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B. D. FOLKMAN
SAMPLING CONTAINER
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3,199,707

FIG. 1.

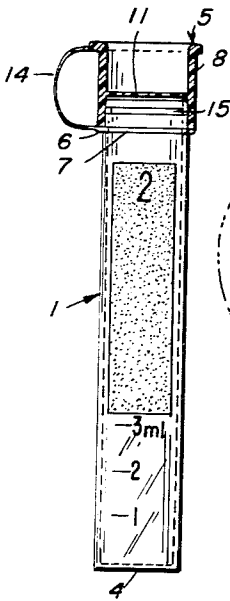


FIG. 2.

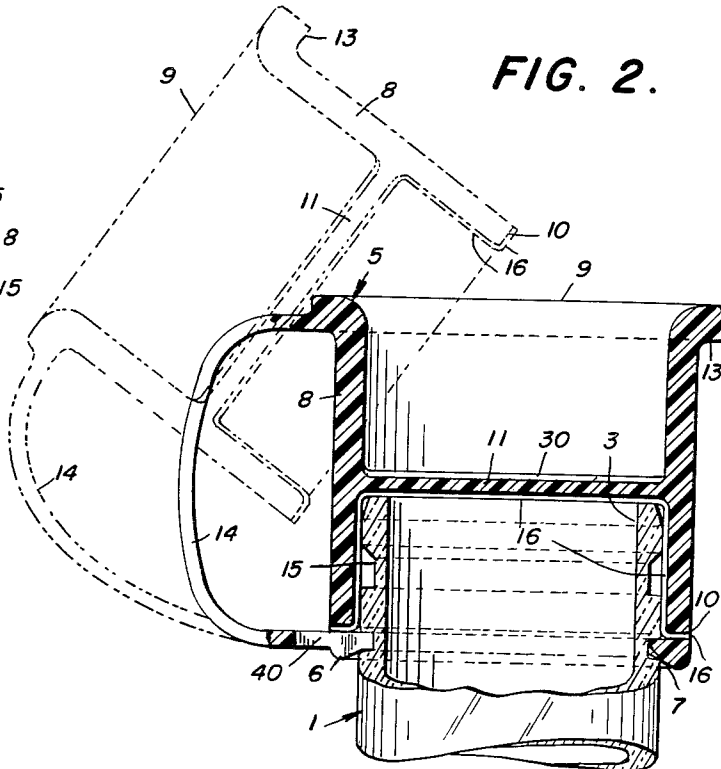


FIG. 3.

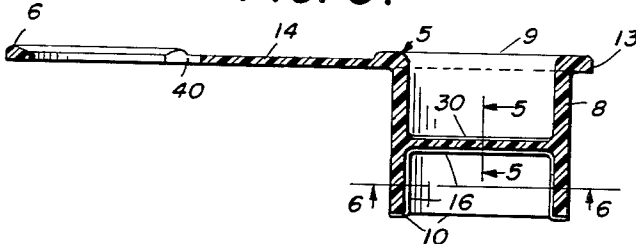


FIG. 5.

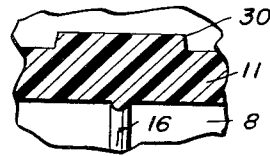


FIG. 6.

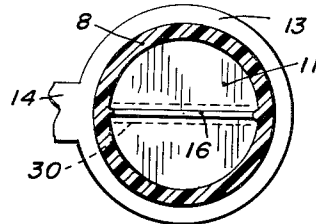
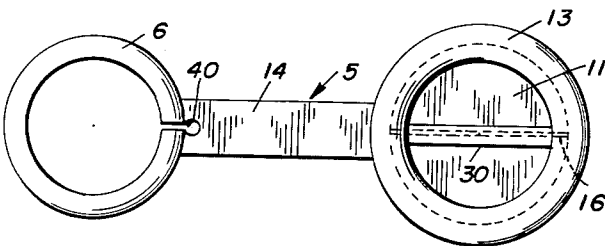


FIG. 4.



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SAMPLING CONTAINER

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6 Claims. (Cl. 215-99)

This invention relates generally to a sampling container comprised of a fluid collection vial and closure combination for obtaining samples for hospital and medical use.

In many situations a physician finds it necessary to analyze a sample of body fluid to diagnose a patient's condition. One fluid that is often collected and analyzed is the cerebrospinal fluid, and the procedure for collection is termed a lumbar puncture. In this procedure, the physician inserts a hollow needle into the patient's spine and draws off samples of the fluid for analysis. He collects these samples in vials, usually three, which are sent to the laboratory.

Since the physician many times performs the lumbar puncture without assistance, he must use one hand to hold the hollow needle so as to prevent it from moving about in its puncture site and use the other hand to manipulate the closure of the sterile vial. Although the physician is gloved, he must not touch the lip or mouth of the vial with anything which is not sterile or the laboratory analysis could be thrown off and an erroneous diagnosis made. Previous collection vials and closures required two hands to aseptically open and close, and attempts to use only one hand frequently contaminated the vial.

After the physician takes the cerebrospinal fluid sample, the vial is sent to the laboratory where a technician usually working without gloves removes a portion of the fluid from the vial and analyzes it bacteriologically. If a technician inadvertently touches and contaminates the mouth or open end of the vial with bacteria, a sample drawn from the vial could include this bacteria. Frequently, the vial would be contaminated without the technician actually knowing it had happened.

It is an object of this invention to provide a sampling container including a vial that can be opened and closed with little danger of inadvertently touching the mouth or open end of the vial.

Another object of this invention is to provide a sampling container which a physician, nurse, or technician can open and close with one hand.

Still another object of this invention is to provide a sampling container in which a closure covers a portion of the exterior of a vial, which closure can be easily removed without touching said portion of the exterior of the vial.

Another object of this invention is to provide an improved closure for a sampling container.

Other objects of this invention will become apparent upon further description and from the following illustrations:

FIGURE 1 is a front elevational view of the closed sampling container with the closure being shown in section;

FIGURE 2 is an enlarged fragmentary front elevational view of the sampling container, the closure being shown in solid line when the sampling container is closed and in dotted line when the sampling container is open;

FIGURE 3 is an enlarged sectional view of the closure;

FIGURE 4 is an enlarged top view of the closure;

FIGURE 5 is a fragmentary section taken along line 5-5 of FIGURE 3; and

FIGURE 6 is a fragmentary section taken along line 6-6 of FIGURE 3.

The sampling container of this invention comprises two separate parts which fit together. The first part is

a vial 1 which has an external peripheral groove 7 near, but spaced from, an open end 3 of the vial. Optional groove 15 between groove 7 and open end 3 of the vial helps hold a closure against prematurely slipping off. The opposite end 4 of the vial is closed. The vial 1 preferably is transparent, has an identifying numeral printed on its side, has volumetric markings, and has a roughened surface which can be written on.

The second part is a closure 5 which connects to the vial by a retaining ring 6 fitting within the groove 7. Closure 5 includes a sleeve 8, a lower portion of which is adapted to slip over the open end of vial 1 to close it. Between an upper end 9 and a lower end 10 of the sleeve is a transverse diaphragm 11 which fits against the open end 3 of a vial and separates the sleeve into upper and lower portions. Since the diaphragm 11 is spaced a distance from the upper end of the sleeve, there is a substantial portion of the sleeve above the open end 3 of the vial. Preferably, diaphragm 11 lies approximately one half the distance between ends 9 and 10 of the sleeve. An external peripheral flange 13 at the upper end of sleeve 8 extends beyond the periphery of the sleeve. By pushing against this flange, the operator can push the closure off the top of the vial. A flexible web 14 connects retaining ring 6 to sleeve 8 and preferably at flange 13. A slot 40 permits the retaining ring 6 to expand slightly so the closure 5 is easy to assemble to the vial 1. The closure 5 includes a rib 16 which extends across the bottom surface of diaphragm 11, down the inner surface of sleeve 8 and across the lower end 10 of sleeve 8. This rib 16 holds the closure a slight distance from the vial 1 and from retaining ring 6 so sterilizing gases can enter vial 1. A rib 30 which extends along the upper surface of transverse diaphragm 11 adds strength to the diaphragm and provides a passage for material to flow into the diaphragm during molding. The closure is of a sterilizable material such as polypropylene, polyethylene, etc.

As shown in FIGURE 1 and 2, the external retaining ring 6 extends beyond the periphery of the vial 1. This structure provides a definite advantage over other collection vials. The retaining ring 6 separates the vial exterior into two separate portions. The portion from groove 7 to the open end 3 must not be inadvertently touched by the technician performing the test. To avoid this the external retaining ring 6 acts in much the same way as a hand shield on a sword and will serve as a stop or barrier against touching the open end of the vial.

Retaining ring 6 in addition to serving as a barrier also indicates when the vial is properly closed. The lower end 10 of sleeve 8 when parallel to and abutting the retaining ring 6 indicates to the operator that the closure 5 is properly aligned on vial 1 and that diaphragm 11 is fitted down on the open end 3 of the vial.

The position of external peripheral flange 13 is a safety feature. As can be noted in the drawings, flange 13 lies a substantial distance above transverse diaphragm 11 and also above the open end 3 of the vial. Thus, when either pushing against the flange 13 with the thumb of one hand to open the vial or if using both hands to open the vial, there is little chance of contaminating the open end 3 of the vial.

Although I have illustrated and described one embodiment of my invention, certain modifications may be made without departing from the spirit and scope of this invention.

I claim:

1. A sampling container comprising:

(a) a vial having an open end, a closed end, and an external peripheral groove spaced from said open end;

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- (b) a closure adapted to close the open end of said vial, said closure including
- (1) a retaining ring fitting within said external peripheral groove,
 - (2) a sleeve having a lower portion adapted to fit over the open end of said vial to cover and keep sterile a portion of the vial between its open end and said peripheral groove, said sleeve extending from a lower end adjacent said peripheral groove to an upper end that lies a substantial distance above the open end of the vial,
 - (3) a transverse diaphragm within said sleeve adapted to fit against the open end of said vial, said diaphragm spaced between the two ends of said sleeve and a substantial distance from the upper end of the sleeve,
 - (4) an external flange projecting radially outwardly about the upper end of said sleeve, said closure manipulatable by said flange to axially slide the closure selectively off and on said vial, thereby opening and closing the sampling container without contaminating the vial between its external peripheral groove and its open end, and
 - (5) a flexible web connecting said retaining ring to said sleeve.
2. A sampling container as set forth in claim 1 wherein said retaining ring extends outwardly beyond the periphery of said vial to provide a barrier preventing inadvertent contamination of the vial between its external groove and its open end.
3. A sampling container as set forth in claim 1 wherein said transverse diaphragm lies approximately one half way between the upper and lower ends of said sleeve.
4. A sampling container comprising:
- (a) a generally tubular vial having an open end and a closed end;
 - (b) an annular stop projecting radially outwardly from said vial and affixed thereto at a location near, but spaced from, the open end of the vial;
 - (c) a removable closure on the open end of said vial, said closure including:
 - (1) a tubular sleeve having an upper and a lower portion, said lower portion telescoping over the outside of the open end of the vial and abutting against the annular stop so as to cover and aseptically protect a portion of the vial from said open end to said stop,
 - (2) a transverse diaphragm across said sleeve and located at the juncture of said upper and lower portions, said diaphragm fitting against and closing the open end of the vial, said diaphragm also serving as a stop to assure that the upper portion of the sleeve projects longitudinally beyond the open end of the vial, and
 - (3) a flange projecting radially outwardly from the upper end of the upper sleeve portion to facilitate easy removal of the sleeve from the vial with one hand, said flange being spaced a substantial distance

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from the lower portion of the sleeve, so the closure can be manipulated by said flange to open and close said vial without contaminating the vial from said open end to said stop.

5. A sampling container comprising:

- (a) a vial having an open end, a closed end, and an external peripheral groove spaced from said open end;
- (b) a closure adapted to close the open end of said vial, said closure including
 - (1) a retaining ring fitting within said external peripheral groove,
 - (2) a sleeve having a lower portion adapted to fit over the open end of said vial to cover the vial between its open end and said peripheral groove, said sleeve having upper and lower ends thereon,
 - (3) a transverse diaphragm within said sleeve adapted to fit against the open end of said vial, said diaphragm spaced between the two ends of said sleeve whereby a substantial portion of said sleeve is above the open end of said vial,
 - (4) a rib extending across a bottom surface of the diaphragm, along an inner surface of the lower portion of said sleeve and across a lower end of said sleeve, said rib holding portions of the sleeve and diaphragm a slight distance from the vial and retaining ring whereby sterilizing gases can enter said vial,
 - (5) an external flange projecting radially outwardly about the upper end of said sleeve, and
 - (6) a flexible web connecting said retaining ring to said sleeve.

6. A closure for a sampling container, said closure including:

- (a) a retaining ring;
- (b) a tubular sleeve having upper and lower ends;
- (c) a flexible web connected at one end to said retaining ring and at another end to said tubular sleeve;
- (d) a transverse diaphragm within said tubular sleeve between said ends of the sleeve and a substantial distance below the upper end of the sleeve; and
- (e) an external flange about the upper end of said sleeve, which flange is located a substantial distance from said diaphragm and the lower end of the sleeve, whereby said closure can be manipulated by grasping said flange without contaminating the transverse diaphragm and a sleeve portion between the transverse diaphragm and the lower end of the sleeve.

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