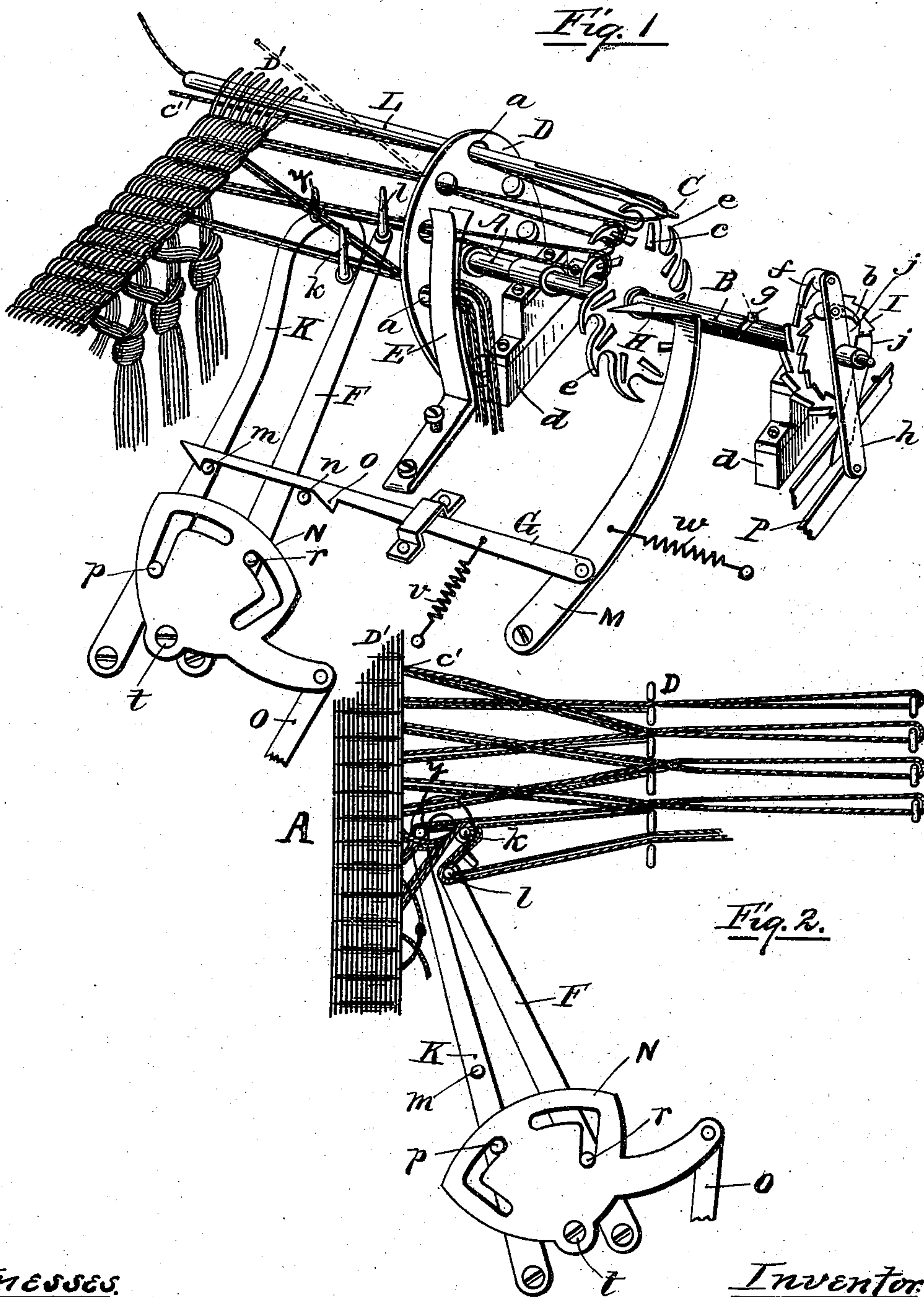


B. ARNOLD.

MACHINE FOR MAKING AND KNOTTING FRINGES.

No. 504,315.

Patented Sept. 5, 1893.



Witnesses:

Charles Hannigan.
E. B. Read

Inventor:

Benz Arnold

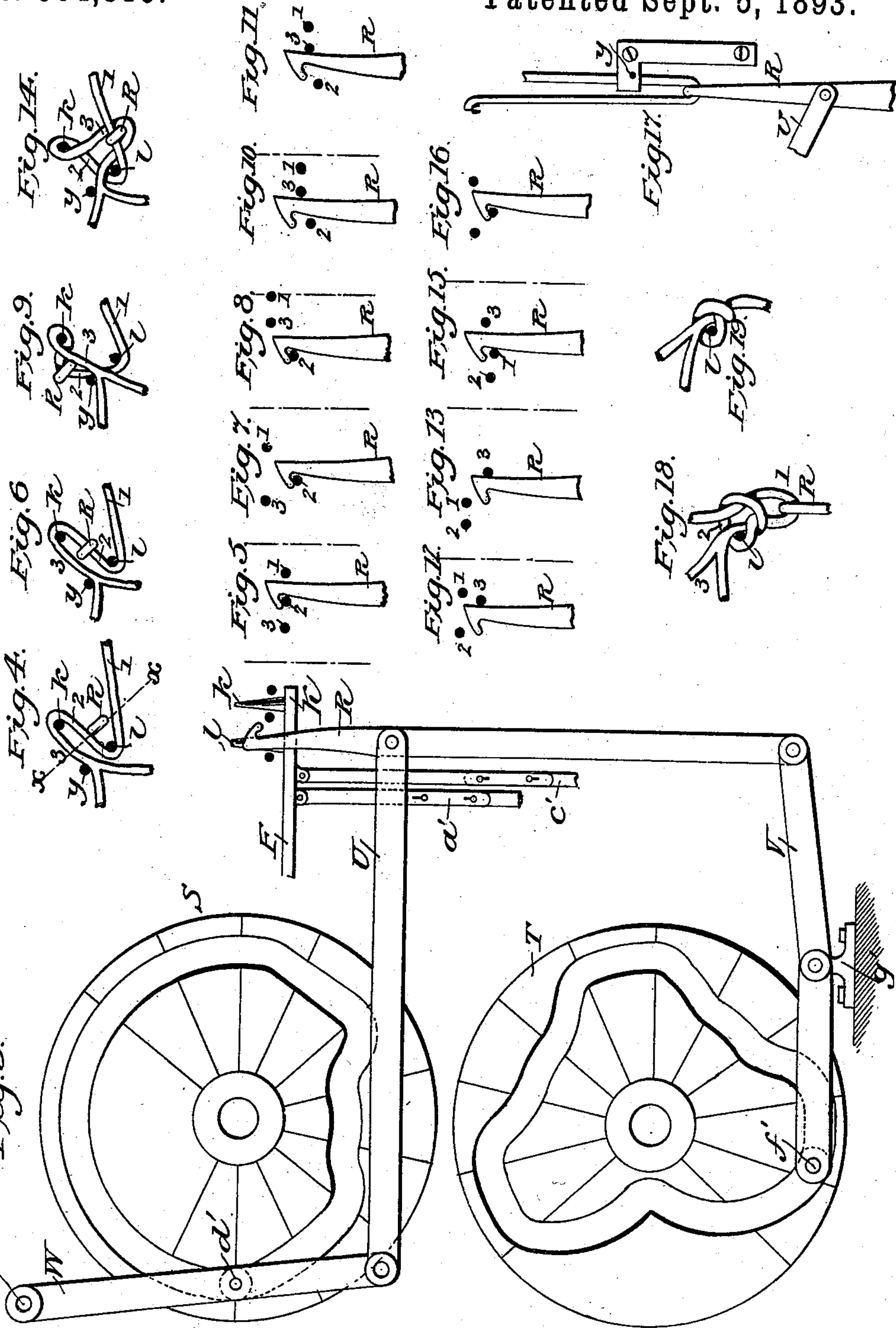
(No Model.)

3 Sheets—Sheet 2.

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Inventor.

E. B. Read
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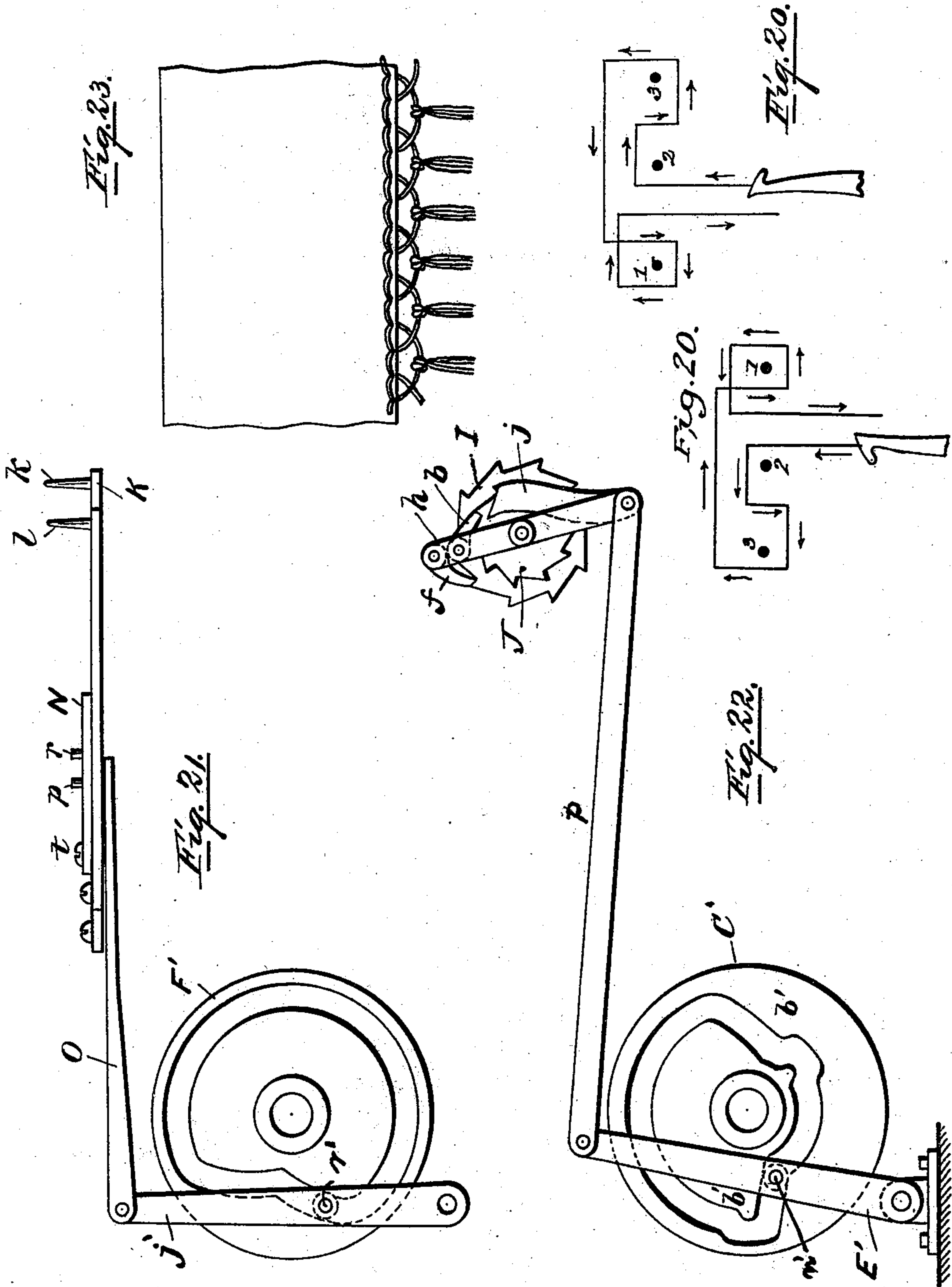
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Berny Arnold

UNITED STATES PATENT OFFICE.

BENJAMIN ARNOLD, OF EAST GREENWICH, RHODE ISLAND, ASSIGNOR
TO THE MERIDEN CURTAIN FIXTURE COMPANY, OF MERIDEN, CON-
NECTICUT.

MACHINE FOR MAKING AND KNOTTING FRINGES.

SPECIFICATION forming part of Letters Patent No. 504,315, dated September 5, 1893.

Application filed December 6, 1892. Serial No. 454,210. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN ARNOLD, of East Greenwich, in the county of Kent and State of Rhode Island, have invented certain
5 new and useful Improvements in Machines for Making and Knotting Fringes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being
10 had to the accompanying drawings, and to the letters and numerals of reference marked thereon, which form a part of this specification.

This invention relates to the class of mechanism for arranging the threads that form the
15 "skirt" of a fringe, and tying them in knots, in the process of making the fringe. It is illustrated in the accompanying drawings.

Figure 1, is a perspective view of the principal devices, or those parts used directly in
20 connection with the threads in the process of arranging them and tying the knots. Fig. 2, is a top view of some of the parts seen in Fig. 1. Fig. 3, represents two cams and their levers, that operate the hook that draws up the
25 knots. Figs. 4 to 20 show the different positions taken by the devices and threads in making the knots. Fig. 21, represents the cam and its connection with the two levers in Figs. 1 and 2, that loop the threads into a
30 knot. Fig. 22, shows the cam that moves the main shaft intermittently, by means of a ratchet wheel and pawl. Fig. 23, illustrates the construction of a fringe on the edge of a piece of cloth.

35 The following description of the mechanism and its operation, will enable others skilled in the art, to construct and use it. It is described as it operates in connection with a fringe in the process of being woven. A
40 horizontal shaft A, is held in bearings *d, d*, secured to the top of the machine and a circular plate D, having a series of openings *a*, made through it near its periphery is made fast on the inner end of the shaft. A sleeve
45 B, is fitted to turn easily on the shaft A, and extends from the plate C, to near the outer end of the shaft. The sleeve B, has a circular plate C, secured on its inner end and two smaller plates I, J, having ratchet teeth made
50 in their peripheries are made fast on the outer

end of the sleeve B. The plate C, has a series of openings made through it corresponding in number and position with the openings *a*, in plate D, and they are cut out through the
edge of the plate to form hooks *e*, and curved 55 to point forward. A series of radial openings *c*, is made in the plate C, one for each hook, starting midway from the sleeve B, and extending well up into the body of the
hook *c*. The sleeve B, turns the shaft A, by 60 means of a pin *g*, which passes through a slot in the sleeve B, and is made fast in the shaft A. The sleeve B, is driven by a lever
h, swinging on the shaft A, outside of the two ratchet plates I, J, by means of two pawls *f*, 65 *b*, which catch into the teeth of the plates one on each side of the lever as the teeth of the two plates face in opposite directions. A relief plate *j*, is made fast to the top plate
of the machine and extends up far enough in 70 front of plate J, to raise the pawl *b*, out of the notch in that plate when it has moved it over to the right one notch, and allows the plates to stop while the lever *h*, carries the
pawl *f*, over far enough to catch another tooth 75 in the plate I. A thread detaining device E, composed of two springs having their upper portions bent to form a part of a circle to agree with the centers of the openings *a*, in
plate D, is held by two screws in the top of 80 the machine just outside of the plate D, to receive the threads in the openings in the plate as it revolves, and detain the same in plate D, after having been cut by the knife H, with
a slight friction sufficient to keep them in 85 place on the other side of the plate while the knot is being tied in them. The feet of the two springs E are made at different angles so that by screwing down on the inner screw
the two springs will be pressed together and 90 the friction on the threads between them increased. The cutting of the threads in the hooks is done at the proper time by a knife
H, held on a swinging arm M, the sharp bevel end of the knife being thrust through the 95 slot *c*, that may be opposite to it, and severing the bight of the loop of the thread where it crosses the slot. This motion is given to the
knife H, by a connecting bar G, which has a hook at its left end that is caught by a pin 100

m, in the arm *K*, as that arm moves to the left with arm *F*, to fold the threads; after drawing the bar *G* far enough to accomplish the cutting of the threads a projection *o*, on bar *G*, strikes against a pin *n*, fast in the plate below and is thrown off of the pin *m*, leaving the arm *M*, with knife *H*, free to be drawn back by the spring *W*, and the plates free to turn.

10 In Figs. 1 and 2 is shown the method of tying the threads of the skirt of a fringe while it is being woven and the way in which the first and fourth picks of thread are selected and brought together to be tied in one knot.

15 The needle *L*, that puts the filling *c'*, in the warp thread *D'*, between the beats of the lay, passes through one of the openings *a*, in the plate *D*, and deposits its loop of thread on a hook *e*, of plate *C*, and each opening *a*, has two picks or passages of the needle *L*, pass through it in the following order: The needle passes through the warp and plate *D*, and leaves its loop on one hook *e*, and draws back. Then the plates *D*, and *C*, are moved back the space of one opening *a*, and the needle passes through the next opening and leaves its loop on a hook *e*, opposite to it and draws back. Then the plates *D* and *C*, move forward two openings and the needle passes through the opening that is brought up and leaves its loop on a hook. Then the plates turn back again one opening which brings up the opening through which the first above described passings of the needle was made, which brings the threads of the first and fourth passages in the same opening *a*, and on same hook *e*. In this way the thread of each pick is associated with the third one from it. The forward and back motions of the plates *D* and *C*, are given to them by means of the ratchet plates *I*, *J*, as shown in Fig. 22. The cam *C'*, moves the arm *h*, by the lever *E'*, carrying a roll *n'*, that runs in a groove in the cam *C'*, and moves the bar *P*, forward at one pick of the needle and back at the next as the cam makes one revolution for every two picks of the needle. The pawl *b*, on lever *h*, moves the plate *J*, back the space of one tooth and then is raised out of its notch by the plate *j*, while the upper end of the lever continues to move over so as to catch the pawl *f*, in another tooth of the plate *I*. After the next passage of the needle the top of lever *h*, moves over toward the front the space of two of the teeth in plate *I*, which represents two of the openings *a*, in plate *D*. A short motion is allowed to the plate *C*, independent of the plate *D*, by the slot in the sleeve *B*, in which plays the pin, *g*, in the shaft *A*, to allow the hooks *e*, to move forward a little way and catch into the thread in the needle *L*, while it is in one of the openings *a*, in plate *D*, without moving that plate. This short motion is given by the projections *b'*, on cam *E'* at the end of each long motion. The proper amount of friction required to prevent the plates *D*, and *C*, from moving except as they are turned by the ratchet plates *I*, *J*, is applied in the boxes *d*, *d*, one being on shaft *A*, and the other on sleeve *B*. 70 As fast as the threads are arranged in proper order in the openings *a*, of plate *D*, they are carried down to the tying devices the first of which are the three pins *l*, *k*, and *y*, between which the threads in the openings *a*, are successively brought with the pins *y* and *l*, back of the two threads and the pin *k*, in front; see Fig. 1. The pin *l*, is held in the end of arm *F*, which swings on a pivot at its other end which is fast in the top of the machine. The pin *k*, is held in the curved end of arm *K*, which is pivoted at its other end in like manner to arm *F*. The pin *y*, is held in arm *K*, on the opposite side of the curve at the end, to the pin *k*. The two arms *K*, *F*, are moved over to the left with the threads between them to the position shown in Fig. 2 by means of a cam plate *N*, that swings on a pivot *t*, fast in the top of the machine. This cam plate moves the two arms *K*, *F*, by the pin *p*, in the former and the pin *r*, in the latter, the pins working in slots in the cam plate *N*. The shape of the slots is designed to keep the pins *k*, *l*, apart in moving, and not bind on the threads. When the arms start from the position shown in Fig. 1 the straight part of its slot moves the arm *K*, over directly, and then the pin *p*, rests in the curved part of the slot, but the pin *r*, does not move until it has reached the straight part of its slot, so that arm *k*, gets well over before arm *F*, is moved. The cam plate *N*, receives a circular motion by means of bar *O*, connected with cam lever *j'*, that has a friction roll *r'* in the groove of cam *F'*, see Fig. 21. When the threads and pins are in the position shown in Fig. 2, they are ready for the passage of the hook bar *R*, which by reference to Fig. 3, will be seen pivoted at its lower end to a cam lever *V* pivoted in a step *g'*, and having a friction roll *f'* in a groove in the cam *T*, which gives an up and down motion to the hook bar *R*. Near the upper end of the bar *R*, it is connected by a bar *U* to a cam lever *W* pivoted at *Z*² that has a friction roll *d'* in the groove in cam *S*, by which the upper end of the hook bar *R*, is moved to the right and to the left. The grooves in the cams are arranged to give motion and rest alternately to the friction rolls in them and set with regard to each other so that the motion of the roll in one cam shall take place while the roll in the other cam is resting and vice versa. In this way the line of motion of the hook shown in Fig. 20, is produced. In this figure the line is shown as a succession of angular motions for clearness, but in practice the corners of the grooves are rounded away so that one roll begins its motion before the other has stopped and the line of motion is resolved into a succession of curves stopping and starting gradually. 130

The motions of the hook *R*, are as follows: In Fig. 4, the hook has passed up. In Figs. 5

and 6, it has passed to the left over thread 2. In Figs. 7, 8 and 9, it has moved down and farther to the left under thread 3, carrying thread 2, with it. In Figs. 10, 11, 12, it has passed up, back to the right, and down, carrying thread 3 with it in the curve in the back of the hook, and in Figs. 13, 14 and 15, it has moved still farther to the right, then up and back left, over thread 1. In Fig. 16, it has moved down carrying thread 1 downward of the hook, and the drawing of the free leg of the loop 1, out of the loop around pin *k*, and into the stationary clamp Y, where it is detained with sufficient friction to cause the hook pulling in the loop below, to draw up the knot around the pin *k*, as in Fig. 18, by the other leg of the loop in the hook, the pin *l*, having been drawn out of the threads at the proper time, by the rod *a'*, attached to the arm F, which is caught at its lower end by the bar U, in descending, and when the knot is sufficiently drawn up around pin *k*, as in Fig. 19, that pin is drawn out by the rod *c'*, attached to the arm K, which is caught by the bar U, and drawn out of the knot. The hook R, continues to draw up the knot, after the pin *k*, is drawn out, by drawing down the loop below the clamp until the end of the loop is pulled out of the clamp, the pressure of which, regulated by the screw in the upper end of the clamp, determines the tightness of the knot. The knot tied, is the same as the single two-bight knot tied in a single cord, only in this case it is tied in two cords, taken as one, and is known as the "overhand-knot."

Having thus described the construction and operation of my improvements, I claim as my invention—

1. In a machine for tying knots in fringes, a circular plate having a series of openings made in it to receive the threads to be tied, in combination with means for giving said plate a forward rotating motion for the space of two of said openings, and a backward rotary motion of the space of one of said openings alternately, a needle to carry the threads through the openings and means for holding the loops of the threads substantially as specified.

2. In a machine for making knots in fringes, a circular plate having openings made in it to form a series of hooks around its periphery in combination with mechanism to rotate said plate forward the space of two hooks and backward the space of one hook alternately, with a needle having a reciprocating motion to deposit the thread to be tied on said hooks substantially as set forth.

3. In a fringe knotting machine, a circular plate having a series of hooks on its periphery in combination with a double ratchet plate having the teeth of one part made facing in the opposite direction to the teeth in the other part, a lever carrying two pawls, one of said pawls engaging in one set of ratchet teeth and the other pawl engaging in the other

set of ratchet teeth, and means to give a reciprocating motion to said lever substantially as described.

4. In a mechanism for knotting fringes, a circular plate having a series of hooks on its periphery, to receive the threads to be tied, a series of radial slots, one in the body of each hook, in combination with a knife or cutter arranged to enter said slots, means for so moving said knife or cutter, and a needle to place the threads to be tied on the hooks, substantially as specified.

5. In a fringe knotting machine, a circular plate having a series of openings made in it to receive the threads to be tied in combination with a clamp arranged to receive the threads by turning of said plate and means for turning the plate substantially as set forth.

6. In a fringe knotting machine, a circular plate having a series of hooks on its periphery to hold the threads to be knotted, a needle to place said threads on the hooks, in combination with a clamp arranged to receive the threads by the motion of said plate and means for moving the plate substantially as set forth.

7. In a fringe knotting machine, the combination of a circular plate having hooks on its periphery to receive the threads to be tied, a needle to place the loops of said threads on the hooks, two levers each pivoted at one end and having in their free ends pins to receive the threads between them as the plate turns, and means to move said levers and fold the threads into an S or double looped form, and means to turn said plate substantially as described.

8. The combination in a fringe knotting machine of a circular plate with hooks to receive the threads to be tied, a needle to deposit the loops of said threads on the hooks, levers with pins to receive the threads from the hooks and arrange them in an S or double looped form, a knotting hook to form an over hand knot of said threads, and means to give said knotting hook reciprocating motions, both vertically and horizontally, substantially as set forth.

9. The combination in a fringe knotting machine of a circular plate with hooks to receive the threads to be tied, a needle to deposit the loops of said threads on the hooks, levers with pins to receive the threads from the hooks and arrange them in an S or double looped form, a knotting hook to form an over hand knot of said threads, and means to give said knotting hook reciprocating motions, both vertically and horizontally, and a clamp arranged to catch and detain one leg of the loop drawn down in finishing the knot substantially as specified.

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Witnesses:

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