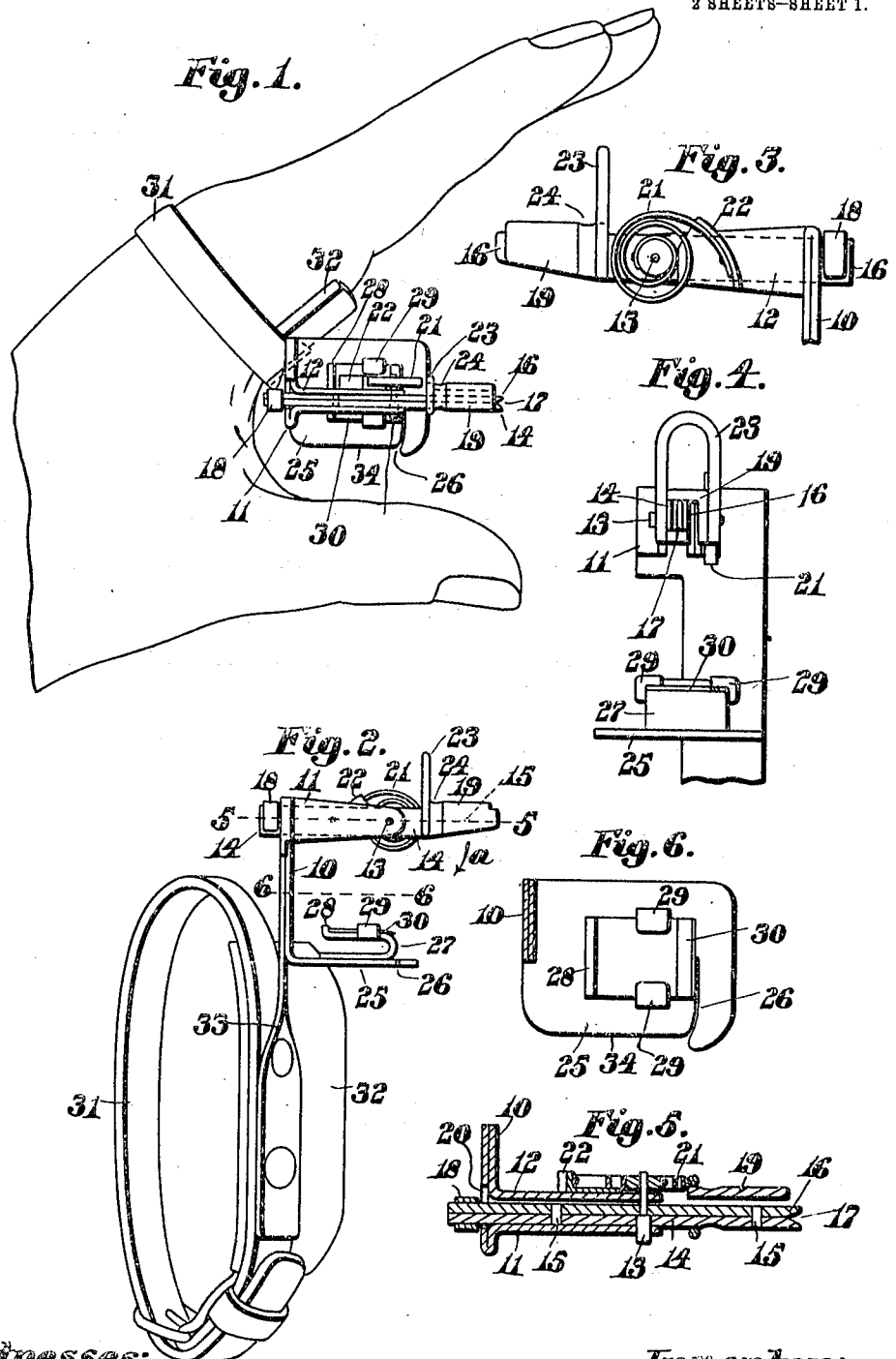


W. RENFREW.
HAND KNOT TIER.
APPLICATION FILED OCT. 6, 1911.

1,041,163.

Patented Oct. 15, 1912.

2 SHEETS—SHEET 1.



Witnesses:

Nathan C. Lombard
Mary C. Smith.

Inventor:

William Renfrew,
by Nathan C. Lombard, Atty.

1,041,163.

Patented Oct. 15, 1911

2 SHEETS-SHEET 2.

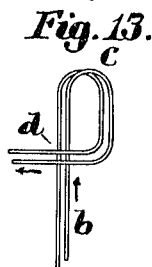
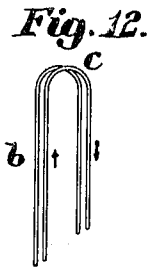
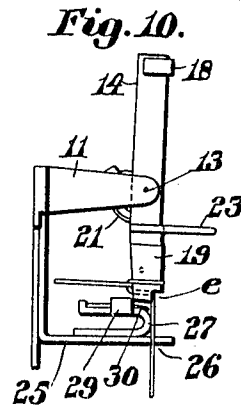
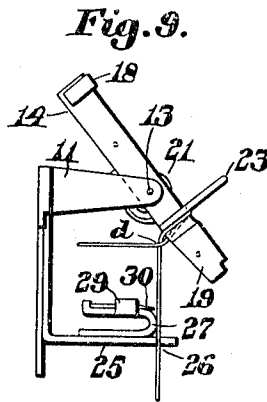
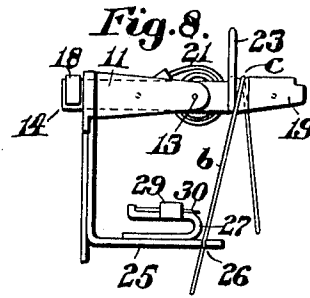
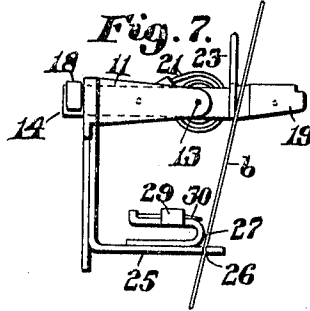
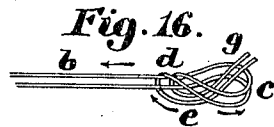
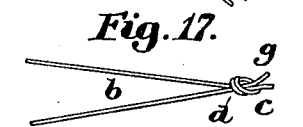
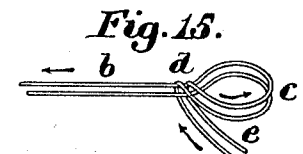
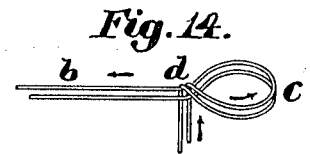
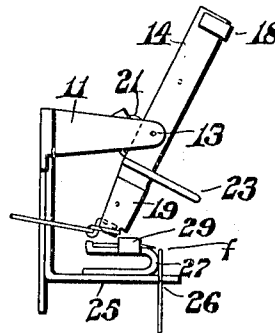


Fig. 11.



Witnesses:
H. C. Lombard
Mary C. Smith.



Inventor:
William Renfrew,
by Walter C. Lombard,
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM RENFREW, OF BROOKLINE, MASSACHUSETTS.

HAND KNOT-TIER.

1,041,163.

Specification of Letters Patent.

Patented Oct. 15, 1912.

Application filed October 6, 1911. Serial No. 653,290.

To all whom it may concern:

Be it known that I, WILLIAM RENFREW, a citizen of the United States of America, and a resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Hand Knot-Tiers, of which the following is a specification.

This invention relates to knot tying devices which are particularly adapted for use in cotton and woolen mills to tie together the severed ends of a thread or yarn.

The object of the present invention is to provide an inexpensive and simple device which may be attached readily to the left hand of the operator in such a position that the severed ends may be grasped between the thumb and fingers of the left hand, and, with a single movement of the right hand, a knot made connecting the severed ends while the portions beyond the knot are subsequently cut off by the continuation of said movement.

The invention consists primarily in a slotted member for positioning the ends of the thread or yarn and a looper around which a loop may be formed in the yarn or thread, said looper being so pivoted that the tension of the thread or yarn, during the formation of the loop, will cause it to be moved about said pivot, and to permit the jaws with which said looper is provided to seize the standing part of the thread or yarn and thereby permit the loop to pass from the end of the looper over said standing part to tie the knot.

The invention further consists in the provision of a knife in the plane of movement of said jaws so that as soon as the knot has been tied the ends extending from said knot will be severed therefrom.

The invention further consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims hereinafter given.

Of the drawings: Figure 1 represents a plan view of a device embodying the features of the present invention showing the same applied to a hand. Fig. 2 represents an elevation of the same. Fig. 3 represents an elevation of the opposite side of the upper part of said device, said figure being drawn to an enlarged scale. Fig. 4 represents an end view of the knot tying device,

drawn to an enlarged scale. Fig. 5 represents a horizontal section of the same, the cutting plane being on line 5—5 of Fig. 2. Fig. 6 represents a horizontal section, the cutting plane being on line 6—6 on Fig. 2. Figs. 7, 8, 9, 10, and 11 represent different positions the looper and threads or yarns assume in the process of tying a knot. Figs. 12, 13, 14, 15, 16, and 17 represent the different stages in the tying of the knot, and Fig. 18 represents the knot as finally tied and connecting the ends of two yarns or threads.

Similar characters designate like parts throughout the several figures of the drawings.

In the drawings, 10 represents a frame having at its upper end the lateral arms 11 and 12, in the outer end of which is mounted the pivot pin 13 adapted to freely oscillate in bearings therein. This pin 13 has driven thereon, so as to oscillate therewith, the jaw member 14. This member 14 has secured therein the steady pins 15 on which is mounted a movable jaw member 16. The outer end of the jaw members 14 and 16 are beveled off to form a notch 17 for the reception of a thread or yarn during the process of tying the knot. The opposite ends of the jaw members 14 and 16 are clamped together by the spring clip 18, the purpose of this spring clip being to normally retain the adjacent faces of the jaw members 14 and 16 in contact, as indicated in Fig. 5 of the drawings. The tension of the spring clip 18 is such as to permit the movement of the jaw 16 away from the member 14 sufficiently to admit a thread or yarn and to hold it during the knot tying operation. The member 15 is provided with an extension 19 bent over the member 16 into its path of movement, thus forming a stop therefor. The jaw member 16 is loosely mounted upon the pivot pin 13, but is compelled to move with said pivot by means of the steady pins secured to the member 14 and extending through openings in the side member 16. The vertical portion of the frame 10 has an opening 20 therein, through which the members 14—16 extend. To the outer end of the pivot pin 13 is secured one end of a spiral spring 21, the opposite end of which is secured to a projection 22 formed upon or secured to the arm 12, the purpose of this spring being to normally retain the members 14—16 in the

position indicated in the drawings, the under wall of the opening 20 serving as a stop therefor. Soldered or otherwise secured to the member 19 is the thread stop 23, and adjacent to this thread stop 23, the stop member 19 is provided with a shallow groove 24 adapted to receive the thread or yarn during the formation of the loop in the knot tying operation. The frame 10 is also provided with a lateral arm 25 in which is formed a thread receiving slot 26, the end of which is in the same plane with the notch 17 of the looper 14—16. Secured to the upper face of this arm 25 in any well-known manner is the knife support 27, having a back stop 28 and side clips 29 adapted to position a cutting knife 30, the cutting edge of which is slightly to the rear of the thread positioning slot 26. The frame 10 is riveted to a band 31 adapted to be secured in any well-known manner to the left hand of the operator as indicated in Fig. 1 of the drawings, the band 31 being provided with an extension 32 which serves the purpose of steadying the device during the knot tying operation. The frame 10 is twisted at 33 so that the device will be at an acute angle to the palm of the hand, thus facilitating its use.

In the operation of the device, whenever a yarn or thread breaks, the two ends *b* thereof are grasped between the thumb and fingers of the left hand, and with the right hand these threads or yarns *b* are placed against the edge 34 of the arm 25 and moved along this edge until they enter the positioning slot 26 as shown in Fig. 7 of the drawings. At the same time with the right hand the threads or yarns are carried over the stop member 19 into the shallow groove 24, as shown in Fig. 8 at *c*, and are prevented from slipping toward the pivot 13 by means of the thread stop 23. The threads or yarn still held in the right hand are carried completely around the member 19 and beneath the same, crossing the part *b* at *d* and are then pulled sufficiently taut to cause the looper or jaws 14—16 to be moved about the axis of the pivot 13 as shown in Fig. 9 until the parts *e* of the threads or yarns extending from the positioning slot 26 to the looper enter between the jaws 14 and 16, as shown in Fig. 10, the tension of these jaws being sufficient to hold the threads or yarns until the said standing part has been severed by the continued movement of the looper in the direction of the arrow *a* on Fig. 2, forcing it against the cutting edge of the knife 30 as indicated in Fig. 10 at *f*. The severed ends *g* will be retained between the jaws 14—16 until by the continued movement of the looper in the direction of the arrow *a* the loop will be drawn from the part 19 as indicated in Fig. 11, thus tying the knot, after which the severed ends *g*

will be removed from the jaws 14—16 by the continued pull upon the threads or yarns.

By referring to Figs. 12 to 18, inclusive, it is believed that the process of tying the knots will be readily understood. As shown in Fig. 12 the yarns *b* are held while the bend *c* is made by passing them over the looper 19 after which the yarns are passed over the standing part *b* as at *d* in Fig. 13. As the looper 19 moves about its pivot into the position indicated in Fig. 9, the yarns will assume practically the position shown in Fig. 14. A further movement of the looper will permit the parts *e* to enter between the jaws 14—16 of the looper and the yarn will be in the position shown in Fig. 15, and at about this time the parts *e* will be severed from the parts of the yarns held by the left hand. Continued movement of the looper 19 while the ends *g* are still in the jaws 14—16 will cause the loop to pass from the looper 19 leaving the yarns in the position shown in Fig. 16. By pulling on the yarns with the ends *g* still seized by the jaws 14—16, the knot will be pulled tight leaving it in the condition shown in Fig. 17. If now the yarns are brought into alinement as shown in Fig. 18 it will be apparent that the two yarns are tied together.

It is apparent that the device may be adapted for use on either hand without altering the principles of the invention.

The spring 21, as soon as one knot has been tied, immediately returns the looper into its normal position preparatory for another operation.

This makes a very simple knot-tying device, which may be cheaply constructed, and which may be operated very rapidly, one quick movement of the right hand tying the knot and severing the ends beyond the knot always at the same distance therefrom, so that uniformity in appearance of the tied yarns or threads is the result.

When not in operation, the device does not interfere with the use of the hands for any other work which the operator is obliged to perform, and yet is ready at any moment for use when it is necessary to connect the severed threads.

It is believed that the many advantages of a device of this character will be fully apparent without any further description.

Having thus described my invention, I claim:

1. In a device of the class described, the combination of a member for positioning the threads to be tied; a pivot member; and a pair of spring jaws with their side faces normally in contact adapted to be encircled by a loop of said threads and movable about the axis of said pivot member into position to seize the positioned threads while the loop is passed over the same.

2. In a device of the class described, the combination of a member for positioning the threads to be tied; a pivot member; a pair of spring jaws with their side faces normally in contact adapted to be encircled by a loop of said threads and to be moved about the axis of said pivot member into position to seize the positioned threads while the loop is passed over the same; and a knife in the plane of movement of said pivoted jaws adapted to sever the threads when the positioned threads have been seized by said spring jaws.

3. In a device of the class described, the combination of a slotted member for positioning the threads to be tied; a pivot member; and a pair of spring jaws with their side faces normally in contact adapted to be encircled by a loop of said threads and to be moved about the axis of said pivot member to seize the positioned threads while the loop is passed over the same.

4. In a device of the class described, the combination of a pivoted member provided with gripping jaws at its outer end; a fixed thread holder; and a knife thereon interposed between said holder and the pivot of said jaws and in the plane of movement of said pivoted member.

5. In a device of the class described, the combination of a frame adapted to be secured to the hand of the operator; a pair of spring jaws pivoted thereto; a thread stop thereon; an arm beneath said pivoted jaws provided with a thread receiving slot; and a knife thereon in the plane of movement of said jaws adapted to cut off the parts of the thread in said jaws from the parts thereof in said slot.

6. In a device of the class described, the combination of a frame adapted to be secured to the hand of the operator; a pair of spring jaws pivoted thereto; a thread stop thereon; an arm beneath said pivoted jaws provided with a thread receiving slot; a knife thereon in the plane of movement of said jaws adapted to cut off the parts of the thread in said jaws from the parts thereof in said slot; and a spring for returning said jaws to their normal position.

7. In a device of the class described, the combination of a frame adapted to be secured to the hand of the operator and provided with two parallel lateral arms; a pair of spring jaws pivoted to one of said arms; a stop member secured to one of said jaws and extending over the other; a spring for returning said jaws to their normal position; and a cutting device adapted to sever the thread seized by said jaws from the standing part thereof.

8. In a device of the class described, the combination of a frame; a member pivoted thereto; a companion member normally in contact and movable laterally from said

pivoted member and with it about its pivot; means for returning said members to their normal position after movement about said pivot; and a thread or yarn holder in the plane of movement of said members about the axis of said pivot.

9. In a device of the class described, the combination of a frame; a member pivoted thereto; a companion member normally in contact and movable laterally from said pivoted member and with it about its pivot; a member extending from said pivoted member over the companion member and adapted to limit the lateral movement of the latter; means for returning said members to their normal position after movement about said pivot; and a thread or yarn holder in the plane of movement of said members about the axis of said pivot.

10. In a device of the class described, the combination of a frame; a member pivoted thereto; a companion member normally in contact and movable laterally from said pivoted member and with it about its pivot; a thread stop extending over said members; means for returning said members to their normal position after movement about said pivot; and a thread or yarn holder in the plane of movement of said members about the axis of said pivot.

11. In a device of the class described, the combination of a frame; a member pivoted thereto and provided with steady pins; a companion member on said steady pins and movable lengthwise thereof; a spring for normally retaining said members in contact; a thread stop secured to one of said members and extending over the other; a thread holder in the plane of movement of said pivoted member; and means for returning said pivoted member to its normal position.

12. In a device of the class described, the combination of a frame; a member pivoted thereto and provided with steady pins; a companion member on said steady pins and movable lengthwise thereof; a spring for normally retaining said members in contact; a thread stop secured to one of said members and extending over the other; a thread holder in the plane of movement of said pivoted member; a cutting blade mounted thereon also in said plane of movement; and means for returning said pivoted member to its normal position.

13. In a device of the class described, the combination of a frame having two substantially parallel arms; a knife secured to one of said arms; means for positioning the threads in front of the cutting edge thereof; and spring thread seizing jaws pivoted to the other arm and movable in the same plane as said knife.

14. In a device of the class described, the combination of a frame having two substantially parallel arms; a knife secured to

one of said arms; means for positioning the threads in front of the cutting edge thereof; spring thread seizing jaws pivoted to the other arm and movable in the same plane as said knife; and means for returning said jaws to their normal position.

15. In a device of the class described, the combination of a frame having two substantially parallel arms; a knife secured to one of said arms with its cutting edge transversely thereof; means for positioning the threads in front of the cutting edge thereof; and spring thread seizing jaws pivoted to the other arm and movable in the same plane as said knife.

16. In a device of the class described, the combination of a frame having two substantially parallel arms; a knife secured to one of said arms; means for positioning the threads in front of the cutting edge thereof; spring thread seizing jaws pivoted to the other arm and movable in the same plane as said knife; and means for limiting the separation of said jaws.

17. In a device of the class described, the combination of a frame having two substantially parallel arms; a knife secured to one of said arms; means for positioning the threads in front of the cutting edge thereof; means for preventing the accidental severing of said positioned threads by said knife; and spring thread seizing jaws pivoted to the other arm and movable in the same plane as said knife.

18. In a device of the class described, the combination of a frame; a pair of spring jaws pivoted thereto; an arm beneath and in the plane of movement of said pivoted jaws provided with a thread positioning means; and a knife thereon in the plane of movement of said jaws adapted to cut off the parts of the thread in said jaws from the parts held by said positioning means.

19. In a device of the class described, the combination of a frame; a pair of spring jaws pivoted thereto; a thread stop thereon; an arm beneath and in the plane of movement of said pivoted jaws provided with a thread positioning means; a knife thereon in the plane of movement of said jaws adapted to cut off the parts of the thread in said jaws from the parts held by said positioning means.

20. In a device of the class described, the combination of a frame; a pair of spring jaws pivoted thereto; an arm beneath and in the plane of movement of said pivoted jaws provided with a thread receiving slot; a knife thereon in the plane of movement of said jaws adapted to cut off the parts of the thread in said jaws from the parts in said slot.

Signed by me at 4 Post Office Sq., Boston, Mass., this 3rd day of October, 1911.

WILLIAM RENFREW.

Witnesses:

WALTER E. LOMBARD,
NATHAN C. LOMBARD.