

No. 650,822.

Patented June 5, 1900.

M. CAIN.
LIGATURE TIER.

(Application filed Nov. 27, 1899.)

(No Model.)

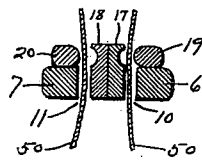
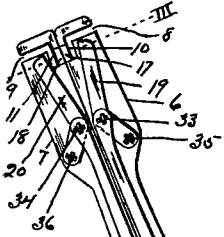


Fig. 3.

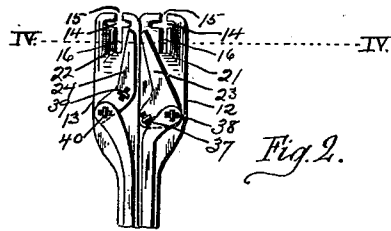


Fig. 2.

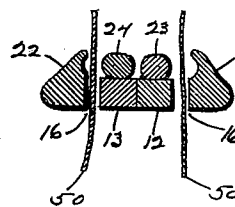


Fig. 4.

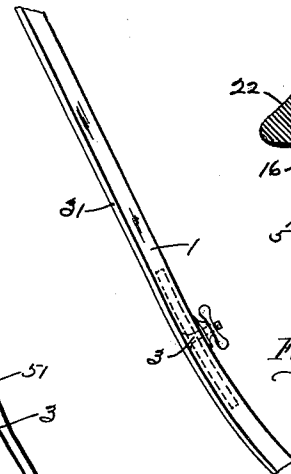


Fig. 5.

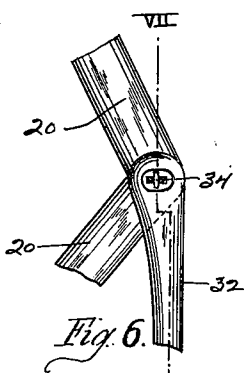


Fig. 6.

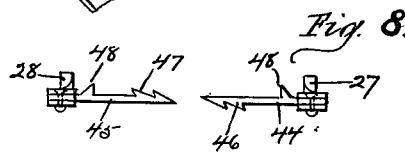


Fig. 8.

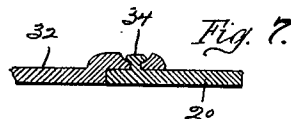


Fig. 7.

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MILTON CAIN, OF JARBALO, KANSAS.

LIGATURE-TIER.

SPECIFICATION forming part of Letters Patent No. 650,822, dated June 5, 1900.

Application filed November 27, 1899. Serial No. 738,372. (No model.)

To all whom it may concern:

Be it known that I, MILTON CAIN, of Jarbalo, in the county of Leavenworth and State of Kansas, have invented certain new and useful Improvements in Surgeons' Ligature-Tiers, of which the following is a specification.

My invention relates to an improved ligature-tier for the use of surgeons in tying or "running up" a ligature when the part in or around which the stitch or ligature is to be made is situated in some recess or cavity of the body or in some incision or wound not easily accessible by the hands or fingers of the operator; and my invention especially relates to an attachment to the ordinary surgical ligature-tier, which attachment consists of a device mounted on the front of the instrument whereby the two strands of thread, wire, or other material leading out from the knot may be firmly seized and held when desired, said holding device being connected by a system of levers to the handles of the instrument, so as to be operated by the same hand which holds the implement, leaving the other hand of the operator free, all of which, together with other features of advantage, will be more fully set forth and described herein.

In the accompanying drawings, Figure 1 is a geometrical view, partly in section, of a surgical ligature-tier with my improvements attached, showing the preferred form of the same. Fig. 2 is a slightly-enlarged view of the heads or points of the blades of the instrument, showing a different construction of the heads and also a different adjustment of the attachments devised by me. Fig. 3 is a cross-section on the line III III of Fig. 1. Fig. 4 is a cross-section on the line IV IV of Fig. 2. Fig. 5 is a side view of the joint where the blades of the instrument are pivoted together. Fig. 6 is a top view of one of the stud-and-slot joints by which the operating-levers are pivoted together. Fig. 7 is a cross-section on the line VII VII of Fig. 6. Fig. 8 is a side view of the pivoted catches shown in Fig. 1 mounted at the ends of the bows.

In Fig. 1, 1 and 2 indicate the blades of the main body of the instrument pivoted together at 3 and having the bows or handles 4 5. The heads or forward ends 6 7 of blades 1 2 are

formed in the usual manner, each head having a transverse slot 8 9 projecting from the outer edge inwardly to receive the strands of the ligature. My improvement includes an addition to these slots consisting of longitudinal extensions thereof, 10 11, leading downwardly or toward the handles from the inner end of said transverse slots. The heads 12 13 (shown in Fig. 2) are also of a common type, so far as concerns the general form, and the transverse slots 14, with openings 15, lead into them at the ends of the blades. The longitudinal slots 16, however, leading downward from said transverse slots, are a part of my invention.

Another part of my invention is the formation on each of the heads 6 7 of integral lugs 17 18, situated between the slots 10 11 and the inner edges of the blades, against which lugs the angular pivoted levers 19 20 impinge and form gripping-jaws to seize and hold the strands of the ligature. The outer edges of said lugs 17 18, as shown in Fig. 3, are made concave, and the inner edges of said levers 19 20 are made convex, so as to obtain a firmer grip on the strand passing through between said lugs and said levers.

In the form shown in Fig. 2 the lugs 21 22 are placed at the outside edges of the heads between said edges and the longitudinal slots 16, and the pivoted levers 23 24 engage said lugs by an outward movement, instead of an inward movement, as in Fig. 1. In this form also, as shown in Fig. 4, the faces of the lugs 21 22 are concave and those of the levers 23 24, which engage them, are convex. The means by which said pivoted levers 19 20 and 23 24 are operated will now be described. Upon the bow or handle portions 4 5 of each of the blades 1 2 are pivoted at 25 26 by a slot-and-stud connection angular levers 27 28, the outer edges of which project somewhat over the adjacent finger-openings in the bows 4 5. At or near the angles of said levers by a similar connection are pivoted at 29 30 to said levers the ends of long flat connecting-bars 31 32, which extend forward to the front end of the instrument, where they are pivoted, radial rotating at 33 34 to the angles of the levers 19 20, before mentioned, which are in turn pivoted at 35 36 to the heads 6 7 of the blades 1 2. It is obvious from the connection shown

that by pressing the levers 27 28 inwardly or toward each other a longitudinal movement will be imparted to the connecting-bars 31 32, the angular levers 19 20 will be rotated on the pivots 35 36, and the edges of the long arm of said levers will be made to engage the lugs 10 11.

In the form shown in Fig. 2 the connection of the connecting-bars 31 32 with the angular levers 23 24 is somewhat different, one of said levers, 23, being pivoted to the head 12 at 37 and to the connecting-bar 31 at 38, and the other, 24, being pivoted to the head 13 at 39 and to the bar 32 at 40, the effect of which is, in operation, to throw the jaws of the levers 23 24 outward into engagement with the lugs 21 22.

All the pivotal connections of the levers described with the bars 31 32 or with the blades 1 2 consist of a T-shaped stud, fixed on the underlying part, fitting a slot in the overlying part in a well-known manner, so as to permit the parts to be easily disconnected for cleansing the same. Fig. 6 is an enlarged view of one of these pivots 34, and Fig. 7 shows the same in transverse section, also the shoulder with which the overlying part is provided and into which the underlying part fits at each of the pivoted points referred to.

The levers 27 28 are provided with springs 41, bearing against pins 42 on the bows 4 5 to push said levers back to normal position after action. The blades 1 2 are also provided with the usual spring 43.

At the bow ends of the blades 1 2 are pivoted latches 44 45, Figs. 1 and 7, which project toward each other and are provided with oppositely-extending teeth or barbs 46 47, which may be made to engage each other and hold the blades 1 2 in open position when and at the point desired. Said latches are also each provided with an upwardly-extending tooth or lug 48, which may be made to engage the ends of levers 27 28 to hold the same in retracted position, and consequently the jaws 19 20 or 23 24 in contact with the lugs 10 11 or 21 22 when desired. Said latches 44 45 are also provided with springs 49, one of which is shown in Fig. 1, to hold the latches in normal position and permit rotation of the same when desired.

As shown in Fig. 5, the curvature of the upper side of the blades 1 2 and connecting-bars 31 32 is convex and of the under side concave; but it is obvious that the curvature of the instrument may be modified according to the special uses contemplated or the blades may, if preferred, be bent at an angle at a suitable point or points.

The operation has been substantially indicated. The thread 50 having been passed through or around the point or part which is to receive the stitch or ligature, the two strands are crossed by the fingers, forming the knot. The instrument being held in the right hand of the operator, the two strands are then inserted in the transverse slots 8, 9,

or 14, one of said strands in each slot, and the extending ends of the strands are held in the left hand of the operator. The blades 1 2 are then separated by pressing the bows together, tension being constantly maintained on the strands and the knot "run up" to the seat of the ligature in a well-known manner, the operation so far as described being the ordinary one. When, however, during the process of running up the knot the operator desires to pause in the operation or to use the left hand for another purpose, the pivoted levers 19 20 or 23 24 are allowed to open by relaxing the pressure on levers 27 28, and the strands 50 are caused to pass into the longitudinal slots 10, 11, or 16 and between the levers 19 20 or 23 24 and lugs 17 18 or 21 22, after which renewing the pressure on levers 27 28 will cause the strands to be firmly gripped and held at the will of the operator until he is ready to continue the process of running up the knot.

Numerous advantages result to the practitioner from his ability, resulting from my improvement, to hold the strands securely at the ends of the blades by mechanical means when desired, one of the chief of which being the greater facility of preserving a uniform tension on each of the strands, it being well understood by practitioners that unless equal tension is maintained upon both strands the knot will tangle, necessitating beginning the process anew.

I claim as my invention and desire to secure by Letters Patent—

1. In a surgical ligature-tier, the combination of a pair of pivoted blades provided with handles and a spring to keep said blades normally closed, flattened extensions or heads on the ends of said blades, having transverse slots therein and longitudinal slots extending downward from said transverse slots, lugs on said heads adjacent to said longitudinal slots, pivoted levers on said heads adapted to engage said lugs to form gripping-jaws meeting over said longitudinal slots, and means for operating said pivoted levers, substantially as set forth.

2. In a surgical ligature-tier, the combination of a pair of pivoted blades provided with handles and a spring to keep said blades normally closed, flattened heads on the ends of said blades, having transverse slots therein and longitudinal slots extending downward from said transverse slots, lugs on said heads adjacent to said longitudinal slots and having curved edges on the sides toward said slots, pivoted levers on said heads with curved edges adapted to engage the curved edges of said lugs and form gripping-jaws, meeting over said longitudinal slots, and means for operating said levers, substantially as set forth.

3. In a ligature-tier of the character described the combination of the flattened heads at the ends of the blades, each provided with a transverse slot and a longitudinal slot leading downwardly therefrom, lugs on said heads

adjacent to said longitudinal slots, levers pivoted on said heads having edges adapted to engage said lugs, immediately over said slots, and form gripping-jaws, longitudinal connecting-bars pivoted at one end to said levers and at the other end to other levers pivoted to the handle portion of the instrument, so that pressure on said last-mentioned levers will move said connecting-bars longitudinally and close said jaws, substantially as set forth.

4. In a ligature-tier of the character described, a pair of pivoted latches mounted on the ends of the bows, and provided with op-

positely-extending teeth or barbs adapted to engage each other and hold the blades in open position, and each having an upwardly-extending lug adapted to engage the end of the jaw-operating lever and hold the same retracted, substantially as set forth.

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

MILTON CAIN.

Witnesses:

BYRON S. CLARK,
L. V. SAMPLE.