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2,661,743

FLUID CONTAINER

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FIG. 1

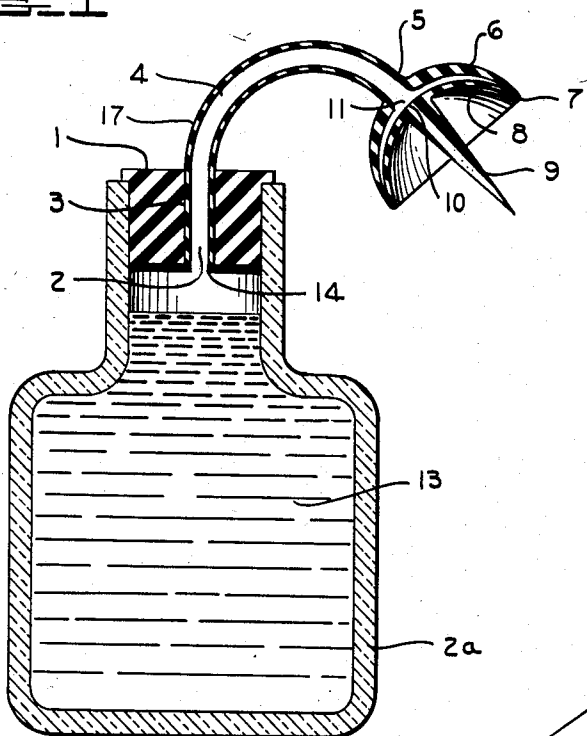
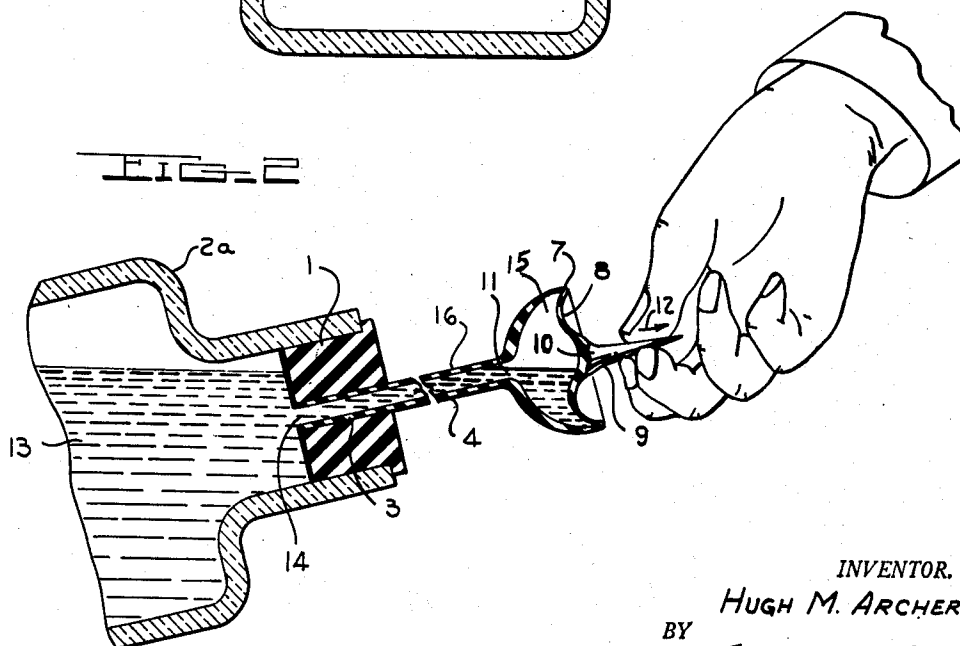


FIG. 2



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FLUID CONTAINER

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3 Claims. (Cl. 128—272)

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The present invention relates to a sterile access device for adding and removing fluids from containers and more particularly to a novel pump and storage sac which may be used in connection with containers employed for collecting, handling, processing, and storing of blood plasma, whole blood, and other fluids which require a high degree of sterility.

The pump and storage sac of the present invention is particularly useful with bottles, and bottle closures and stoppers, which permit either filling or emptying of such bottles without displacement of the stopper from the mouth thereof. The pump and sac of the present invention are especially useful in the techniques employed in the collection of blood from donors, and, therefore, the invention is described in detail for use in such bleeding processes.

Before infusion of stored blood into a recipient, a specimen of the recipient's blood and a sample of the stored blood are mixed to make certain that they will react satisfactorily. This is standard procedure even though the stored blood has been previously typed and classified.

Thus, in the process of collecting blood from donors, it is customary to obtain a small sample of the blood to be used as a reaction sample at the time of infusion into the recipient. This sample, comprising approximately 10 cubic centimeters in volume in most cases, is collected in a small glass test tube which is then fastened to the side of the blood bottle by, for example, a pressure sensitive adhesive tape. It has been found that the small test tube when fastened in this position often becomes broken or displaced so that the attending physician is frequently compelled to withdraw a small sample of blood from the storage bottle by improvised means in order that he can assure himself that the blood in the bottle is suitable for infusion into the recipient. This procedure is inconvenient and time-consuming and increases the possibility of contamination of the blood with subsequent deleterious effects upon the recipient or the complete loss of a unit of blood at a time when it is desperately needed to save a human life.

It is, accordingly, an important object of the present invention to provide a novel sterile access device affixed to a container which may be used to provide a sample of the fluid within the container without danger of contamination of the contents thereof, or to supply additional materials to the fluid within the container.

Another object of the present invention is to provide a sterile access device for use with a

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container used in handling, storing and treating of blood, plasma, serum, vaccines and the like under prescribed sterile conditions and in which provision is made for testing a portion of the contents of the container without affecting the sterile conditions of the fluid.

Another object of the present invention is to provide a combination pump and sac arrangement which can be made an integral part of the stoppers used as closures for blood bottles which will permit the simple and convenient withdrawal and storage of a sample from the container at any time after the bleeding of the donor in a fashion that will obviate completely the possibility of contamination or mismatching caused by the inadvertent attachment of the incorrect reaction or typing sample to the bottle in question.

It is another object of the present invention to provide a simple and efficient container for collecting and storing fluid which can be easily and economically manufactured.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Fig. 1 is a midsectional view of the sterile access device of the present invention and illustrating the pump and sac attached to a blood stopper of a type in common use, and showing the device prior to removing a sample from the container.

Fig. 2 is a fragmentary midsectional view of the pump and sac shown in Fig. 1 during the operation of obtaining a sample of blood from a blood storage bottle.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

With reference to the drawings, a body or stopper 1 having a hole 2 is shown extending into the neck of a storage bottle 2a. The end 3 of the tube 4 projects through the hole 2 and terminates adjacent the inner end thereof.

The tube and stopper are both preferably

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formed of a resilient material, such as rubber, although any suitable material may be used.

The tube 4 is provided on the end 5 with a sac comprising a relatively thick walled cup-shaped enlargement 6 and a concave diaphragm 8. The diaphragm 8 is preferably formed of an elastic or deformable material, such as rubber or other similar material. The walls of the enlargement 6, as shown, become thinner toward the periphery 7. However, it has been found that the wall thickness is not critical to the pumping operation of the sac.

The concave diaphragm 8 is secured to the wall 6 adjacent the periphery 7 of the enlargement and forms a pumping chamber therein. At the innermost or central portion of the concave diaphragm 8 is a small handle 9. In this embodiment of the device, the handle 9 is integrally cast as a portion of the concave diaphragm 8. The base portion 10 of the handle is made larger than the opening 11 to provide a reinforced seal on the end of the tube 5 when the bottle is evacuated and the diaphragm 8 is drawn inwardly into the enlargement 6.

In operation, when it is desired to remove a sample of blood from the bottle 2a, the handle 9 is pulled in an outward direction as indicated by arrow 12, Fig. 2, while the bottle 2a is held in a tilted fashion so that the blood 13 in the bottle covers the opening 14 in the stopper 1. The pulling action on the handle 9 on the inwardly extending diaphragm 8 causes it to move outwardly creating a void 15, Fig. 2, into which the blood flows. When sufficient blood has entered the void to satisfy the needs of the operator, the tube 4 is clamped shut at any suitable point such as at 16 using any standard clamping device. If the operator desires, the blood sample may be left in the sac or chamber for use at a later time. If it is to be used immediately, the sac may be separated from the tube by cutting or the fluid may be withdrawn from the chamber by a needle or similar tool.

It is desirable but not essential that the walls of the pump and sac be made of a transparent or translucent material so that it is possible to see the blood collected in the sac.

Some technicians in collecting blood prefer to bleed the reaction and typing sample directly into the storage device. My invention permits this procedure by the simple expedient of inserting the bleeding needle through the wall of tube 4 and permitting the blood to flow into the sac formed by the outward pulling of handle 9. In collecting the sample in this fashion, it is desirable to clamp shut the tube 4 at the point 17, Fig. 1.

In addition to using the present sterile access device for removing a sample from the container, it may be employed to make small additions to a body of fluid within the container without impairing the sterile condition of its contents. For example, it is presently believed possible that stored blood periodically requires a quantity of additives to maintain it in a usable condition during storage. Such additions may be made to blood or other fluid within a con-

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tainer such as by filling the sac at the same time the container is filled and then adding the contents of the sac to the contents of the container at any desired time. It will be understood that when the device is used for making fluid additions to a container, prior to the addition, the tube 4 is maintained closed, as at 16, by any conventional clamp or the like. In addition, it will be understood that the sac of the present device may also be used to remove a sample, if desired, after the additions have been made to the contents of the container.

It is apparent from the foregoing that I have made it possible to make access to a container for sterile fluids and the like, in which a sample may be withdrawn from a sealed container for testing, or a fluid material may be added to another fluid within the container without, in either case, impairing the sterile conditions within the container or requiring a breaking of the seal of the container.

Having thus described my invention, I claim:

1. A sterile access device for removing and storing a blood sample from a blood container, comprising a chamber having an inlet means and formed from a concave inner wall and a concave resilient outer wall disposed adjacent said inner wall, said outer and inner walls being connected at their peripheries, a handle affixed to said outer wall for pulling said outer wall away from said inner wall to create a negative pressure within said chamber, and a flexible tube affixed to said inner wall and extending therefrom for insertion into a blood container.

2. A sterile access device in accordance with claim 1 and being further characterized in that said handle is provided with an enlarged base portion to cover and seal the inlet means of said chamber during evacuation of said chamber.

3. A fluid receptacle for collecting and storing fluids comprising a container, stopper means to seal said container, a tube having one end extending through said stopper means into said container, and a sac secured to and communicating with the opposite end of said tube, said sac comprising a chamber having an inlet means and formed from a concave inner wall and a concave resilient outer wall disposed adjacent said inner wall, said outer and inner walls being connected at their peripheries, a handle affixed to said outer wall for pulling said outer wall away from said inner wall to create a negative pressure within said chamber.

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