

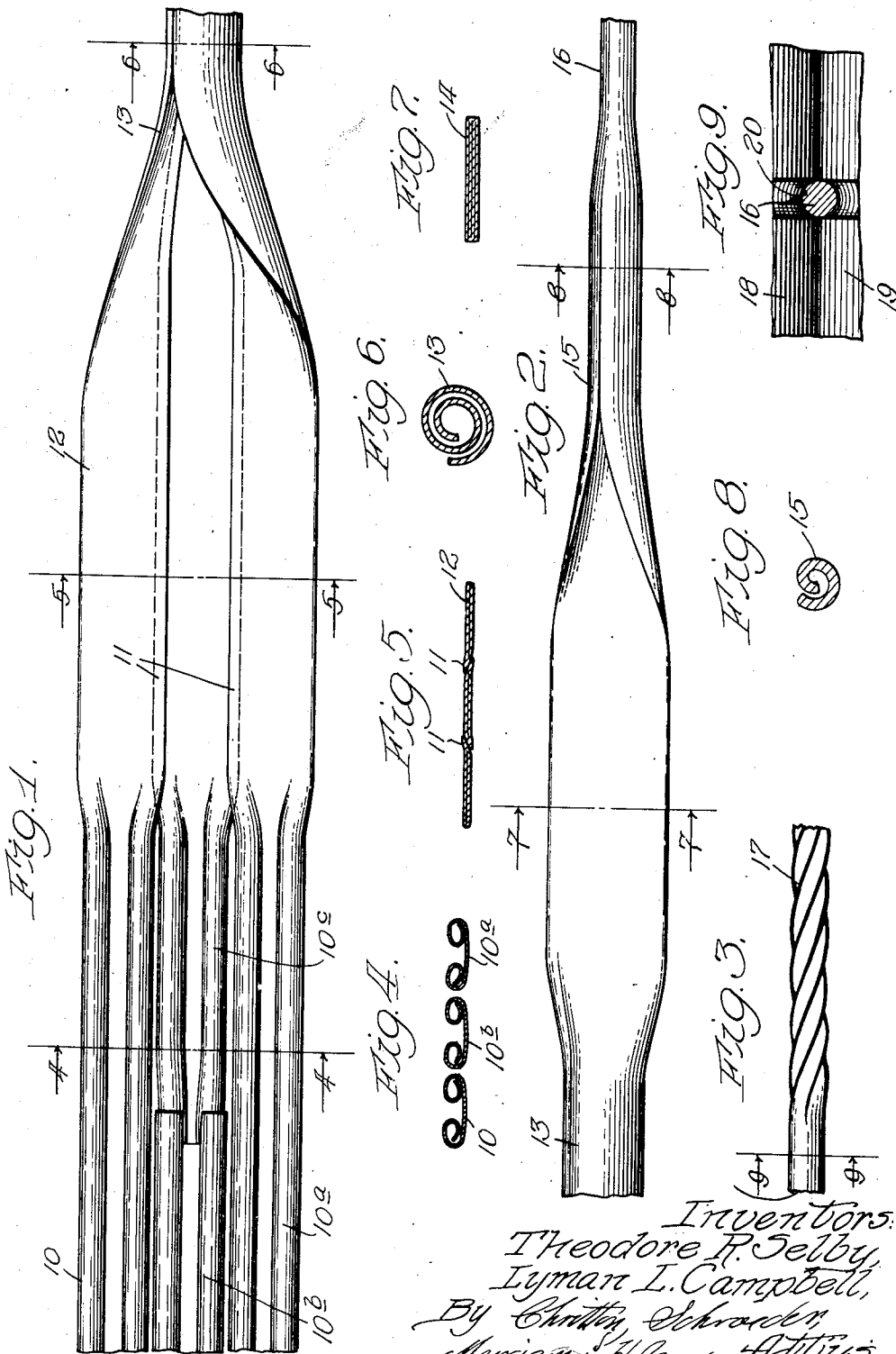
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SUTURE

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SUTURE

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4 Claims. (Cl. 128—335.5)

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This invention relates to sutures and more particularly to continuous sutures formed from a number of small individual strands of split casings.

This application is a division of our co-pending application filed August 24, 1945 as Serial Number 612,464, now Patent Number 2,438,131.

Continuous sutures for use in the finest type of suture work should have a uniform diameter and great longitudinal strength. Sutures presently available generally have a portion of greater diameter at the point of overlap of the various strands used in making up the continuous suture. Likewise, loose ends of the material project from the string, which ends are of no importance for most work but are undesirable for certain types of operations.

We have invented, and are herein disclosing and claiming, a continuous suture made up of a small number of individual strands of split casings which possesses great longitudinal strength, has a uniform diameter and has no loose ends protruding to interfere with most efficient use, the casings being obtained from animal intestines.

In accordance with this invention the casings are split longitudinally, the smooth side splits of the casings are selected which curl inwardly at the edges, the casings are provided with an evenly distributed amount of water, the casings are subjected to pressure such that the water therein is squeezed laterally outward to force the casing into a flat surface, the amount of residual water being such as to leave the casing in its natural adhesive state, make-up strands are very slightly overlapped at the termination of each strand, the flattened casings are rolled into a spiral, the spiral is flattened, the flattened spiral is again curled and is then passed through a sizing die and twisted to final condition, all of this occurring while the casings retain plasticity.

A more complete description of the process is contained in our said co-pending application Serial Number 612,464.

The invention is illustrated in the drawings in which Figs. 1 to 9, inclusive, are diagrammatic views, in the nature of a flow sheet, illustrating the progress of the formation of the finished suture.

The invention is perhaps best described by referring to Figs. 1 to 9. As there shown, the individual casings 10, 10a and 10b have been split and are uniformly supplied with moisture, have a form shown in Fig. 4 with the edges curled inwardly. These strands are arranged

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side by side in parallel relationship. When one strand ends, the new strand overlaps it, as shown where 10a overlaps strand 10c. These strands need not be supplied immediately on top of the previous strand but may be supplied side by side. For example, strand 10b placed above strand 10. It will be secured to the other strands when it is rolled and pressed, as shown in the succeeding operations. Generally, however, one strand will be placed over the end of another, as shown in Fig. 1. The amount of overlap is very small, normally about $\frac{1}{4}$ ".

The strands are then pressed, during which pressing water is forced outwardly and strains the strands into the form shown in Fig. 5. The strands are placed so that the edges overlap longitudinally as indicated; for example at 11. The composite sheet 12 thus formed is rolled into a spiral 13, shown in Fig. 6 and this spiral is then pressed into a ribbon 14, shown in Fig. 7 and in Fig. 2. This ribbon is then again curled, as shown in Figs. 2 and 8, into the coil 15. This coil then passes through the rollers 18 and 19 which are grooved to form a circular opening 20, as indicated in Fig. 9, which acts as a sizing die to form the circular cylindrical cord 16. At this stage the casing still retains plasticity by reason of its moisture content. After passing through the sizing die, the cord is twisted, as shown in Fig. 3, into the final suture 17; the number of twists of the finished suture being approximately two per inch. The gut is twisted and then dried while under stretching tension.

A complete apparatus for carrying out these steps is shown and described in our co-pending application filed May 16, 1946 as Serial Number 670,189, now Patent Number 2,441,601.

The finished product is a continuous suture of uniform diameter, having no increases in diameter at the points of overlap of the casing. The finished suture possesses great longitudinal strength and has no loose ends protruding therefrom.

While for purposes of disclosure, a process for making the sutures has been described, it is to be understood that the sutures may be made by many processes, and therefore no unnecessary limitations should be construed from the description of the process or from the foregoing detailed description generally.

We claim:

1. A suture material consisting of a plurality of edge joined split casings, said joints being formed by a slight overlap of edges of adja-

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cent casings and being joined by pressure and without the use of adhesives other than the natural adhesives contained in the casings.

2. The suture material of claim 1 in which said material is a single broad ribbon which has a spiral cross-section and a substantially cylindrical surface.

3. The suture material of claim 1 in which said material is a single broad ribbon in folded form in the shape of a spiral resulting in a substantially cylindrical string.

4. The suture material of claim 3 in which said string is twisted.

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