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D. H. TILSON
TAMPERPROOF CLOSURE

2,387,955

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Fig. 1.

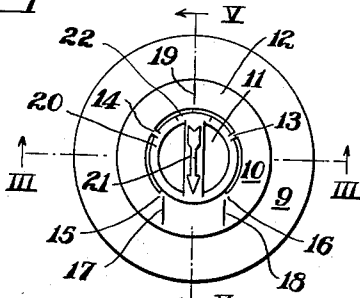


Fig. 2.

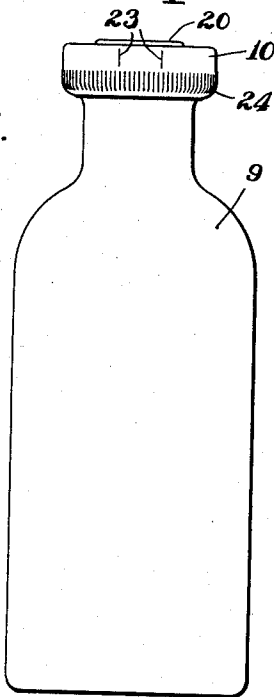


Fig. 4.

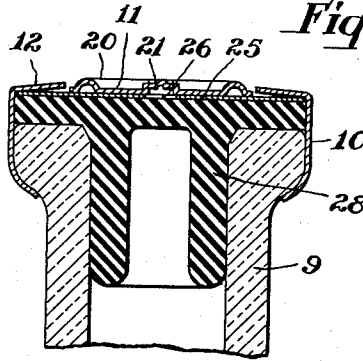


Fig. 5.

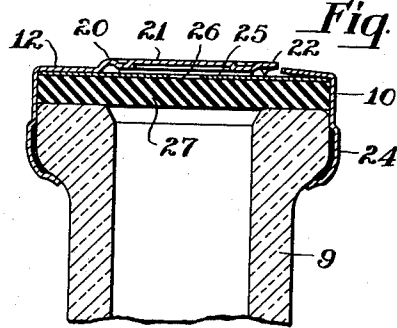


Fig. 6.

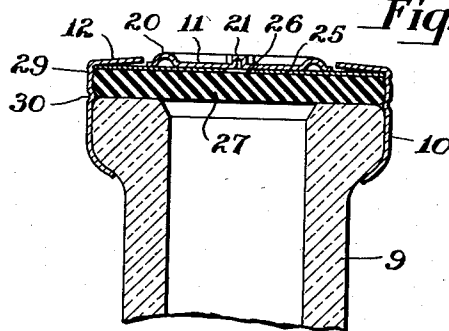
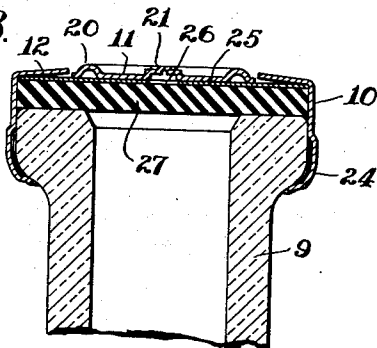


Fig. 3.



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TAMPERPROOF CLOSURE

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5 Claims. (Cl. 215—38)

This invention relates to closures for containers and more particularly to tamperproof closures for containers which may be used in packaging sterile fluids such as serums.

An object of this invention is to provide a closure which may be reformed on a container over an intermediate disc and a sealing diaphragm to effectively seal the container.

Another object is to provide a closure which is easy to open partially to expose a penetrable diaphragm through which a tube or hypodermic needle may be inserted to withdraw portions of the contents of a container.

Yet another object is to provide a closure which is easy to remove entirely for emptying the contents of a container.

A further object is to provide a tamperproof closure which, because of fractured or mutilated portions thereof, will immediately indicate any partial opening or entire removal of the closure.

Prior to this invention, containers provided with closures through which a needle might be inserted for withdrawal of the contents were known. Many such closures left exposed to direct contact with septic media that surface portion of the closure through which the needle passed. Others had a protective foil covering which tended to dull the needle upon its insertion there-through. Some were constructed so that the closure could be removed and later replaced in such a manner that it was impossible to immediately detect use, dilution, contamination, or substitution of the contents of the container.

Serums injected intravenously by means of a hypodermic needle are an example of fluids which, because of their use, must be kept sterile. It is important that the user of such fluids be able to determine whether the package he possesses has been opened in any way, that is, whether it is in the same uncontaminated, undisturbed, sterile condition as when it left the packager. It is also important that he have ready access to the fluid, i. e. that the closure be easy to open. If the contents are to be withdrawn by a hypodermic syringe, the method should be one that will not dull a needle, and one that will keep the contents free from contamination by entry of foreign substances during and between withdrawals. For this purpose it is desirable to have a closure which by partial removal permits the withdrawal of fluid and yet effectively continues to exclude septic media. In some cases the user might wish to empty the entire contents, and therefore it is desirable to have a closure which is easy to remove entirely.

The closure of this invention permits no access to the interior of the container without apparent irreparable and telltale damage to the closure. The closure may be easily removed entirely or, upon choice, may be removed only partially to expose a needle-penetrable portion. In the case of partial removal of the closure, a needle may be inserted, without dulling the same, to withdraw portions of the contents while the closure then and thereafter effectively excludes extraneous matter from the contents remaining in the container. Reference to the drawing will make more clear the objects of this invention as exemplified in a preferred embodiment thereof.

Fig. 1 is a plan view of a preferred form of the closure of the invention, assembled with a container;

Fig. 2 is a side elevation of the closure and container shown in Fig. 1;

Fig. 3 is an enlarged section of the closure and upper part of the container taken on the line III—III of Fig. 1;

Fig. 4 is a sectional view similar to Fig. 3 showing a modification of the closure;

Fig. 5 is an enlarged section taken on the line V—V of Fig. 1; and

Fig. 6 is a sectional view similar to Fig. 3 showing another modification of the closure.

Referring now to the drawing, the outer closure 10 may be made of any pliable material capable of permanent deformation and ready tearing. Thin metal, preferably aluminum, is suitable. The closure 10 is cylindrical or cup-like in shape and is shown reformed into close contact with the finish or shoulder at the neck of bottle 9. The invention, however, is applicable to container finishes of varied shapes and contours, it being desirable that intimate contact between the skirt of the closure and the finish of the container be attainable.

From the top panel of the closure 10 a tear-off tab 11 is partially severed within the rim 12, the latter being integrally connected with the tear-off tab by bridges 13 and 14. As shown in Fig. 1, the arcuate line of severance is discontinued at the rear of the tab 11 to form a tab base between the points 15 and 16. Bridges 13 and 14 are oppositely disposed, preferably at angles greater than about 45° but less than 90°, from a line perpendicularly bisecting the tab base as shown, for example, in Fig. 1. This positioning facilitates their rupturing since the force transmitted to them upon lifting the tab will act chiefly as shearing force. When said bridges are disposed less than about 45°, their rupturing, while still pos-

sible, is through force transmitted chiefly as tension. The rim 12 is provided adjacent and outside points 15 and 16, and leading to the margin of rim 12, with two weakened lines 17 and 18, either cuts or scores, disposed as extensions of parallel chords of the circular portion of tab 11. Unweakened portions thus remain at the bridge points 15 and 16, which provide an optional hinge for the tab.

The tab 11 is provided with a marginal bead 20 adjacent to its line of severance and across the non-severed tab base in order to strengthen the tab and protect the fingers of the user from the scored or cut edge thereof when the tab is digitally grasped. For further longitudinal strengthening of the tab 11 there is provided an embossed rib 21 extending from the front of the marginal bead 20 of the tab, along the diameter parallel to the weakened lines 17 and 18, to the rear of the marginal bead 20 at the tab base.

At the front of the tab and between the bridges 13 and 14, there is provided a raised lip 22 in the bead 20 (into which the rib 21 merges) that permits the insertion of the fingernail of the user or a lever means, such as a spatula or knife blade, for lifting the tear-off tab 11. On the rim 12 immediately in front of the raised lip 22 of tab 11 a score or cut 19 extends from a point adjacent to the line of severance of the tab to the margin of the rim 12.

The skirt of the closure 10 is provided with parallel cuts or scores 23 leading from the top of the skirt part way down the same and well within the area between the extended chord lines 17 and 18. This relationship, as is best shown in Figs. 1 and 2, creates a further optional hinge for the tab 11 along the line of junction of the rim 12 and the skirt. The cut or scored lines 23, as shown in Fig. 2, extend from the top of the skirt to shortly above the scored or fluted band 24. In the forms of closure shown in Figs. 4 and 6, the band 24 is not shown, and in its absence it is desirable to extend cut or scored lines 23 to shortly above the bottom of the skirt. As shown in Figs. 2, 3 and 5 the scored or fluted band 24 should be located slightly above the bottom of the skirt and extended vertically upward about half the skirt length.

The scored or fluted band 24, the cut or scored lines 19 and 23, the weakened lines 17 and 18, and the partially severed top panel produce a frangible closure when the same is made from pliable metal of customary thickness. A disc 25 may be used to reinforce the closure 10 at the upper portions thereof. It may be located between the closure 10 and a liner or stopper, as shown in Figs. 3 through 6. This disc 25 is provided with an aperture 26 near its center under the tear-off tab 11. A liner or stopper of a resilient, rubber-like, fluid-impervious substance, preferably having some degree of self-sealing properties, may be located below the disc 25 for disposition over the orifice of bottle 9. With this closure combination it should be apparent that the contents of the bottle cannot be reached without either removing the closure entirely or lifting the tear-off tab and penetrating that portion of the liner or stopper accessible through aperture 26 in disc 25.

A flat disc liner 27 is shown in Figs. 3, 5 and 6. A recessed stopper 28 is shown in Fig. 4. Either may be used, as is desired.

Fig. 6 discloses an annular inwardly disposed groove 29 in the closure skirt which serves to retain the disc 25 against the rim 12. Also Fig. 6 shows a similar inwardly disposed groove 30 in the

closure skirt which serves to retain the liner 27 within the closure 10. These grooves 29 and 30 may be used singly or in conjunction with each other. Where, in the assembling of the closure combination, there is to be transportation or handling thereof between the insertion of the disc 25 and the insertion of the liner 27, it is convenient to provide groove 29 to prevent loss of the disc 25. Later, upon insertion of the liner 27, groove 30 may be provided. However, if in the assembling of the closure combination the disc and the liner are inserted at once, it is convenient to provide only groove 30 which will then serve to retain both the disc and the liner.

The closure combination may be, either by separate or coincidental disposition of the elements thereof, placed over the container. It is sealed or reformed by customary methods, one of which consists of pressing closure 10, disc 25, and liner 27 or stopper 28 firmly against the orifice of the container such as bottle 9; and then rolling in the lower portion of the skirt under the shoulder of the container.

To open the container for the insertion of a hypodermic needle or the like, it is necessary only to lift the tear-off tab 11, hinging the same at either bridges 15, 16 or at the periphery of rim 12. This will expose the penetrate liner or stopper accessible through the aperture in the reinforcing disc. To do this it is necessary that the bridges 13 and 14 be broken. As above mentioned, bridges 15 and 16 may or may not be broken, as desired.

To remove the closure entirely from the container it is necessary only to lift the tear-off tab 11 and pull it downwardly over the bottle neck. The bridges 13, 14, and 15 and 16 will break away and the metal will tear as guided by the scored or cut lines 17, 18 and 23, and throughout scored band 24, thereby rupturing the skirt. When the skirt is spread out and away from the bottle, the closure will break along the scored or cut line 19 for easy removal.

The bridges 13 and 14 serve as tamperproof means indicating whether or not tab 11 has been lifted. The rib 21 prevents undetectable bending of the tab and facilitates severing of bridges 13 and 14 when the end of tab 11 is lifted. The scored band 24 acts as a further tamperproof means since any attempt to spread the lower skirt portion, which is reformed inwardly under the shoulder of bottle 9, will cause the skirt to split along the scored lines of band 24, making the closure incapable of re-use. It should be apparent that any entry or attempted entry into the interior of the bottle through the closure at any point will result in some obvious mutilation or tearing of the closure 10.

Several modifications of the invention have been described, and the appended claims should be read in the light thereof without being limited specifically thereto.

What is claimed is:

1. A closure combination comprising a sealing member adapted to be pierced readily by a needle, a rupturable outer closure and an apertured reinforcing element, said outer closure having a top panel cut to form a tab partially severed therefrom but integral therewith at rupturable bridges, said reinforcing element being disposed between said top panel and said sealing member, said tab having a marginal bead and a longitudinal rib merging into said bead intermediate a pair of said bridges so located that the aperture in said reinforcing element can be exposed upon lifting of said tab only by rupturing one or more

of said bridges, said tab and said sealing member being thereby protected respectively from undetectable lifting and undetectable perforation.

2. A closure combination comprising a sealing member adapted to be pierced readily by a needle, a rupturable outer closure and an apertured reinforcing element therebetween, said outer closure having a top panel cut to form a partially severed tab, a non-severed tab base, a tab-surrounding rim, and rupturable bridges connecting said tab and rim disposed at least one on each side of a line perpendicularly bisecting the tab base and interrupting that portion of the line of tab severance opposite the tab base, said tab having a marginal bead and a diametral rib merging into said bead intermediate a pair of said bridges so located that the aperture in said reinforcing element can be exposed only by rupturing one or both of said pair of bridges, said tab and said sealing member being thereby protected respectively from undetectable lifting and undetectable perforation.

3. A container-closure combination comprising a container having a shouldered orifice, a sealing member of a material adapted to be pierced readily by a needle and disposed in closing relationship to said orifice, a rupturable outer closure over said sealing member secured to said container by a portion disposed under said shoulder and an apertured reinforcing element between said closure and said sealing member, said closure having a top panel cut to form a partially severed tab, a non-severed tab base, a tab-surrounding rim, and rupturable bridges connecting said tab and rim disposed at least one on each side of a line perpendicularly bisecting the tab base and interrupting that portion of the line of tab severance opposite the tab base, said tab having a marginal bead and a diametral rib merging into said bead intermediate a pair of said bridges so located that the aperture in said reinforcing element can be exposed only by rupturing one or both of said pair of bridges, said tab and said sealing member being thereby protected respectively from undetectable lifting and undetectable perforation.

4. A closure combination comprising a sealing member adapted to be pierced readily by a needle, a rupturable outer closure and an apertured reinforcing element, said outer closure having a skirt with a rupturable band of fluting near its lower edge and a top panel cut to form a tab partially severed therefrom but integral therewith at rupturable bridges, said reinforcing element being disposed between said top panel and said sealing member, said tab having a marginal bead and a longitudinal rib merging into said bead intermediate a pair of said bridges so located that the aperture in said reinforcing element can be exposed upon lifting said tab only by rupturing one or more of said bridges, said tab and said sealing member being thereby protected respectively from undetectable lifting and undetectable piercing.

5. A container-closure combination comprising a container having a shouldered orifice, a sealing member of a material adapted to be pierced readily by a needle and disposed in closing relationship to said orifice, a rupturable outer closure over said sealing member secured to said container by a portion disposed under said shoulder and an apertured reinforcing element between said closure and said sealing member, said closure having a skirt with a weakened band near its lower edge and a top panel cut to form a partially severed tab, a non-severed tab base, a tab surrounding rim, and rupturable bridges connecting said tab and rim disposed at least one on each side of a line perpendicularly bisecting the tab base and interrupting that portion of the line of tab severance opposite the tab base, said tab having a marginal bead and a diametral rib merging into said bead intermediate a pair of said bridges so located that the aperture in said reinforcing element can be exposed only by rupturing one or both of said pair of bridges, said tab and said sealing member being thereby protected respectively from undetectable lifting and undetectable piercing.

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