Jan. 18, 1949. F. BLANK 2,459,304

MEDICAL VIAL STOPPER FOR INSURING STERILE NEEDLE PUNCTURES

Filed Aug. 28, 1946

Fig. 1.

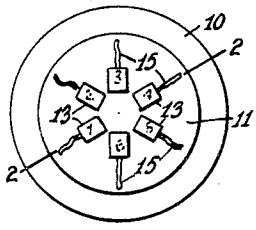


Fig. 3.

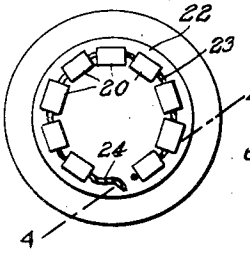


Fig. 5.

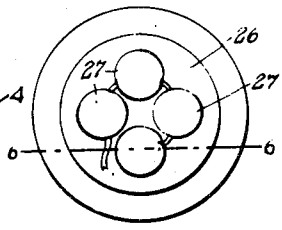


Fig. 7.

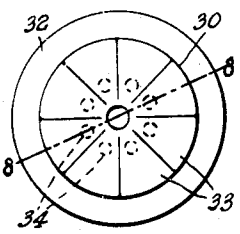


Fig. 2.

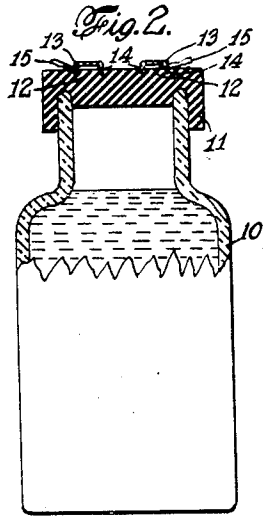


Fig. 4.

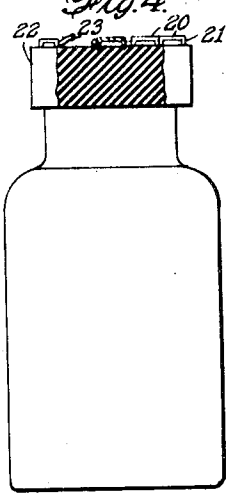


Fig. 6.

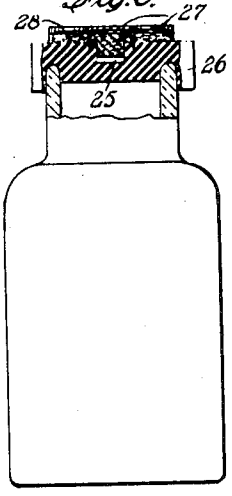


Fig. 8.

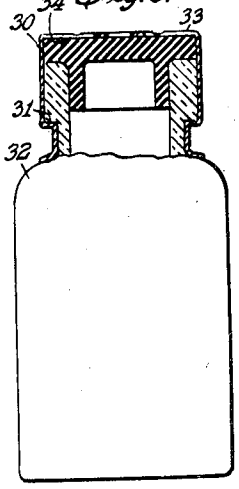


Fig. 9.

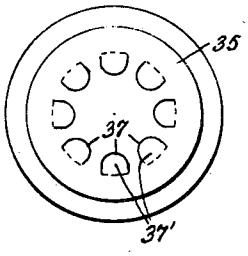


Fig. 10.

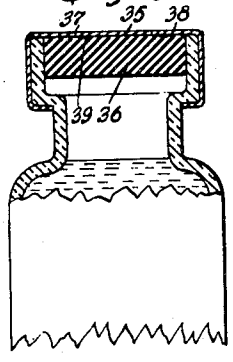


Fig. 11.

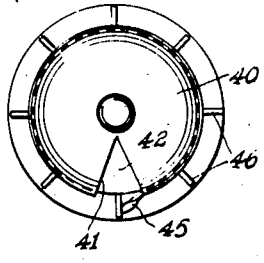
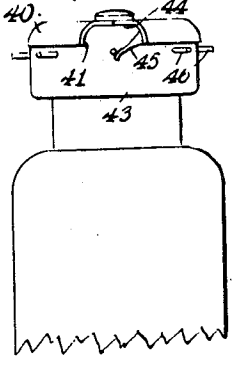


Fig. 12.



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MEDICAL VIAL STOPPER FOR INSURING STERILE NEEDLE PUNCTURES

Frederick Blank, New York, N. Y.

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8 Claims. (Cl. 128—272)

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The invention relates to bottle closures and more particularly to the type utilized in closing medical vials or the like, and adapted for successive piercings by a hypodermic needle of a syringe to withdraw successive charges of the liquid from the container.

It has been the practice heretofore in the use of hypodermic syringes for multiple injections to insert the needle through a soft rubber stopper of the vial and preferably through a thinned area of said stopper. This concentration of the piercing points at a localized area of the top surface of a stopper is particularly unsatisfactory for the reason that as soon as the customary protective shield, usually of plastic or metal, is removed when the vial is used the first time, the exposed area of the top of said stopper remains completely unprotected against contamination. Moreover, the depressed form of surface to provide the thinned out area favors collection of dirt particles and the like therein. Furthermore, cleansing of this area by alcohol or other disinfectant immediately before insertion of a needle is of no great value, as to bacteriostatic or bactericide action, since it is known from many experiments that such a short exposure to a disinfectant is quite unreliable. In addition, the repeated insertion of a needle at substantially the same area creates a rough surface thereat, making the stopper material such as rubber brittle and thus favoring bacterial growth at these points. This brittleness, moreover, renders the vacuum insecure when extracting liquid from the vial, contributing to the deterioration of said fluid; and particles of the rubber and other foreign matter may be introduced into the liquid as a result of the brittleness.

The most serious objection, however, resides in the possibility of pathogenic microbes entering the liquid by way of the needle which is inserted through the stopper and thereby contaminating the injection fluid; or, said needle, picking up bacteria settled on the stopper, may cause a direct infection to the patient.

It is an object of the present invention to provide a stopper arrangement which will avoid all of the aforesaid objections by presenting a plurality of individualized sterile areas of the top surface of the stopper, which area portions are preferably reduced in thickness to the required extent.

Another object of the invention is to provide means over the selected sterile areas of the stopper surface which will protect such areas against contamination and will maintain the same sterile

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until the moment an area is required for use, as in receiving the piercing needle.

A further object of the invention is to furnish a means of indication as to prior use of an area to insure that only a sterile one will be used.

In carrying out the invention, a suitable vial is provided with a stopper of soft, pliable and liquid-impervious material such as rubber, and there is distributed over its upper surface a plurality of cover elements. These elements are designed to be applied over corresponding sterilized areas of the top surface, thinned as required, and maintain the same in the sterilized condition up to the time of use when a cover may be manually separated from the top to expose the underlying area to receive the piercing needle. Provision may be made, also, to predetermine the order of succession of use of the plurality of sterile areas.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of a vial fitted with stopper equipped with the novel protection means; and Fig. 2 is a vertical section taken on the line 2—2, Fig. 1.

Fig. 3 is a plan view similar to Fig. 1, and illustrates a different arrangement of the protection means on the stopper as well as a modification in the means for stripping individual protection means therefrom.

Fig. 4 is a vertical section taken on the line 4—4, Fig. 3.

Fig. 5 is a plan view and Fig. 6 a vertical section, taken on the line 6—6, Fig. 5, illustrating a further modification in the stopper and protection means.

Fig. 7 is a plan view, and Fig. 8 a sectional view, taken on the line 8—8, Fig. 7, illustrating a modification in the cover means.

Fig. 9 is a plan view and Fig. 10 a fragmentary elevation of a further modification.

Fig. 11 is a plan view and Fig. 12 an elevation illustrating a still further modification.

Referring to the drawings, more particularly Figs. 1 and 2 thereof, 10 designates a container such as a bottle or vial for medicinal liquid or serum, having a closure member in the nature of a stopper 11 of relatively soft, pliable and liquid-impervious material, such as rubber, which is suitable for piercing by the needle of a hypodermic syringe by which a charge of liquid may be withdrawn from the container as is well understood. In accordance with the invention, provision is made to isolate a plurality of areas 12 of the top surface of such stopper by corresponding protection shields or cover elements 13.

These elements are designed to be attached to the upper surface of the stopper, for example by an adhesive; or preferably by attaching means such as end, downwardly-turned prongs 14 which are forced into the material of the stopper over the respective areas 12 after first securing proper sterilization both of said areas and the cover elements, as by any well known means. The said elements 13 have outwardly extending tabs 15 or other means which may be manually grasped when it is desired to pierce an area for access to the contents of the container. This is accomplished then by drawing a tab upwardly to detach its cover element from the top surface of the stopper 11 and expose thereby a sterile area for use.

It will be noted that all of the remaining sterile areas are not affected thereby but remain in a sterile state, and will thus present each time a charge is to be withdrawn a clean and sterile area through which the hypodermic needle may pierce the stopper material.

The various areas with their cover elements may be disposed over the stopper surface in any desired pattern, in the instant embodiment of a radial conformation; and, where a cover element has been lifted, an indication, for example, such as a number as shown, is thus provided of the use of the particular area so that it will not be used again. At such time a new area is to be exposed in the manner hereinbefore described.

The cover elements with underlying areas may, also, be disposed circularly over the top surface. Thus, reference being had to Figs. 3 and 4, a plurality of cover elements 20 similar to the ones shown in Figs. 1 and 2 are removably attached by means of downwardly turned pairs of prongs 21 to the top of stopper 22; but, instead of individual withdrawal tabs being provided therefor, a continuous wire or like pliable cable 23 is caused to be fitted beneath each cover element, the wire passing out between points of a pair of prongs from beneath an element. One of free ends 24 of said wire is brought out, for example in the instant embodiment, between juxtaposed cover elements; and by exerting an upward pull on the protruding wire end, a corresponding cover element will be lifted off the surface and the areas uncovered successively as required.

In order further to insure sterility of the area, the same may be constituted as a depression 25, of more or less depth, in the upper surface of a stopper 26, Figs. 5 and 6; and the cover elements 27 fitted thereover are caused to carry on their respective undersides a medicated pad 28 conforming substantially to the shape of a depression. When a cover element is then lifted from the top surface to which it has been secured as aforesaid, the pad 28 will be withdrawn therewith from the depression leaving the same perfectly sterile and the puncturable thickness of the stopper reduced by the extent of the depth of a depression. By thus reducing the thickness of the puncturable portion, another objection to the use of rubber-stoppered vials is overcome, namely, that the needle becomes dull rapidly because of having to perforate a comparatively thick layer of the rubber stopper before its actual use for the injection of liquid into a patient.

Instead of the cover means comprising discrete elements as hereinbefore described, a single member 30, Figs. 7 and 8, of pliable material such as metal foil, may be formed over the stopper and about the shoulder 31 of the container 32. This member, however, is divided radially into sector-like tabs 33 extending outwardly from substantially the center of the stopper, and under each such tab is located a sterilized area 34 of the stopper top surface. These individual tabs may be conveniently lifted manually off the stopper and torn off and discarded when it is desired to puncture the stopper through an area thus exposed, succeeding tabs being removed as successive withdrawals of liquid are to be made from the container.

Or, reference being had to Figs. 9 and 10, a metal top 35 of continuous thin metal may be secured over the bottle stopper 36 to cover tightly the same; and there is cut into said top a succession of more or less circular but incomplete cuts 37. These are of a diameter, preferably, large enough only to pass conveniently a piercing hypodermic needle when the cut portion 37' is manually raised and torn off to expose the underlying top surface 38 of the stopper. Such surface, it will be understood, will have been sterilized, as well as the inner and juxtaposed cap surface, prior to the application of the said cap over the stopper; and as the several cut-out portions are successively removed, corresponding underlying sterile areas 39 are presented for piercing by a hypodermic needle. Moreover, the torn-off portions will automatically indicate punctured areas so that there will be no difficulty in determining each time which portions of the surface are no longer suitable for use.

The cover means may, also, be of the nature of a solid rotatable disk 40, Figs. 11 and 12, having a sector opening or window 41 extending outwardly substantially from the center of the stopper and through which window it is possible to view the particular working area—one area 42 being blank. The said disk 40 is mounted to rotate over the top surface of the stopper 43 or, rather, its sterilized area 44, the window exposing successively the respective areas for use. The top surface area 42 registering with the window 41 in its initial location, of course, is a blank area not intended for use and may be appropriately marked. To prevent possible multiple punctures through any of the sterilized areas, the disk is arranged for uncovering the said areas successively in one direction of rotation only, which may conveniently be insured by the detent element 45 engaging peripheral projecting elements 46 on the stopper below its top surface.

I claim:

1. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material with a plurality of individual sterile areas distributed over its upper surface, and cover means normally protecting the individual areas to retain normally their sterility and adapted for removal individually to expose areas in succession when it is desired to pierce the stopper therethrough.

2. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material with sterile upper surface areas, and cover means including a plurality of cover elements distributed over its upper surface area portions and individually separable manually therefrom to expose successive independent sterile surface portions of the top of the stopper for piercing by a hypodermic needle through the stopper thereat.

3. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material with sterile upper surface areas, and a cover means mounted over

the stopper and including a plurality of tabs directed over its upper surface area portions and individually separable manually therefrom to expose successive independent sterile surface portions of the top of the stopper for piercing by a hypodermic needle through the stopper thereat.

4. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material, a plurality of cover elements removably attached to the upper surface of the stopper, and means associated with the cover elements to separate successively the same manually from the said upper surface to expose successive independent sterile surface portions of said top for piercing by a hypodermic needle through the stopper thereat.

5. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material, and a plurality of cover elements having end prongs inserted into the upper surface of the stopper and individually separable manually therefrom to expose successively independent sterile surface portions of the top of the stopper for piercing by a hypodermic needle through the stopper thereat.

6. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material, a plurality of cover elements having end prongs inserted into the upper surface of the stopper, and a wire inserted under said elements and extending through the same between the prongs with a free end for manipulation to separate the cover elements from said upper surface and expose successively independent sterile surface portions of the top of the stopper for piercing by a hypodermic needle through the stopper thereat.

7. A stopper for a hygienic vial having socket portions to receive a hypodermic needle, and a cover means for the socket portions including a plurality of cover elements for the respective socket portions, each element bearing an attached medicated pad to fit its socket.

8. A hygienic vial closure for multiple injections, comprising a container stopper of soft, pliable and impervious material and provided with a plurality of sockets in its upper surface, a plurality of cover elements secured to the top and distributed over the respective sockets bearing medicated pads to fit the same, said elements being individually separable manually from the top to expose successively independent sterile surface portions of the top of the stopper for piercing by a hypodermic needle through the respective sockets and stopper.

FREDERICK BLANK.

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