United States Patent

[11] **3,587,899**

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[54] **FREEZE DRYING CONTAINER**
2 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **215/73,** 285/177
[51] **Int. Cl.** **B65d 47/14**
[50] **Field of Search** ..... 215/73, 47 (Cursory); 285/177, 302, 355 (Inquired)

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ABSTRACT: A freeze drying container for animal organs is shown which is formed of a transparent bottle having a wide mouth opening. The mouth opening carries a side portion which bears lateral threads. A cover member overlies the mouth portion and bears additional lateral threads disposed upon a downwardly depending portion. The additional lateral threads mate with the first-named lateral threads upon the side portion of the mouth opening. The cover member is provided with a narrower opening therewithin. An open tube member is formed with an outwardly extending flange which underlies the narrower opening. The tube member projects upwardly from the opening. The tube member is adapted to be connected to a vacuum pump.

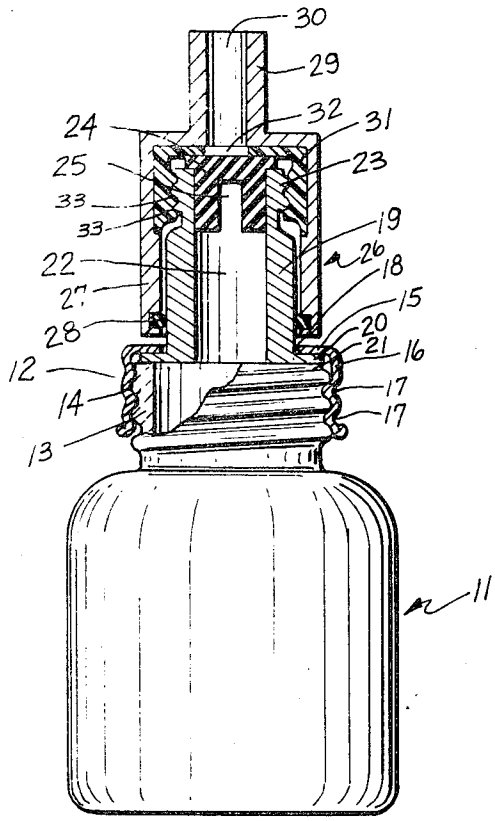


Fig. 1

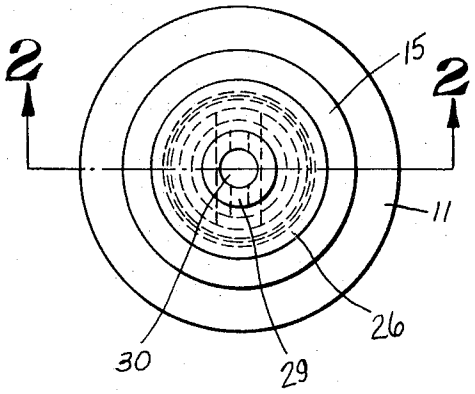


Fig. 4

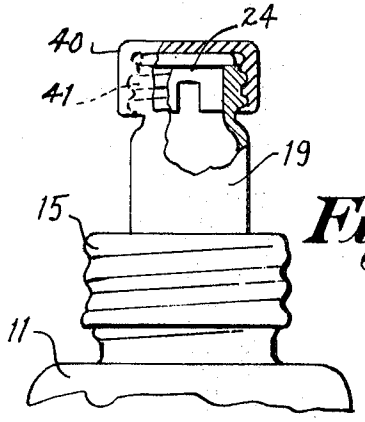


Fig. 2

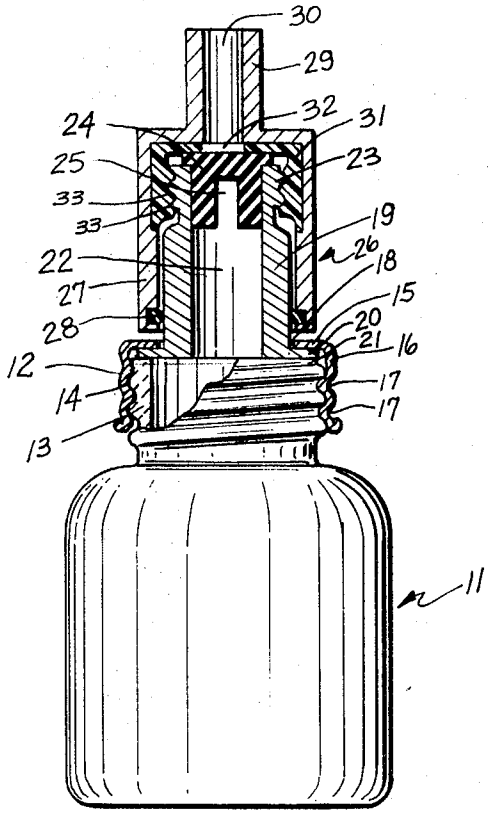
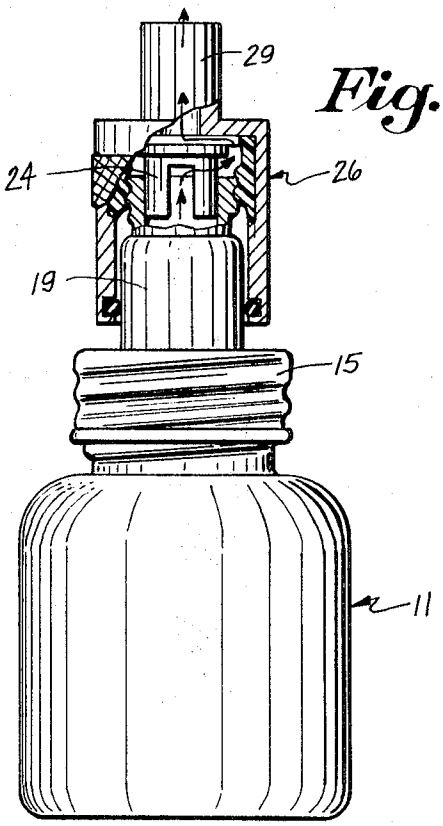


Fig. 3



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FREEZE DRYING CONTAINER

DESCRIPTION OF THE INVENTION

This invention relates to a freeze drying container for animal organs and is particularly utilizable in preparing freeze dried organs for use in "organ banks" and the like.

With the increased use of tissue transplants it has become general practice to store organs which have been removed from those who have died in organ banks where these organs can be used to advantage for such tissue transplant into others. These organs are generally preserved by the freeze drying process and held in a sealed sterile container under vacuum dried conditions until ready to be used. Since these organs are of large size a relatively large diameter container is required. Also, of course, the mouth portion of the container must also be relatively large to permit the organ to be inserted therein. A large mouth container is unsatisfactory in freeze drying procedures for various reasons. In the first place, a large mouth would require a large stopper and use of a large stopper means that high stoppering pressure must be applied to the container in order to seal the same. Furthermore, the use of such large stopper means that there is a large surface area permitting large permeation of air and great possibilities of leakage.

The invention described in this specification eliminates the disadvantages set forth above. While the holding portion for the organs is of relatively large size and provided with a wide mouth, structure is provided which permits the use of a narrow mouth for aspiration connection to a vacuum freeze drying system. This is accomplished by providing a cover secured to the mouth of the container which bears an additional opening therewithin which is narrower than the mouth opening. An open tube member is disposed within the narrower opening and this narrower tube member is in turn connected to a vacuum pump. Optionally the tube member bears a lateral outwardly projecting flange which underlies the narrower opening, a gasket is provided between the flange and the wide mouth of the holding portion, and automatic stoppering means are provided within an end portion of the tube to permit utilization of the container as a storage means for the organs or organ involved.

The invention described herein can also be used as a bulk container for freeze drying of material such as blood plasma, whole blood, etc. While such liquid materials could be simply inserted into a narrow mouth container the use of such material would present serious problems since it might be difficult to get to the contents of a wide container through a narrow mouth.

The above constitutes a brief description of this invention and some of the objects and advantages thereof. Other objects and advantages of this invention will become apparent to the reader of this specification as the description proceeds.

The invention will be further described by reference to the accompanying drawings which are made a part of this specification.

FIG. **1** is a plan view of the freeze drying container made in accordance with this invention. This view also shows the mechanism for automatic stoppering of the container after the freeze drying process is completed. The automatic stoppering mechanism per se is disclosed and claimed in our copending application Ser. No. 611,941 filed Jan. 26, 1967, now U.S. Pat. No. 3,465,342 and is not separately claimed in this application. No disclaimer of this subject matter is intended by reason of the failure to separately claim the same per se in this application.

FIG. **2** is a perspective view, partly in section, of the freeze drying container as shown in FIG. **1**. In this view the organ contained with the holding portion and the gasket optionally employed between the base of the tube and the mouth of the container are not shown for clarity of illustration and the automatic stoppering mechanism is shown in the closed position

that the parts assume after completion of the freeze drying process.

FIG. **3** is a view generally similar to that of FIG. **2** but showing the position of the parts of the automatic stoppering mechanism that they assume when the freeze drying process is operating.

FIG. **4** is a view of the container of this invention with the parts shown in the position that they assume after the freeze drying process is completed and the container is stored.

The invention will now be further described by reference to the specific form thereof as shown in the drawings. In this connection, however, the reader is cautioned to note that the specific form of this invention as set forth in this specification herein is for illustrative purposes and for purposes of example only. Various changes and modifications can obviously be made within the spirit and scope of this invention.

Now referring to the drawings of this specification for a detailed description of this invention the device involved is formed with a holding or organ receiving portion **11**. Portion **11** is preferably a glass transparent bottle of suitable size to receive the organ to be freeze dried and thence stored. The organ itself is not shown in the drawings.

The organ receiving portion **11** is provided with a relatively wide mouth **12** which is formed with a lateral portion **13** carrying threads **14**.

Overlying mouth **12** is a cover **15** having a downwardly depending portion **16** which carries mating threads **17**. Within cover **15** is an opening **18** which is preferably centrally disposed therewithin. An adapter includes a tube **19** projecting through opening **18** and carries an outwardly extending lateral portion **20** disposed on the underside of cover **15**.

Between the lower portion of tube **19** and the abutting portion **21** of portion **11** a gasket (not shown) is preferably disposed so as to permit proper seal of the parts. The gasket is provided with a centrally disposed hole (also not shown) which registers with hole **22** located within tube **19**. At the upper portion of tube **19** is a threaded lateral portion **23**. A stopper **24** is adapted to be placed within the upper portion of tube **19** in order to seal the same. Stopper **24** is provided with a cutout portion **25** whose function will be subsequently described.

Overlying tube **19** is a sealing mechanism **26**. This sealing mechanism **26** is specifically disclosed and claimed in our copending application Ser. No. 611,941 filed Jan. 26, 1967. The sealing mechanism consists of a side portion **27**, an O-ring **28**, a projecting tube portion **29**, and an opening **30** provided therewithin. A cap portion **31** is also provided which carries a hole **32** which is in registering relationship with hole **30**. Cap **31** bears threads **33** which are adapted to mate with threads **23** to provide axial movement of the adapter on rotation of the adapter relative to the sealing mechanism, thereby seating the stopper **24**.

Overlying threads **23** is a storage cap **40**. Cap **40** bears mating threads **41** and is not placed into position until the freeze drying process is completed, the sealing mechanism removed, and the container including the freeze dried material stored.

With the foregoing specific description the operation of this invention may now be explained.

Cover **15** is removed from portion **11** and the organ to be freeze dried is deposited into portion **11** through mouth **12**. Cover **15** bearing tube **19** is then screwed into position. The remaining structure is then placed into position upon tube **19** as shown in FIG. **3**.

Element **29** is then connected to a vacuum freeze drying system and freeze drying commences with the air being exhausted in the direction of the arrows shown in FIG. **3**. When the freeze drying process is completed the parts are placed in the position shown in FIG. **2** which automatically seals the container. Thereafter all of the parts with the exception of member **26** are removed from position about tube **19**. At this point, cap **40** is placed in position overlying threads **23**.

The foregoing sets forth the manner in which the objects of this invention are achieved.

We claim.

1. A container and stoppering means particularly adapted for use in freeze drying large masses of tissue, organs and the like and thereafter stoppering said container while under vacuum, said container including an organ receiving portion having a relatively large opening forming a mouth, an apertured cover member adapted to cover said mouth, means for fluidtightly and removably attaching said cover to said organ receiving portion, tube means extending from said apertured cover away from said mouth, said tube means having an elongated smooth circumferential portion adapted for circumferential sealing engagement with said stoppering means, thread means on a terminal portion of said tube means for engagement with corresponding thread means in said stoppering means to cause axial movement between said tube and stoppering means and stopper means received in said terminal portion of said tube means for seating therein on axial movement of said stoppering means.

2. An adapter and stoppering means for use in joining wide mouth containers to a source of vacuum and stoppering off said container while under vacuum, said adapter comprising tube means for vacuumtight attachment to said wide mouth container, said tube means including an open end for receiving a stopper, an axially extending circumferentially smooth portion adapted for fluidtight engagement with said stoppering means, thread means on said tube means for engagement with complementary thread means in said stoppering means whereby rotation of said tube means relative to said stoppering means causes axial movement of said open end to seat said stopper, said circumferentially smooth portion maintaining sealing engagement with said stoppering means throughout said axial movement whereby said wide mouth container may be stoppered under vacuum.