

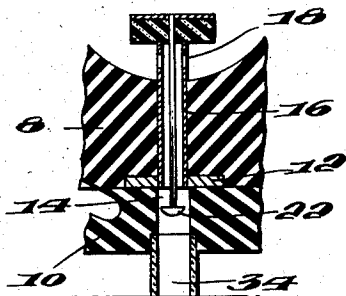
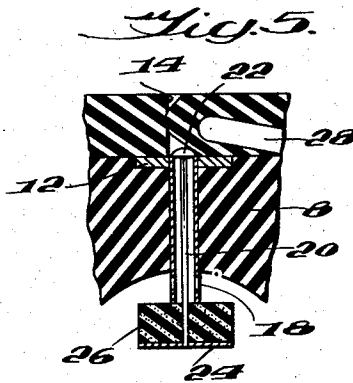
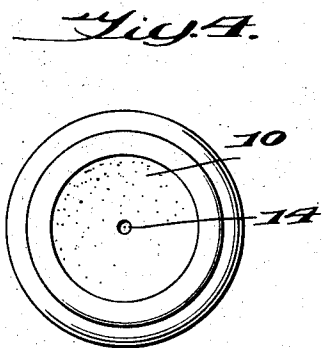
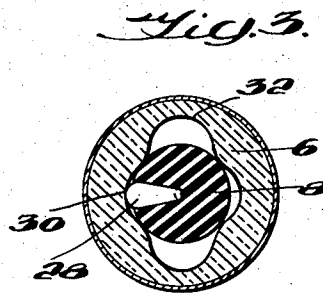
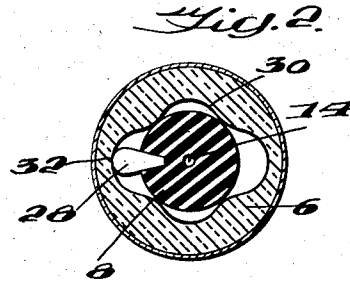
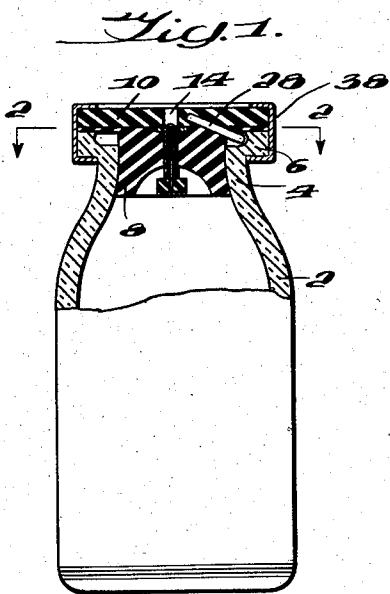
April 14, 1959

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2,881,937

STOPPER FOR AMPOULES AND THE LIKE

Filed June 4, 1954



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2,881,937

STOPPER FOR AMPOULES AND THE LIKE

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18 Claims. (Cl. 215-76)

The invention relates to a closure for containers and more particularly for ampoules intended to contain pharmaceutical preparations, especially in the liquid state.

It is the usual practice to package pharmaceutical preparations intended for hypodermic injection in ampoules closed by a rubber stopper or diaphragm which is pierced by the hypodermic needle when all or a part of the contents are to be administered. I have found that there are often undesirable reactions, not attributable to the contents of the ampoules, when pharmaceuticals so packaged are injected hypodermically into the patient. Close examination shows that the hypodermic needle, in piercing the rubber diaphragm, often tears or cuts off tiny particles of rubber which enter the solution or suspension within the ampoule and may then be drawn into the syringe and administered to the patient along with the intended medicine. Rubber is such a foreign substance that it can cause considerable discomfort and serious disturbance of the system.

The primary object of the invention is to provide an arrangement which avoids the disadvantages of the prior art.

Another object of the invention is to provide an arrangement which is normally tightly sealed, but which can be manipulated so that fluid can be withdrawn from the interior of an ampoule without the necessity of piercing a piece of rubber.

Still another object of the invention is to provide such an arrangement in which the opening through which the liquid is withdrawn can be again tightly closed after the withdrawal, so as to prevent contamination of the material remaining in the ampoule.

A further object of the invention is to provide a self-closing arrangement for such a bottle in combination with a manually closable sealing arrangement, so that the ampoule is closed except when material is actually being withdrawn therefrom and can thereafter be hermetically sealed.

The structure shown herein is an improvement on that shown in my application Serial No. 424,201, "Stopper for Ampoules and the Like," filed April 19, 1954, now Patent No. 2,797,837, granted July 2, 1957.

Further objects and advantages of the invention will appear more fully from the following description especially when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

Fig. 1 shows partly in vertical cross-section an ampoule provided with a stopper embodying one form of my invention;

Fig. 2 is a cross-section on the line 2-2 of Fig. 1;

Fig. 3 is a view similar to Fig. 2 with the opening closed;

Fig. 4 is a top plan-view of Fig. 1;

Fig. 5 is a cross-section on an enlarged scale of the central portion of the stopper showing the parts in closed position; and

Fig. 6 is a view similar to Fig. 5 showing the parts in the position occupied when the needle is being withdrawn.

In the device as shown, there is a glass ampoule or other container 2 having a neck 4 provided with an outward flange 6. Seated within the neck is a stopper of rubber or other resilient material formed of two parts 8, 10 suitably secured together as by vulcanizing, but holding between them a metal disc 12 having a central opening therethrough. This central opening aligns with a normally open hole 14 in the upper rubber part 10. Secured in the opening of the disc 12 and extending downwardly through the lower part 8 of the stopper is a metal tube 16 having near its lower end, and outside of the body 8, lateral openings 18.

A metal stem 20 runs upwardly through tube 16 and has at its upper end an enlarged head 22 forming a valve large enough to overlie the upper end of tube 16, but smaller than the cross-section of hole 14. Stem 20 has secured on its lower end a flange 24, and between this flange 24 and the lower end of tube 16 is a resilient member such as a body 26 of soft elastic rubber.

Embedded in the stopper formed by the two parts 8, 10 is a rigid member 28 which may be of metal, plastic or the like. One end of this member is located close to, but out of contact with, the hole 14. The other end extends beyond the member 8, opposite the inner wall of the flange 6 of the bottle neck. This inner wall is of cam shape, having depressions 30 closer to the axis of the hole 14 and other depressions 32 more remote from this axis.

A metal cap or band 38 surrounds the stopper 8, 10 and the flange 6, thus holding the stopper in the bottle. The outer edge of the portion 10 is preferably adhesively secured to this strip as by welding.

With such an arrangement, the hole 14 can be opened or closed in the manner generally described in my prior application referred to above. When the parts are in the position shown in Figs. 1, 2, 4 and 6, the hole 14 is open. In this condition, the tip 34 of a hypodermic syringe (that is, the portion on which the needle is mounted) can be inserted partly into the hole 14 (because of the resiliency of the rubber of stopper portion 10). The ampoule is then inverted, and the plunger of the hypodermic syringe is withdrawn. This creates a suction in the hole 14 which will draw the valve head 22 downward against the resilient action of rubber 26, and will allow the liquid to flow through holes 18 and past head 22 into the syringe.

When the desired amount has been withdrawn and movement of the plunger stops, resilient member 26 restores valve 22 to the position shown in Fig. 3, thus cutting off the flow of liquid. This will happen even though the tip 34 be removed while the ampoule is still inverted, and only the small amount of liquid in the hole 14 would be lost.

Now, by turning the metal band 38 and the stopper on the neck 4, from the position shown in Fig. 2 to that shown in Fig. 3, the member 28 will be shifted from seat 32 to seat 30, which results in pushing it inwardly to the position shown in Fig. 5 in which it closes the hole 14 and thus seals the ampoule hermetically.

While I have described one embodiment of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the claims hereto or hereinafter appended.

I claim:

1. A stopper for containers comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means to deform the body so as to close said normally open

portion, and valve means in the lower end of said passage normally closing such lower end and movable by suction in the upper end to open position.

2. A stopper for containers comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means to deform the body so as to close said normally open portion, valve means in the lower end of said passage normally closing such lower end and movable by suction in the upper end to open position, and resilient means urging said valve means to closed position.

3. A stopper for containers comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means to deform the body so as to close said normally open portion, the lower portion of said passage including a part of less cross-section than the upper portion, the upper face of said part forming a valve seat, and a valve mounted in said passage above said valve seat adapted to seat thereon and of less cross-section than the part of the passage above the valve seat, said valve being movable by suction in the upper end to open position.

4. In a stopper as claimed in claim 3, means resiliently urging said valve against said seat.

5. In a stopper as claimed in claim 4, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof.

6. A stopper for containers comprising a body of elastic material having a hole therethrough, a rigid tube arranged in the lower part of said hole terminating short of the upper end of the hole, the upper end portion of the hole being normally open, means to deform the body so as to close said normally open portion, and a valve in said upper end portion adapted to rest on the upper end of the tube and being of less cross-section than the hole, said valve being movable by suction in the upper end to open position.

7. A stopper for containers comprising a body of elastic material having a hole therethrough, a rigid tube arranged in the lower part of said hole terminating short of the upper end of the hole and extending below the lower face of the stopper, the upper end portion of the hole being normally open, means to deform the body so as to close said normally open portion, a valve in said upper end portion adapted to rest on the upper end of the tube and being of less cross-section than the hole, a stem connected to said valve extending downward through said tube, and resilient means engaged between said stem and the lower end of the tube normally urging said valve to closed position against the upper end of the tube, said valve being movable by suction in the upper end to open position.

8. In a stopper as claimed in claim 7, a washer of rigid material embedded in the body of the stopper, the upper end of the tube being embedded in said washer.

9. In a stopper as claimed in claim 7, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof.

10. In a stopper as claimed in claim 1, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof.

11. In combination with a container having a neck, a stopper in said neck, said stopper comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means operatively associated with said neck and embedded in said body to deform the body so as to close said normally open portion, and valve means in the lower end of said passage normally closing such lower end and movable by suction in the upper end to open position.

12. In combination with a container having a neck, a stopper in said neck, said stopper comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means operatively associated with said neck and embedded in

said body to deform the body so as to close said normally open portion, valve means in the lower end of said passage normally closing such lower end and movable by suction in the upper end to open position, and resilient means urging said valve means to closed position.

13. In combination with a container having a neck, a stopper in said neck, said stopper comprising a body of elastic material having a passage therethrough, the upper end portion of said passage being normally open, means operatively associated with said neck and embedded in said body to deform the body so as to close said normally open portion, the lower portion of said passage including a part of less cross-section than the upper portion, the upper face of said part forming a valve seat, and a valve mounted in said passage above said valve seat adapted to seat thereon and of less cross-section than the part of the passage above the valve seat, said valve being movable by suction in the upper end to open position.

14. In combination with a container having a neck, a stopper in said neck, said stopper comprising a body of elastic material having a hole therethrough, a rigid tube arranged in the lower part of said hole terminating short of the upper end of the hole, the upper end portion of the hole being normally open, means operatively associated with said neck and embedded in said body to deform the body so as to close said normally open portion, and a valve in said upper end portion adapted to rest on the upper end of the tube and being of less cross-section than the hole, said valve being movable by suction in the upper end to open position.

15. In combination with a container having a neck, a stopper in said neck, said stopper comprising a body of elastic material having a hole therethrough, a rigid tube arranged in the lower part of said hole terminating short of the upper end of the hole and extending below the lower face of the stopper, the upper end portion of the hole being normally open, means operatively associated with said neck and embedded in said body to deform the body so as to close said normally open portion, a valve in said upper end portion adapted to rest on the upper end of the tube and being of less cross-section than the hole, a stem connected to said valve extending downward through said tube, and resilient means engaged between said stem and the lower end of the tube normally urging said valve to closed position against the upper end of the tube, said valve being movable by suction in the upper end to open position.

16. In a device as claimed in claim 15, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof, said neck having a cam surface on its inner wall engageable with said member to displace it inwardly.

17. In a device as claimed in claim 13, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof, said neck having a cam surface on its inner wall engageable with said member to displace it inwardly.

18. In a device as claimed in claim 11, said deforming means including a rigid member embedded in the stopper and extending beyond one side wall thereof, said neck having a cam surface on its inner wall engageable with said member to displace it inwardly.

References Cited in the file of this patent

UNITED STATES PATENTS

1,247,497	Brown	Nov. 20, 1917
1,892,988	Knapp	Jan. 3, 1933
2,115,035	Morgan	Apr. 26, 1938
2,392,602	Luger	Jan. 8, 1946
2,411,216	Leutz	Nov. 19, 1946

FOREIGN PATENTS

22,755	Great Britain	of 1895
365,984	Great Britain	Jan. 28, 1932
973,069	France	Sept. 6, 1950