

Apr. 17, 1923.

1,452,373

J. S. GÓMEZ

SURGICAL LIGATURE AND MEANS FOR APPLYING THE SAME

Filed Oct. 15, 1921

2 Sheets-Sheet 1

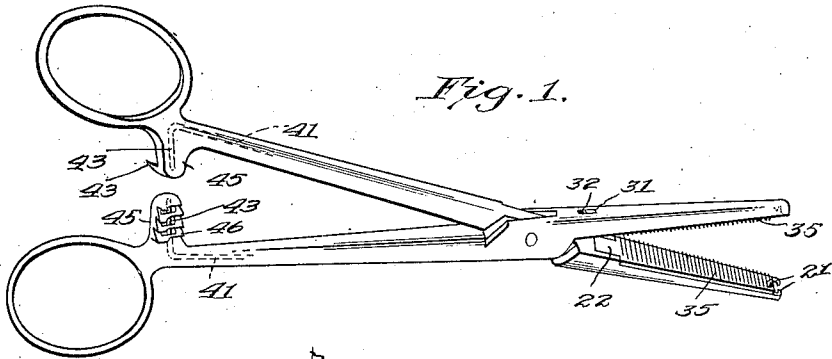


Fig. 1.

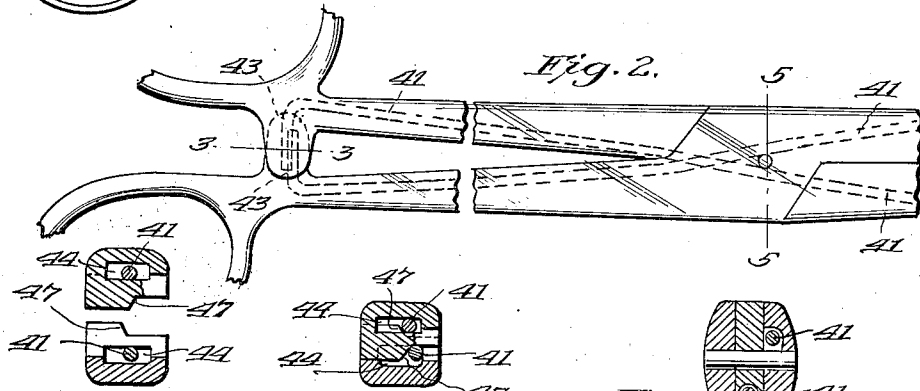


Fig. 2.

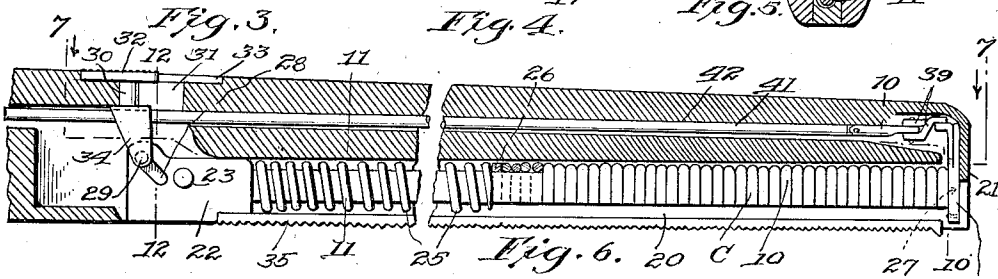


Fig. 3.

Fig. 4.

Fig. 5.

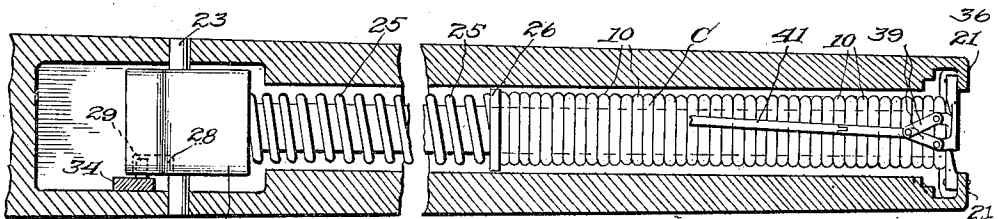


Fig. 7.

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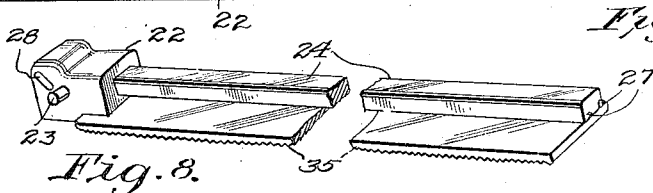


Fig. 8.

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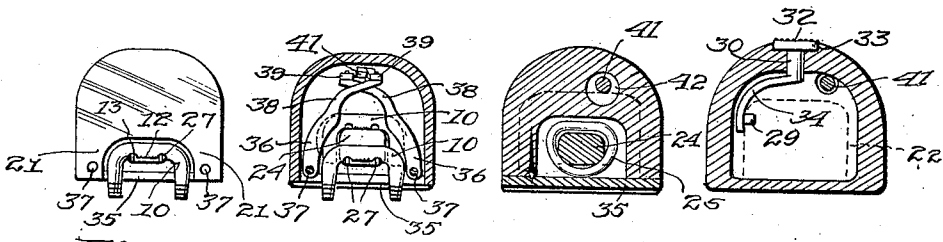


Fig. 9.

Fig. 10.

Fig. 11. Fig. 12.

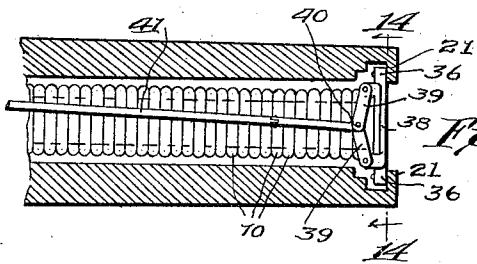


Fig. 13.

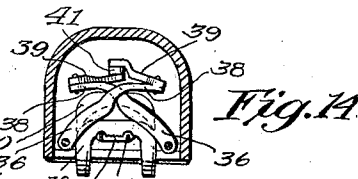


Fig. 14.

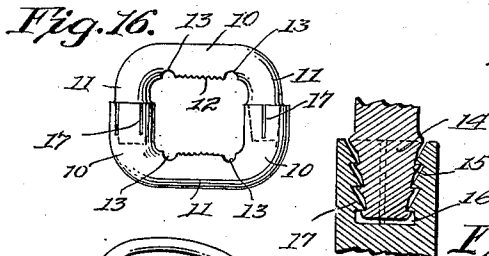


Fig. 16.

Fig. 17.

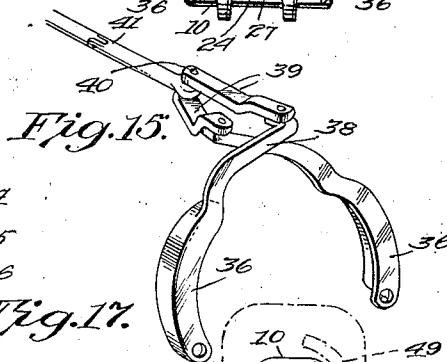


Fig. 15.

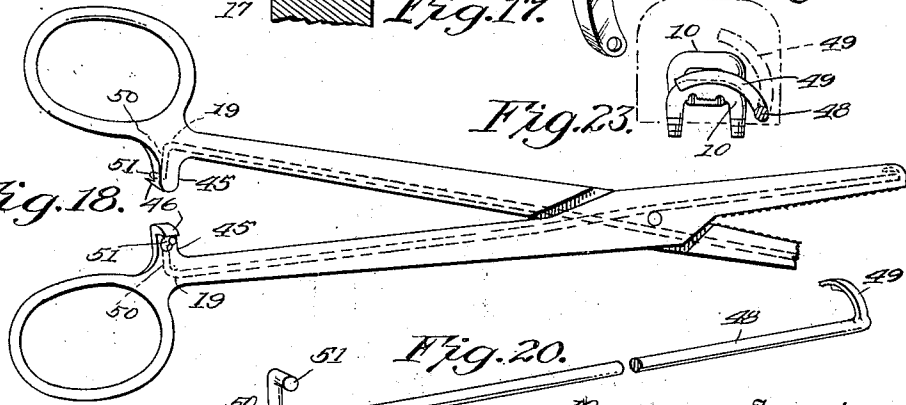


Fig. 18.

Fig. 20.

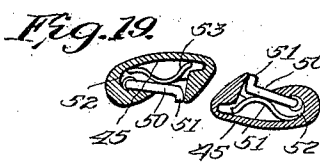


Fig. 19.



Fig. 21.

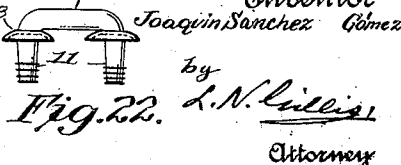


Fig. 22.

# UNITED STATES PATENT OFFICE.

JOAQUIN SÁNCHEZ GÓMEZ, OF WASHINGTON, DISTRICT OF COLUMBIA.

SURGICAL LIGATURE AND MEANS FOR APPLYING THE SAME.

Application filed October 15, 1921. Serial No. 507,887.

*To all whom it may concern:*

Be it known that I, JOAQUIN SÁNCHEZ GÓMEZ, a subject of the King of Spain, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Surgical Ligatures and Means for Applying the Same, of which the following is a specification.

This invention relates to surgical appliances and has special reference to a metallic ligature and forceps for applying the same.

One important object of the invention is to provide means for ligaturing wounds in the human body and that of animals, the ligature used being preferably formed of absorbable material.

Another important object of the invention is to provide an improved form of clip constituting the ligature, the clips being complementary so that they lock together solidly in forming the ligature.

A third important object of the invention is to provide an improved form of ligature for use in organic tissues which will act to hold the margins of a wound closely together.

A fourth important object of the invention is to provide an improved forceps for applying ligatures of this description.

A fifth important object of the invention is to provide a surgical forceps for use in connection with clips of this description which will have its jaws equipped with a magazine and a single feed mechanism so that a number of the clips can be held by the forceps and fed into position therefrom one by one.

A sixth important object of the invention is to provide an improved forceps of this character wherein the operation of closing the forceps will actuate the said mechanism.

With the above and other objects in view, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically claimed.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—

Figure 1 is a perspective view of the complementary forceps as constructed in accordance with this invention, the instrument being shown open.

Figure 2 is an enlarged detail view with the instrument closed the better to show the location of the operating wires.

Figure 3 is a detail section with the forceps open on the line 3—3 of Figure 2.

Figure 4 is a detail similar to Figure 3 but with the forceps closed.

Figure 5 is a detail section on the line 5—5 of Figure 3.

Figure 6 is a longitudinal vertical median face on an enlarged scale through one of the forceps jaws.

Figure 7 is a section on the line 7—7 of Figure 6.

Figure 8 is a detail perspective view showing the magazine bar removed from the forceps.

Figure 9 is an end view of one jaw of the forceps, one of the clip portions being shown in position for locking with its cooperating clip.

Figure 10 is a detail section on the line 10—10 of Figure 6.

Figure 11 is a detail section on the line 11—11 of Figure 6.

Figure 12 is a detail section on the line 12—12 of Figure 6, the main bar being removed.

Figure 13 is a view similar to the forward end of Figure 7 but showing the single feed mechanism in the position assumed in feeding one of the clips toward its component in the other jaw.

Figure 14 is a section on the line 14—14 of Figure 3.

Figure 15 is a detail perspective showing a single feed mechanism removed from the jaw.

Figure 16 is a view showing two of the complementary clips assembled to form the complete ligature.

Figure 17 is an enlarged detail of the serrate connection preferably used with these clips.

Figure 18 is a view in perspective showing forceps provided with a modified form of single feed device.

Figure 19 is a detail section on the line 19—19 of Figure 18.

Figure 20 is a perspective view, partly broken away, showing the modified delivery mechanism removed from the forceps.

Figures 21 and 22 are views showing modified closed constructions.

Figure 23 is a detail view showing the operation of the modified form of single delivery mechanism.

The ligature 11 part of the subject matter of this invention is formed preferably in two portions which when united are of general quadrangular form with the corners rounded as clearly shown in Figure 16. Each of the clips constitutes a U-shaped member having a back portion 10 and parallel legs 11. The back portion has its inner surfaces serrated as at 12 and notches 13 are provided on each side of the serration for purposes which will be explained in connection with the action of the forceps. In the form shown in Figure 16 one of the clips has its legs terminating in frusto-conical portions 14 which have their surfaces provided with circumferential serrations 15. Each of the legs 10 of the other complementary clip has its end recessed as at 16 and the inner wall of this recess is provided with circumferential serrations 17 complementary to the serrations 15. For the purpose of allowing ready engagement of the frusto-conical end 14 in the recess 16 the side walls of this recess 16 are slit at 17 and it is to be understood that any desired number of slits may be used and these may be located in any convenient position. In place of the clip being provided with two of the legs as shown in Figure 16 a clip may be utilized which has a back portion 10 and a greater number of legs, as for instance four, as shown in Figure 21. In like manner the legs 11 may be provided with guard members 18 as shown in Figure 22.

Considering now the forceps. The general form of these forceps is that of the usual class of surgical instruments but in the particular form each jaw of the forceps is provided with a longitudinal channel 20 opening through the view of the jaw forming a point near the base or pivot and of the forceps to the nose, the latter being partly closed by a pair of spaced flange portions 21. Within this channel is located the main bar or rod. This magazine bar is provided with an enlarged end 22 pivoted to the side walls of the channel by means of the pivots 23. From the forward portion of this enlarged end extends a rod 24 which, in cross section, is of form and size to accommodate the clip members previously described. Mounted on this rod 24 and bearing at one end against the enlarged portion 22 is a coil spring 25. The forward end of this coil spring engages a follower plate 26 and on the portion of the rod forward of the follower plate are located the clips which, in the views in the figures of the drawings will be indicated generally by C. This rod terminates in spaced relation to the flanges 21, the space between

the end of the rod and said flanges being just sufficient to accommodate one clip and the feeder mechanism. It should be mentioned that the forward end of the rod is provided at its lower corners with small spurs 27 which serve as stop members for the end clip.

The enlarged end 22 is provided on one of its sides with a cam slot 28 wherein engages the pin 29 of a magazine lock. This magazine lock, besides the pin, consists of a body portion 30 sliding in a slot 31 formed in the back wall of the respective jaw. This body terminates in a serrated head 32 accessible to the thumb or finger of the operator, the head sliding in a recess 33 in the outer face of this back wall. From the inner end of the jaw 30 extends a curved arm 34 carrying the pin 29. By means of this construction when the head 32 is pushed forward the magazine rod or bar will have its forward end forced down out of the jaw but when the head is pulled back the magazine rod will be held up in the jaw. It is to be observed that the lock fits snugly in its slot so that there is sufficient friction to prevent accidental dropping of the bar. Extending forwardly from the enlarged portion 22 is a closure plate 35 serrated on its under surface and arranged to close the channel 20 as can clearly be seen by reference to the various figures.

Several forms of single delivery or single feed mechanisms may be used in this connection and in the form shown in such Figures as 6, 7, 10, 13, 14, and 15 there is provided a pair of arcuate jaws 36 L-shaped in cross section and pivoted at their lower ends or pivots 37 carried by the flanges 21. These jaws have their upper ends crossed as at 38 and pivoted to these upper ends are links 39 which are united at their free ends by a pivot 40, the latter also connecting with an operating rod or wire 41. Referring particularly to Figures 7 and 10 and to Figures 13 and 14 it will be seen that when the links are in the position shown in Figure 7 the jaws 36 will be in the position in Figure 10. This will permit the clip at the end of the magazine to pass forward and engage within the L-shaped portions of the jaws 36 from whence it may drop into the position shown in Figure 10, the notches or recesses 13 engaging on the prongs 27. If now the rod or wire 41 be pushed forward the links will assume the position shown in Figure 13 and the jaws 36 will be forced inwardly and downwardly as shown in Figure 14 thus engaging and solidly holding the dropped clips. At the same time this movement of these jaws will cut off the remaining clips. It is to be understood that at the instant that this operation of holding the clip in one of the forceps jaws is effected an identical operation takes place in the other for-

ceps jaw. Thus when the jaws are brought together the complementary clips are united. In order to provide space for the rod 41 a channel or bore 42 extends to the forceps jaw adjacent its back and this rod is carried through said channel or bore. At the handle end of the forceps the rods 42 terminate in angularly disposed portions 43 which lie in channels 44 formed in the forceps latch members 45, these being provided with the usual latching serrations 46. These serrations are cut away to provide cam portions 47 as shown clearly in Figures 3 and 4 and the cam portions are so arranged that when the latch members come together said cam portions engage the wire ends 43 and move them from the position shown in Figure 3 to the position shown in Figure 4 thus forcing each of the rods 41 forward and moving the links from the position shown in Figure 7 to that shown in Figure 13. By this means the operation of closing the forceps effects actuation of the single delivery mechanism.

In the form of the device illustrated in Figures 18, 19, 20, and 23 the single delivery mechanism is somewhat modified. In place of a longitudinal wire 41 there is employed a stiff wire 48 which is in effect a rock shaft and on one end of this wire is carried a single arcuate arm 49 L-shaped in cross section and corresponding to the jaws 36. On the other end of the wire is an angular portion 50 with a bent end 51, the angular portion 50 being received in a recess 52 in the latch mechanism while the end 51 projects forwardly of said recess. Behind the portions 50 are small leaf springs 53 which normally hold these portions outward. In this form when the forceps are closed the latch members 45 come together and the serrations 46 engage the bent ends 51 and push the same inward thus locking the rocker wire 48 and moving the arm 49 in a manner similar to the movement previously described of the arms 36, the initial and final conditions of the arm 49 being clearly illustrated in the dotted and full line positions in Figure 23.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material principles thereof. It is not therefore desired to confine the invention to the exact form herein shown and described but it is wished to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new, is:—

1. A surgical ligature consisting of a pair of clips each separate from the other and each having a back portion and legs extending therefrom in parallel relation, the legs of each clip being provided with locking

means cooperating with the legs of the other clip.

2. A surgical ligature comprising a pair of clips each having parallel spaced legs, the legs on one clip being tubular at their ends and the legs on the other clip being of proper size to engage in said tubular ends.

3. A surgical ligature comprising a pair of clips each having parallel spaced legs, the legs on one clip being tubular at their ends and the legs on the other clip being of proper size to engage in said tubular ends, the contacting surfaces of said legs being transversely serrated.

4. A surgical ligature comprising a pair of clips each having parallel spaced legs, the legs on one clip being tubular at their ends and the legs on the other clip being of proper size to engage in said tubular ends, the contacting surfaces of said legs being transversely serrated, and the tubular leg ends being longitudinally split to provide spring jaws.

5. A surgical forceps for applying interlocking clip ligatures and including a pair of jaws movable toward and from each other, means carried by each jaw for receiving and holding a series of clips, means urging said clips forwardly of said jaws, and mechanism actuated by the operation of closing the jaws to bring a pair of said clips into interlocking relation.

6. A surgical forceps for applying interlocking clip ligatures and including a pair of jaws movable toward and from each other, a clip magazine in each jaw, and a single delivery mechanism for said clips in each jaw, said mechanism being arranged to bring clips in pairs in interlocking relation, and being actuated by the operation of closing said jaws.

7. In a forceps of the class described, a jaw having a channel extending longitudinally of its face, a rod in said channel for carrying a series of clips arranged side by side, spring means arranged to urge said clips toward the nose of said jaw, a delivery mechanism at said nose arranged to engage the end clip and move the same vertically out of the channel, and means connected to the delivery mechanism for operating the same.

8. In a forceps of the class described, a jaw having a channel extending longitudinally of the face, a rod pivoted in said channel for carrying a series of clips arranged side by side, spring means arranged to urge said clips toward the nose of said jaw, a delivery mechanism at said nose arranged to engage the end clip and move the same vertically out of the channel, means connected to the delivery mechanism for operating the same, and releasable means to lock the rod in position in the channel.

9. In a forceps of the class described, a

- jaw having a channel extending longitudinally of the face, a rod pivoted in said channel for carrying a series of clips arranged side by side, spring means arranged to urge said clips toward the nose of said jaw, a delivery mechanism at said nose arranged to engage the end clip and move the same vertically out of the channel, means connected to the delivery mechanism for operating the same, releasable means to lock the rod in position in the channel, and a closure plate carried by the rod and closing the portion of the channel remote from the nose.
10. A surgical forceps comprising a pair of members pivoted intermediate their ends to provide handle and jaw portions, each jaw portion being provided with a clip magazine and a single delivery mechanism, operating rods connected to the single delivery mechanisms and extending through the forceps members into the handle ends thereof, the rear portions of said rods being accessible through the walls of said handle ends, and means carried by the handle ends to engage and move said rods and thereby effect actuation of the single delivery mechanisms.
11. A surgical forceps comprising a pair of members pivoted intermediate their ends to provide handle and jaw portions, each jaw portion being channelled longitudinally, a magazine rod pivoted in each jaw and arranged to carry a series of clips, a spring on said magazine rod urging said clips forwardly off the rod, a single delivery mechanism at the forward end of each jaw for feeding the clips one by one toward the opposite jaw, operating rods connected to the single delivery mechanisms and extending through the forceps members into the handle ends thereof, the rear portions of said rods being accessible through the walls of said handle ends, and means carried by the handle ends to engage and move said rods and thereby effect actuation of the single delivery mechanisms.
12. A surgical forceps comprising a pair of members pivotally connected intermediate their ends to provide handle and jaw portions, each jaw portion being channelled, a clip magazine in each channel, and a single delivery mechanism in each jaw comprising an arcuate jaw at the forward end of the forceps jaw adapted to engage and move clips toward the other forceps jaw, a rock shaft whereon said arcuate jaw is mounted, said shaft extending into the handle portion of the respective member and having a rock arm at its rear end and means carried by each handle portion for engaging and moving the rock arm in the other handle portion.
13. A surgical forceps comprising a pair of members pivoted intermediate their ends to provide handle and jaw portions, each jaw portion being channelled, a clip magazine in each channel and a single delivery mechanism in each jaw comprising a pair of opposed arcuate jaws each pivoted at one end to the forward end of the forceps jaw, the other ends of said arcuate jaws being connected by knuckle joint links, a rod connected to the central joint of the knuckle joint links and extending rearwardly within the respective handle portion, and means on each of the handle portions to engage the rod on the other handle portion and move the same longitudinally to effect operation of the same longitudinally to effect operation of the knuckle joints.

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