Oct. 18, 1966 W. F. BLANFORD 3,279,595

PACKAGE

Filed Jan. 11, 1965 2 Sheets-Sheet 1

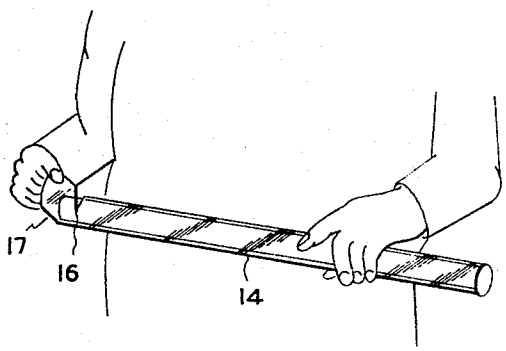


FIG. 2

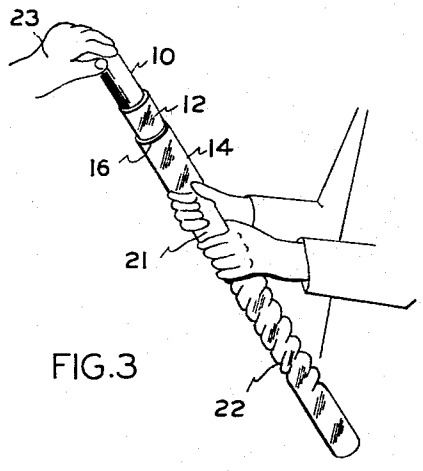


FIG. 3

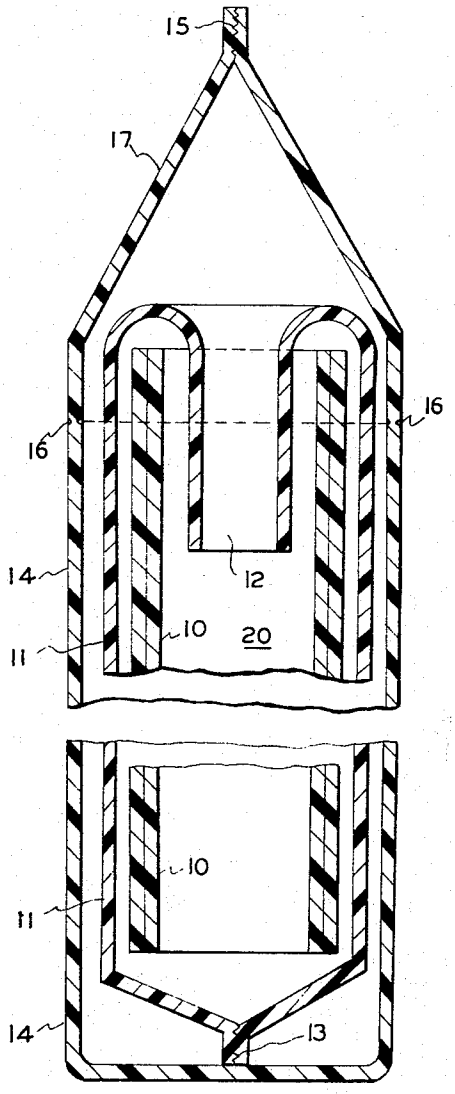


FIG. 1

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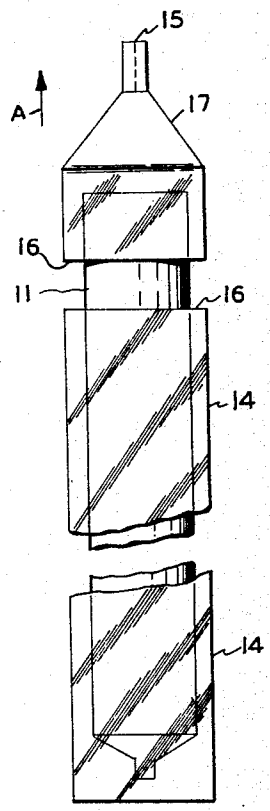


FIG.4

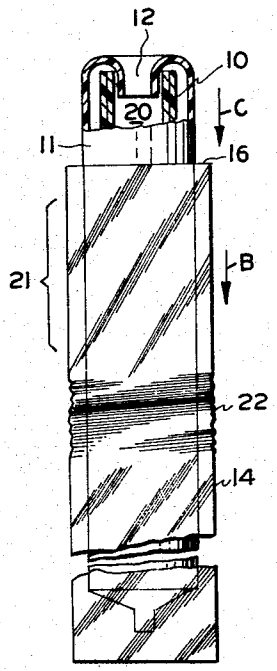


FIG.5

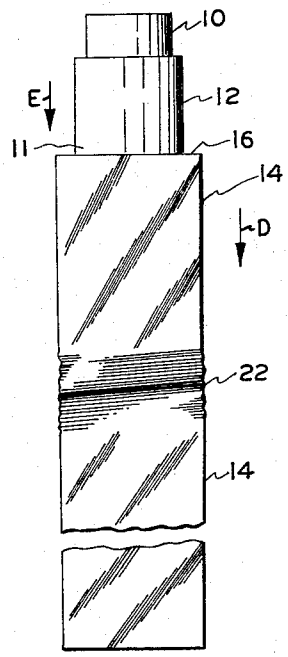


FIG.6

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PACKAGE

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Filed Jan. 11, 1965, Ser. No. 424,663
6 Claims. (Cl. 206—63.2)

The present invention relates to an improved package supplying a tubular roll of material in sterile form which allows the sterilized materials therein to be removed therefrom without destroying asepsis. Particularly, the present invention relates to sterile packaging supplying sterile rolls of thin plastic film surgical drape material.

Increased use is being made of plastic surgical drapes which can be adhesively secured to the patient over the area where the incision is to be made. These drapes are desirably supplied to the hospital in separately packaged presterilized rolls of lengths of film found to be desirable in most surgical operations. These rolls are packaged in a plastic tube, but the outside of this tubular package cannot be maintained in sterile condition. In opening the package there is a danger of destroying asepsis in that the sterilized drape may contact a portion of the package wrapper which has become contaminated either prior to or during the package opening process.

The present invention contemplates a new and improved package supplying a tubular roll of material in sterile form which eliminates the danger of accidentally contaminating the material during its removal from the package since the package is so constructed that any contaminated portion of the package is prevented from coming into contact with the roll of sterile material as it is being withdrawn from its package.

The present invention necessarily involves a tubular roll of material having a hollow core. An inner tube encloses at least the upper end of the roll with the upper end of this inner tube being folded down within the upper end of the hollow core of the roll. A second, outer tube encloses at least the upper end of the roll and the inner tube with at least one of the tubes enclosing the complete roll and being sealed to prevent bacterial entrance into the package. Preferably, the inner tube is sealed at its lower end and completely encloses the roll, and the outer tube is sealed at both ends and completely encloses the inner tube. The use of two packaging tubes with the upper end of the inner tube folded down within the hollow core of the roll being packaged, allows the roll of material to be forced from the package while it is protected by the upper end of the inner tube so as to avoid the danger of accidentally destroying asepsis when the package is opened and the roll of sterile material removed therefrom.

The present invention will be discussed in connection with a tubular roll of surgical drape material; the accompanying drawings illustrating a preferred embodiment of the invention in which:

FIG. 1 is a vertical cross-section on an enlarged scale of a package supplying a tubular roll of material in sterile form constructed in accordance with the invention, the central portion of the structure being cut away for clarity of illustration;

FIG. 2 is a picture view which shows the removal of the upper end of the outer tube as a preliminary to opening a package constructed as shown in FIG. 1,

FIG. 3 is a further picture view showing the package in a completely opened position with the roll of sterile material therein being removed while it is protected by the upper end of the inner tube; and

FIGS. 4, 5 and 6 show the opening and roll extruding operations in sequence. More particularly, FIG. 4 shows

the opening of the package with the upper end of the outer tube being removed;

FIG. 5 shows the structure in an intermediate position in which the roll is partially extruded; and

FIG. 6 shows the structure in its roll-extruded condition in which the upper end of the roll has been made available to be grasped by a sterile hand to complete the task of aseptic removal.

Referring more particularly to the drawings, a sheet of surgical drape material in roll form, generally indicated by numeral **10**, is placed within an inner plastic packaging tube **11**. In the preferred structure shown, the inner tube **11** completely encloses the roll **10** with the upper end **12** of the tube **11** being folded down inside the upper open end of the roll **10**, the cylindrical opening defined by the roll being identified by the numeral **20**. The other lower end of inner tube **11** is preferably closed as by a heat seal **13**. The inner tube **11** in which the roll of surgical drape material **10** is enclosed is placed within an outer plastic tube generally indicated by numeral **14**. The outer tube **14** is preferably closed at the top and bottom as by the use of a heat seal **15** on the upper end thereof to provide a sealed outer package which contains the inner tube enclosing the roll of surgical drape. The outer tube **14** may be provided with means to facilitate the opening of the outer tube. This means may desirably take the form of a tear line or groove **16** located near the upper end of tube **14**. This groove **16** may be provided by applying a heated knife edge to the plastic. It should be understood that any appropriate means may be used to facilitate opening of the outer package, such as a tear strip, etc. Again, and while it is preferred to employ means to facilitate opening the outer tube, this is not entirely necessary since the outer tube may be cut or torn open in any desired manner. The upper portion of outer tube **14** above the groove **16** is identified by the numeral **17**.

The roll of surgical drape material is provided to the hospital in sterilized condition, the drape being conveniently sterilized following its enclosure in the package under consideration. The personnel at the hospital may easily remove the roll of drape material from within its package as will be more fully explained in connection with a discussion of FIGS. 2–6.

Referring to FIGS. 2 and 4, force is applied to the upper portion **17** of the outer tube **14** in a direction indicated by arrow A in FIG. 4 to cause the upper portion **17** to be torn away from the rest of the outer tube **14**, along the tear line or groove **16**. The upper portion **17** which is torn away is then lifted off the package by a continuing movement in the direction A. The person who is opening the package then encircles the outer tube **14** with the hands at a point below the tear line **16** and grasps the tube to apply a squeezing pressure to the outer tube **14** to force the same into frictional engagement with the inner tube **11**.

The zone which is grasped is indicated in FIG. 5 by the numeral **21**. The outer tube may be grasped by one or both hands, the use of two hands being shown in FIG. 3.

With the bottom of the package rested against any support, or held by one hand, a downward movement of the grasping hand or hands, as indicated by arrow B, forces the outer tube to move downwardly, and the frictional engagement of the outer tube **14** with inner tube **11** forces the inner tube to also move downwardly, as indicated by arrow C.

As can be seen in FIG. 5, the tubes **11** and **14** wrinkle up beneath the grasping zone **21** and the roll of plastic material **10** is moved upwardly with respect to the inner tube **11**, the upper end **12** of the inner tube being forced

out of the core **20** of the roll **10**. The wrinkled portion is identified by numeral **22**. As the tubes **11** and **14** are collapsed, more and more of the drape material **10** becomes exposed. In this way, the turned-in portion **12** of the tube **11** is progressively drawn out of the tube **10** until the end of the tube **10** becomes exposed.

Assuming all outer surfaces of the outer tube **14** to have become contaminated, it will be observed that the inner tube **11** has protected the roll **10** from being contaminated by the the upper portion **17** in FIG. 4 and it has also prevented any contact between the roll **10** and the outer tube in the vicinity of the groove **16**.

Upon still further downward movement by the grasping hand or hands as shown by arrow D in FIG. 6, the upper end of inner tube **11** continues its downward movement as shown by arrow E to expose the upper end of the roll **10** with the only contact of the roll **10** with any object being with the interior sterile portions of the inner tube **11** and with the upper end of this inner tube which was previously protected from contamination by its position within the core **20**.

The final position reached in FIG. 6 corresponds with that shown in FIG. 3 in which it will be seen that the upper end of the roll **10** is available for sterile removal from its package by a sterile hand identified by numeral **23**.

While the inner and outer tubes have been illustrated as completely enclosing structures, this is not essential as only one of the two tubes need completely enclose the roll. Thus, one might provide a package in accordance with the invention in which the inner tube only partially encloses the roll, the upper end being folded within the core **20**. As a further alternative, the inner tube may be a complete enclosing tube with the lower portion of the outer tube being sealed to the inner tube so that the upper end of the outer tube still provides the removable top **17** of the outer tube. In either instance, the roll would be supplied by removing the top of the outer roll and extruding the roll from the inner tube precisely as described hereinbefore.

Since it is desirable to provide the hospital with a sealed package with the contents in sterile condition, the roll of material is factory sterilized. The sterilization is preferably undertaken after sealing of the package by subjecting the package and its contents to a sterilizing gas such as ethylene oxide. Preferably, the packaging material is thin plastic film, such as vinyl polymers, polyethylene or nylon film or sheeting and the tubular structure may be provided by extrusion or by a longitudinal heat sealing of sheet material.

While the packaging materials should be impervious to water and bacteria, it should also be sufficiently gas-permeable to permit ethylene oxide gas sterilization.

Steam sterilization also may be employed by subjecting the contents of the package to the sterilizing steam prior to final sealing of the outer tube.

While the packaging materials under consideration are preferably formed of plastic sheet material, other materials which are sufficiently impermeable to air-borne bacteria may also be used, such as paper, and especially resin-impregnated paper. If desired, the package may also include a sterilization indicator which will show that sterilization conditions have been met. Conveniently, the indicator is inserted between the inner and outer tubes during the packaging operation.

While the package of the present invention has been illustrated as being useful in packaging tubular, hollow core rolls of surgical drape material, the package may also be used as a sterile package for any material in tubular roll form such as rolls of gauze, bandage, etc.

The invention is defined in the claims which follow:

I claim:

1. A sealed sterilized package supplying a tubular roll of material in sterile form comprising:

(A) a tubular roll of material;

(B) an inner tube enclosing at least the upper end of said roll, the upper end of said tube being folded down within the upper end of said roll; and

(C) an outer tube sealingly enclosing at least the upper end of said inner tube and said roll; at least one of said inner and outer tubes enclosing the lower end of said roll.

2. A package as recited in claim **1** in which the upper end of said outer tube is provided with means to facilitate removal of the top portion thereof.

3. A package as recited in claim **1** in which said inner and outer tubes are formed from heat-sealable, gas-permeable and water and bacteria impermeable plastic sheet material.

4. A package as recited in claim **3** in which said sheet material is composed of polyethylene.

5. A sealed sterilized package supplying a tubular roll of material in sterile form comprising:

(A) a tubular roll of surgical drape material;

(B) an inner tube open at its upper end completely enclosing said roll, said upper end of said inner tube being folded down within the upper end of said roll; and

(C) an outer tube completely enclosing said inner tube and said roll and sealed to prevent ingress of contaminating bacteria.

6. A package as recited in claim **5** in which said tubes are constituted by gas-permeable plastic sheet material and the entire assembled structure is subjected to ethylene oxide gas to sterilize the same.

No references cited.

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