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R. M. WOOD
DISPENSING DEVICE

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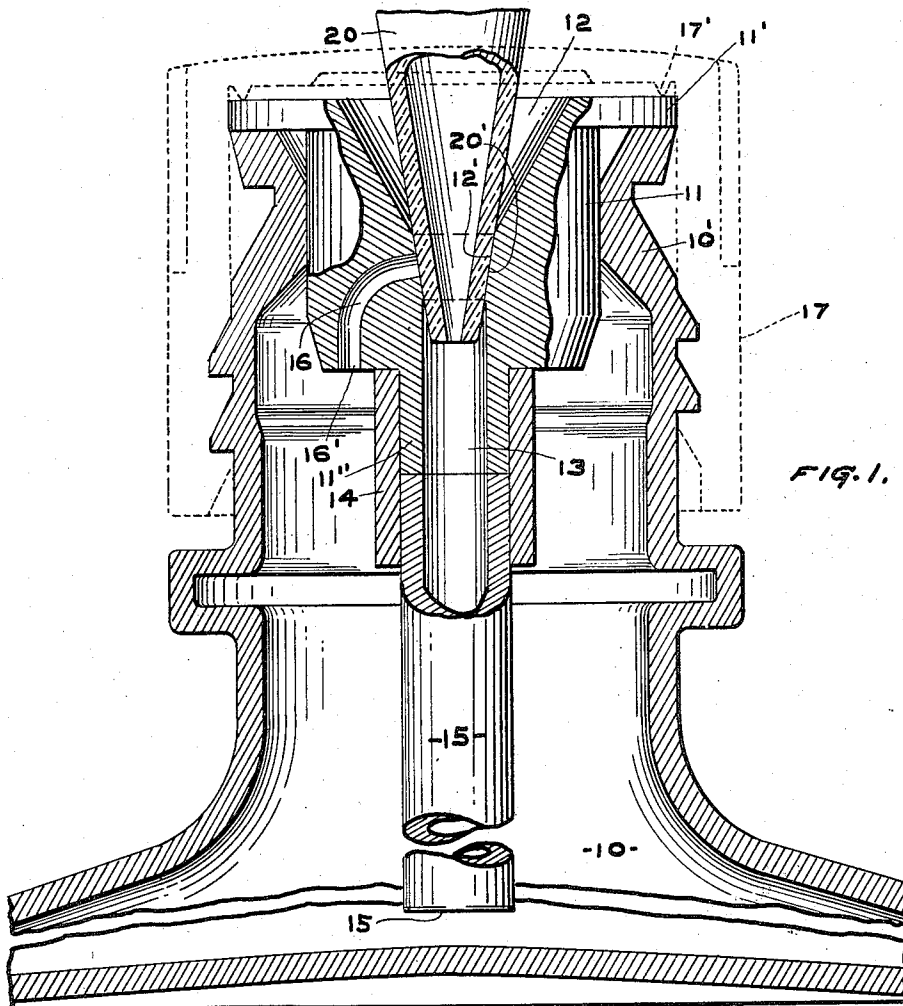


FIG. 1.

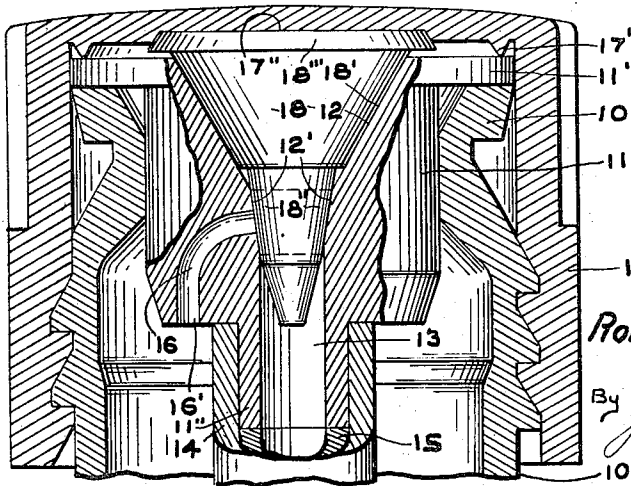


FIG. 2.

INVENTOR

Ronald M. Wood

By *J. Wesley Everett*

ATTORNEY

1

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DISPENSING DEVICE

Ronald M. Wood, Pikesville, Md.

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4 Claims. (Cl. 141-113)

The present invention relates to an improvement in a dispensing unit which is primarily designed to the dispensing of liquids and is particularly adapted to withdrawing liquid into "pipettes" or other suitable containers.

The unit is particularly advantageous in withdrawing chemicals or other substances in small amounts from bulk containers without the danger of coming into personal contact with the contents.

One object of the invention is to provide such a unit that will be economically manufactured and simple in its use.

Another object of the invention is to provide such a unit in which small amounts of predetermined quantities of liquid may be accurately withdrawn.

A further object of the invention is to provide such a unit in which predetermined amounts of liquid may be withdrawn from, or added to, the bulk with a minimum chance of spillage.

Still another object of the invention is to provide means whereby the withdrawing of the liquid is accomplished with a minimum of mechanical operation.

While the general objects of the invention have been set forth, its uniqueness consists of certain novel features of construction and in the combination and arrangement of the several parts as will be more apparent as the nature of the invention is more fully disclosed which is described in the following description and illustrated in the accompanying drawings in which:

Figure 1 is a fragmentary sectional view of an unsealed unit illustrating a "pipette" in position to receive a portion of the contents from the unit.

Figure 2 is a fragmentary sectional view of the unit similar to that shown in Figure 1 showing the unit normally sealed.

Figure 3 is a fragmentary vertical sectional view of a modified form of the invention.

Figure 4 is a fragmentary vertical sectional view of a further modification of the invention.

Figure 5 is a view in elevation on a reduced scale of the unit and pipette illustrating the manner in which the fluid is withdrawn from the unit.

In referring to the drawings, like reference numerals are used to point out like and similar parts throughout the several views.

The unit consists principally of a resilient compressible container, or bottle, having a short neck including an aperture therethrough and an insert fixedly secured within the aperture in the bottle neck through which the contents of the bottle are extracted.

The unit as illustrated comprises an elastic container, or bottle, 10 having a neck 10' and an aperture located at its outer end which may be referred to later as the mouth of the bottle. The bottle is preferably constructed of one of the plastics, such as polyethylene, or the like.

Referring in particular to Figures 1 and 2, the mouth of the bottle is provided with a close fitting insert, or liquid transfer device which consists of a main body portion 11 and an upper flange 11' extending over the outer

2

surface of the neck 10'. The member 11 also is constructed preferably of an elastic compressible plastic such as polyethylene, or the like, and is provided with an opening or well, as shown at 12, extending inwardly top surface in the form of a cone. This cone, or flare shaped opening is preferably greater than the taper of the lower end of the pipette or other members to be used in the withdrawal of the liquid. This well is part of a center liquid opening 13 extending inwardly from the upper surface of the insert toward the interior of the bottle. The member 11 is provided with a shoulder 11" surrounding the opening 13 and a collar 14 is fixed about the shoulder. The collar extends beyond the shoulder 11" and is adapted to embrace the upper end of a hollow tube 15 which extends from the shoulder 11" of the member 11 to a point adjacent the bottom of the container, as shown in Figure 1. Extending from the lower end of the well 12 to the top of the opening 13 is an area 12' having a similar cone-shaped area tapered in the same direction as the side walls of the well 12 but with much less taper than the sides of the upper portion of the well 12. The taper of the walls in the area 12' is designed to be of substantially the same taper as that of the taper of the outer walls of the lower end of a "pipette" designated by the number 20 for withdrawing the liquid. It will be noted that the end of the pipette snugly fits the area 12'. Extending outwardly from this second tapered area 12' is an air passage 16. This air passage extends from the area 12' to the area of the bottle neck which is above the upper level of the liquid and is shown terminating at the bottom of the member 11 at 16'. The end of the air passage entering the area 12' is preferably at right angles to the side wall to insure its stoppage by the pipette when the pipette is inserted in the liquid transfer device element, as shown in Figure 1.

In Figure 2 the bottle is shown fully sealed which is the normal method of sealing the bottle when withdrawals are not being made. The bottle is provided preferably with a screw cap 17 having an annular ring 17' to contact the upper side of the member 11 to hold it downwardly into the mouth of the bottle. To prevent the liquid from moving up the hollow tube 15, or the air passage 16, there is provided a stopper 18. This stopper is particularly designed for closing the opening 13 and the air passage 16. The stopper is provided with tapered walls 18' adapted to fit the walls of the well and the portion 18" of the stopper is adapted to fit the area 12' to close the opening 16. The outer end 18" is adapted to fit within a centered recess 17" of the cap. When the cap 17 is screwed down upon the bottle neck, the stopper will be forced into the well and the area 12' to completely cut off opening 13 and the air passage 16.

Figure 3 is a modified form of the invention. In this form there is an annular under-cut 21 in the area 12' to provide a flexible lip portion 12''. The diameter of the area 12'' is slightly less than the corresponding portion of this area in Figure 1. When the tapered end of the pipette contacts this area 12'' it presses it downwardly until its lower edge 12''' comes in contact with the upper edge 13' of the opening 13 which forms a seal adjacent these two edges. The air passage 16 has its upper end opening into the outer area of the annular groove 21 at a point adjacent its perimeter and, therefore, it is also closed off from the atmosphere by the action of the depressed pipette. The remainder of the structure is substantially the same as that described for the form shown in Figure 1.

Figure 4 is still a further modified form in which the element 11 may be constructed in two parts. The body portion of the member 11 is shown with a slightly

3

enlarged well 22 having a rounded shoulder 23 about its lower inner surface and an annular recessed portion 23' below the shoulder area. Over the outer end of the member 11 is an outer member 24. This member, or portion, may be made integral with the member 11 or secured thereto by a suitable adhesive. This member 24 is also provided with a well 24' the sides of which are substantially flexible. The inner, or lower, end 24'' of the well extends below the shoulder 23 and ends substantially opposite the annular recess 23'. When the pipette is inserted, the lower end 24'' of the wall 24 is first contacted by the tapered end of the pipette. By pressing downwardly on the pipette the end 24'' will be moved in contact with the shoulder 23 and seal off the well 22. As the air passage 16 opens into the upper portion of the well 22 it likewise will be shut off from the outer well 24 and to the atmosphere.

The use of the unit is illustrated in Figure 5. When it is desired to withdraw any of the contents from the container or bottle 10, the cap 17 and the stopper 18 are removed. The pipette is then inserted in the well. If the element 11 is of the construction as shown in Figures 1 and 2, the tapered end 20' of the pipette upon slight pressure will move against the upper end of the air passage 16 sealing it off from the atmosphere. The container or bottle is then compressed to reduce the inside area of the bottle, or compressed air may be directed into the upper portion of the container or bottle by any of the well-known devices (not shown) and as the area above the liquid is sealed off by the closing of the air passage 16, the liquid will move up the tube 15 into the pipette. When a sufficient amount has been withdrawn the finger is placed over the top of the pipette and the pipette removed. By stopping the upper end of the pipette the liquid will remain in the pipette for transferring the liquid to another container. When the pipette is removed and the air passage 16 is opened to the pressure of the atmosphere, the liquid in the tube 15 will move to the level of the liquid in the container. This operation may be repeated until the liquid contents in the bottle have been exhausted.

The operation is substantially the same regardless of the form used. The only difference being in the manner in which the air passage 16 to the atmosphere is closed off, which has been previously described.

While several modified forms of the invention have been illustrated and described in detail, other forms of the invention may become apparent to one skilled in the art after becoming familiar with the general principles set out herein. Therefore, the invention is not to be limited to the particular structural details shown, but what is claimed as new and desired to be secured by Letters Patent is:

1. A liquid dispenser comprising, in combination, a closed collapsible resilient liquid container having an opening in its top, a liquid transfer device comprising an upper body portion tightly fitted within the opening of the closed container and an elongated lower portion extending downwardly into the container to a point adjacent the bottom thereof, a liquid passage extending longitudinally through the upper body portion and the elongated lower portions of the liquid transfer device, a separable liquid receiving means connective to the outer end of the liquid passage in the upper body portion, the liquid passage through the upper body portion and the elongated lower portion of the liquid transfer device providing a passage for liquid from the bottom of the container to a point outside the container, the upper body portion of the liquid transfer device having an independent air passage therethrough, the air passage extending through the upper body portion having one end communicating with the liquid passage and its other end terminating within the container adjacent the upper end thereof providing a free air passage from the top of the container to the atmosphere when the liquid receiving

4

means is disconnected from the liquid transfer device, the liquid receiving means communicating with the outer end of the liquid passage and closing the air passage when in its connected position, whereby the liquid will be forced through the liquid passage of the liquid transfer device into the liquid receiving means when pressure is applied to the container by collapsing the same.

2. A combination container and liquid dispenser comprising, in combination, an elastic collapsible closed resilient container having an open mouth therein, a liquid transfer device having a body portion fitted tightly into the mouth of the container and a portion of the liquid transfer device extending downwardly into the container to a point adjacent the bottom thereof, the liquid transfer device having a continuous liquid passage extending therethrough from the end adjacent the bottom of the container to the outer end thereof through which the liquid in the container is dispensed, the wall of the liquid passage in the outer end of the body portion of the liquid transfer device being flared outwardly from a point inwardly from the outer surface of the body portion, a separate liquid receiving means having one end connective with the flared end of the liquid transfer device, the body portion of the liquid transfer device having a normally open air passage separated from the liquid passage leading from the flared outer end of the body portion to the interior of the container, the end of the air passage terminating in the flared area of the liquid passage being normally open to atmospheric pressure and so positioned there as to be closed to the atmosphere by the end of the liquid receiving means when connected to the liquid passage in the outer flared end of the liquid opening, whereby the liquid will be forced through the liquid passage of the liquid transfer device into the liquid receiving means when pressure is applied to the container by collapsing the elastic container.

3. A liquid dispenser for pipettes comprising, in combination, a closed collapsible resilient liquid container having an opening in its top, a liquid transfer device comprising an upper body portion tightly fitted within the opening of the closed container and an elongated lower portion extending downwardly into the container to a point adjacent the bottom thereof, a liquid passage extending longitudinally through the body portion and the elongated lower portion through which the liquid passes from the container, a pipette connective to the outer end of the liquid passage in the upper body portion, the upper body portion of the liquid transfer device having an independent air passage therethrough, the air passage having one end communicating with the liquid passage and the other end opening within the container for providing a free air passage from the container to the atmosphere when the pipette is disconnected from the liquid transfer device, the pipette communicating with the outer end of the liquid passage and closing the air passage when in its connected position, whereby the liquid will be forced through the liquid passage of the liquid transfer device into the pipette when pressure is applied to the container by collapsing the same.

4. A liquid dispenser comprising, in combination, a closed collapsible resilient liquid container having an opening in its top, a liquid transfer device comprising an upper body portion tightly fitted within the opening of the closed container and an elongated lower portion extending downwardly into the container to a point adjacent the bottom thereof, a liquid passage extending longitudinally through the upper body portion and the elongated lower portion, a separable liquid receiving means connective to the outer end of the liquid passage in the upper body portion, the liquid passage through the upper body portion and the elongated lower portion of the liquid transfer device providing a passage for the liquid from the bottom of the container to a point outside the container, the upper body portion having an independent air passage therethrough, the air passage having

5

one end communicating with the liquid passage and its other end opening within the container for providing a free air passage from the container to the atmosphere when the liquid receiving means is disconnected from the liquid transfer device, the upper end of the air passage being located inwardly from the outer end of the liquid passage in the upper body portion and in the form of a circular opening surrounding the liquid passage, the circular opening communicating with the liquid passage and extending outwardly, substantially laterally from the upper end of the liquid passage forming a dependent resilient lip spaced inwardly from the outer end of the liquid passage and above the circular upper end of the air opening, the lip being movable downwardly to close the air passage to the atmosphere by the liquid receiving means when connected to the liquid transfer device, the liquid receiving means communicating with the resilient lip provided within the upper body portion, closing the air passage when in its connected position, whereby the liquid will be forced through the liquid passage of the liquid transfer device into the liquid receiving means when pressure is applied to the container by collapsing the same.

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