

C. T. DAVIS.
SUTURE AND METHOD OF MAKING THE SAME.
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1,254,031.

Patented Jan. 22, 1918.

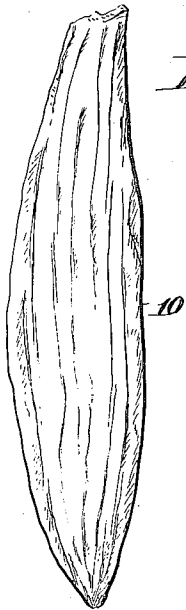


Fig. 1.

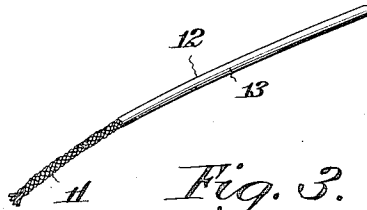


Fig. 3.

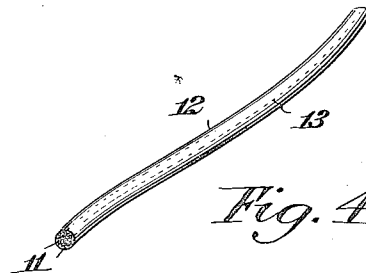


Fig. 4.



Fig. 2.

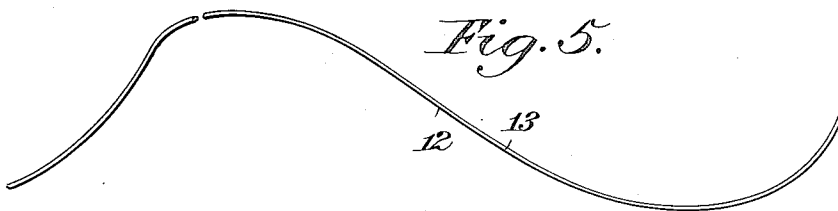


Fig. 5.

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UNITED STATES PATENT OFFICE.

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SUTURE AND METHOD OF MAKING THE SAME.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES T. DAVIS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sutures and Methods of Making the Same, of which the following is a specification.

This invention relates to certain novel and useful improvements in sutures, ligatures, cords and the like and in the method of manufacturing the same.

In the present instance, it is my purpose to manufacture the sutures, ligatures or cords preferably from beef tendons, although it is to be understood that other kinds of tendons may be utilized for this purpose.

Hereafter, throughout the specification, where I use the term "suture," I wish it to be understood that it is intended to include, not only sutures or ligatures such as may be employed in surgical work, but is also intended to embrace cords, strings or the like which may be advantageously used for a great variety of purposes, such as in the stringing of tennis racquets, musical instruments and other articles or devices.

As is well known, it is common practice to make sutures, such as are ordinarily used in surgical work, from catgut, which is produced from sheep intestines. However, experience has shown that such catgut sutures are relatively expensive, not only because expert and laborious hand work is required in the manufacture thereof, but also by reason of the fact that the sheep intestines are comparatively costly, being in great demand for other purposes.

Furthermore, as the ordinary catgut sutures are usually made by hand, the work involved in the production thereof is necessarily tedious and painstaking and at the same time it is difficult to make, by this hand process, sutures which will possess uniformity of size throughout, and this latter is an exceedingly important factor when considered in connection with surgical work as will be readily appreciated.

Another disadvantage incident to the usual catgut suture, is its deficiency in strength, and the limited degree of flexibility which it possesses, this latter not only increasing the difficulty of the stitching operation, but also prevents the tying of

closely fitting knots, which is very important in surgical work.

In the present instance I propose to obviate the above mentioned objections, and others of a like nature, incident to the ordinary hand-made catgut suture, by employing animal tendons, preferably beef tendons from which the fibrous portions or parts thereof are freed, or segregated through a course of treatment hereinafter described in detail, the fibers being subsequently braided on a braiding machine into a long continuous strand which is of uniform diameter throughout, this uniformly braided strand in turn being subsequently immersed in a bath of collagen, glue or similar substance, which causes a close adhesion of the braided fibers in addition to filling up the interstices of the braided strand and providing a smooth, uniform, highly finished coating or surface for the continuous strand. After this operation is completed the continuous strand may be cut or separated into sections to provide sutures of the desired length, and it will be obvious that by this method of braiding the fibers into a continuous strand, and then cutting the latter into predetermined lengths, sutures of uniform thickness and length may be attained.

Furthermore, a suture so produced or manufactured in addition to uniformity of size, will possess relatively greater strength than the ordinary catgut suture, while it is capable of being manufactured by a braiding machine, and therefore, the cost of production is exceedingly low as compared with the cost of the catgut sutures, as the tendons from which my suture is made, may be obtained very cheaply, as the only general use for these tendons at the present time is in the manufacture of glue, which is of but little intrinsic value, and of course, the advantage from the standpoint of cost of machine work over hand work is obvious.

Another advantage incident to the manufacture of a suture embodying my invention is that being made in continuous lengths, the strands may be wound upon large spools as is done in the manufacture of cotton, flax, hemp and jute cordage. Such continuous lengths render it possible to employ machines for winding sutures of predetermined lengths and inserting them in glass tubes, this being work that is now necessarily done entirely by hand because of the fact that

catgut strands cannot be made in continuous lengths and cannot, therefore, be fed into automatic machines to wind them into small coils or loops to be inserted into the glass tubes.

With the above recited objects and others of a similar nature in view, my invention consists in the construction, combination and arrangement of parts set forth in and falling within the scope of the appended claims.

In the accompanying drawing:

Figure 1 is a view in elevation of a section of beef tendon from which the fibers are produced.

Fig. 2 shows several fibers as produced after splitting, shredding and otherwise treating a selected tendon.

Fig. 3 is an enlarged view showing a suture made up by braiding the tendon fibers, such suture being shown as partially coated with collagen or like material.

Fig. 4 is a perspective view on an enlarged scale illustrating more clearly the manner in which the collagen or coating material fills the interstices of the braided suture and it is also illustrative of the smooth coating obtained by so treating the suture.

Fig. 5 is a view illustrating a continuous suture made in accordance with this invention, the suture shown being intended to be cut up into predetermined lengths for any desired purpose.

Referring now to the accompanying drawings in detail, the numeral 10 indicates a tendon from which the suture is to be made. It is known that by subjecting the tendon to the action of certain solutions and otherwise by drying and then by splitting, shredding and hammering such dry tendon, a fibrous mass is the result. The fibrous mass is then put into a machine which segregates the mass into single fibers, such as those shown in Fig. 2 of the drawing, and designated by the numeral 11. The fibers are then braided into a long, continuous strand, a portion of which being shown in Fig. 3, and designated by the numeral 12. On reference to Fig. 3, it will be seen that such strand is braided uniformly, which is extremely important as will be more clearly explained hereinafter.

It will be manifest that by braiding the fibers the strand resulting will present numerous interstices, readily receptive of some suitable viscous substance. In the present instance, I prefer to immerse such continuous strand in collagen, with the result that the fibers and the collagen coalesce, giving the strand a smooth, finished coating or surface. The numeral 13, designates the filled part of the strand, in other words, it shows the braided fibers after coalescence with the collagen. The collagen besides acting to unite the fibers gives a filler and coating for the finished article. In Fig. 4 a

portion of the strand has been shown on an enlarged scale and as shown it is somewhat exaggerated, to show more clearly the union of the elements.

In Fig. 5 the strand though somewhat exaggerated, illustrates clearly the idea of a continuous strand. These long strands may be wound upon spools, and afterward cut up into predetermined sections to produce sutures of selected lengths. These sutures are then wound into coils to be placed into glass tubes, for preservation, as is usual.

In the practice of my invention strands or cords may be made of various gages or thickness and strength to be utilized as strings for musical instruments, tennis racquets and other articles. Where the strand is intended to be employed as a string for a musical instrument, this uniformity of size is a distinct advantage in giving the best tonal effects, while when employed in the stringing of tennis racquets, the greater strength and better resistance to moisture, coupled with their greater economy, makes them far more desirable for such a purpose than the expensive catgut strings now employed.

While I have herein shown and described one particular embodiment of my invention, I wish it to be understood that I do not confine myself to all the precise details of construction herein set forth by way of illustration, as modification and variation may be made without departing from the spirit of the invention or exceeding the scope of the appended claims.

What I claim is:

1. A suture comprising a plurality of animal tendon fibers braided together to constitute a single strand, and viscous substance capable of coalescence with the braided fibers constituting a filler and coating for the strand and providing a smooth, uniform surface therefor.

2. A suture comprising a plurality of animal tendon fibers braided together to constitute a single strand, and a coating of collagen coalesced with the braided fibers and causing adhesion of the fibers and constituting a filler for the interstices of the strand.

3. The herein described method of producing sutures which consists in treating animal tendons to separate the fibers from the flesh, mechanically segregating the fibers into single fibers, and braiding the fibers into a single strand; and immersing said strand into a viscous substance capable of causing the coalescence of said fibers and viscous substance to provide a filler and a coating for the strand.

4. The herein described method, consisting of putting animal tendons into a fibrous mass, mechanically segregating the fibrous mass into single fibers and braiding the fibers into a strand, immersing said braided

strand into a viscous substance capable of coalescence with the braided fibers, and cutting said strand into predetermined lengths to produce sutures.

5 5. A suture comprising a plurality of animal tendon fibers mechanically united together throughout their length to constitute a single strand, and a filler completing the suture configuration and formed of a viscous

substance capable of coalescing with the 10 united fibers, whereby the fibers will be united mechanically and by coalescence.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES T. DAVIS.

Witnesses:

E. C. PIERSON,

BENJAMIN F. HIRSCH.