July 2, 1957 C. B. ROBERTS 2,797,837

STOPPER FOR AMPOULES AND THE LIKE

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Fig. 1.

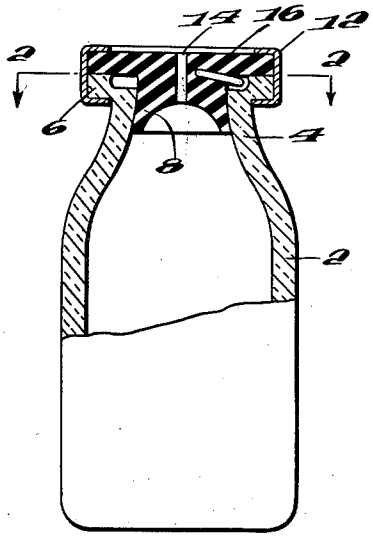


Fig. 3.

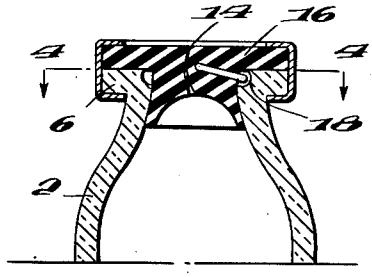


Fig. 4.

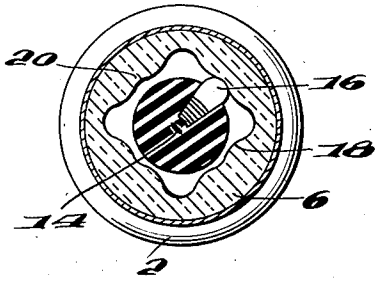


Fig. 2.

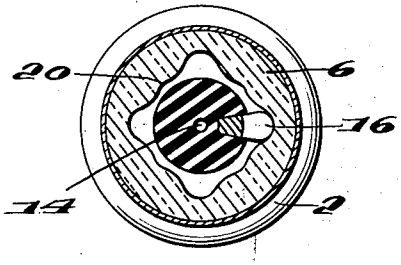


Fig. 5.

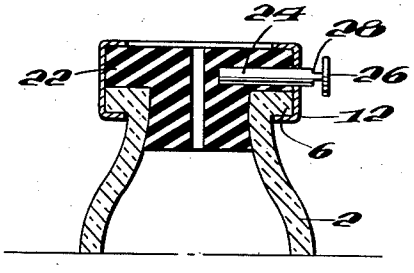
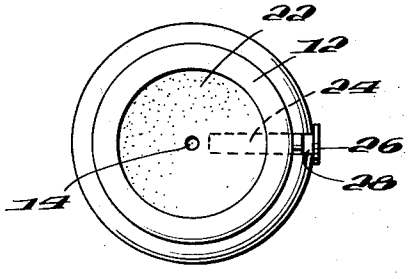


Fig. 6.



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STOPPER FOR AMPOULES AND THE LIKE

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Fig. 7.

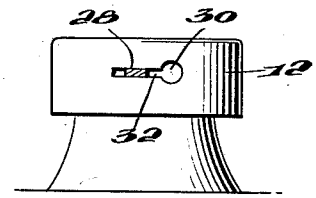


Fig. 8.

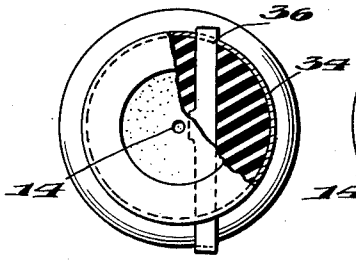


Fig. 9.

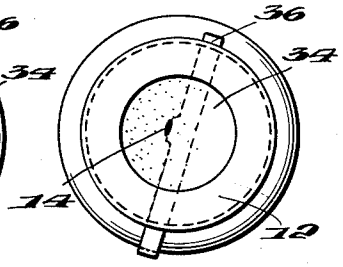


Fig. 10.

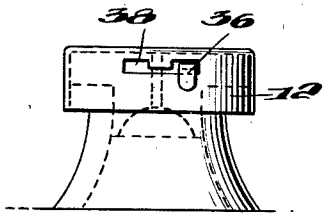


Fig. 11.

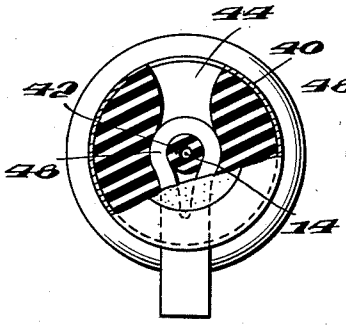


Fig. 12.

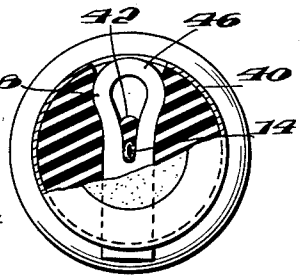


Fig. 13.

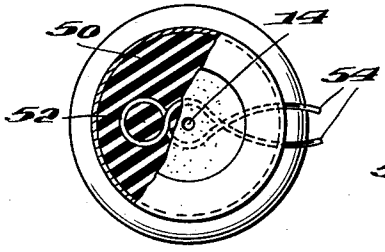


Fig. 14.

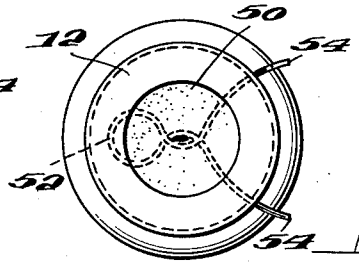


Fig. 15.

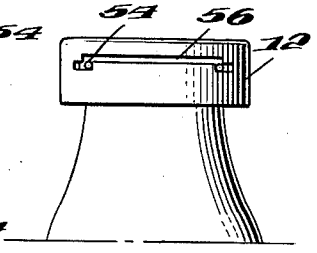
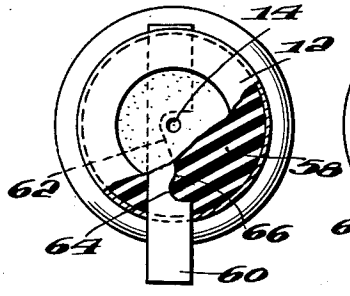


Fig. 16.



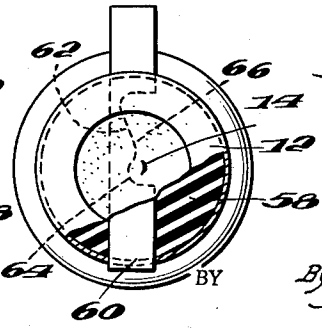


Fig. 17.

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STOPPER FOR AMPOULES AND THE LIKE

Charles Buford Roberts, Sparta, Tenn.

Application April 19, 1954, Serial No. 424,201

1 Claim. (Cl. 215—74)

The invention relates to container closures, and more especially to stoppers for ampoules containing pharmaceutical materials intended for hypodermic injection.

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 ampoule, 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.

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.1 of the top portion of the bottle with the opening closed;

Fig. 4 is a cross-section on the line 4—4 of Fig. 3;

Fig. 5 shows in vertical cross-section a modified form of stopper;

Fig. 6 is a top plan view thereof;

Fig. 7 is a side elevation showing the parts of the stopper of Fig. 5 in closed position, partly in section;

Fig. 8 shows in top plan view, partly in section, a modified form of stopper in open position;

Fig. 9 is a top plan view thereof in closed position;

Fig. 10 shows the stopper arrangement of Figs. 8 and 9 in side elevation;

Fig. 11 is a top plan view, partly in section, of a further modification in open position;

Fig. 12 is a similar view of the stopper of Fig. 11 in closed position;

Fig. 13 shows in top plan view, partly in section, another modified form of stopper in open position;

Fig. 14 is a plan view of the same arrangement in closed position;

Fig. 15 is a side elevation of the stopper of Figs. 13 and 14 in closed position;

Fig. 16 is a top plan view of a further modification of the stopper; and

Fig. 17 is a similar view of the stopper of Fig. 16 in closed position.

In the form of the invention shown in Figs. 1–4, an ampoule or other container **2** of glass or the like is provided with a neck **4** having an outward flange **6** at its top. Fitted within this neck is a stopper of rubber or other suitable elastic material having a stem **8** and an outward flange **10** adapted to rest on flange **6**, the stem **8** fitting tightly within the neck **4**. A metal ring **12** flanged at top and bottom holds the stopper in position on the flange **6**.

The stopper is provided with a normally open central hole **14**. Embedded within the stopper is a member **16** which may be of any suitable rigid material such as plastic or metal. This member extends beyond one side wall of the stopper, at its outer end, while its inner end terminates just short of the hole **14**, so as to be out of contact with the interior of this hole.

Flange **6** has its inner wall **18** of generally square shape, the sides of the square, however, having slight curvature and the corners being rounded. In the center of each of the side walls of the square is a slight depression **20**.

This arrangement operates as follows:

When the parts are in the position shown in Figs. 1 and 2, the hole **14** is open. However, if the stopper is turned with respect to the bottle, as by turning the metal cap **12** to which the rubber of the stopper is secured by welding or the like. Member **16** will ride around in the space beneath the flange **10**, engaging the inside wall **18** of flange **6**, and will be pushed inwardly by cam action to the position shown in Figs. 3 and 4. This inward movement of the member **16** so deforms the rubber of the stopper that it closes the hole **14** tightly, and thus seals the material in the ampoule. Since the member **16** engages in the depression **20**, it is securely held against accidental displacement in either direction which might allow opening of the hole **14**.

It is thus possible to open the ampoule very readily, to insert a needle through the hole **14** withdrawing such of the contents as may be desired and thereafter to close the hole again as shown in Figs. 3 and 4.

Figs. 5–7 show a modified form of the invention. The rubber stopper **22** is provided with a central opening **14** therethrough, and is held on top of flange **6** by a metal cap **12**. Embedded in the rubber, but terminating short of the hole **14**, is a plunger **24** having a head **26** connected to it by a thin neck **28**. Cap **12** is provided with a key-hole shaped slot having an enlarged portion **30** large enough for the plunger **24** to pass therethrough and a narrow portion **32** capable of receiving neck **28**.

In this arrangement, the rubber stopper is not fixedly secured to the cap **12**. The opening **14** may be closed by pushing in the plunger **24** to deform the rubber, and may be held in closed position by then turning the cap on the stopper so as to bring slot **32** over neck **28** (Fig. 7) so as to hold the plunger in its inward position.

In the modification of Figs. 8–10, the stopper **34** with its central opening **14** is likewise held in position by a cap **12**. Embedded in the stopper is a strip **36** of metal or other rigid material which fits at one end through an opening in the cap, while its other end fits through a slot **38** having enlargements at each end. When the parts are in the position shown in Figs. 8 and 10, the hole **14** is open. By pushing down on the end of the member **36**,

however, and shifting it to the left (Fig. 10), it will assume the position shown in Fig. 9 in which it closes the hole **14**. It may be held in this closed position by raising it into the left hand enlargement of slot **38**.

Fig. 11 shows a further modification in which the stopper **40** has a central stem **42** around the hole **14** and a slot **44** therethrough. Closing member **46** has an enlarged head **48** with an opening of generally tapering shape.

With the parts in the position shown in Fig. 11, hole **14** is open. By pushing inwardly part **46**, however, to the position shown in Fig. 12, the narrower part of the opening in head **48** asserts inward pressure on stem **42** so as to close the hole **14**. In this latter position, the part **46** is held by the shape of the end of slot **44**, having passed the narrowest portion of this slot.

Figs. 13–15 show another modification, in which the stopper **50** has embedded in it a piece of stiff wire or rod **52** formed in a figure **8**, with legs **54** extending through the cap **12**. This cap is provided with a slot **56** having downward extensions at its ends.

With the parts in the position shown in Fig. 13, hole **14** is open. If legs **54** are spread apart, however, as shown in Fig. 14, and moved into the downward projections of slot **56**, as shown in Fig. 15, the central bight of the figure **8** member will be squeezed shut and will compress the material around hole **14** closing that hole.

In the form of Figs. 16 and 17, the stopper **58** has slidably embedded in it a bar **60** having on the side nearest the hole **14** a cam surface consisting of a high portion **62** and a shallower portion **64** separated by a projection **66**. When this piece is in the position shown in Fig. 16, hole **14** is open. By sliding the bar to the position shown in Fig. 17, shallower cam portion **64** comes opposite the hole and compresses the rubber so as to close the hole. Projection **66** resists release of the bar **60** from closed position.

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

I claim:

In combination with a container having a neck, a stopper of elastic material in said neck having a normally open hole therethrough, a rigid member embedded in said stopper and extending substantially radially thereof and projecting beyond one side wall thereof, said neck having parts in the same plane perpendicular to the axis of the neck, and in which plane said member is located, at different distances from said axis to form a cam surface on its inner wall engageable with the projecting portion of the member to push the member inwardly so as to deform the elastic material and close said hole, when said stopper is turned in said hole.

References Cited in the file of this patent

UNITED STATES PATENTS

1,244,205	Heck	Oct. 23, 1917
1,619,770	Stewart	Mar. 1, 1927
1,788,795	Hoban	Jan. 13, 1931
2,092,401	Miller	Sept. 7, 1937
2,115,035	Morgan	Apr. 26, 1938
2,608,972	Chrigstrom	Sept. 2, 1952
2,662,669	Schmidt	Dec. 15, 1953

FOREIGN PATENTS

22,755	Great Britain	of 1895
387,446	Great Britain	Feb. 9, 1933
973,069	France	Sept. 6, 1950
876,980	Germany	May 18, 1953