Dec. 14, 1926. 1,610,607

B. F. HIRSCH

LIGATURE WINDER, PACKAGE, AND METHOD.

Filed Jan. 9, 1926

Fig. 1

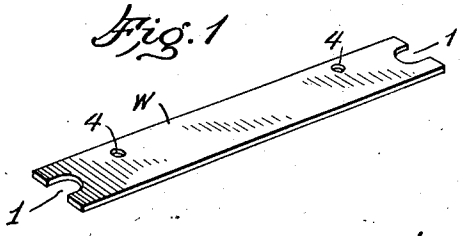


Fig. 5

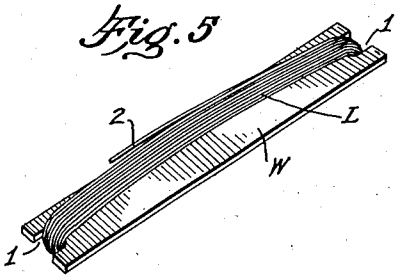


Fig. 3

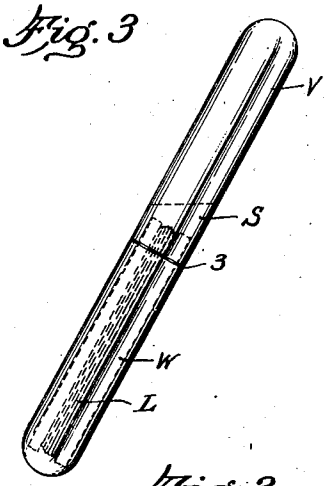


Fig. 4

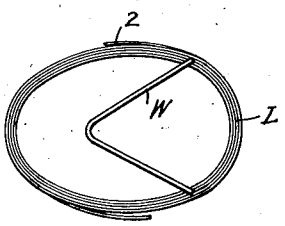
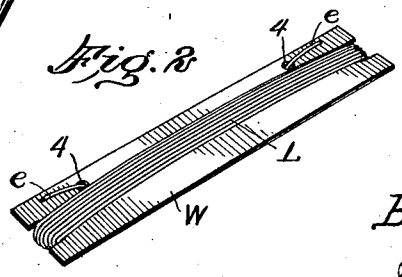


Fig. 2



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Patented Dec. 14, 1926. 1,610,607

UNITED STATES PATENT OFFICE.

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LIGATURE WINDER, PACKAGE, AND METHOD.

Application filed January 9, 1926. Serial No. 80,238.

My invention consists in an improved holder or winder for surgical ligatures, sometimes called "sutures"; a package comprising a sealed vial enclosing a ligature wound upon such a winder, and usually a preserving, "storing," or sterilizing liquid; and to a method of making such packages.

A leading object of the invention is to prevent twisting of the hanks or skeins into which the gut or other ligatures are formed, under the influence of the sterilizing or other liquid, or for other reasons, by providing an improved winder of non-metallic, fibrous, sheet material, which is non-corrosible and neutral to the liquid, and has other definite advantages, sufficiently referred to below, in addition to properly supporting and preventing twisting of the ligature coil.

Another object is to provide such or other winders or holders with means for conveniently positioning or retaining one or both ends of the ligature, such means consisting, in one simple form, as here disclosed, in small holes provided in the winder through which the ends of the ligature may be easily and quickly passed, and which then retain such ends and the entire coil or skein in the proper form, without risk of accidental displacement, but so that the ends and the entire coil or skein may be easily and quickly removed or freed from the holder and the retaining holes when the ligature is to be used.

Further, the object is to provide a complete package including the vial and contained liquid (when a liquid is used), and a ligature upon its winder.

Further, the object is to provide a new and improved method of producing this package.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawing, which shows one representative embodiment of the invention. After considering this example, skilled persons will understand that many variations may be made, and I contemplate the employment of any structures that are properly within the scope of the appended claims.

Fig. 1 is a perspective view of a winder embodying one part of the invention in one form.

Fig. 2 shows such a winder with a ligature properly wound and detachably secured upon it in one way.

Fig. 3 is an elevation of the ligature package forming one part of the invention, in one form.

Fig. 4 shows one convenient mode of removing the ligature from the winder, or vice versa.

Fig. 5 shows a modified winder, in which the retaining holes of Figs. 1 and 2 are omitted.

Ligatures have heretofore been wound or coiled in one way or another upon glass forms or holders, and placed within a sealed vial, with or without a suitable sterilizing, preserving or "storing" liquid. These glass holders are relatively heavy and hard and are therefore likely to crack the vial, and are themselves brittle and liable to breakage. They are also inflexible and cannot be manipulated for the removal of the suture in the convenient manner hereafter referred to. It is impracticable to use metal for this purpose because, in addition to the objections above noted in connection with glass, metals are subject to attack and corrosion by the sterilizing or other liquid, and this would in turn injuriously affect the ligatures.

When a coiled or skeined ligature is placed in the vial with sterilizing or other liquid, the entire coil or skein tends to twist, usually into several complete turns, this probably being due to action of the water component of the liquid upon the gut. This is very annoying to surgeons in using the ligatures, as considerable delay is involved in untwisting the hank, and the manipulation is also likely to impair its aseptic condition.

I avoid the stated and other existing difficulties and disadvantages of previous arrangements and methods, by providing an improved winder W, Fig. 1, the specific form of which may vary considerably, but which conveniently consists of a single, flat piece of fibrous sheet material which is neutral to the sterilizing or other liquid and also substantially or sufficiently non-absorbent to maintain its form unless intentionally deformed, as later referred to. More particularly, this winder may consist of a chemically hydrated cotton cellulose, which is commercially available. This material has the desirable qualities above stated. It is also

very light and not hard in the sense that metals and glass are hard, so that impact with the ends of the vial cannot cause breakage. The ends are desirably provided with concave curvatures or indentations 1, to aid in retaining the gut ligature L, (or, of course, in some cases other ligatures, such as silk, may be used) which is wound lengthwise on the holder in the form of a compact, long coil or skein, as shown in Figs. 2 and 5. Fig. 5 shows one manner of winding, in which one end is left free, as at 2, ready for quick and easy unwinding. In many cases, the ligature is sufficiently retained upon the winder, especially after it is placed in the tube or vial, without special retaining means. In other cases, however, it is desirable to provide means for definitely but detachably retaining one or both ends of the ligature. Such means are illustrated in one form, in Figs. 1 and 2, and consist in this specific example in small holes 4 in convenient locations, usually near the ends and near one long edge of the winder. One end *e* of the ligature is passed through one of the holes at the beginning of the winding operation, substantially as shown in Fig. 2. This aids in the winding by retaining the initial or inner end of the ligature upon the winder with sufficient definiteness, while the winding is commenced, and then the final or outer end is passed through the other hole and retains this end portion and the entire ligature in coiled or skeined form upon the winder, without risk of accidental displacement. The ends may, however, be easily removed in an obvious way, and the ligature removed from the winder by uncoiling it, or in the manner hereafter described. The holder is of such thickness that there is no tendency to cut or to sharply bend the portions of the ligature which pass about the edges of the indentations or through the holes.

The holder and ligature are then placed in the usual vial V, having the usual breakage line 3, scratched or etched thereon, the sterilizing or other liquid S inserted, and the vial sealed and treated for sterilization in any usual or suitable way. The holder evidently retains the coiled suture in proper form, with the turns maintained in the proper straight, parallel relation, and twisting is entirely prevented and the ligature is otherwise kept in perfect condition, ready for immediate and convenient use.

Fig. 4 sufficiently illustrates one way in which the holder of stated characteristics may be quickly and easily removed from the coiled ligature, after the holder with the ligature have been removed from the vial. This mode of release consists simply in bending the holder transversely, at or near the middle, sufficiently to permit it to be quickly freed from the turns of the ligature, which can then be easily uncoiled without delay incident to unwinding it from the holder. This mode of quick release is permitted by the flexible or bendable character of the holder, in distinction from relatively rigid holders such as those of glass, which evidently cannot be handled in this fashion.

In the interest of complete disclosure, the material selected for the holder or winder in one specific preferred instance, is now further described, without intention to impose limitations beyond the definitions of the claims: The material in this particular instance is a particularly treated or processed fibre. It is made by reduction of suitable cotton rag stock, in accordance with usual paper making methods. The wet stock is sheeted and the sheets then treated with zinc chloride acid, usually about 67 to 72 Baumé test to substantially vulcanize the sheet and render it practically homogeneous. The sheets are then leached sufficiently to remove the acid and dried, and rolled or calendered if necessary, to produce the desired surface finish, unity and density.

I claim:

1. A holder or winder for surgical sutures or ligatures consisting of a long, flat, relatively thin piece of chemically hydrated cotton cellulose, substantially neutral to suture preserving and sterilizing liquids and having its ends shaped to receive and hold a ligature in the form of a long flat coil, and serving to prevent twisting of the coiled ligature.

2. A ligature package comprising a vial and enclosed therein a liquid of the character specified and a surgical ligature coiled in a long skein, upon a holder consisting of a long, flat and relatively thin piece of non-metallic fibrous sheet material which is substantially neutral to and unaffected by said liquid and has its ends shaped to retain the ligature, the holder also preventing twisting of the ligature.

3. A ligature package comprising a vial and enclosed therein a liquid of the character named and a surgical suture or ligature coiled in a long skein, upon a holder consisting of a long, flat and relatively thin piece of chemically hydrated cotton cellulose which is neutral to and unaffected by said liquid and has its ends shaped to retain the ligature, the holder also preventing twisting of the ligature.

4. A ligature package comprising a vial and enclosed therein a liquid of the classes named and a surgical suture or ligature coiled in a long skein, upon a holder consisting of a long, flat and relatively thin piece of non-metallic fibrous sheet material, substantially neutral to the liquid, having its ends shaped to retain the ligature, the holder also preventing twisting of the ligature.

5. A holder or winder for surgical sutures or ligatures consisting of a long, flat, relatively thin piece of non-metallic, fibrous sheet

material. substantially neutral to a suture sterlizing or preserving liquid and having its ends indented to receive and hold a surgical ligature in the form of a long flat coil, and serving to prevent twisting of the coiled ligature, the holder being of substantial strength and stiffness, but flexible or bendable to admit of quick removal of the coiled ligature by bending of the holder.

Signed at Brooklyn, in the county of Kings and State of New York, this 31st day of December A. D. 1925.

BENJAMIN F. HIRSCH.