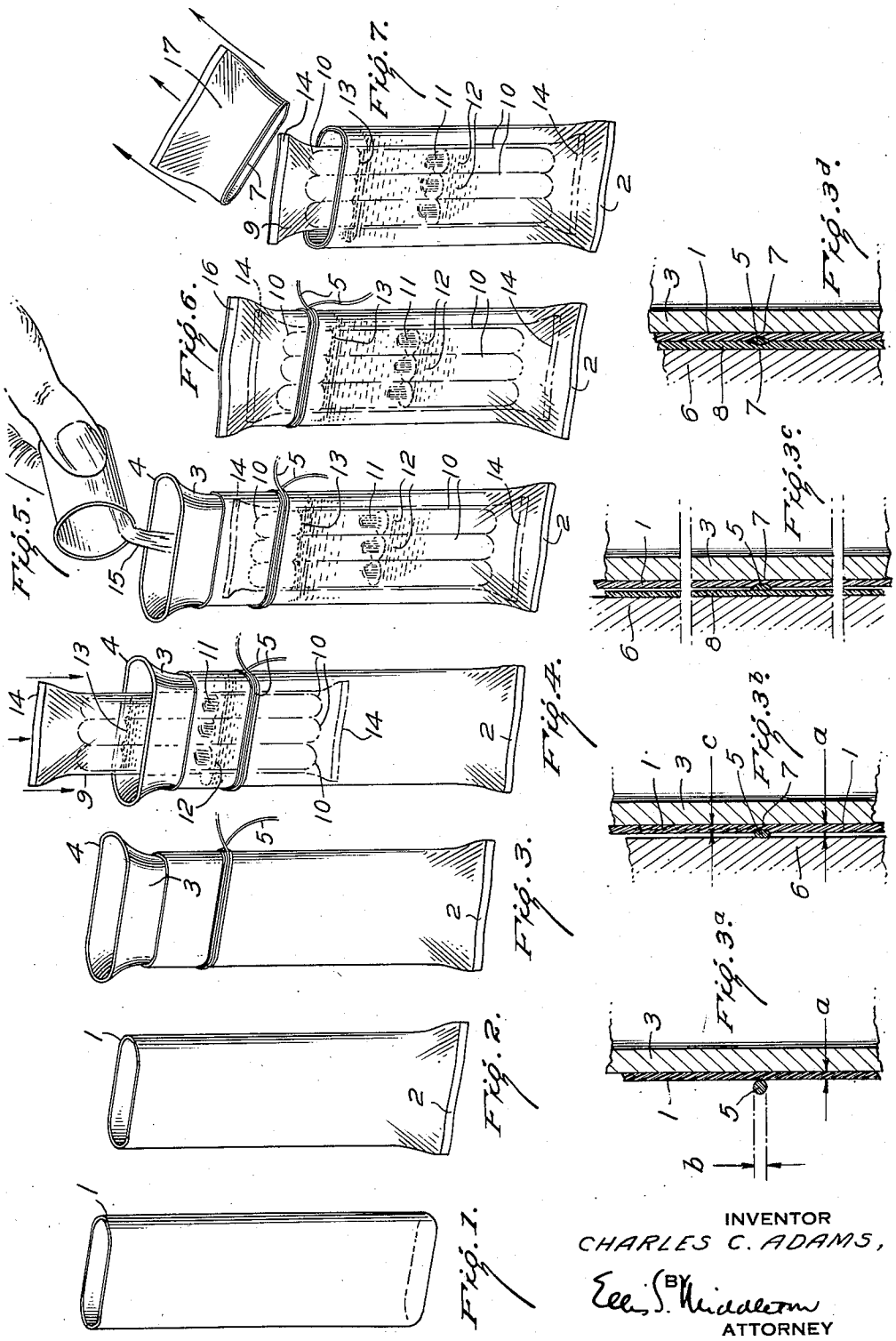
Sept. 23, 1952 C. C. ADAMS 2,611,483

FLEXIBLE SUTURE TUBE PACKAGE WITH EMBEDDED TEAR STRING

Filed Jan. 4, 1950



INVENTOR
CHARLES C. ADAMS,
BY Lee S. Middleton
ATTORNEY

Patented Sept. 23, 1952 2,611,483

UNITED STATES PATENT OFFICE

2,611,483

FLEXIBLE SUTURE TUBE PACKAGE WITH EMBEDDED TEAR STRING

Charles C. Adams, New York, N. Y., assignor to Davis & Geck, Inc., Brooklyn, N. Y., a corporation of New York

Application January 4, 1950, Serial No. 136,806

1 Claim. (Cl. 206—63.3)

1

The present invention relates to a package containing a sterile surgical article or a plurality of articles such as sutures in tubes and to a method of making the same.

The principal object of the invention is to provide such a package with means for readily opening the same when the contents are to be used.

Still another object is to provide a novel method of applying a tear string to a flexible container.

In the surgical article art and particularly the surgical suture field, it is common practice to supply the trade with sutures immersed in a sterilizing liquid such as ethyl alcohol, aqueous formaldehyde, "Zepherin" or the like in a sealed transparent tube. Thus when the doctor or surgeon desires to use the suture, he has only to rupture the same and remove the suture which is in a sterile condition and ready for use.

It has been customary in the trade to include a plurality of such tubed sutures in cardboard containers but one of the objections thereto is that the outside of the suture tube is not sterile which requires a separate and additional sterilizing operation on the part of the customer.

It has also been customary to enclose a plurality of suture tubes in a tin can containing sufficient sterilizing liquid to completely immerse the tubes. This package has the advantage that the customer receives tubes completely sterile on the outside. However, the cans are open to the objection that they are extremely heavy which increases the transportation costs and such containers are expensive.

It has also been proposed to seal a suture into an envelope and enclose the first envelope into a second and outer envelope, all in a dry, sterile condition. Thus when the outer envelope is opened, the outside of the inner envelope remains sterile and the danger of contaminating the sterile suture in the inner envelope when the latter is opened is lessened. Such a proposal, while theoretically good, is open to the objection that it is impractical to satisfactorily dry heat sterilize either the sutures or the envelopes under those conditions and moreover no satisfactory transparent or translucent material was available which would resist the solvent or deteriorating action of the usual liquid sterilizing mediums or satisfactorily hold such volatile mediums in storage or over long periods of time.

With the advent and commercial availability of thermoplastic resins such as the polyethylenes, trifluorochloroethylene polymers, polyvinyl chloride either alone or copolymerized with vinyl acetate, rubber, latex and the like, all of which are available as heat sealable, transparent or translucent, flexible sheets resistant to the usual sterilizing liquids, it now becomes possible to supply the lack in the prior proposal and provide a transparent or translucent, flexible package for tubed sutures which may be readily heat sealed and contain the necessary quantities of the usual sterilizing liquids without fear of leakage or package deterioration.

2

One of the difficulties encountered in developing such a package has been the provision of a satisfactory method of opening the same in order to make the contents accessible. While surgical scissors might be used to simply cut off the end, yet this is objectionable in view of the fact that the outside of the outer envelope is unsterile and the act of shearing offers the possibility of carrying contaminations onto the previously sterile inner envelope and so to the tubes and sutures therein. Moreover, the use of scissors requires their availability and constitutes a separate, cumbersome opening operation.

All of the above objections are overcome and the stated and other objects are accomplished by the present invention which contemplates the provision of an inner envelope containing one or more suture tubes, each of which carries a suture and sterilizing liquid, with a sterilizing liquid in the inner envelope, the latter being enclosed in an outer sealed envelope with additional sterilizing liquid and a tear string heat sealed into the outer envelope and/or inner envelope so that a cap or section of the outer envelope may be readily removed when the tear string weakens the wall thereof. The invention contemplates that the material of which the envelopes are made shall be of a flexible, thermoplastic, heat sealable resin composition and substantially transparent or translucent.

In applying the tear string to the outer and/or inner envelope, the method of the invention contemplates inserting a mandrel into the envelope, heat pressing the tear string against the envelope wall so as to partially embed the string therein, applying a strip of a thermoplastic, heat sealable resin composition over the string and heat pressing the same against the envelope and string so as to partially embed the string in the strip and heat seal the strip to the envelope. This has the effect of reducing the thickness of the envelope material in proximity to the string so that when the applied strip is severed as by removing the string, a simple pull on one end of the envelope will cause it to be severed at the reduced thick-

ness portion and the cap or end portion of the envelope thus removed making the inner envelope available.

The invention is further illustrated in the drawings in which

Fig. 1 is a perspective view of a section of endless tubing material.

Fig. 2 is a similar view showing one end heat sealed.

Fig. 3 is a similar view showing a mandrel inserted and the tear string applied.

Fig. 3*a* is an enlarged fragmentary sectional view showing the string applied to the envelope.

Fig. 3*b* is a similar view showing the string heat pressed against the envelope and partially embedded therein.

Fig. 3*c* is a similar view showing the strip applied to the string.

Fig. 3*d* is a similar view showing the strip heat pressed against the string and envelope to partially embed the string in the strip and heat seal the strip to the envelope.

Fig. 4 is a perspective view showing the method of insertion of the inner envelope.

Fig. 5 is a similar view showing the sterilizing liquid being filled into the outer envelope.

Fig. 6 is a similar view showing the sealed composite package.

Fig. 7 shows the removal of the cap from the composite package after removal of the tear strip.

Referring now to the drawings and the embodiments illustrated, in Fig. 1 a section of endless tubing is shown at 1 of any of the well known thermoplastic and heat sealable compositions such as above mentioned. One end portion of the tube section is collapsed between heating elements to make a heat seal as at 2. A mandrel 3 having a flared mouth 4 is then inserted into the envelope 1 and the tear string applied. This is accomplished as shown in Fig. 3*a* by positioning a tear string 5 as shown. The tear string may be of any suitable material. As shown in Fig. 3*b* a heating element 6 is then pressure applied to the string 5 to such an extent as to cause the string to be partially embedded in the wall of the envelope 1. This has the effect of producing an area 7 of decreased thickness as shown in Fig. 3*b*. A strip 8 of the same or different thermoplastic, heat sealable resin composition of which the envelope 1 is made is then applied over the string and heating element 6 pressure applied thereto so as to bring the strip in substantial contact with the wall of the envelope 1 as shown in Fig. 3*d* and partially embed the string in the strip. The heating element as shown causes the heat sealing of the strip and envelope wall together with the string in between.

In Fig. 4 an inner sealed envelope 9 containing one or more suture tubes 10, each of which contains a suture 11 immersed in a sterilizing liquid 12, is then inserted through the flared mouth 4 of the mandrel 3 as shown in Fig. 4. It is to be understood that the inner envelope 9 also contains an adequate amount of a sterilizing liquid 13. Also, the inner envelope 9 is preferably made of the same or different thermoplastic, heat sealable resin composition as above indicated with the two ends sealed as at 14. It is also to be understood that the inner envelope may be similarly furnished with a tear string as above indicated although for convenience of illustration, no tear string is shown.

The inner envelope having been inserted into the outer envelope, a quantity of sterilizing liquid 15 is then added as shown in Fig. 5, the mandrel 3 removed and the upper end 16 sealed between heating elements in the usual manner. Thus Fig. 6 shows a completed modification with the free ends of the tear string available for rupturing the outer envelope.

In use, the tear string is simply pulled off which causes it to tear through the strip 8 thus leaving the outer envelope still sealed through with a weakened portion 7 of its wall. Pulling the end of the envelope as shown in Fig. 7 causes a cap 17 to pull off thus making the inner envelope available. Due to the fact that there is sterilizing liquid between the two envelopes, the inner one is completely sterile. The upper end of the inner envelope may either be similarly removed where it is provided with a tear string or cut by scissors preferably after inverting the inner envelope so as to bathe the parts of the wall being cut with a sterilizing liquid. The tear string is preferred as this insures maintenance of sterile conditions. The tubes may then be used and the sutures removed therefrom in the usual manner.

While the invention has been described with particular reference to specific embodiments, it is to be understood that it is not to be limited thereto but is to be construed broadly and restricted solely by the scope of the appended claim.

What is claimed:

1. In combination, a sealed suture tube within an inner sealed, flexible, translucent envelope of a thermoplastic, heat sealable resin composition, a similar outer envelope enclosing the inner envelope, sterilizing liquid in each envelope, a strip of thermoplastic, heat sealable resin composition sealed to the outer envelope around its outer periphery, and a tear string between the outer envelope and the strip and embedded in each, the ends of the tear string being free, whereby pulling said tear string causes it to tear through said strip leaving the outer envelope still sealed though with a weakened portion in its wall.

CHARLES C. ADAMS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
889,361	Flanders	June 2, 1908
1,962,900	Hirsch	June 12, 1934
2,075,136	Rice	Mar. 30, 1937
2,106,748	Karnes et al.	Feb. 1, 1938
2,231,529	Dey	Feb. 11, 1941
2,307,406	Howard	Jan. 5, 1943
2,307,735	Fehr	Jan. 12, 1943
2,307,736	Clunan	Jan. 27, 1943
2,542,957	Adams	Feb. 20, 1951
2,554,160	Von Gunten	May 22, 1951