July 8, 1958 W. F. BUTLER 2,842,276

CONTAINER CLOSURE

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Fig. 1

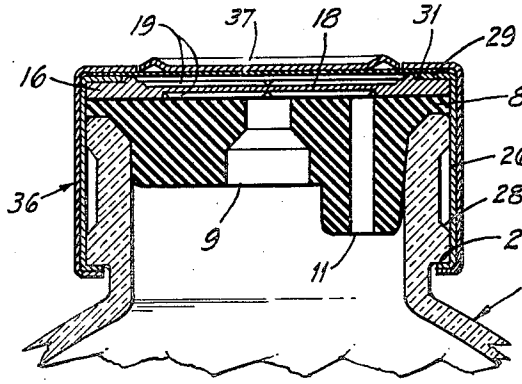
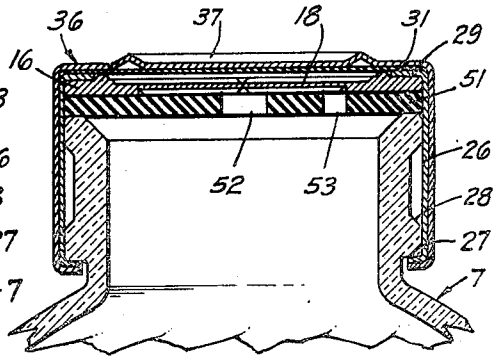


Fig. 2



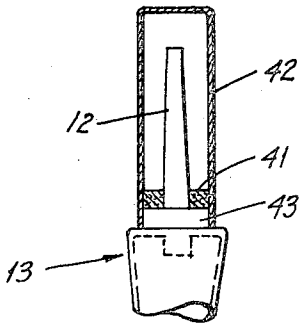


Fig. 4

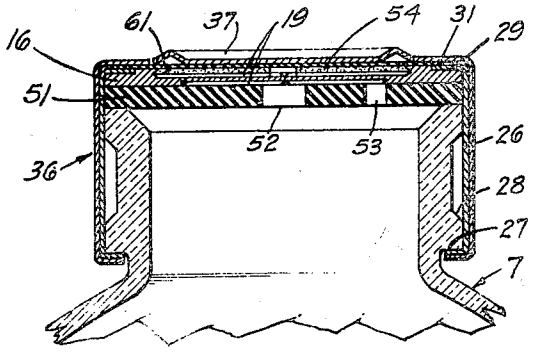


Fig. 3

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Fig. 5

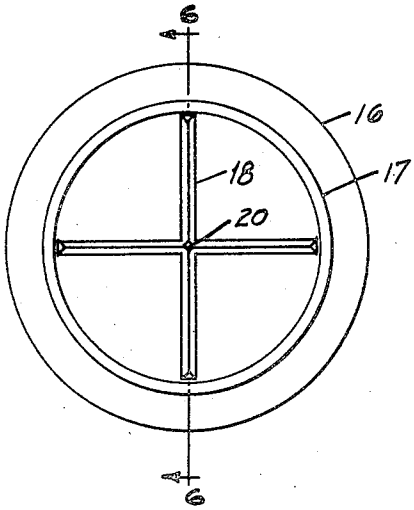


Fig. 6

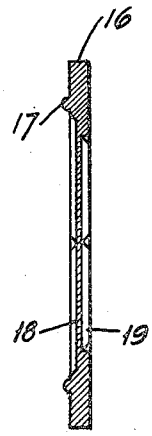
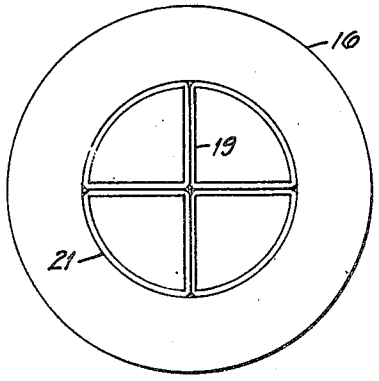


Fig. 7



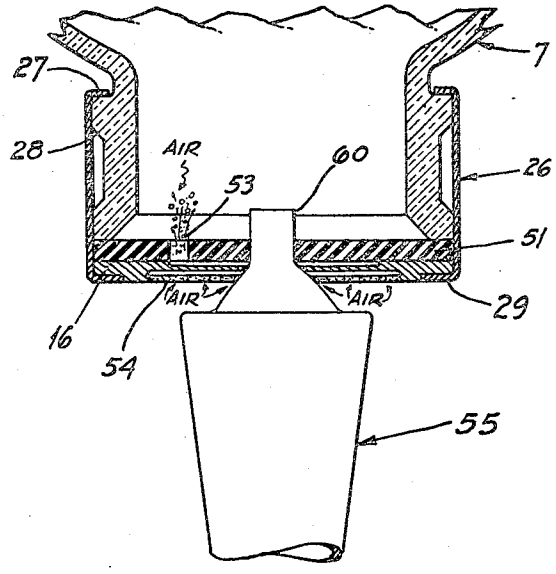
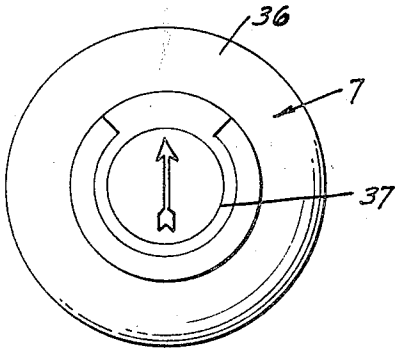


Fig. 9

Fig. 8



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2,842,276

CONTAINER CLOSURE

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Application August 2, 1955, Serial No. 526,013

6 Claims. (Cl. 215—79)

This invention relates to an improved closure for a container which enables a fluid to be withdrawn from the container while air is admitted to the container to replace the withdrawn fluid, all with only one puncture having been made in the closure.

Many medical liquids are packaged under sterile conditions in containers fabricated of glass and the like, the containers being provided with a flexible closure which is sealed under aseptic conditions, usually in the mouth opening of the container. Sealing means are usually provided about the stopper, enabling the aseptic condition of the stopper to be maintained until access to the container is desired. In the past, withdrawal of a solution from such a container has usually involved such manipulation that two separate devices were required to pierce the stopper at two different locations, one for withdrawal of the fluid and the other for air admission.

In accordance with this invention, I provide a container closure which can be utilized with any of the conventional solution withdrawal means, but which does not require any supplemental means for air admission. In this way, the container can be opened and put into use much more readily. In addition, the apparatus required is simplified.

It is in general the object of the present invention to provide a novel and improved container closure, particularly one intended for use in the withdrawal of solutions from containers.

A further object of the present invention is to provide a novel container closure requiring but one puncture for withdrawal of a liquid from the container and for admittance of air.

The invention includes other objects and features of advantage, some of which, together with the foregoing, will appear hereinafter wherein the present preferred form of container closure of this invention is disclosed. In the drawings accompanying and forming a part hereof:

Figures 1, 2, and 3 are sections taken through the upper portion of containers and illustrating various container closures embodying the present invention.

Figure 4 is a side elevation, partly in section, through a drip meter modified to be utilized in accordance with a closure of the present invention.

Figure 5 is a plan view of a portion of the novel container stopper of the present invention.

Figure 6 is a section taken along the line 6—6 in Figure 5, while Figure 7 is a bottom view of the stopper shown in Figure 5.

Figure 8 is a plan view of a container prior to use.

Figure 9 is a side elevation, partly in section, showing a closure embodying this invention in use.

Referring to the drawings, I have indicated the upper portion of a container generally at 7. In that form of the invention which is shown in Figure 1, a container closure in the form of a rubber stopper 8 is shown as fitting over the top and extending partially downwardly

into the container opening. The stopper shown includes two passages 9 and 11; passage 9 is adapted for insertion of the spike 12 of a drip meter, such as is generally indicated at 13 in Figures 4 and 9; passage 11 is for air admission to the interior of the container.

In accordance with this invention, I provide a suitable flexible annular cover member 16 over the top of the stopper 8. On its upper surface, the cover member 16 is provided with a ring 17. Extending radially and at 90° to one another within the confines of the annular ring 17 are four V-shaped cuts 18, dividing the annular member 16 into four quadrants within ring 17. On its underside, the ring 16 is provided with four V-shaped cuts 19 which extend radially beneath and in alignment with cuts 18. The outer ends of the cuts 19 are, however, joined by a circular V-shaped groove 21, so that each of the cuts 19 is in fluid communication with each of the other cuts 19 by means of the ring-shaped groove 21.

The aforementioned cover member is positioned over the stopper 8 with the annular ring 17 uppermost, and the structure so provided is then assembled by securing an annular retaining ring 26 in position on the neck of the container 7, a portion of the ring 26 providing an annular flange 27 engaging the underside of flange 28 on the bottle while the other annular portion of the ring 26 is flanged over as at 29 to retain the cover member and stopper in position on the bottle. An annular metal cover disc 31 is positioned over the cover member 16, following which the usual tear-strip-cap-retainer, generally indicated at 36, is provided, this having a tear strip portion 37 which, when lifted and pulled, will tear away and so rupture the sidewall of the cover member 36 (Figure 8).

The foregoing structure is assembled under suitable aseptic conditions so that the entire closure below metal disc 31 is sterile and remains so until it is ready for use when, upon suitable tearing of the outer cover 36, by means of the tear strip 37, the outer disc 31 is exposed and can be removed. The upper end of the cover member 16 can then be swabbed with a suitable sterilizing agent, following which one can gain access to the contents of the container under aseptic conditions. This may be achieved, for example, by forcing the spike 12 of a drip meter 13 through the cover member 16 at the central meeting point 20 of the several V-shaped grooves 18 and 19. Puncturing of the cover 16 by insertion of a pointed or blunt instrument causes the cover 16 to tear in the area between aligned grooves 18 and 19 with the result that the inner portion of the cover 16 becomes four flexible flaps. The flaps only fit loosely about the end of the inserted instrument and the only fluid tight connection is that between the inserted instrument and passage 9. Because of the loose fit of the flaps and the inserted instrument, as the fluid is withdrawn, air is admitted between cover 16 and the closure 8 along each of the passages 19 and about the ring 21 to the air inlet passage 11.

If it is desired to admit only filtered air to the interior of the container 7, then a suitable filtering element, such as indicated at 41 on the drip meter 13, can be utilized, this filtering element coming to rest against the torn flaps in the cover member 16 when the drip meter is in position. To maintain the drip meter spike and interior sterile, as well as filter 41, a suitable cover 42 is provided about the end of the drip meter, the cover fitting the shoulder 43 on the upper end of the drip meter, as is shown in Figure 4.

In that modification shown in Figures 2, 3, and 9, a flat disc 51 is shown as positioned across the top of the container, this having apertures 52 and 53 therein corre-

sponding to apertures **9** and **11** in the structure shown in Figure 1.

In the structure shown in Figure 3, a separate air filter disc **54** is shown retained in position on the top of the cover member **16** by the recessed edge **61**, the structure being otherwise similar to that shown in Figure 2. In Figure 9, I have illustrated the structure of Figure 3 in use with an ordinary drip meter **55**, having a spike **60**.

As a filtering element, one can use any suitable filtering material. I have successfully used that known as Micronite, and which is a loosely packed cellulose material having excellent filtering qualities. The filtering material should preferably be treated with a silicone to render the material non-wetting in the event the solution should leak back. To apply a silicone, one dissolves it in a suitable solvent such as acetone or water, applies the solution to the filtering element and thereafter removes the solvent. As a silicone, one can use any of the silicones disclosed as useful in surface coating materials in the Goldman and Rosenblum patents, 2,504,482 and 2,622,598.

The closures **8** and **51** and covers **16** can be made of rubber or other suitable elastomer.

I claim:

1. A closure for a container having a mouth, a flexible stopper provided as a closure for said mouth, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, a flexible cover provided over the upper face of said stopper as a closure for said passages in the stopper, said cover being adapted to pass a tubular piercing element into said first passage in the stopper, said cover having an outer rim seating on the stopper about the peripheral edge thereof and supporting the cover on the stopper with that portion of the cover within the rim spaced from the upper face of the stopper to permit air to enter the container through the second passage when a tubular piercing element is inserted through the flexible cover and the first passage.

2. A closure for a container having a mouth, a flexible stopper closing said mouth, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, a flexible cover on the upper face of said stopper as a closure for said passages in the stopper, said cover having an outer annular rim seating on the stopper about the peripheral edge thereof and supporting the cover on the stopper with that portion of the cover within the annular rim spaced from the upper face of the stopper to define an air passage between the cover and stopper to permit air to enter the container through the second passage when a tubular piercing element is inserted through the flexible cover and the first passage.

3. A closure for a container having a mouth, a flexible stopper provided across said mouth as a closure, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, a flexible frangible cover provided over the upper face of said stopper as a closure for said passages in the stopper, said cover being frangible and adapted to pass a tubular piercing element into fluid-tight engagement with the first passage, said cover being supported by a rim seating on the upper face of the stopper about the peripheral edge thereof and supporting the cover on the stopper with that portion of the cover within the rim spaced from the stopper to permit air to enter the container through the second passage when the tubular piercing element is inserted through the flexible cover and the first passage.

4. A closure for a container having a mouth, a flexible stopper provided across said mouth as a closure, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, a flexible, frangible cover provided over the upper face of said stopper as a closure for said passage in the stopper, said cover including a peripheral rim supporting that portion of the cover within the rim spaced from the upper face of the stopper, said cover portion having radial passages therein on the underside of said cover portion for passage to permit air to enter the container through the second passage when a tubular piercing element is inserted through the flexible cover and the first passage.

5. In combination with a container having a mouth and a flexible stopper provided as a closure for said mouth, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, a flexible cover provided over the upper face of said stopper as a closure for said passages in the stopper, said cover being adapted to pass a tubular piercing element into said first passage in the stopper, an outer rim seating on the stopper about the peripheral edge thereof and supporting the cover on the stopper with that portion of the cover within the rim spaced from the upper face of the stopper to permit air to enter the container through the second passage when a tubular piercing element is inserted through the flexible cover and the first passage, a tubular piercing element adapted to be inserted through the flexible cover into the first passage, and air filter means provided about the tubular piercing element for seating on the outer face of the cover to filter air passing into the container.

6. In combination with a container having a cylindrical mouth, a cylindrical flexible stopper fitting as a closure in said mouth, said stopper having an upper face and a first and a second passage therethrough to the atmosphere from the container, the first passage being provided centrally of the stopper, a filter element in the second passage, a thin flexible cover provided over the upper face of said stopper as a closure for said passages in the stopper, said cover being adapted to pass a tubular piercing element into said first passage in the stopper, said cover having an outer circular rim seating on the stopper about the peripheral edge thereof and supporting the cover on the stopper with that portion of the cover within the rim spaced from the upper face of the stopper, said cover having several radial grooves formed in the underside thereof and providing passages for air to enter the container through the second passage when a tubular piercing element is inserted through the flexible cover and the first passage.

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