

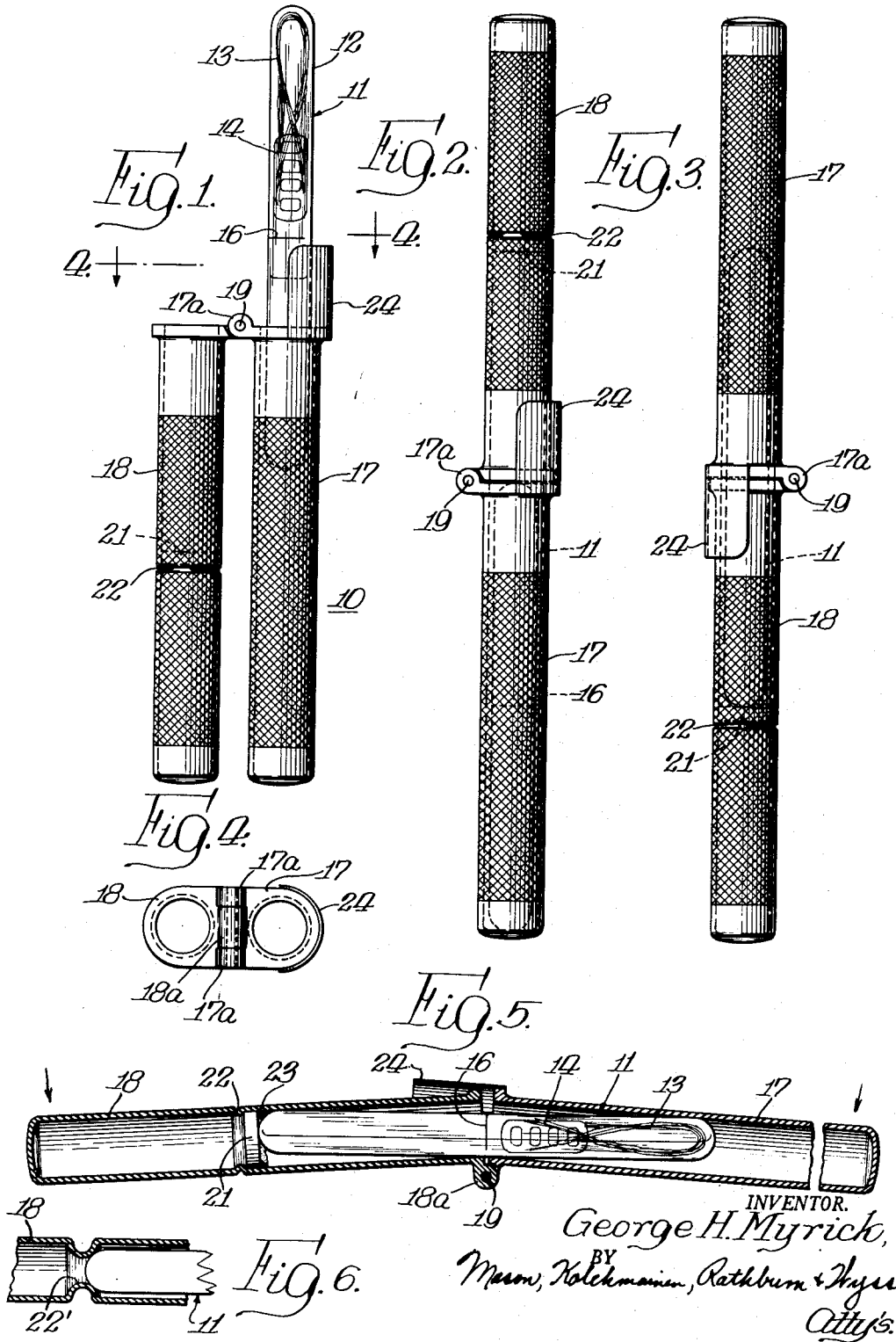
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APPARATUS FOR BREAKING FRANGIBLE SUTURE TUBES

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APPARATUS FOR BREAKING FRANGIBLE
SUTURE TUBES

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3 Claims. (Cl. 81—3)

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The present invention relates to apparatus for breaking frangible suture tubes and more particularly to a device or implement by means of which glass vials or the like containing catgut or similar suture material for use in surgery may be broken easily and safely to make available the suture material in a sterile condition at the proper time.

In modern medical surgery, the material used for sutures generally comprising catgut or the like, is sterilized and sealed in frangible glass vials until needed. Generally the frangible vial is provided with a circumferential score line in the form of an etched arcuate or circular line near the central portion thereof so that the tube may be broken along this score line when the suture material contained in the vial is to be used. Heretofore the practice commonly employed in hospitals and the like for making the suture material contained in such vials available to the surgeon or those assisting him, was first to cover the suture tube with gauze and then manually apply a pressure to the vial to break it along the score line. The gauze was employed to prevent the glass from cutting the hands of the nurse or such person as might attempt to break the same. This practice was undesirable because of the ever present danger to the person breaking the vials by virtue of ragged glass edge along the break in the vial. Furthermore, the supply of gauze which must be used each time involves an additional expense although the danger of cutting the fingers or hand on the broken glass is the real objection to the prior methods of breaking suture tubes. Moreover, such suture tubes are usually broken over a supply table that also holds other articles and instruments. In breaking the suture tube, it is essential that flying glass as well as the sterile liquid generally included in the suture tube surrounding the suture material be prevented from reaching any other equipment on the supply table.

It is obvious, of course, that in surgery time is all important. For this reason extensive preparations are always made before the surgical operation is commenced so that everything is in readiness even as to preparing for rather remote contingencies. As far as the suture tubes are concerned, it is essential that they can be broken in the very shortest period of time when the sterile suture material is needed. It would be desirable to provide a device or apparatus for breaking suture tubes at high speed and in an efficient manner with complete safety to the operator so far as flying glass and the like are concerned.

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Accordingly, it is an object of the present invention to provide an apparatus for the breaking of frangible suture tubes in an expeditious manner and with complete safety to the operator.

It is another object of the present invention to provide a suture tube breaker for use during a surgical operation by which the suture tubes may be broken to make available the suture material contained therein in a minimum of time and without danger or damage to personnel or associated apparatus or equipment.

Still another object of the present invention is the provision of a new and improved suture tube breaker which will eliminate the possibility of flying glass or liquid during the breaking of the suture tube from coming in contact with either personnel or other apparatus and which may be used many times in succession in a completely satisfactory manner.

It is a feature of the present invention to provide an apparatus for breaking frangible suture tubes comprising a pair of pivotally related members adapted to support a suture tube with the mid-point of the suture tube closely adjacent to the pivot point of the members whereby pivotal movement of the members with the suture tube properly associated therewith will cause breaking of the suture tube and release of the sterile suture material contained therein.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the present invention reference may be had to the accompanying drawing in which

Fig. 1 is an elevational view of the apparatus of the present invention in the "open" position thereof with a representative suture tube shown partially inserted in one portion thereof to illustrate a first step in the process of utilizing the device of the present invention;

Fig. 2 is a view similar to Fig. 1 with the apparatus of the present invention in the "closed" position effectively showing a second step in the process of utilizing the present invention;

Fig. 3 is a view similar to Fig. 2 showing the apparatus of the present invention in the closed position illustrating a third step in the process of utilizing such apparatus with the suture tube being disposed in such a position that breakage thereof will result upon moving said apparatus to the "open" position;

Fig. 4 is a top view looking in the direction of

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the arrows 4—4 of Fig. 1, with the suture tube removed from the apparatus of the present invention;

Fig. 5 is a longitudinal sectional view of the apparatus of the present invention showing an intermediate position thereof during the suture tube breaking operation to illustrate the breaking forces applied by the apparatus to the suture tube; and

Fig. 6 is a fragmentary view of a modification of the present invention.

The apparatus or device of the present invention comprises a two part frame with the two frame parts pivotally related so as to be capable of moving into coaxial alignment. Preferably the apparatus is constructed so that the suture tube may be suitably inserted or attached thereto when in the so-called "open" position. Means are provided whereby upon moving the apparatus to the so-called "closed" position, the suture tube may be correctly positioned so that subsequent movement of the device to the "open position" will cause breaking of the suture tube in the desired manner.

Referring now to the drawing where there is illustrated what at present is considered to be a preferable embodiment of the present invention, there is provided a device generally designated at 10 for breaking a frangible suture tube 11 of a type commonly used. As illustrated, such suture tube comprises a completely sealed tubular member 12 formed of glass or other frangible material. One standard type available on the market has a length of the order of four inches and an outer diameter of the order of three eighths of an inch. Disposed within the sealed glass container 12 of the suture tube 11 is suitable suture material generally indicated at 13 which may comprise catgut or any of the synthetic materials now used for making surgical sutures. A suitable spool 14 for the suture material is generally also disposed within the frangible container 12, which container is furthermore partially filled with a sterile liquid. Conventionally, the suture tubes, which are designed to be broken at the instant the suture is to be used, are provided with a score line generally designated at 16 which preferably extends about three fourths of the distance around the tube 12 at the mid-portion thereof to insure breakage of the suture tube along this line.

In accordance with the present invention, the suture tube breaker 10 of the present invention comprises an elongated suture tube supporting frame including two sections specifically designated as 17 and 18, which sections are pivotally related as indicated at 19. The sections 17 and 18 in the illustrated embodiment comprise tubular members or containers open at the ends adjacent the hinge or pivot 19. Preferably this hinge is provided by means of a pair of spaced arms 17a projecting laterally from the open end of the member 17 and a corresponding laterally projecting arm 18a on the member 18, disposed between the arms 17a as clearly shown in Fig. 4 of the drawing. The arms 17a and 18a are provided with aligned openings to receive the pivot pin 19.

For the purpose of supporting the suture tube 11, the tubular members 17 and 18 have a sufficiently large inside diameter to accommodate the suture tube 11. Moreover, one of the members specifically designated as 17 has a sufficient depth whereby the suture tube 11 may be completely inserted therein as is clearly shown in Fig. 2 of the

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drawing. With this arrangement the members 17 and 18 may be moved to what is generally termed the "closed" position of the device 10 with the suture tube 11 supported therein as shown in Figs. 2 and 3 of the drawing, as contrasted with the "open" position shown in Fig. 1 of the drawing.

With the apparatus of the present invention described thus far, the suture tube 11 may be broken when disposed within the device 10 if the tube is moved so that the score line 16 is opposite the pivot pin 19 as shown in Fig. 3 and the suture tube breaker 10 then moved to the open position. If desired, the members 17 or 18 may be provided with suitable openings through which the suture tube may be viewed whereupon by properly tilting the device 10, the suture tube may be moved to the position shown in Fig. 3 of the drawing. Preferably the discontinuous portion of the score line 16 should be immediately adjacent the pivot point 19.

For ready manipulation of the device 10, the outer surfaces of the tubular members 17 and 18 are preferably knurled or otherwise provided with a surface that lends itself to being readily gripped by the hands of the operator. With the suture tube 11 in the position shown in Fig. 5 of the drawing and a pressure applied to each of the members 17 and 18 in the direction indicated by the arrows, it will be apparent that forces are applied to spaced points along the suture tube tending to move the center upwardly as viewed in Fig. 5 and correspondingly to move the two ends thereof downwardly, with the resultant breaking of the suture tube along the score line 16.

From the above description it is clear that satisfactory breaking of the suture tube can be obtained in a simple manner. However, without more, considerable time will be lost in properly positioning the suture tube 11 in the manner shown in Figs. 3 and 5 of the drawings prior to breaking the same. In accordance with another important feature of the present invention, there is provided in one of the tubular members 17 or 18 a suitable stop 21 which correctly positions the suture tube in the manner shown in Fig. 5. This stop may take numerous forms. For example, it may merely comprise a deformation of the casing of sufficient extent to limit or stop the suture tube from moving further into the tube of member 17 or 18, as shown in Fig. 6 of the drawing. As illustrated in Figs. 1 to 5 of the drawing, the member 18 is provided with a stop 21 suitably positioned to define a cavity in the member 18 capable of receiving only one half of the suture tube 11. This stop 21 may be soldered or otherwise secured within the member 18. Preferably and as illustrated in Figs. 1 to 5 of the drawing, the tubular member 18 is deformed so as to provide an inner ledge or shoulder 22 for the stop 21 to which the latter might be soldered as indicated at 23. On the other hand, this deformation might comprise a rolled section such as is designated at 22' in Fig. 6 of the drawing which rolled section is deep enough to act as a stop for the suture tube 11. With this arrangement the apparatus of the present invention may be used with high speed by following the sequence of steps more or less illustrated in successive figures of the drawing.

When it is desired to break a suture tube 11, the implement 10 is moved to the open position shown in Fig. 1 and the suture tube is wholly inserted within the tubular member 17. Prefer-

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ably the suture material within the tube 11 is jarred to one end of this tube or vial as shown in Fig. 1 before the suture tube is inserted into the tubular member 17 with the suture material at the upper end. Next, the implement 10 is moved to the closed position shown in Fig. 2 of the drawing. The implement thereafter is inverted while still in the closed position whereupon the suture tube 11 moves against the stop 21 which determines the appropriate position as shown in Fig. 5 of the drawing for breaking the tube 11.

For the purpose of providing an additional safety factor there is attached to at least one of the members 17 or 18 a concave shield member 24 which extends over the joint between these members. As illustrated, this shield which is of semi-cylindrical configuration is attached to the end of the tubular member 17 so as to extend over the end of the tubular member 18 when in the closed position shown in Figs. 2, 3 and 5 of the drawings. The shield 24, as is obvious from Fig. 5, completely covers the opening beginning to form between the member 17 and 18 at the instant of breaking of the suture tube, whereupon any flying glass or liquid is caught by this shield 24 and is not allowed to move any appreciable distance from the tube 11 being broken. This shield 24 also readily differentiates the sections 17 and 18 from each other so that the user will know into which section the suture tube should initially be inserted before moving the sections to the closed position. It will be understood that the deformation defining the ledge 22 in the section 18 further differentiates the sections.

It will be understood that, if desired, the section 18 may be shorter than the section 17 thereby readily indicating the specific section with which the suture tube 11 should initially be associated. However, a more pleasing appearance is obtained by having the parts of the same length and furthermore a more satisfactory device from the standpoint of leverage and operation thereof during the tube breaking process is provided with the specific embodiment disclosed.

In view of the detailed description included above, the operation of the present invention will readily be understood by those skilled in the art and no further discussion thereof is included herewith. It will also be apparent that there has been provided a very simple and fool-proof device for rapidly and efficiently breaking suture tubes in a manner that provides complete safety to personnel as well as to associated apparatus.

While there has been illustrated and described what is at present considered to be a preferred embodiment of the present invention, it will be obvious that the present invention is subject to numerous changes and modifications, and it is aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. Apparatus for breaking frangible suture tubes of the type provided with a score line intermediate the ends thereof to facilitate breaking comprising an elongated hinged member including two tubular sections of equal length each having an open end adjacent the hinge of said member whereby said hinged member may assume any position between a closed position with the longitudinal axes of said sections coincident and the open ends abutting and an open position

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wherein access to the open ends of said sections is permitted, said first section including a first cavity along the longitudinal axis thereof having a depth sufficient to receive a suture tube wholly therein, said second section including a second cavity along the longitudinal axis thereof, means within said second cavity for limiting its depth effectively to receive only such a portion of a suture tube within said second cavity so as to position the score line opposite the hinge, said sections being manually graspable for moving said hinged member from the closed to the open position after a suture tube has been inserted into said first cavity with the hinged member in the open position and then moved against said means within said second cavity after said hinged member has been moved to the closed position whereby said suture tube is broken along the score line thereof, and shield means attached to one of said sections adjacent its open end and extending over the abutting open ends of said sections when said member is in the closed position to shield against flying particles of said frangible suture tube while moving said hinged member from the closed to the open position to break said suture tube.

2. A device for breaking frangible suture tubes of the type provided with a score line intermediate the ends thereof to facilitate breaking, comprising a pair of hollow tubular sections each having a closed end and an open end, hinge means connected to the adjacent open ends of said sections and having a transverse hinge axis in close proximity to the open ends of the sections for pivotally interconnecting said sections adjacent open ends thereof, said hinge means movably securing said sections for movement into one extreme position wherein said sections are in substantial coaxial relationship with the adjacent ends thereof in abutting relation and into another extreme position wherein the sections are at a substantial angle relative to each other thereby to make accessible the open ends of the sections for insertion of a suture tube into one of the sections, one of said sections having a stop therein to limit the depth to which a suture tube may be inserted therein and to position the score line of the tube opposite the axis of said hinge means, and the other of said sections having a length sufficient to cover the remainder of the tube when it is positioned in said section alone to enable the tube to be placed in it and to enable the two sections to be moved into said coaxial relationship, said tube being movable from said one section so as to be partly in both when said sections are in said coaxial relationship, and said sections being manually graspable for moving said sections out of coaxial alignment whereby a suture tube disposed partially within each section is broken along the score line thereof.

3. A device for breaking frangible suture tubes of the type provided with a score line intermediate the ends thereof to facilitate breaking, comprising a pair of hollow tubular sections each having an open end, hinge means connected to the adjacent open ends of said sections and having a transverse hinge axis in close proximity to the open ends of the sections for pivotally interconnecting said sections adjacent open ends thereof, said hinge means movably securing said sections for movement into one extreme position wherein said sections are in substantial coaxial relationship with the open adjacent ends thereof in abutting relation and into another extreme position wherein the sections are at a

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substantial angle relative to each other thereby to make accessible the open ends of the sections for insertion of a suture tube into one of the sections, one of said sections having stop means therein to limit the depth to which a suture tube may be inserted therein and to position the score line of the tube opposite the axis of said hinge means, and the other of said sections having a closed end and a length sufficient to cover the remainder of the tube when it is positioned in said section alone to enable the tube to be placed in it and to enable the two sections to be moved into said coaxial relationship, said tube being movable from said one section so as to be partly in both when said sections are in said coaxial relationship, and said sections being manually graspable for moving said sections out of coaxial alignment whereby a suture tube disposed partially within each section is broken along the score line thereof.

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