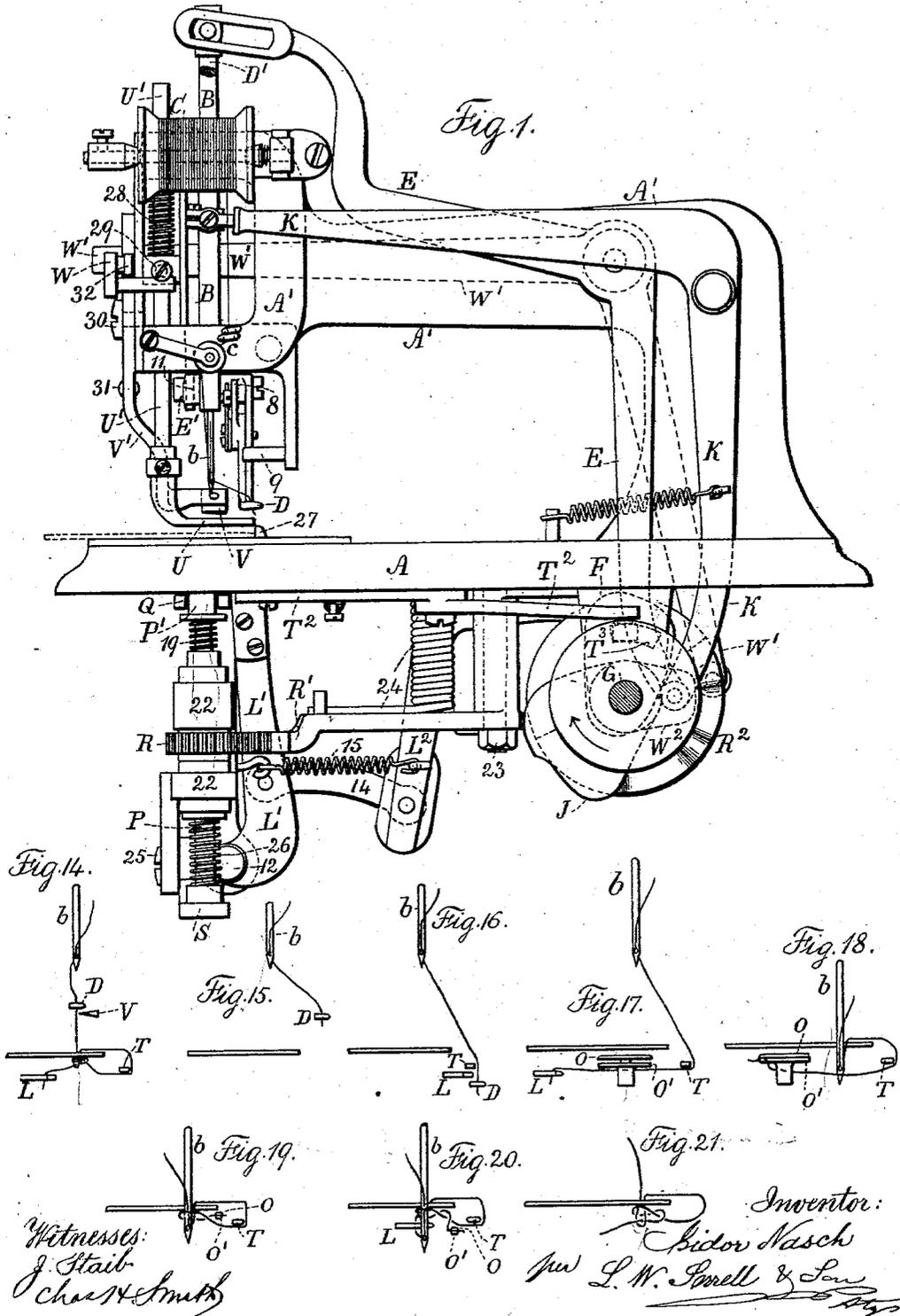


I. NASCH.
THREAD STITCHING AND TYING MACHINE.

(Application filed July 13, 1898.)

(No Model.)

4 Sheets—Sheet 1.



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4 Sheets—Sheet 3.

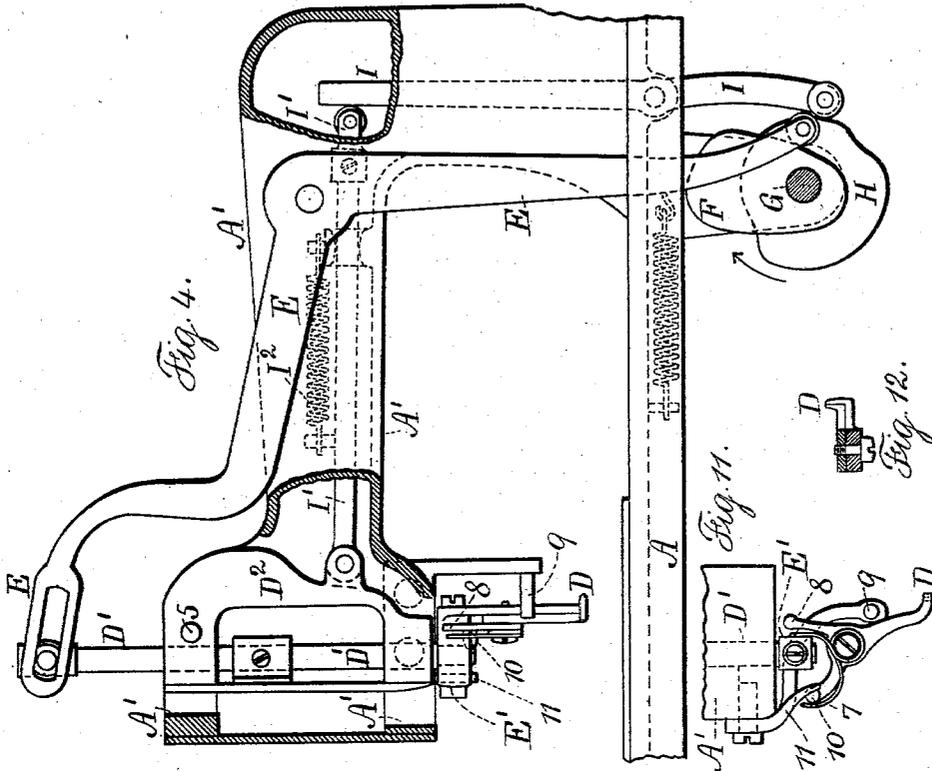
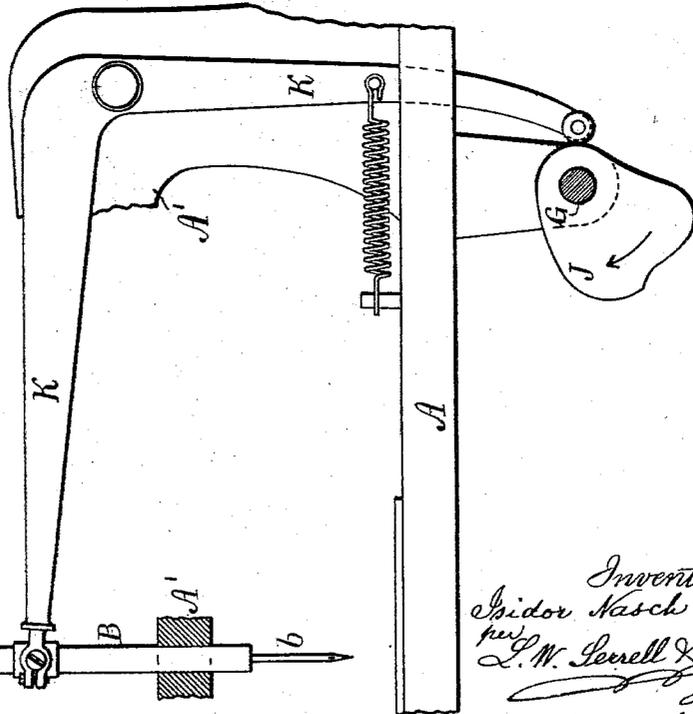


Fig. 3.



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UNITED STATES PATENT OFFICE.

ISIDOR NASCH, OF LONDON, ENGLAND, ASSIGNOR TO THE SMYTH MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT.

THREAD STITCHING AND TYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 634,698, dated October 10, 1899.

Application filed July 13, 1898. Serial No. 685,812. (No model.)

To all whom it may concern:

Be it known that I, ISIDOR NASCH, a subject of the Queen of Great Britain, residing at London, England, have invented an Improvement in Machines for Threading, Looping, and Tying Flexible Materials, of which the following is a specification.

The object of the present invention is to pass a thread through a card, sheet or sheets of paper, or similar article and bring the parts of the thread together and tie a knot, so that the loop of thread thus formed can be used for hanging up the card or for connecting sheets of paper together, or for any other useful or ornamental purposes; and it is to be understood that the expression herein used of "cord" or "thread" applies to a ribbon or string or similar flexible materials and that the present invention is available for tying a loose loop by which a calendar, card, or other article may be hung up, or for tying a loop that passes comparatively tight around the fold of a signature at either the top or bottom, or both, for connecting a number of sheets together, such as in a weekly periodical, the act of tying being the same in both instances; but in one case the thread is drawn up closely, while in the other instance it is spread by a thumb, so as to be loose around the edge of the article.

In carrying out this invention I make use of a bed upon which the article to be strung is laid, and a reciprocating eye-pointed needle is made use of with the thread, cord, or string passing through the eye, and the operations performed are in the following order: A pair of fingers grasps the thread near the end and beyond the eye of the needle. These fingers carry the end of the thread down through an opening in the bed of the machine. A second set of fingers below the bed grasps the thread and takes it from between the first fingers and carries it along nearly horizontal. A third pair of fingers that oscillate passes around and grasps the thread and takes it from the second fingers and carries the thread around the eye-pointed needle, that at this time has passed through the paper or other material. The eye-pointed needle rises slightly to form a loop of its thread and the second pair of fingers upon a return movement passes through

this loop at the needle and grasps the thread from the oscillating fingers and draw the same back through the loop of thread at the needle, and the needle rising tightens the knot thus tied and a knife cuts off the thread simultaneously with the grasping of the thread by the first pair of fingers, which at this time has returned above the bed and is in position to receive the thread as it passes from the eye-pointed needle to the knife that effects the separation of such thread. The article thus tied by a loop of string or thread is removed, another one placed in position, and the operations are repeated.

Where the loop is left loose around the edge of the card or other material, a thumb beneath the bed is projected across the slot in the bed, so that the loop is tied around this thumb as it is drawn up, and then the thumb is withdrawn to allow the loop to escape through the slot in the bed.

In the drawings, Figure 1 is a side view of the machine. Fig. 2 is an inverted plan. Fig. 3 is a diagram representing the mechanism that reciprocates the eye-pointed needle. Fig. 4 is a diagram representing the mechanism that actuates the first pair of fingers. Fig. 5 is a diagrammatic side view, and Fig. 6 an end view of the mechanism that reciprocate the second pair of fingers that reciprocate beneath the bed. Fig. 7 is a diagrammatic side view of the mechanism that actuates the third or oscillating pair of fingers and a section of the bearing for the shaft carrying the same. Fig. 8 is a diagrammatic view of the mechanism for actuating the thumb. Fig. 9 is an elevation of the mechanism for the third pair of fingers at right angles to Fig. 7. Fig. 10 shows the end of the arm, knife, and presser-foot. Fig. 11 shows part of the end of the arm and the first pair of fingers, the presser-foot being removed. Fig. 12 is a section at the pivot of the first pair of fingers. Fig. 13 is a detached plan of the second pair of fingers. Figs. 14 to 21 are diagrams representing the formation of the loop; and Fig. 22 is a plan of the third fingers, the position of the slot in the bed being indicated by dotted lines.

The bed A is of ordinary character, and the hollow arm A' is adapted to receive the de-

vices hereinafter described, and the needle-bar B slides in bearings at the end of the arm A', and the eye-pointed needle *b* is at the end of the needle-bar B, and the thread or similar fibrous material is supplied from the spool C and passes through a suitable tension device *c* and through the eye of the needle *b*.

The first pair of fingers D is mounted upon a finger-bar D', that slides through a rocking head D², that is pivoted at 5 near the end of the hollow arm A'. This first pair of fingers D has to be opened and closed at the proper times, and after the thread has been grasped by this pair of fingers said fingers pass down through a mortise 6 in the bed A, and the fingers are opened at the proper time to drop the thread after the second pair of fingers has grasped the same, and the first pair of fingers rises through the bed and returns to its first position, and these movements are to be given by any desired mechanism. I have, however, represented means for rocking the head D² and also for raising and lowering the finger-bar and for opening and closing the fingers.

The lever E is slotted at its upper end and acts upon a stud or roller upon the finger-bar D' to raise and lower the same at the proper time and carry with it the first pair of fingers, and there is a head E' upon the lower end of the finger-bar D', upon which the fingers D are carried, and the cam F upon the driving-shaft G gives motion to the lever E at the proper time for raising and lowering the fingers. The moving finger is closed by the spring 7, and it has a projection 8 that comes in contact with a stationary arm 9 to open the finger at the proper time when the fingers have carried the thread below the bed, and it has another projection 10 to come in contact with a stationary arm 11 to open the fingers as they go forward to grasp the thread close to the eye-pointed needle and just before the thread is cut.

There is a cam H on the driving-shaft G, acting upon a lever I, and there is a rod I', extending longitudinally through the hollow arm A' to the rocking head D², and the spring I² keeps the lever against the cam and moves the rocking head in one direction. The movements of these parts are as follows: The arm 11, acting on the projection 10, opens the moving finger when the first pair of fingers is in the elevated position above the bed, and the cam H acts on the lever I and swings the head D², carrying the fingers D open against the thread as it passes from the eye-pointed needle, and the projection 10 slips off the arm 11 and allows the spring 7 to close the fingers and grasp the thread, and a continuance of the movement of the rocking head brings the fingers over the mortise 6, and the cam F now acts upon the lever E and carries the finger-bar D' and fingers D down through the mortise 6, and the second pair of fingers, hereafter described, grasps the thread in the first pair of fingers D just before the projection 8 comes in contact with the stationary arm 9

and opens the fingers D to drop the thread, and these fingers D now return to their first position. The cam J, acting upon the lever K, carries the needle-bar B downward and perforates the paper or other material with the eye-pointed needle *b*. Thereby the thread is carried double by the needle through the card, paper, or other material, and such cam J causes the needle-bar to rise slightly to throw out the loop of thread, and then holds the needle in its depressed position during the operations hereinafter described in tying the knot, and then the needle rises to the normal position. The second pair of fingers L is carried by a lever L', pivoted at 12, and the position of this pivot is such that in the swinging of the lever the second pair of fingers L is moved longitudinally of the machine and parallel, or nearly so, with a slot that extends from the mortise 6 to the hole through which the eye-pointed needle descends. Any suitable mechanism may be made use of for moving the second pair of fingers and for opening and closing the same at the proper time. I have represented a bent lever L², pivoted at 13 and having a connecting-rod 14 to the lever L', and the cam M upon the driving-shaft G acts upon the bent lever L² to give to the parts the proper motions at the proper times. The spring 15 acts to press the bent lever L² toward the cam and to move the second pair of fingers in one direction.

One finger of the pair of fingers L is pivoted at 16 and has a tail 17, by which the finger is opened or closed, and this tail is acted upon by a lever N, pivoted upon the lever L', and the lever N' and cam N² on the shaft G serve to act upon the tail 17 at the proper time to open the second pair of fingers, there being a spring 18 to close the fingers when not otherwise acted upon.

It will be seen that the points of the fingers L are toward the shaft G, and the shapes of the cams are such that when the first pair of fingers D has carried the thread down through the mortise 6 the second pair of fingers L passes along and grasps the thread slightly above the fingers D and between the same and the bed A, and at this moment the fingers D open and the fingers L close and the thread is drawn along nearly horizontally into the fingers, assuming the position represented in Fig. 2, ready for the third or oscillating pair of fingers to take the same, as hereinafter described, the second pair of fingers opening and remaining in position to pass through the loop of thread at the needle and catch the end of the thread from the oscillating fingers and draw the same through the loop in tying the knot, as before intimated.

The third set of fingers which oscillate are made as segments of circles, as shown at O O'. The shank of the finger O is connected with the shaft P, and the finger O' is connected to the sleeve P', around the shaft P, and the spring 19 tends to close the fingers, and the lever Q, with a fork acting upon the sleeve

P', tends to open the fingers, and this lever Q is pivoted at 20 and actuated at the proper time by the lever Q' and cam Q² on the shaft G.

There is a slot in the sleeve P' and a pin 21 therein to allow the fingers to open, but to hold them in the proper relative positions, and the shaft P is supported in a suitable bearing 22, in which it can revolve and also be moved longitudinally, and the pinion R is held between the parts of the bearing 22 and has a feather by which the shaft P is rotated, and this pinion R is acted upon by a segmental rack R', so as to partially revolve the pinion, the shaft, and the fingers, and this segmental rack R' is upon a lever pivoted at 23 and having an arm against which the cam R² acts, there being a spring 24 that turns the segmental rack, pinion, and fingers in one direction, the cam R² turning the parts in the other direction.

An end motion vertically is given to the shaft P by a lever S, pivoted at 25, there being a spring 26 acting against a collar to move the shaft P downward, and the lever S raises the shaft at the proper time against the action of the spring, and a lever S' and cam S² act upon the lever S to give the required motions at the proper time.

The motions given to the oscillating fingers O O' by the before-named parts are as follows: As the second pair of fingers L draws the thread along below the bed the fingers O O' are moved up toward the under side of the bed and swung around so as to be above the thread, and then the fingers O O' are moved downward away from the under side of the bed and opened and at the same time they are turned so that the thread passes in between the ends of these fingers O O' and the fingers close, grasping the thread between them. Then these fingers O O' carry the thread across the path of the eye-pointed needle, holding the thread while the eye-pointed needle descends, and then the fingers O O' oscillate backward and carry the thread around the eye-pointed needle and hold the same while the eye-pointed needle rises slightly to throw out a loop of thread adjacent to the needle, and the second pair of fingers L passes through the loop, and they open and then close, grasping the thread as it is held by the fingers O O', and these fingers O O' now open and release the thread, leaving such thread in the grasp of the second pair of fingers L, that now move backward and draw the thread through the loop adjacent to the eye-pointed needle, and such eye-pointed needle draws up, shedding off the loop that had been wrapped around it by the oscillating fingers and causing the knot to be tied by the drawing up of the eye-pointed needle.

It will be apparent that if only the devices thus far described were employed the thread would draw against the edge of the card or other article lying upon the bed A and that the knot would be tied with the thread comparatively tight as the eye-pointed needle

draws up through the card or other material, the second pair of fingers L holding on to the end of the thread as the knot is tightened by the drawing up of such eye-pointed needle, and in this manner the loop of thread tied might be employed for joining sheets together, or it might be employed at the top or bottom or at first one and then the other of a folded signature for connecting the sheets together; but where the loop is to be slack, so that it may be used for hanging up a card, calendar, or other article, a thumb T is made use of, the same being upon a block T' and moved by a lever T², spring, and cam T³, so that the thumb is passed across the slot through the bed previous to the thread being carried down through the mortise 6 by the first pair of fingers D. Hence the thread is around this thumb at the time the knot is tied, after which the cam T³ causes the withdrawal of the thumb, so that the loop of thread in a loose condition is free to draw up through the slot in the bed when the card or other article is removed from the surface of the bed.

It is advantageous to employ a stop 27, against which the card or other article is laid upon the bed A, so as to determine the position of such card or other article in relation to the eye-pointed needle for such needle to pass through at the proper place, and a presser-foot U is made use of upon a bar U', that is pressed down by a spring 28, and there is a knob 29 or projection by which the presser-foot can be lifted for inserting or removing the card or other article through which the cord or string is passed and tied, as aforesaid, and it is necessary to cut the cord or string after the knot has been fully tied, and with this object in view a knife V is provided upon a bar V', that is pivoted at 30 upon the end of the arm A', and the spring 31 moves the knife and bar in one direction, and there is a lever W, having a roller or stud 32, that acts against the bar V' to move the same, and this lever W receives its motion from a lever W' and cam W², and the bar V' is notched near where the stud 32 acts upon the same, so that the spring 31 can draw the knife back out of the way while the eye-pointed needle rises and the first pair of fingers D passes along and grasps the thread that descends from the eye-pointed needle to the card or other article that has been perforated, and as these fingers D draw back with the thread, pulling the same through the eye of the needle, the bar V' and knife pass forward and in contact with the thread, so as to cut the same between the fingers D and the bed, and as this operation is performed the lever W acts upon the projection 29 of the bar U', lifting the presser-foot U, so as to relieve the card from its holding action and allow the card or other article to be lifted off and another one replaced, so that the foregoing operations will be repeated.

I claim as my invention—

1. In a machine for threading, looping and

tying flexible materials, the combination with the eye-pointed needle carrying the thread, cord, or other material, of a pair of fingers acting above the bed, and means for moving the same to grasp the end of the thread and carry the same down through an opening in the bed, a second pair of fingers and means for reciprocating the same and grasping the thread from the first pair of fingers and carrying the same along below the bed, a third pair of fingers and means for oscillating the same for taking the thread from the second pair of fingers and carrying the same around the eye-pointed needle and means for acting upon the second pair of fingers to move them through a loop of thread at the eye-pointed needle and grasp the thread from the oscillating fingers and draw the same through the loop in tying a knot, substantially as set forth.

2. In a machine for threading, looping and tying flexible materials, the combination with the eye-pointed needle carrying the thread, cord, or other material, of a pair of fingers acting above the bed, and means for moving the same to grasp the end of the thread and carry the same down through an opening in the bed, a second pair of fingers and means for reciprocating the same and grasping the thread from the first pair of fingers and carrying the same along below the bed, a third pair of fingers and means for oscillating the same for taking the thread from the second pair of fingers and carrying the same around the eye-pointed needle and means for acting upon the second pair of fingers to move them through a loop of thread at the eye-pointed needle and grasp the thread from the oscillating fingers and draw the same through the loop in tying a knot, a knife and means for moving the same above the bed for separating the thread between the article sewed and the first pair of fingers, substantially as set forth.

3. In a machine for threading, looping and tying flexible materials, the combination with the eye-pointed needle carrying the thread, cord, or other material, of a pair of fingers acting above the bed, and means for moving the same to grasp the end of the thread and carry the same down through an opening in the bed, a second pair of fingers and means for reciprocating the same and grasping the thread from the first pair of fingers and carrying the same along below the bed, a third pair of fingers and means for oscillating the same for taking the thread from the second pair of fingers and carrying the same around the eye-pointed needle and means for acting upon the second pair of fingers to move them through a loop of thread at the eye-pointed needle and grasp the thread from the oscillating fingers and draw the same through the loop in tying a knot, a thumb below the bed and means for moving the same across the slot in the bed, so that the thread is distended by the thumb to form a loose loop after the

knots have been tied, substantially as set forth.

4. The combination in a machine for threading, looping and tying flexible materials, of an eye-pointed needle to carry a loop of thread down through a card or other article, a supporting-bed having a mortise through it and a slot from the mortise to the opening for the eye-pointed needle, a pair of fingers acting above the bed to grasp the thread that has passed through the eye of the needle and near the end of such thread, a finger-bar, a rocking head and means for opening and closing the fingers and means for rocking the head and for moving the finger-bar to carry the fingers through the mortise in the bed and means below the bed for engaging and acting upon the thread and for tying the knot, substantially as set forth.

5. The combination in a machine for threading, looping and tying flexible materials, with the bed, of an eye-pointed needle for carrying a loop of thread through the card or other article, and means for carrying the thread around the edge of the card or other article, of a pair of fingers acting below the bed for drawing the end of the thread along substantially horizontally, means for opening and closing the said fingers and for carrying them through a loop at the eye-pointed needle, and mechanism for carrying the thread around the needle and for presenting the end thereof to the fingers after they have passed through the loop at the needle, substantially as set forth.

6. In a machine for threading, looping and tying flexible materials, a pair of oscillating fingers, a shaft to which one of the fingers is connected, a sleeve to which the other finger is connected, a pinion, segmental rack, lever and cam for giving to the shaft, sleeve and fingers a partial revolution first in one direction and then in the other, a spring for closing the fingers, a lever for opening the fingers, a lever and cam for moving the shaft endwise through its bearings and raising and lowering the fingers, substantially as set forth.

7. In a machine for threading, looping and tying flexible materials, the combination with the finger-bar D' and means for moving the same, of the fingers D one of which is pivoted, a spring for closing the fingers, an arm and projection for opening the fingers when below the bed, an arm and projection for opening the fingers for grasping the thread near the eye-pointed needle, the arm sliding off the projection as the fingers are moved so as to allow the spring to close the fingers and means for engaging and acting upon the thread and tying the knot, substantially as set forth.

Signed by me this 25th day of April, 1898.

ISIDOR NASCH.

Witnesses:

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