

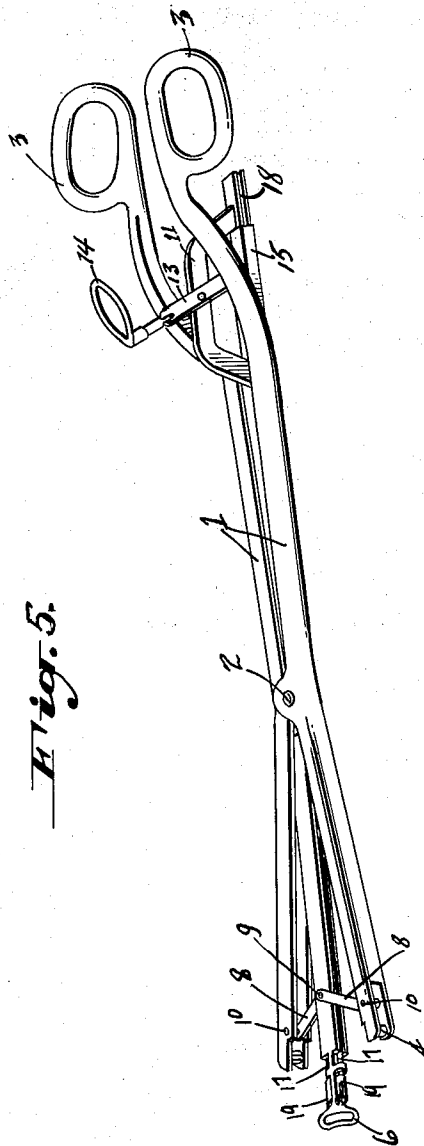
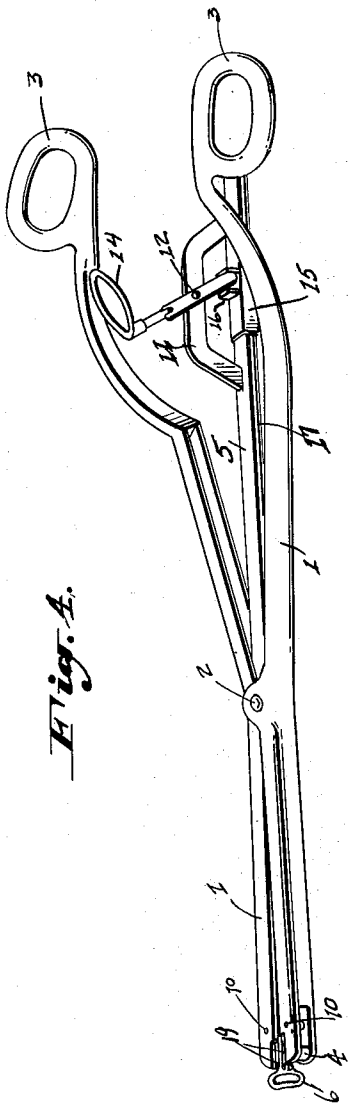
Oct. 21, 1952

M. C. L. GIACCAGLIA ET AL
LIGATURE APPLYING INSTRUMENT

2,614,564

Filed Jan. 14, 1949

2 SHEETS—SHEET 2



INVENTORS,
M. C. L. Giaccaglia
R. A. Mudry
BY
Glascock Downing & Seebold
Attorneys.

UNITED STATES PATENT OFFICE

2,614,564

LIGATURE APPLYING INSTRUMENT

Mario Ciriaco Liberato Giaccaglia and Rodolfo
Alejandro Mudry, Buenos Aires, Argentina

Application January 14, 1949, Serial No. 70,872

4 Claims. (Cl. 128—326)

1

This invention relates to a surgical instrument of the type known as a ligature applying instrument for facilitating the tying of knots to close off severed blood vessels.

The object of the present invention is to provide a ligature applying instrument which will facilitate the tying of knots to close off severed blood vessels in deep incisions or wounds where the ends of the surgical thread cannot be reached by the fingers of the surgeon or other practitioner.

Another object of the present invention is to provide a ligature applying instrument which will firmly hold the knot taut, after same has been tied, hold the ends of the thread beyond the knot under tension, and then sever the latter.

A further object of the present invention is to provide a ligature applying instrument having a central element for holding the knot taut, after same has been tied, and elements on either side of the central element for holding the ends of the thread beyond the knot under tension.

An additional object of the present invention is to provide a ligature applying instrument having a central element for holding the knot taut, after same has been tied, elements on either side of the central element for holding the ends of the thread beyond the knot under tension, and cutting blades associated with the central element for severing the thread between the knot held by the latter and the elements holding same taut.

A still further object of the present invention is to provide a central element for holding the knot taut, after same has been tied, elements on either side of the central element for holding the ends of the thread beyond the knot under tension, cutting blades associated with the central element for severing the cord between the knot held by the latter and the elements for holding same taut, and operating means for said central element, holding elements and cutting blades grouped in close juxtaposition whereby all three may be manipulated by the surgeon or other practitioner with one hand, leaving the other hand free to carry out other steps in connection with the operation.

Additional objects, advantages, and improvements will become apparent from the following specification, taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of the forward part of the ligature applying instrument according to the present invention showing the knot immediately after same has been tied;

2

Figure 2 is a perspective view similar to Figure 1 but showing the knot abutting loop held against the knot;

Figure 3 is a perspective view similar to Figure 2 showing the operator for the knife blades;

Figure 4 is a perspective view of the complete ligature applying instrument according to the present invention showing same before application to the knot; and,

Figure 5 is a perspective view similar to Figure 4 but showing the arms spread apart to the positions that they occupy in tensioning the cord beyond the knot.

Referring now to Figures 4 and 5 in detail the ligature applying instrument is here shown as being in part of scissors construction. Two arms or levers 1—1 of channel bar construction are pivoted at approximately their mid-sections at 2 and at their rear ends these arms have integrally formed handles 3—3 for reception of the operator's fingers. At their forward ends the arms 1—1 are cut away through the webs of the channels and have pulleys 4—4 mounted therein which form thread guiding means.

Intermediate the arms 1—1 there is slidably mounted the central bar 5 which has formed therein at its outer end the thread abutting loop 6. The central bar 5 has at approximately its mid-section a longitudinal slot 7 which receives the pivot 2 and which permits the central bar to be reciprocated with respect to said pivot. Links 8—8 are pivoted to the central bar 5 at 9 and to each of the arms 1—1 between the sides of the channels at 10—10. At its rear end the central bar 5 has suitably secured thereto an upright bridge piece 11, to which there is pivoted at 12 an operating lever 13. To the upper end the operating lever 13 there is pivotally connected a ring 14 adapted to be grasped by the middle finger of the surgeon or other practitioner. At the lower end the operating lever is positioned intermediate two parallel upwardly extending ears 16—16 integrally formed on a block 15 which is slidably mounted on the central bar 5.

The central bar 5 has grooves 18 which are semi-circular in cross section formed in its opposite edges. Rods 17—17 are slidably mounted in the grooves 18—18 and at their rear ends are suitably secured to the slidable block 15 and have secured at their forward ends cylindrical supporting heads 19—19. The cylindrical supporting heads have diametrically opposed slots 19a extending from the open forward ends for approximately half the length. Knives 20—20 which are formed from plates having their for-

3

ward ends suitably sharpened, are mounted on the outer ends of the respective rods 17—17 and extend outwardly through the slots 19a in the cylindrical supporting heads 19—19. A curved strap 21 extends from the shank of the knot abutting loop 6 outwardly and downwardly on each side of the latter and constrains the rods 17—17 for reciprocable movement within the grooves 18—18 in the edges of the central bar 5.

In operation, the surgeon or other practitioner takes the surgical thread 22 and forms a loop 23 therein encompassing the severed blood vessel in a deep incision, and then ties a knot at 24 in the thread, keeping all of the thread except the knot 24 and the free ends therebeyond out of the wound. The ligature applying instrument is then introduced into the incision in such a way that the knot abutting loop 6 is forced against the mid-point of the knot 24, as shown in Figure 2, the free ends of the surgical thread 22 are trained over the pulleys 4—4 and held by the fingers, very likely the index finger and the thumb, of the surgeon or other practitioner's hand, which fingers also are inserted through the handles 3—3 on the far ends of the arms 1—1. The ligature applying instrument is then in the position shown in Figure 4, wherein however the surgical thread or the hand of the operator are not shown. The handles 3—3 on the ends of the arms 1—1 are now moved towards each other, to the position shown in Figure 5, the arms 1—1 rotating on the pivot 2 and spreading apart at the far ends where the pulleys 4—4 are located. Since the ends of the surgical cord are kept stationary by being gripped by the fingers of the surgeon or other practitioner at the handles 3—3, the only parts of the thread that can move are the loop 23 and knot 24, and it is therefore possible to adjust the knot according to the requirement of the particular case.

Once the knot is fixed, the free ends of the surgical thread 22 can be severed. This is done by pulling backwardly the ring 14, usually by the middle finger of the same hand with which the surgeon or other practitioner holds the loops 3—3, the rods 17—17 and supporting heads 19—19 are moved forwardly and the free ends of the surgical thread are received in the recesses 19a in the supporting head where they are severed by the blades 20—20.

Finally the handles 3—3 are moved apart, the arms 1—1 moving towards each other, the links 8—8 withdraw the knot abutting loop 6, and the instrument is removed from the incision.

Having now described our invention, what we claim as new and useful and desire to secure by Letters Patent of the United States is:

1. In a ligature applying instrument, a central bar, a knot abutting loop on said central bar and extending forwardly therefrom, a pair of arms respectively disposed on the opposite sides of said central bar, means pivotally mounting said arms in co-planar relationship on the central bar, thread guiding means on the forward ends of said arms, and handles on the rear ends of said arms, operable when drawn toward each other to force the forward ends of said arms and the

4

thread guiding means apart to draw taut the ends of a thread tied into a knot beneath the knot abutting loop and trained over said thread guiding means.

2. In a ligature applying instrument, a central bar having a slot intermediate its ends and a knot abutting loop extending forwardly therefrom, a pair of arms disposed respectively on the opposite sides of said central bar, a pivot extending through said arms and the slot in said central bar mounting said bars in co-planar relationship on the central bar, links pivoted to the arms and the central bar adjacent the forward ends of both, pulleys on the forward ends of said arms, and handles on the rear ends of said arms operable when drawn toward each other to force the forward ends of said arms and the pulleys apart to draw taut the ends of a thread tied into a knot beneath the knot abutting loop and trained over said pulleys.

3. In a ligature applying instrument, a central bar, a knot abutting loop on said central bar and extending forwardly therefrom, a pair of arms respectively disposed on the opposite sides of said central bar, means pivotally mounting said arms in co-planar relationship on the central bar, pulleys on the forward ends of said arms, and handles on the rear ends of said arms operable when drawn toward each other to force the pulleys apart to draw taut the ends of a thread tied into a knot beneath the knot abutting loop and trained over said pulleys, and reciprocable knives extending outwardly from the central bar on both sides of the latter to the rear of the knot abutting loop for severing the thread between the latter and said pulleys.

4. In a ligature applying instrument, a central bar, a knot abutting loop on said central bar and extending forwardly therefrom, a pair of arms disposed respectively on the opposite sides of said central bar, means pivotally mounting said arms in co-planar relationship on the central bar, pulleys on the forward ends of said arms, and handles on the rear ends of said arms operable when drawn toward each other to force the pulleys to draw taut the ends of a thread tied into a knot beneath the knot abutting loop and trained over said pulleys, at least one rod reciprocably mounted along said central bar, a pair of knives on said rod and extending outwardly from the central bar on both sides of the latter to the rear of the knot abutting loop for severing the thread between the latter and said pulleys, and operating means positioned between said handles and connected to said rod for reciprocating same.

MARIO CIRIACO LIBERATO GIACCAGLIA.
RODOLFO ALEJANDRO MUDRY.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,855,546	File	Apr. 26, 1932
1,856,721	Nagelmann	May 3, 1932
2,427,169	Wandel	Sept. 9, 1947