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Freshley

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[54] **ANAEROBIC SPECIMEN COLLECTING AND TRANSPORTING DEVICE**

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[51] **Int. Cl.²**..... **A61B 10/00**

[58] **Field of Search**..... 128/2 W, 2 B, 2 R, 2 F, 128/269; 195/127

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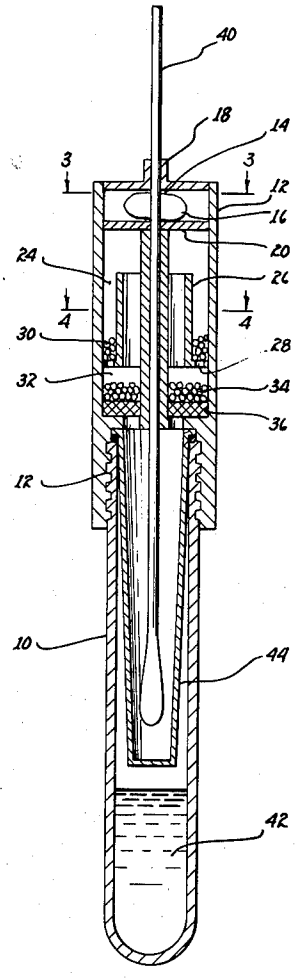
[57] **ABSTRACT**

An anaerobic specimen collecting and transporting device is described incorporating a transporting tube having a suitable transport media therein; a removable closure is provided for the tube and incorporates a swab slidably mounted therein; the closure is compartmentalized and includes a frangible ampule containing a liquid for combination with a hydrogen generating substance to remove oxygen from within the device that would otherwise be destructive of the collected specimen.

7 Claims, 4 Drawing Figures



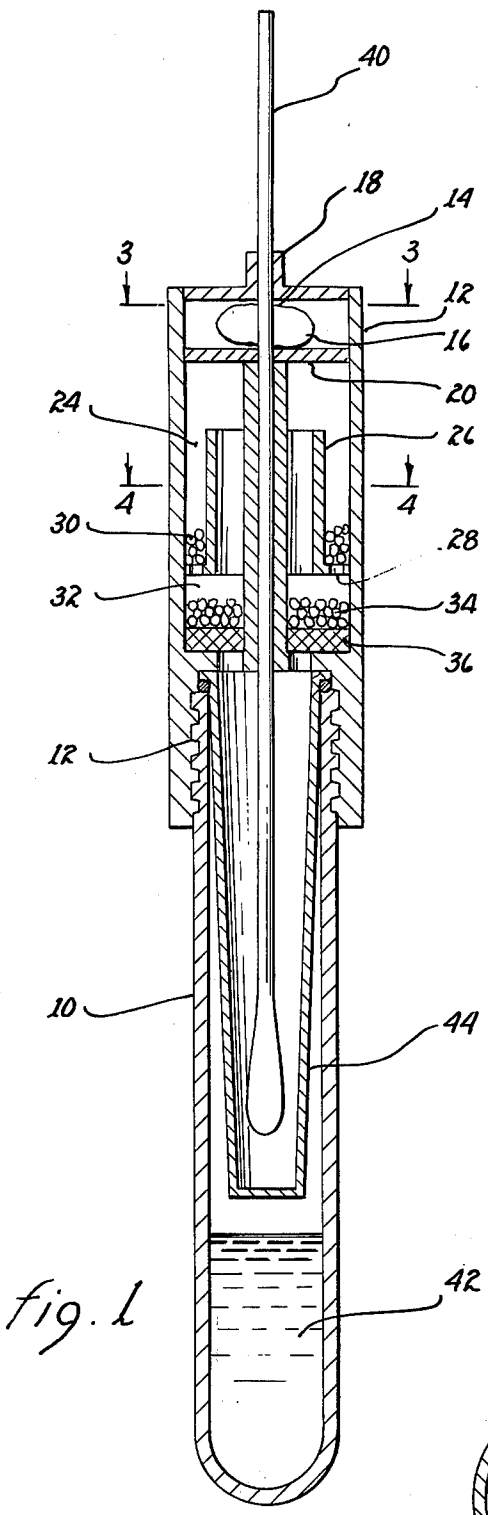


fig. 1

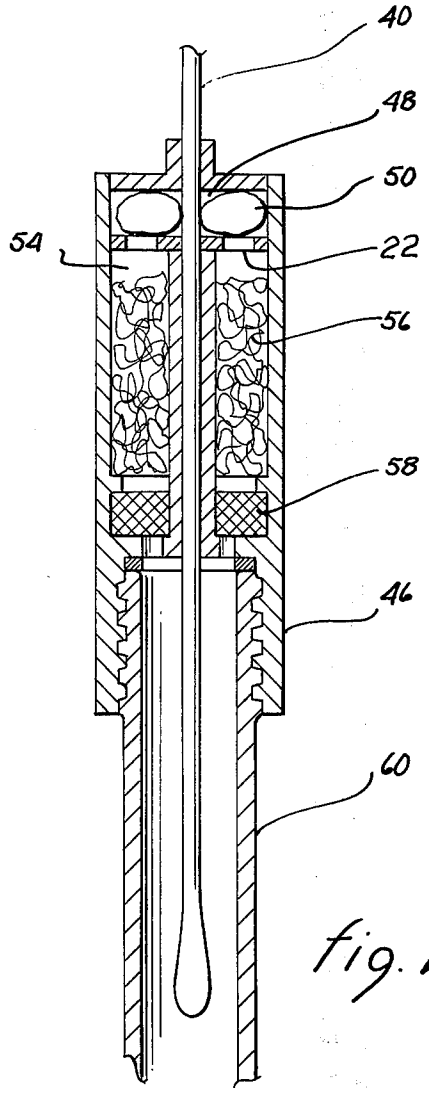


fig. 2

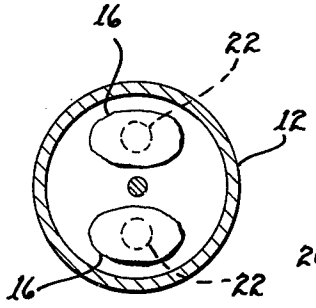


fig. 3

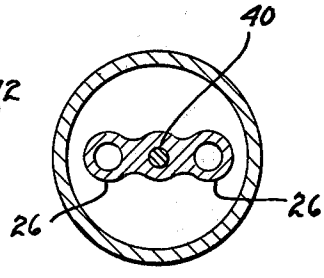


fig. 4

ANAEROBIC SPECIMEN COLLECTING AND TRANSPORTING DEVICE

The present invention pertains to devices for conveniently collecting and preserving an anaerobic culture specimen for subsequent transportation to a laboratory for analysis.

The collection of anaerobic culture specimens from wound drainage and tissues requires careful handling and preservation to prevent destruction of the specimens prior to analysis; since the specimens are frequently collected in a physicians office or other location remote from a laboratory having proper facilities for analysis of the specimen; the handling of the specimens immediately after collection and prior to analysis in the laboratory is of great significance. Prior art devices for maintaining the proper conditions for preservation of such anaerobic samples are usually complicated and cumbersome. While portability of bacteriological specimens is a recognized desideratum, there does not appear to be any existing device capable of protecting the anaerobic specimens immediately subsequent to collection and prior to analysis.

It is therefore an object of the present invention to provide a device for the convenient collection and preservation of anaerobic specimens.

It is another object of the present invention to provide a device for anaerobic specimen collection and transportation that is self-contained and upon actuation will provide a continuous deoxifying effect to prevent destruction of the anaerobes.

It is still another object of the present invention to provide a device that is small and readily portable while providing the ready collection of anaerobic specimens combined with the subsequent preservation of the specimens during transportation and storage prior to analysis.

These and other objects of the present invention will become apparent to those skilled in the art as the description thereof proceeds.

The present invention may more readily be described by reference to the accompanying drawings, in which:

FIG. 1 is an elevational view partly in section of apparatus constructed in accordance with the teachings of the present invention; and

FIG. 2 is an elevational view of a portion of the apparatus shown in FIG. 1 modified to show another embodiment of the present invention;

FIG. 3 is a cross-sectional view of FIG. 1 taken along lines 3—3;

FIG. 4 is a cross-sectional view of FIG. 1 taken along lines 4—4.

Referring now to FIGS. 1, 3 and 4 a disposable threaded transparent plastic tube 10 is provided with a closure 12 threadedly engaged to the open end thereof. The closure 12 is compartmentalized and includes a first compartment 14 containing frangible ampules 16 which, in the embodiment chosen for illustration in FIG. 1, contains water. The compartment 14 is defined by a vertically movable top 18 and a platform 20 having openings 22 therein to permit the liquid, or water, in the ampules 16 to descend therethrough.

A second compartment 24 is defined by the cylindrical space between the outer walls of the closure 12 and a vertically extending tube 26 supported therein by radially extending flange 28. It may be noted that the closure 12 may be formed integrally with the platform 20, the tubes 26 and the flange 28. The second compartment 24 is provided with a hydrogen generating compound 30 which may conveniently be formed of compressed pelletized powder magnesium and compounds to catalytically control the reaction rate such as sodium chloride. The compartment 24 communicates with the compartment 14 through the openings 22, and the hydrogen generated by the mixture of the water in the ampules 16 and the compound 30 is free to circulate from the compartment 24 through the device including a third compartment 32.

The compartment 32 forms a catalyst chamber and contains a material providing catalytic action for the combination of hydrogen given off by the compound 30 with the free oxygen contained in the atmosphere within the tube 10. A variety of catalytic materials may be used; however, palladium coated alumina pellets 34 are commercially available to provide suitable catalytic action to facilitate the reaction between the generated hydrogen and the free oxygen.

A porous mat 36 supports the pellets 34 and prevents pellets or other catalytic compounds from entering the tube 10 but is porous enough to permit the flow of gases throughout the apparatus. The mat 36 may be made from any non-reactive material such as certain metals but is preferably formed of asbestos. A swab 40 is slidably mounted in the closure 12 and may be raised or lowered from the position shown in FIG. 1. The swab may be lubricated at those portions in contact with the closure as it passes through the closure 12 by any sterile viscous non-water soluble lubricant.

The tube 10 is provided with a viscous semi-gelatinous transport media of the type commercially available (for example, Stuart's Formula Transport Media sold by Baltimore Biological Laboratories). The transport media 42 is specifically modified to provide an oxygen free environment for the preservation of anaerobic specimens. The media may include a resazurin indicator that will provide a pinkish hue to indicate the presence of oxygen and insure that the media will not be used if it has deteriorated. The transport media 42 may also contain cysteine as a reducing agent for the reduction of any oxygen that may have diffused into the media. Prior to the utilization of the apparatus described herein, the swab 40 is maintained out of contact with the media 42; to insure separation, a divider 44 is removably positioned between the tube 10 and the closure 12 and may be conically shaped as shown in FIG. 1.

Referring now to FIG. 2, an alternative form of the present invention is shown wherein an enclosure 46 is provided with a compartment 48 having liquid containing ampules 50 therein. The compartment 48 communicates through openings 22 to a second compartment 54 containing steel wool 56. A porous mat 58 separates the compartments 48 and 54 from the tube 60. In the embodiment shown in FIG. 2, the liquid contained within the ampules 50 is a solution which will react with the steel wool to provide an oxygen utilizing reaction to remove the free oxygen in the atmosphere within the apparatus. The liquid, for example, may be formed of Tween 80 (commercially available from Baltimore Biological Laboratories) and may contain $CuSO_4$, and H_2SO_4.

The operation of the apparatus of the present invention may be described as follows. The device is stored in substantially the form shown in FIG. 1. When its use

is required, the closure **12** is unscrewed from the tube **10** and the divider **44** is discarded. The swab **40** is then utilized in the well known manner for collecting an anaerobic culture specimen from a wound or the like. The swab remains, during this period of time, as a unit with the closure **12.** Subsequent to the collection of the specimen, the closure **12** is returned to the tube **10** and the two are threadedly engaged.

The swab **40** is then lowered into the transport media **42** by sliding it downwardly. The ampules **16** are then crushed by applying pressure to the top **18**; the water drops through the openings **22** into the compartment **32** in contact with the hydrogen generating pellets **30.** A hydrogen rich atmosphere is thus generated and circulates through the device. The hydrogen combines with oxygen present in the atmosphere within the device in the presence of the catalyst **34.** The hydrogen rich atmosphere combined with the catalyst provide continuous oxygen purging during storage and transportation of the device to a laboratory having facilities for anaerobiasis. When the storage and transportation time is very brief, it may not be necessary to utilize the transport media and rely instead on the hydrogen rich atmosphere to combine with the oxygen present to produce a non-destructive environment for the anaerobic specimen.

I claim:

1. An anaerobic specimen collecting and transporting device comprising:

a transport tube for enclosing a specimen and maintaining the specimen in a predetermined atmosphere;

a compartmentalized closure removably secured to, and sealingly engaging, said tube;

a specimen gathering swab slidably mounted in said closure and extending through said closure into said tube;

said closure including a first compartment containing a frangible ampule having a liquid therein;

a second compartment in said compartmentalized closure communicating with the said first compartment and containing a hydrogen generating substance, said substance, when combined with said liquid, producing hydrogen; and

a third compartment in said compartmentalized closure communicating with said second compartment, containing a catalytic material for producing a combinative reaction of hydrogen from said hydrogen generating substance and oxygen in the atmosphere within said device.

2. The combination as set forth in claim **1** wherein said liquid is water and said hydrogen generating substance is responsive to contact with water and generating hydrogen.

3. The combination as set forth in claim **1** wherein said liquid is water and said hydrogen generating substance is magnesium.

4. The combination as set forth in claim **2** wherein said catalytic material is palladium.

5. An anaerobic specimen collection and transporting device comprising:

a transport tube for enclosing a specimen and maintaining the specimen in a predetermined atmosphere;

a compartmentalized closure removably secured to, and sealingly engaging, said tube;

a specimen gathering swab slidably mounted in said closure and extending through said closure into said tube;

said closure including a first compartment containing a frangible ampule having a liquid therein; and a second compartment communicating with said first compartment containing a substance chemically activated by said liquid to remove oxygen from the atmosphere within said device; and

said tube including a viscous anaerobic transport media for receiving an end of said swab when the latter is slidably lowered into said tube.

6. The combination as set forth in claim **5** including a divider removably mounted between said tube and closure and extending into said tube for receiving said swab and maintaining separation of said swab and said transport media until said device is to be used.

7. The combination as set forth in claim **5** wherein said liquid contains $CuSO_4$ and H_2SO_4 and wherein said chemically activated substance is steel wool.

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