition and having its point of communication below the partition, and means on said casing for suspending and supporting the same adjacent to an opening of the container, said second conduit opening into a container to which the casing is attached above the point of communication of said first mentioned conduit.

4. In a liquid dispensing device for combination with a primary liquid container, a casing having means for supporting the same from said container and having a chamber for liquid, a partition located at one end of said chamber, means adjacent to said partition for connecting said casing to the container for liquid, a conduit ex-

tending from said chamber past said partition for establishing communication between the container and said chamber, a liquid discharge conduit extending through said chamber and partition but isolated from said chamber, and an inlet for air to said casing positioned in relation to the liquid in said chamber during dispensing operation for directing and discharging the air through the liquid in said chamber, which serves to replace the liquid which is being dispensed, said inlet being remote from said partition.

5. In a device of the character described, in combination, a container for liquid, said container having an outlet, a dispensing cap or closure for said outlet, said cap or closure including a casing having an inlet for air positioned below the normal level of the liquid in said casing during operation, directing and discharging the air through the liquid in said casing, a liquid dispensing passageway extending into said container for conducting liquid therefrom through said casing but out of contact with the liquid contents of said casing, and a partition for isolating the contents of the container from the contents of said casing when the container is inverted for dispensing.

6. In combination with a container for gravitationally dispensing liquid, a casing having means for supporting the same from said container and having a chamber for liquid, a partition between the latter and said container, an air inlet to said chamber positioned below the level of the liquid in said chamber during normal gravitational dispensing of the liquid from said container for directing and discharging the air through the liquid in said chamber, an outlet from said chamber connected with said container, permitting replacement of the liquid dispensed by the air passing through said chamber, a connection past said partition between the chamber and said container, and a liquid discharge conduit from said container passing through said partition and chamber.

7. In combination with a container for liquid, a casing having means for supporting the same from said container and having a chamber for liquid, a partition between the latter and said container, an air inlet to said chamber below the normal level of the liquid in said chamber which is positioned for directing and, during operation, discharging the air through the liquid in said chamber, a connection past said partition between the chamber and said container and opening into said container beyond said partition, and a liquid discharge conduit from said container passing through said partition and chamber.

8. In combination with a container for liquid, a casing having means for supporting the same from said container and having a chamber for liquid, a partition between the latter and said container, an air inlet to said chamber positioned in relation to the liquid in said chamber for directing and discharging the air through the liquid in said chamber, a connection past said partition between the chamber and said container, and a liquid discharge conduit from said container passing through said partition and chamber and which may be extended adjustably above the level of liquid in said container.

9. In combination with a container for liquid, a liquid dispensing device including a casing connected adjacent to an opening in the container and having a chamber, a partition between said chamber and container, an air inlet to said chamber, a liquid conducting passage past said partition forming a connection between said chamber and said container for supplying a predetermined quantity of liquid to said chamber from said container in an inverted position of the latter, and an independent liquid discharge conduit passing through said partition and chamber.

10. In combination with a container for liquid, a liquid dispensing device including a casing connected adjacent to an opening in the container and having a chamber, a partition between said chamber and container, an air inlet to said chamber, a connection past said partition between said chamber and said container for supplying a predetermined quantity of liquid to said chamber from said container in an inverted position of the latter, and an independent liquid discharge conduit passing through said partition and chamber, and communicating with said container below said connection when the container is inverted.

11. In combination with a container for liquid, a liquid dispensing device including a casing connected adjacent to an opening in the container and having a chamber, a partition between said chamber and container, a connection past said partition between said chamber and said container for supplying a predetermined quantity of liquid to said chamber from said container in the inverted position of the latter, an inlet for air or gas to said chamber below the level of liquid therein, and an independent liquid discharge conduit passing through said partition and chamber.

12. In combination with a container, a casing having means for supporting the same from said container and having a chamber for liquid, a partition between the latter and said container, an air inlet to said chamber below the normal level of the liquid in said chamber which is positioned for directing and, during operation, discharging the air through the liquid in said chamber, a connection past said partition between the chamber and said container, and a liquid discharge conduit from said container passing through said chamber independently thereof, said liquid discharge conduit having connection with the container above the level of liquid in said chamber.

13. In a device of the character described, in combination, a container having an outlet opening, and a dispenser closure for said opening, means on said closure whereby a predetermined quantity of the contents of said container may be trapped in said closure upon inversion of said container, means on the closure for dispensing the contents of said container independently of the liquid in said closure, and means for excluding the entrapped contents of said closure from contact with the remainder of the contents of said container as they are dispensed from said container.

14. In a device of the character described, in combination, a container having an outlet opening, and a dispenser closure for said opening, means on said closure whereby a predetermined quantity of the contents of said container may be trapped in said closure upon inversion of said container, means on the closure for dispensing the contents of said container, and means for excluding the entrapped contents of said closure from contact with the remainder of the contents of said container as they are dispensed therefrom, and means for admitting air to the container and discharging the same through the entrapped contents of said closure.

15. In a device of the character described, a

casing adapted to be connected to a container for fluid, a connection on said casing terminating into the liquid of said container during operation for conducting a predetermined quantity of liquid from such container to said casing to form an air washing liquid and forming a communication therebetween, an outlet for discharging liquid leading directly outwardly from such container but out of contact with the liquid contents of said casing, and a passageway for discharging atmospheric air through the liquid in said casing.

16. In a device of the character described, a casing adapted to be connected to a container for fluid, a connection on said casing terminating into the liquid of said container during operation for conducting a predetermined quantity of liquid from such container to said casing and forming a communication therebetween, an outlet for discharging liquid leading directly outwardly from such container but out of contact with the liquid contents of said casing, and a passageway for atmospheric air to said casing, said passageway being arranged to discharge air below the level of liquid in said casing.

17. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container, whereby, when the latter is inverted during operation, a predetermined portion of the liquid contents of said container enter said casing, means for admitting air to said casing below the level of liquid in said casing, and means for extracting liquid from said container independently of the liquid in said casing.

18. In a device of the character described for draining liquids from containers in combination with a container having an outlet and adapted to be inverted for discharging liquid directly therefrom, means for entrapping a portion of the liquid of the container in the inverted position of said container in the liquid entrapping means and for excluding the remainder of the liquid of the container from said means, and means for admitting air or gas into the container including means for passing and discharging the air through the thus entrapped liquid before passing into said container, said outlet being independent of said liquid entrapping means.

19. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermied portion of the liquid contents of said container may flow into said casing and be trapped therein, an outlet from the container forming a direct outward passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough from contact with the liquid contents of said casing, and a vent in said casing through which air or gas may enter and flow through the liquid contents of the casing and then into the container above the level of liquid contained in said container.

20. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermined portion of the liquid contents of said container may flow into said casing and be trapped therein, said connection being arranged to prevent the return flow of liquid trapped in said casing into said container, an outlet from the container forming a direct and continuous passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough from contact with the liquid contents of said casing, and a vent in said casing through which air or gas may enter and flow through the liquid contents of the casing and then into the container above the level of liquid contained in said container.

21. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermined portion of the liquid contents of said container may flow into said casing and be trapped therein, a partition disposed between said container and casing, an outlet from the container forming a direct and continuous passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough from contact with the liquid contents of said casing, and a vent from said casing into the container above the level of liquid contained in said container.

22. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermined portion of the liquid contents of said container may flow into said casing and be trapped therein, an outlet from the container forming a direct outward and continuous passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough from contact with the liquid contents of said casing, and a vent in said casing through which air or gas may enter and pass into the liquid of said casing and then pass into the container.

23. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermined portion of the liquid contents of said container may flow into said casing and be trapped therein, said connection being arranged to prevent the return flow of liquid trapped in said casing into said container, an outlet from the container forming a direct outward and continuous passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough from contact with the liquid contents of said casing, and a vent in said casing through which air or gas may enter and flow through the liquid contents of the casing into the container.

24. In a device of the character described, a casing adapted to be attached to a container for liquid and having a connection extending into said container so that, when the same is inverted, a predetermined portion of the liquid contents of said container may flow into said casing and be trapped therein, a partition disposed between said container and casing, an outlet from the container forming a direct outward and continuous passage for dispensing the liquid contents thereof, said outlet passing through said casing but excluding the liquid flowing therethrough, from contact with the liquid contents of said casing, and a vent in said casing through which air or gas may enter and including means to

cause the same to flow through the liquid contents of the casing into the container.

25. In a device of the character described for combination with a primary liquid container, a casing adapted to be attached to and supported by the container for liquid and having a connection extending into said container, whereby, when the latter is inverted, a portion of the liquid contents of said container enters or is retained by said casing, means for admitting air into said casing below the level of liquid in said casing, and means which is positioned for directing and, during operation, discharging the air through the liquid in said casing independent of the liquid in the casing for extracting liquid from said container.

MARTIN C. SCHWAB.