

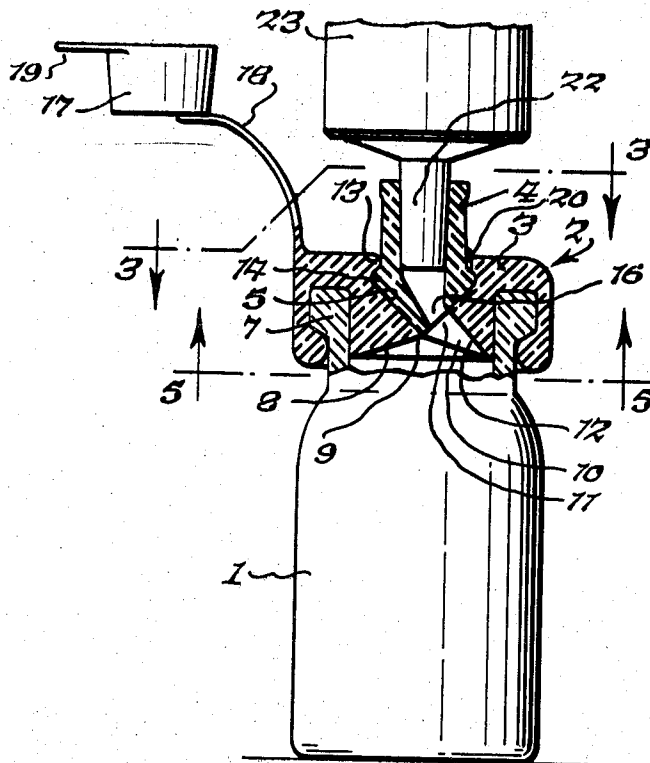
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[54] **CONTAINER CLOSURE**
 7 Claims, 6 Drawing Figs.
 [52] U.S. Cl. 141/18,
 141/383, 222/548, 251/352
 [51] Int. Cl. B65b 1/04,
 B65b 3/04
 [50] Field of Search 141/325,
 326, 327, 383, 384, 385, 386, 311, 18—29;
 251/350, 352; 222/548; 215/99

ABSTRACT: A two-part closure assembly having a sleeve part rotatable in a stopper part between open and closed positions. The two parts have mating conical sealing surfaces each with an opening therethrough, the openings being in registry in the open position. The sleeve part snugly receives the needle fitting of a hypodermic syringe and the stopper part has a dished under surface leading to the opening through its sealing surface. A removable cap closes the outer end of the sleeve, and rotation of the sleeve is limited by position-defining stop means.



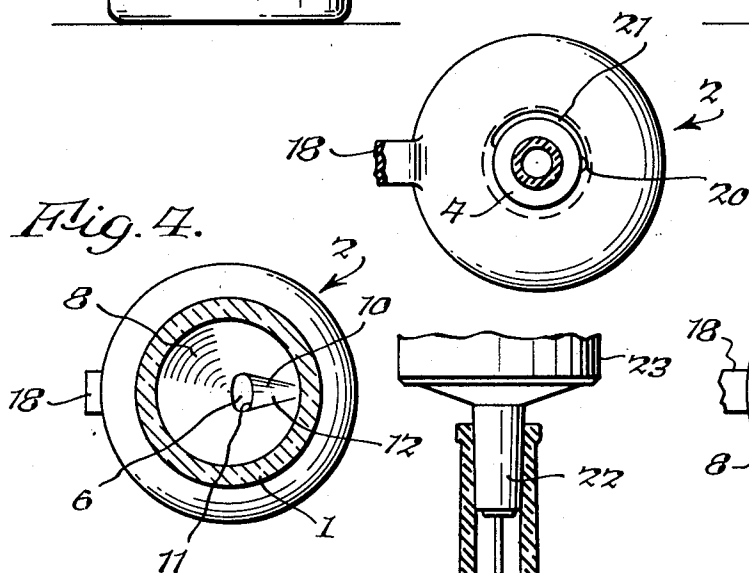
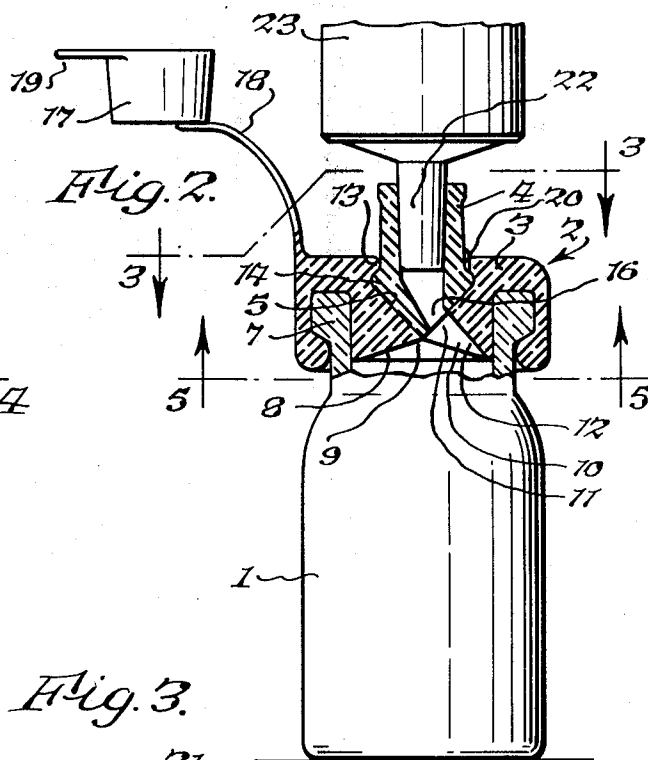
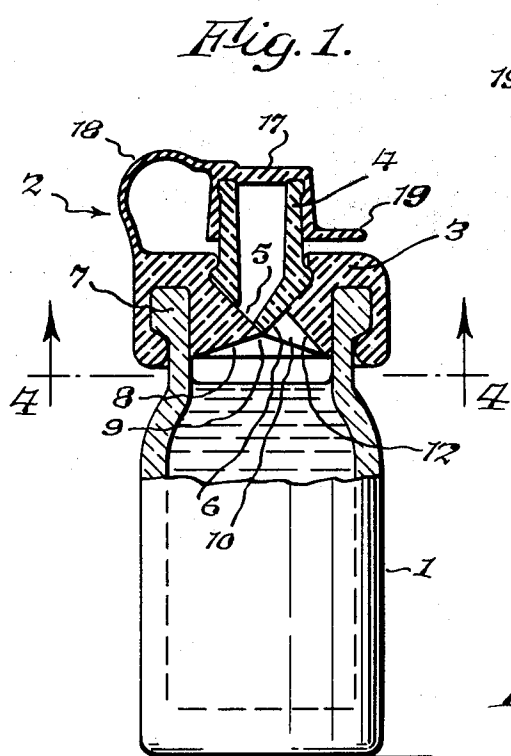


Fig. 4.

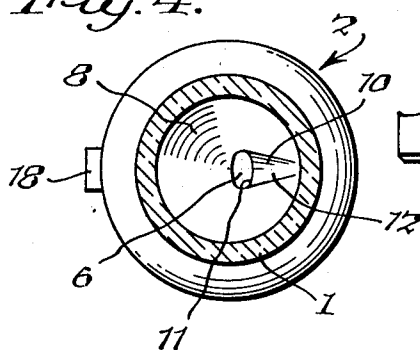


Fig. 5.

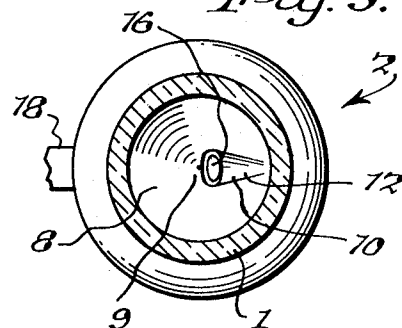
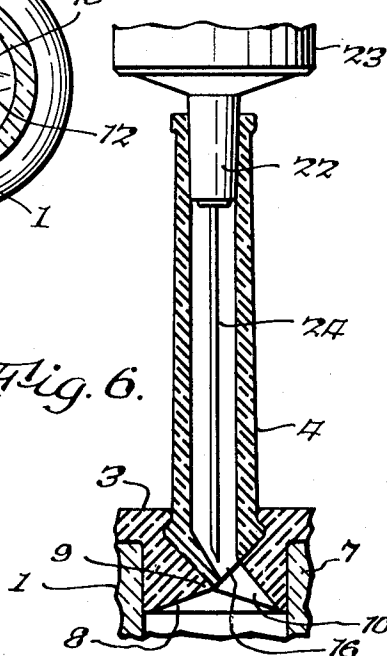


Fig. 6.



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CONTAINER CLOSURE

BACKGROUND OF THE INVENTION

This invention relates to a closure for an open-mouthed container having means forming a part of the closure alternately opening and sealing the container and more particularly to a closure wherein such means are adapted for use with a hypodermic syringe.

Heretofore, vials and bottles containing medicine, vaccines and other substances intended for injection by medical, dental and veterinary practitioners customarily have been sealed by membranous caps placed over the tops of the vials and bottles and adapted to be punctured by the insertion therethrough of a hypodermic needle. When the needle is inserted through such a cap, there is an everpresent possibility that small particles of the cap material will lodge in the needle itself, or be inadvertently pushed by the needle into the injection fluid in the bottle, and subsequently withdrawn through the needle into the barrel of the hypodermic syringe. This raises the danger of contaminating the injection fluid in both the vial and the hypodermic needle. Even more significantly, it creates the danger of forming embolisms in the blood stream if injected into the articular and muscular areas. Such embolisms, inter alia, can cause serious damage to vital organs, develop lesions to joint and articulation surfaces and cause severe local and systematic reactions in the muscular areas, and can result in death.

Further, inasmuch as medical and biological injection fluids often are packaged in multidose bottles, the danger of contamination of the fluids and the danger of injecting particles of cap material into a patient increases with repeated penetration of the hypodermic needle through the cap. Moreover, the needle point of a hypodermic syringe becomes dull after repeated thrusts through the cap material and causes discomfort to the patient when an injection is given. Additionally, with the bottles and closures presently used, often it is difficult to draw out all of the injection fluid since the inversion of the bottle with the needle penetrating through the cap precludes withdrawing of the fluid which finds a level below the needle inlet. Such fluid is usually wasted.

SUMMARY OF THE INVENTION

The present invention avoids the aforementioned defects and provides a simple, safe, multiuse closure cap of the type hereinbefore described. In particular, the present invention provides a closure cap composed of two closure members rotatable with respect to each other with passages in each wherein by rotating one closure member relative to the other the cap can be alternately opened and sealed.

An object of the instant invention is to provide a closure member of the foregoing characteristics wherein one of the rotatable closure members is adapted to receive in sealing relationship the needle fitting of either a hypodermic barrel where disposable needles are utilized or of a hypodermic barrel utilizing a fixed needle.

Another object of the invention is to provide a closure cap for bottles or vials of the foregoing characteristics wherein puncturing the cap by the hypodermic needle is not required in order to withdraw fluid from the bottles or vials, thus in no way blunting or dulling the needle point.

It is a further object of this invention to provide a closure cap of the foregoing characteristics which prevents exposure and contamination of the injection fluid as it is being drawn into the hypodermic syringe. To this end, a first and primary seal is formed when the one closure member is rotated relative to the other closure member sealing off passages therein. A secondary seal is provided between the same closure member and the needle fitting of the hypodermic barrel when the closure member receives the needle fitting thereof. The injection fluid passes into the hypodermic barrel upon rotation of the one closure member to the open position without exposure to and contamination by the external environment.

It is still further an object of the present invention to provide a closure cap of the foregoing characteristics which facilitates the withdrawal by a hypodermic syringe of all the injection fluid from a container when the container and cap are inverted. To this end, the construction and arrangement of one of the closure members is such as to provide an opening in the lowermost portion of the closure which, when the container is inverted, will drain all of the injection fluid into the hypodermic barrel.

It is still another object of the invention to provide a means limiting the rotational movement of the closure members.

It is still a further object of the invention to provide a means limiting the rotational movement of the closure members between two extremes thereby giving an indication of whether the container is opened or sealed and precluding contamination of the injection fluid by inadvertently leaving the closure open.

It is still further object of the present invention to provide a closure cap of the foregoing characteristics which adapts a container holding injection fluid for multiple use. The primary seal of the closure cap of the present invention precludes contamination of the injection fluid and permits repeated use of the closure and container combination as a source of injection fluid for hypodermic syringes.

Various other novel details of construction and advantages inherent in the closure construction of the present invention are pointed out in detail in conjunction with the following description of an illustrative embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

FIG. 1 is a view partly in vertical section and partly in side elevation showing a closure cap and container arrangement of the present invention with the closure cap in sealed position;

FIG. 2 is a similar view thereof but with the closure cap in an open position receiving the needle fitting of a hypodermic syringe;

FIG. 3 is a plan view thereof taken about along line 3-3 of FIG. 2 and illustrating a groove and nub arrangement for limiting rotational movement of the closure members;

FIG. 4 is a horizontal sectional view taken about on line 4-4 of FIG. 1;

FIG. 5 is a horizontal sectional view taken about on line 5-5 of FIG. 2; and

FIG. 6 is a fragmentary vertical sectional view of a modified closure cap of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring now to the drawing wherein like reference characters refer to like parts in the various figures, there is shown a container 1 of the type used to store fluid which ultimately will be injected by practitioners of the medical, dental, and veterinary professions into their respective patients. A closure assembly of this invention is shown at 2 and is sealed by a friction fit to the neck portion of container 1.

Closure assembly 2 comprises a two-part construction having a stopper member 3 and a sleeve or socket member 4, the two members having mating conical sealing surfaces 5 and 6 respectively. Stopper 3 fits into the neck of container 1 with a friction fit providing sealing engagement therebetween, and has a concentric skirt with an internal peripheral bead fitted about and beneath lip 7 of container 1 in sealing engagement therewith for added security. The bottom surface of stopper 3 interiorly of lip 7 is formed to provide a conical surface 8 extending upwardly from substantially the entire cross-sectional area of the container neck to an apex 9. Apex 9 is disposed on the container axis passing through the center of sleeve 4 and container 1. The conical upper surface 5 of stopper 3 extends downwardly to an apex which is coincident with apex 9 of lower conical surface 8, and provides a valve seat for the conical lower end 6 of member 4. The apex of surface 6 also is coincident with apex 9.

A channel 10 is disposed through a portion of lower conical surface 8, terminating in an opening 11 through the upper conical surface 5 at one side of the common apex of surfaces 5, 8. Channel 10 is provided by a sidewall portion 12 disposed at a greater inclination to the horizontal than the sidewall defining conical surface 8. Consequently, when container 1 and closure assembly 2 are inverted, injection fluid in the bottle will gravitate toward the lowermost portion of closure member 3, along channel 10, thereby facilitating complete draining of the inverted container when the closure assembly is in open position, as will be readily seen from FIGS. 2 and 6 if the drawing is inverted.

Sleeve 4 terminates at its lowermost end in a head portion defined by conical surface 6 which is in sliding sealing engagement with conical surface 5 of stopper 3, and by a peripheral flange 14 around sleeve 4 having a snap-fit into engagement beneath an undercut flange 13 on stopper 3. The flanges 13, 14 cooperate to retain stopper 3 and sleeve 4 in fluidtight sealing relation while facilitating relative rotation therebetween about the axis passing through the coincident apices of conical surfaces 5, 6 and 8.

Sleeve 4 is elongated, extending through the stopper opening defined by flange 13 and projecting therebeyond. A vertical passage 15 extends through sleeve 4, along the container axis, terminating in open ends. The uppermost end of passage 15 is aligned with the container axis to receive the needle fitting 22 of a hypodermic syringe 23 in releasable sealing engagement therewith. The lowermost end of passage 15 extends obliquely of the container axis and terminates in an opening 16 through the conical surface 6. Opening 16 is offset from apex 9, whereby in the closed position seen in FIG. 1 opening 16 is aligned with and sealed closed by the complementary conical surface 5 of stopper 3. Rotation of sleeve 4 in stopper 3, from the closed position shown in FIG. 1 to the open position seen in FIG. 2, brings opening 16 into registry with opening 11 and provides a through passage for the egress of fluid from the container into the syringe. It is apparent that when the closure assembly is in the closed position of FIG. 1, opening 16 is sealed by conical surface 5 of stopper 3 and opening 11 is sealed by conical surface 6 of sleeve 4.

A cap 17 seats on the uppermost portion of sleeve 4 in sealing relation therewith and is integrally connected to stopper 3 by a flexible strap 18 providing a hinge therefor. A pull tab 19 integral with cap 17 provides convenient means for lifting cap 17 from sleeve 4 and breaking the sealed relationship therebetween. Cap 17 provides additional sealing and prevents contamination of the interior of sleeve 4.

A nub 20, integral with and external of sleeve 4, is disposed on the same side of sleeve 4 as opening 16, and rotates with sleeve 4 in a limited perimetrical groove 21 formed in the upper, outer surface of circular flange 13. The opposite ends of groove 21 define the open and closed positions of the closure and limit the degree of rotation of sleeve 4 within stopper 3.

In the form illustrated in FIG. 6, sleeve 4 is vertically elongated to a greater extent than in the form of FIG. 1, to accommodate the length of a nondisposable hypodermic needle 24. Whereas sleeve 4 of the form shown in FIG. 1 snugly accommodates the major portion of needle fitting 22 of a hypodermic syringe 23 which utilizes disposable needles, the elongated sleeve 4 depicted in FIG. 6 similarly accommodates the needle fitting 22 with the needle 24 inserted therein. In the two forms disclosed, the needle fitting 23 of the hypodermic syringe engages in fluid sealing relation with sleeve 4 providing a secondary seal and facilitating inversion of the container and cap assembly without leakage therefrom when filling the hypodermic needle. Except for the difference in length, sleeve 4 is identical in both forms.

Stopper 3, cap 17 and sleeve 4 are made of a flexible material, such as one of the synthetic plastics providing fluidtight friction fit therebetween and with container 1, the material being inert to the fluid in the container and being stable over a long shelf life under those conditions normally encountered.

To use the invention, cap 17 is first lifted off the upper end of sleeve 4 by pull tab 19. In either form, needle fitting 22 of hypodermic syringe 23 is inserted within and sealingly engages sleeve 4. Sleeve 4 is rotated from the closed position of FIG. 1 to the open position of FIG. 2 either by grasping sleeve 4 and rotating it or by rotating hypodermic syringe 23 which will rotate sleeve 4 due to friction fit formed at the seal therebetween. The bottle containing the injection fluid and the hypodermic syringe in place in sleeve 4 are then inverted as a unit and the fluid withdrawn by the suction created by the hypodermic needle. It will be noted that all of the injection fluid can be drained from the bottle because channel 10 is angled vertically to a greater extent than conical surface 8 and when the bottle is inverted with openings 11 and 16 aligned, the fluid gravitates into conical surface 8 and channel 10, through openings 11 and 16 and into sleeve 4.

It is a feature of the present invention that the closure adapts the container for multiple use without contamination of the injection fluid. When the container is inverted and the syringe is filled to the extent desired, the container is merely reverted back to its original position with the openings 11 and 16 remaining in registry. Fluid in sleeve 4 will then drain back into the container whereupon sleeve 4 is rotated to the closed position of FIG. 1. The syringe is then withdrawn from sleeve 4 and cap 17 is repositioned to seal the top end thereof. The injection fluid thus remains uncontaminated ready for subsequent use. Nub 20 indicates the rotative position of sleeve 4 relative to the open or closed position and proper indicia, not shown, may be provided on the stopper to further indicate same to preclude inadvertent opening of the closure member.

At no time is it necessary to puncture a seal, thereby obviate the danger of contamination from that source, and the possibility of forming an embolism by the inadvertent injection of seal material particles.

I claim:

1. A closure for containers for injection fluid adapted for use with a hypodermic syringe of the type having a needle fitting, said closure comprising a first closure member having a first surface at its inner end and an outwardly opening socket adapted to receive the needle fitting of a syringe in releasable sealing engagement therewith, a second closure member adapted to engage and close the mouth of a container and having a second surface corresponding to said first surface, means mounting said closure members for relative rotation of said surfaces in sealing engagement therebetween, said socket having a passage therethrough terminating in an opening through said first surface, said second surface sealing said first closure member opening in one position of relative rotation between said members, said second closure member having an opening through said second surface, said first surface sealing said second closure member opening in said one position of relative rotation, said closure members being relatively rotatable into another position placing said openings in registry and thereby providing a passage through said closure for passage of injection fluid from a container to a syringe.

2. A closure according to claim 1, wherein said first and second surfaces are oblique surfaces and wherein said openings terminate in said oblique surfaces.

3. A closure according to claim 1 wherein said first and second surfaces are conical surfaces having substantially coincident apices and wherein said openings terminate in said conical surfaces.

4. A closure according to claim 3 together with a third conical surface on the underside of said second closure member and having an apex substantially coincident with the apices of said first and second surfaces, a channel formed in said third surface terminating in said opening in said second surface.

5. A closure according to claim 1 wherein said engaging surfaces are recessed within said second closure member and said mounting means comprise a flange on said socket and a shoulder on said second closure member engaging over said flange and retaining said socket in said recess, thereby retaining said first and second closure members in sealing engagement and facilitating relative rotation therebetween.

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6. A closure according to claim 3 wherein said openings lie wholly within their respective conical surfaces in laterally offset relation to the apex thereof.

7. A closure according to claim 1 wherein said second closure member as a third surface on the underside thereof with a channel formed therein, all of said surfaces being conical surfaces with substantially coincident apices and said channel terminating in said opening in said second surface, said engaging

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surfaces being recessed within said second closure member, and said mounting means comprising a flange on said socket and a shoulder on said second closure member engaging over said flange and retaining said socket in said recess thereby permitting relative rotation between said first and second closure members.

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