(Model.)

4 Sheets—Sheet 1.

S. ELLIOTT.

PAMPHLET STITCHING MACHINE.

No. 263,031. Patented Aug. 22, 1882.

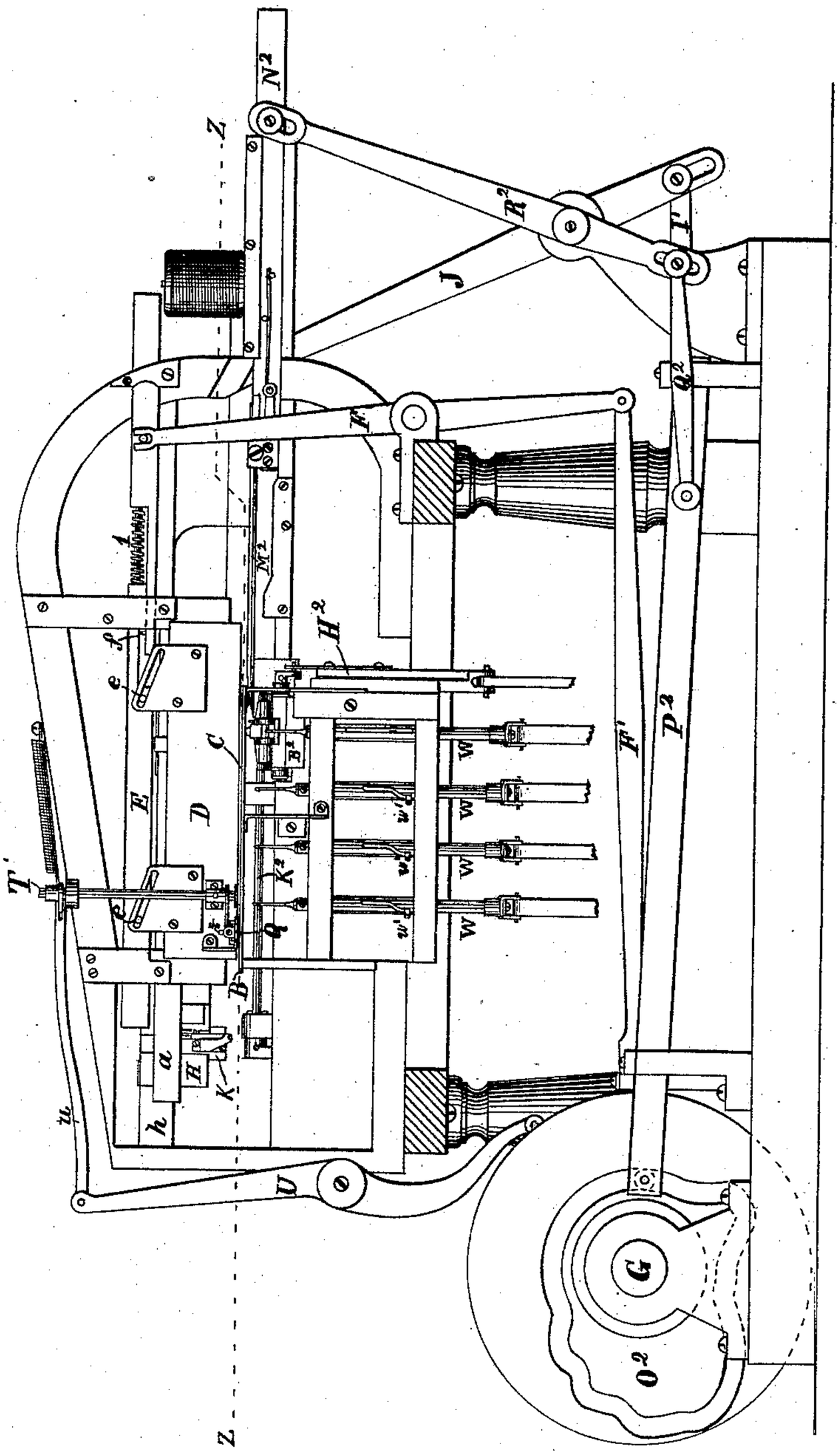

Fig. 1.

Witnesses.
H. R. Thompson.
Benj. Andrews, Jr.

Inventor.
Sterling Elliott

(Model.) 4 Sheets—Sheet 2.

S. ELLIOTT.

PAMPHLET STITCHING MACHINE.

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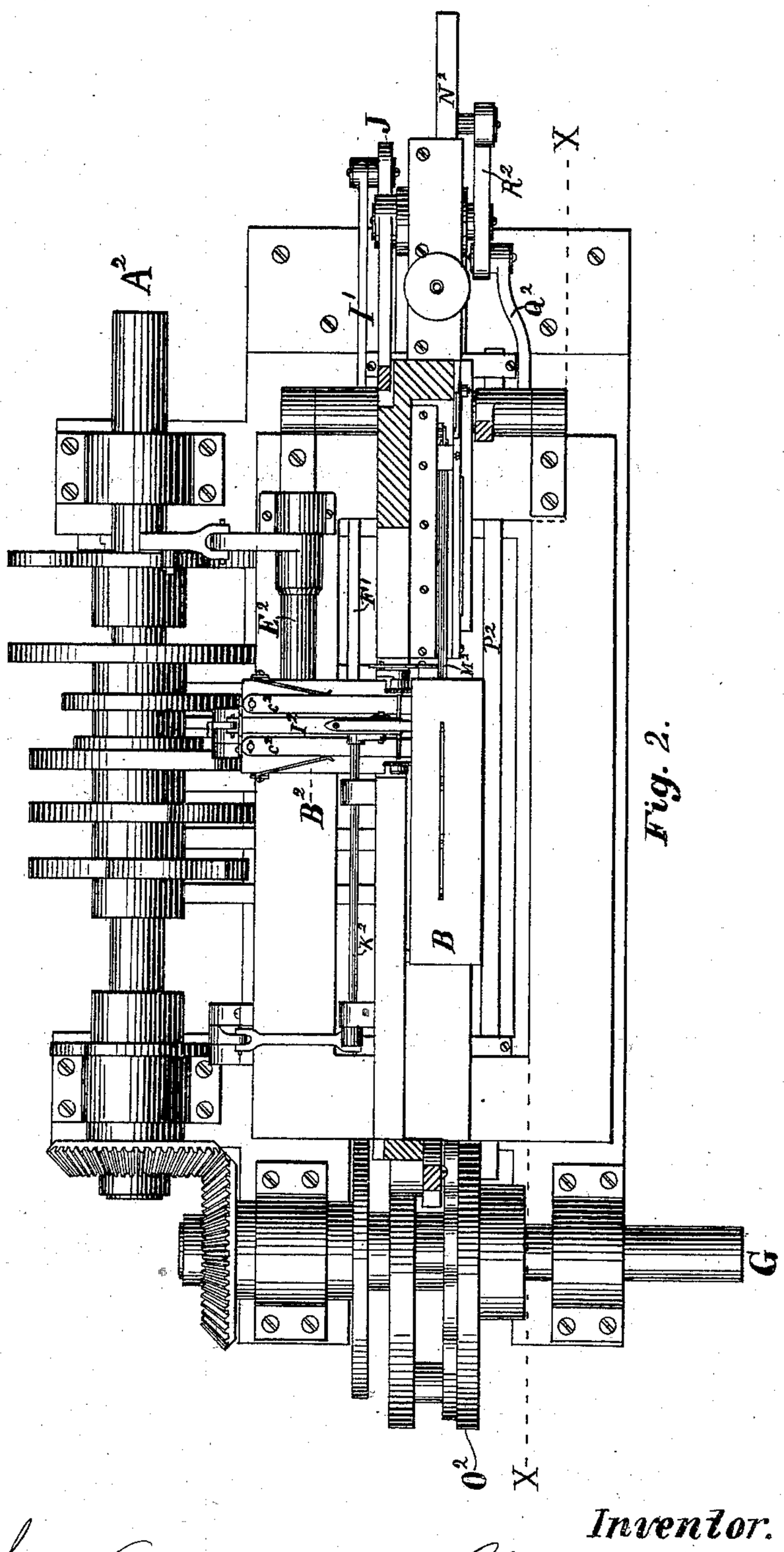

Fig. 2.

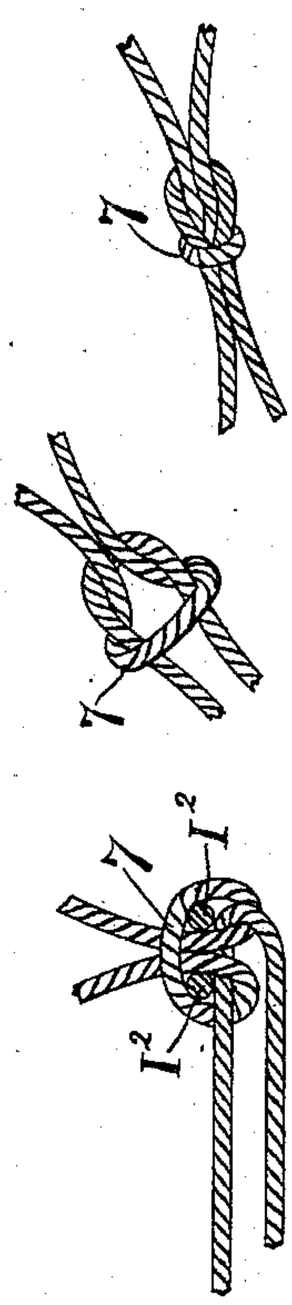

Fig. 23.

Fig. 22.

Fig. 21.

Witnesses.
H. R. Thompson.
Benj. Andrews. Jr.

Inventor.
Sterling Elliott

(Model.)

4 Sheets—Sheet 3.

S. ELLIOTT.

PAMPHLET STITCHING MACHINE.

No. 263,031. Patented Aug. 22, 1882

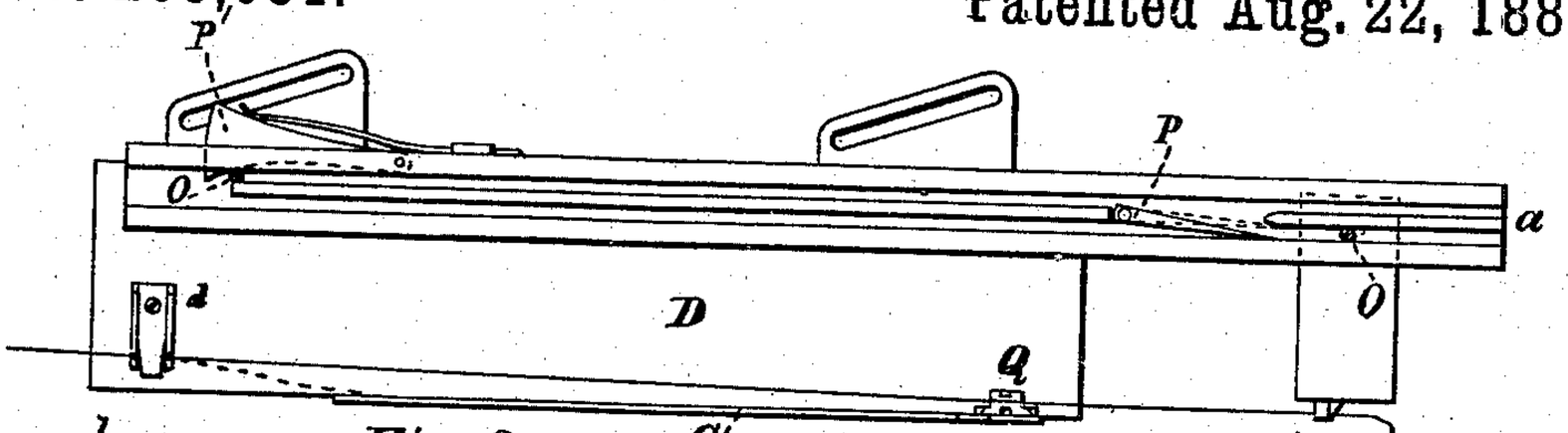

Fig. 3.

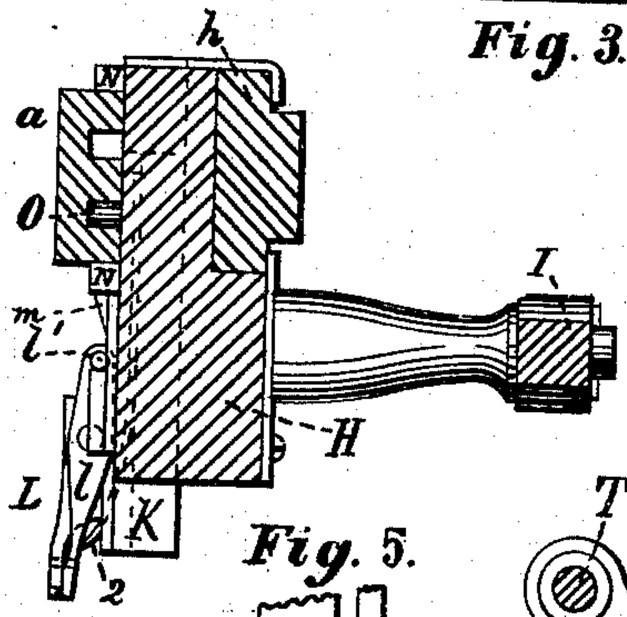

Fig. 5.

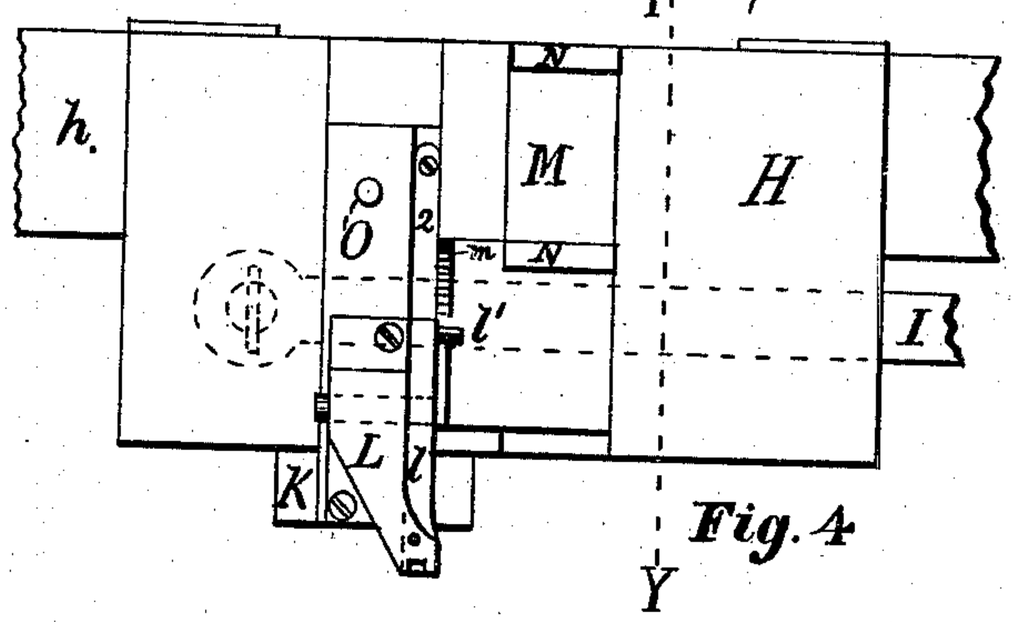

Fig. 4.

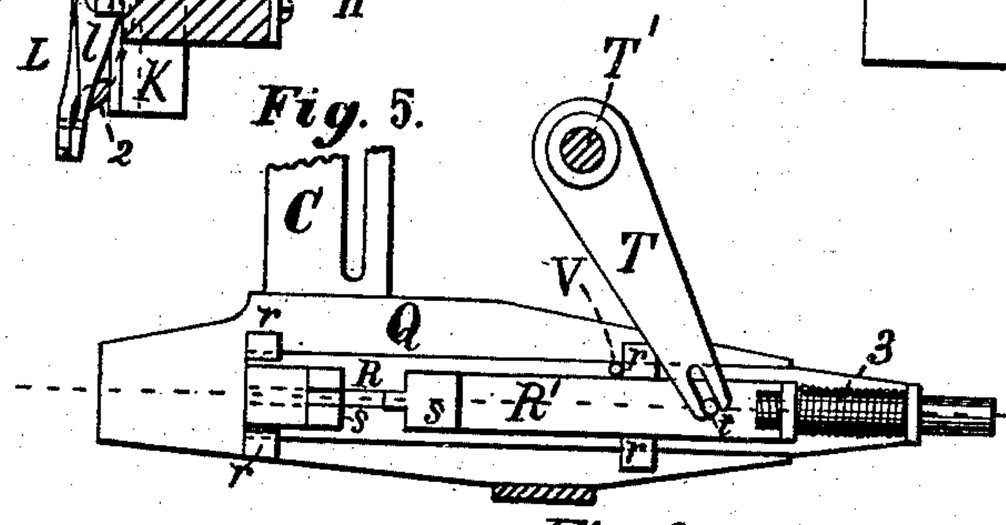

Fig. 6.

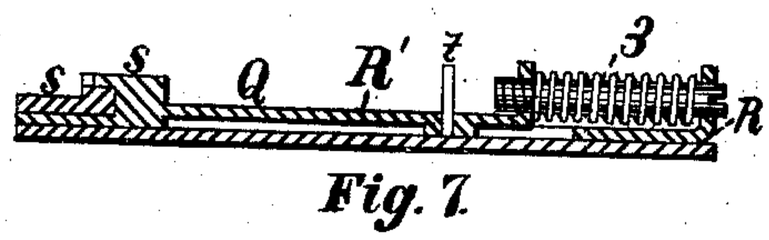

Fig. 7.

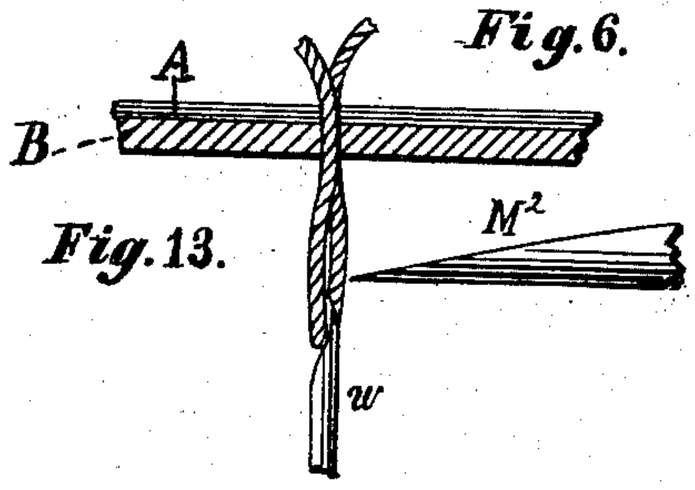

Fig. 13.

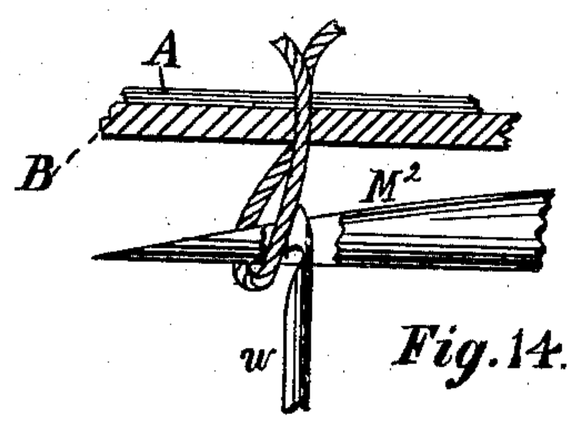

Fig. 14.

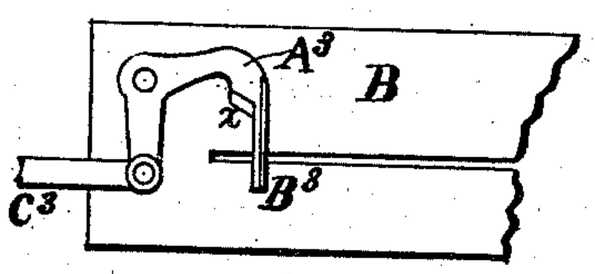

Fig. 20.

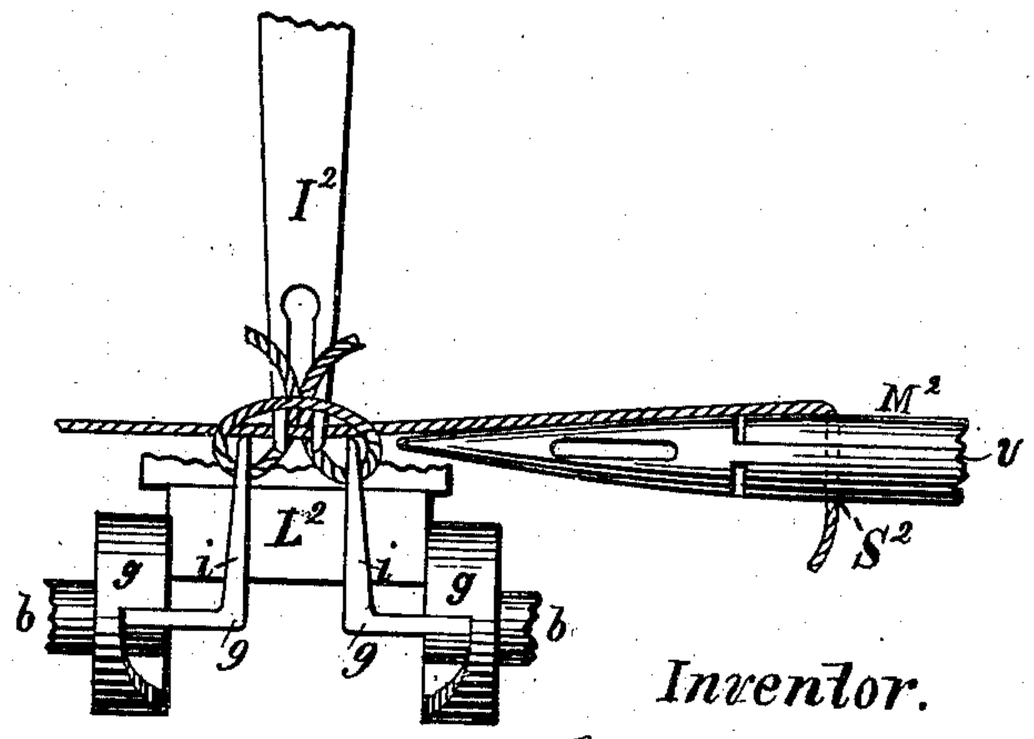

Fig. 19.

Witnesses.
H. R. Thompson
Benj. Andrews. Jr.

Inventor.
Sterling Elliott

(Model.)

4 Sheets—Sheet 4.

S. ELLIOTT.

PAMPHLET STITCHING MACHINE.

No. 263,031. Patented Aug. 22, 1882.

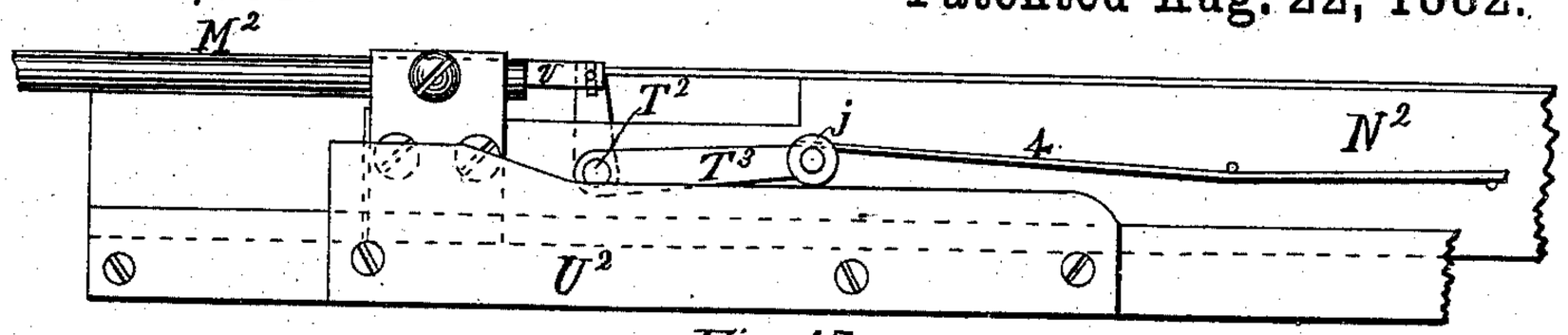

Fig. 15.

Fig. 11.

Fig. 12.

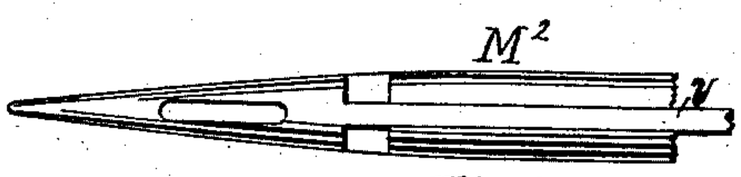

Fig. 10.

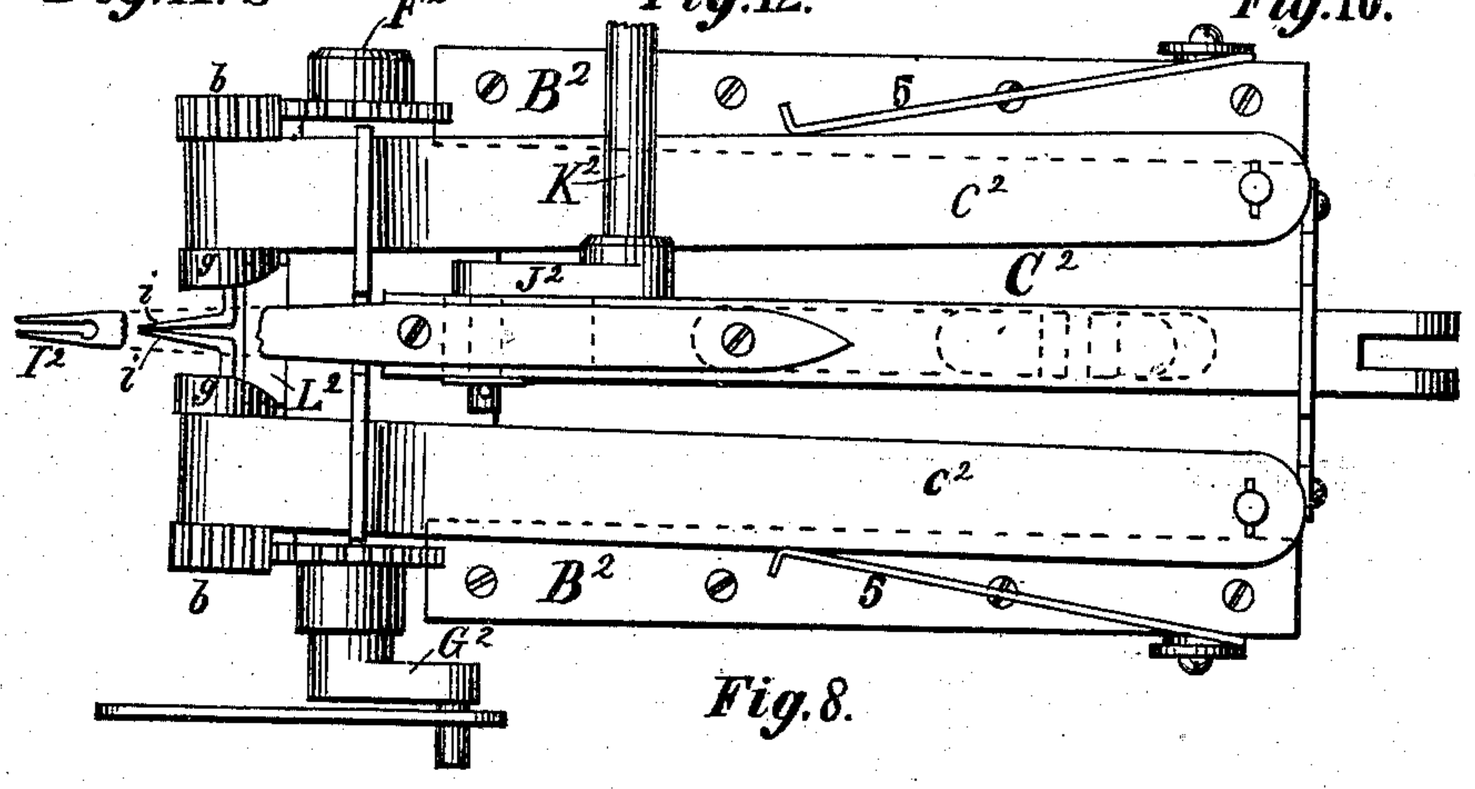

Fig. 8.

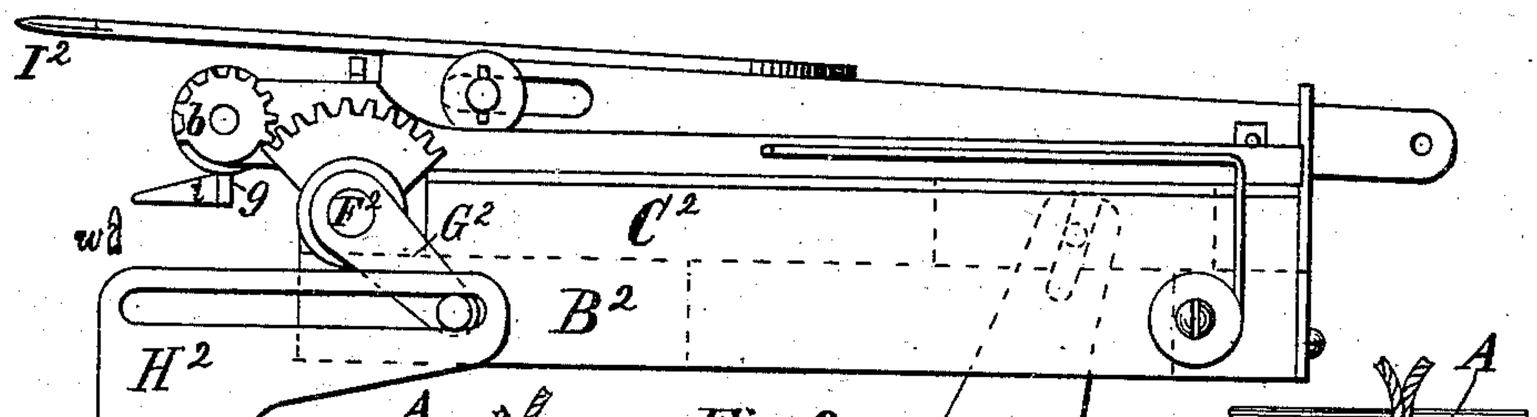

Fig. 9.

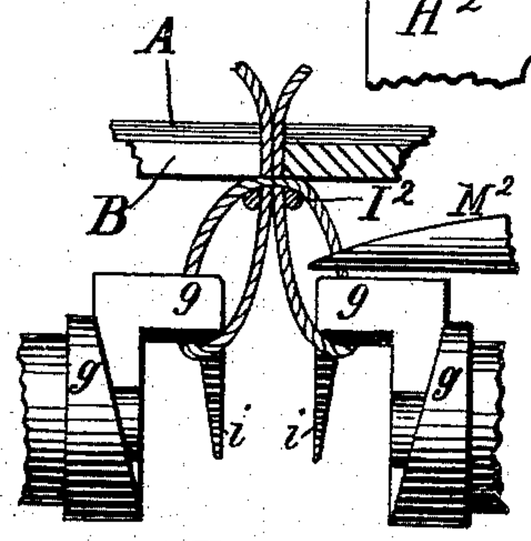

Fig. 18.

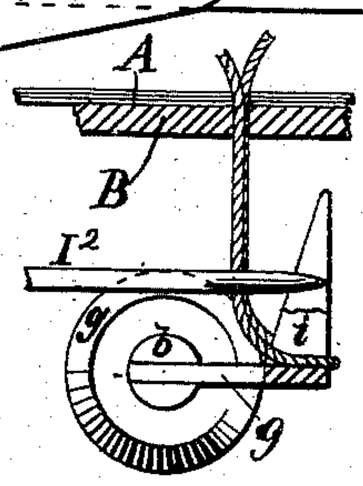

Fig. 17.

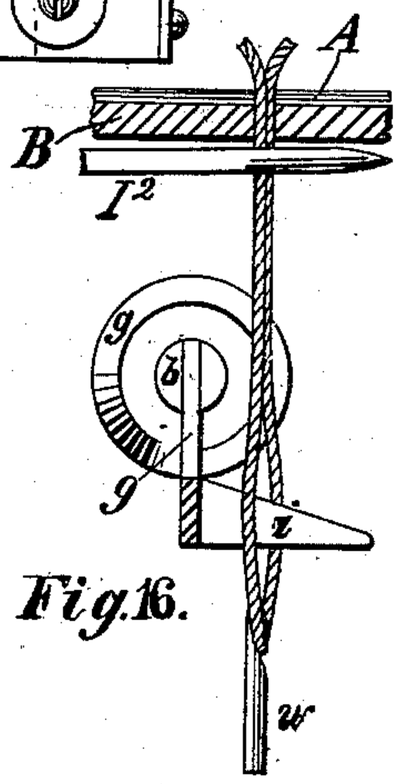

Fig. 16.

Witnesses.
H. R. Thompson
Benj. Andrews. Jr.

Inventor.
Sterling Elliott

UNITED STATES PATENT OFFICE.

STERLING ELLIOTT, OF BOSTON, MASS., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE ELLIOTT MACHINE COMPANY, OF SAME PLACE.

PAMPHLET-STITCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 263,031, dated August 22, 1882.

Application filed March 23, 1881. (Model.)

To all whom it may concern:

Be it known that I, STERLING ELLIOTT, a citizen of the United States, residing at Boston, county of Suffolk, and State of Massachusetts, have invented a certain new and useful Machine Designed for Stitching and Tying Pamphlets, Papers, &c., of which the following is a specification.

The particular kind of stitch and knot which this machine is designed to make is clearly shown and described in Letters Patent No. 237,966, issued to me and bearing date February 22, 1881.

The object of my present invention is to accomplish the stitching and tying of pamphlets, &c., mechanically, thus making a much stronger fastening and at a greatly reduced cost as compared with hand-work, which is at present employed.

In describing my invention I refer to the accompanying drawings, which form a part of this specification.

Different views of the same parts are designated by the same letters and figures of reference.

Figure 1 shows the frame and all the more important working parts. It is a sectional elevation on the line *x x*, Fig. 2, omitting the rear driving-shaft, which is plainly shown in Fig. 2. Fig. 2 is a sectional plan, showing the top of all parts below the line *z z*, Fig. 1. Fig. 3 is a rear view of the presser-clamp D, the front of which is clearly shown in Fig. 1. Fig. 4 shows a front elevation of thread-carrier. Fig. 5 is a cross-section of same on the line *y y*, Fig. 4. Fig. 6 is a top view of thread-controller. Fig. 7 is a longitudinal cross-section of same. Fig. 8 is a plan view of double-loop-turning device; Fig. 9, a side elevation of same. Fig. 10 is a top view of horizontal needle M^2; Fig. 11, a side view of same. Fig. 12 is a cross-section of needle-body. Figs. 13 and 14 represent method of transferring the loops of thread from barbed needles *w w w w* to the horizontal needle M^2. Fig. 15 is a side elevation of device for operating the needle-tension shown at Figs. 10, 11, and 19. Figs. 16, 17, 18, and 19 show successive stages of the operation of the loop-turning points *i i*, taking loop of thread from barbed needle *w* and doubling the same, as described in the patent above referred to. Fig. 20 shows the cutting device. Figs. 21, 22, and 23 show the loops and knot.

The operation of this machine is as follows: The paper or other material, A, to be stitched is placed upon the slotted bed-plate B. The horizontal plate C, at the bottom of presser-clamp D, has a longitudinal slot, which corresponds with the slot in bed-plate. The clamp D, is made to descend upon the paper by the forward motion of sliding bar E, Fig. 1. Said bar has upon its face the pins *e e*. The motion of these pins being horizontal and engaging in the oblique slots at the top of presser, they cause the same to move vertically, and, owing to the slight inclination of said slots, the presser cannot be raised except by the withdrawal of the bar E. To allow the presser to hold equally well a greater or less thickness of material without restricting the movement of its operating-lever F, I have arranged a compression-joint in bar E, the spring 1 allowing that part of bar carrying the pins *e e* to stop short of its full stroke to allow for a greater thickness of material, while the stop *f* causes the bar on its return to raise presser D to the full height required by the stroke of lever F. Said lever receives motion from a suitably-shaped cam on shaft G through the medium of connecting-rod F′. The thread to be used is taken from a spool on the right of machine, as shown in Fig. 1. From this spool the thead passes to and through the spring thread-guide *d*, Fig. 3. From this guide the thread is taken and manipulated by the following described mechanism: H, Fig. 4, shows a front view of a guide-block, which is moved horizontally upon the stationary track *h* by means of a cam on the shaft G, through the connecting-rods I′ I and lever J. Sliding vertically in said guide-block is a dovetailed bar, K, which has attached to its front side the thread-carrier, consisting of a stationary jaw, L, having pivoted to its side a movable jaw, *l*, (shown more clearly in Fig. 5,) which is a side view on the line *y y*, Fig. 4. One of these jaws has in its face pins which fit into holes in the opposite jaw, to prevent displacement of the thread. This movable jaw has an upwardly-projecting end, in

which is inserted a horizontal pin, *l'*. At the right of dovetailed bar K, and parallel with it, is another slide, M, having upon its side an incline, *m*, which is directly behind the pin *l'*. The horizontally-reciprocating guide-block H, above described, moves in a plane directly behind and has its face side in close contact with the face of grooved bar *a*, which is rigidly attached to the vertically-operating presser D. (See Figs. 3 and 5.) The slide M is held always in the same relative vertical position to the presser by means of the lugs N N, while the vertical position of the dovetailed slide K is determined by the grooves in bar *a*, in which moves the pin O, which pin is rigidly fixed in the upper end of bar K. Thus when the pin O is in the upper groove the pin *l'* will be at the highest point of incline *m*, in which position the jaws L *l* are open, and when the bar K descends until pin O is in the lower groove then the said jaws will be closed by the action of the spring 2.

The operation of the thread-carrier is as follows: Starting from the extreme left of its stroke, as shown at Fig. 1, the pin O being in the lower groove and jaws L *l* closed. In moving toward the thread-guide *d* the pin O rises upon the drop-latch P, thus transferring it to the upper groove and opening the jaws L *l*. It then moves along under the spring-latch P' until it reaches the end of said groove, when it drops by the action of its own gravity, assisted by the spring-latch, thus closing its jaws upon the thread near the thread-guide *d*. Moving backward along the lower groove it draws thread from the spool through the guide *d* until its passes under the drop-latch P, which falls behind it, as shown in Fig. 3. After a sufficient length of thread has been drawn off it is manipulated as follows by the thread-controller Q, which consists of a flat plate horizontally attached to the bottom of presser D and at right angles to it. (See Fig. 6.) This plate has rigidly attached to its upper side four short lugs, *r r r r*, between which is held the horizontally-reciprocating bar R. At the top of this bar, and arranged to slide upon it, is a second bar, R'. The rear ends of these bars terminate in a pair of jaws, *s s*, as shown in section at Fig. 7. These jaws are held together by the spring 3, arranged between the opposite ends of bars R' R. At the top of the upper bar is a vertical pin, *t*, which engages with the arm T on the lower end of vertical rock-shaft T'. To this rock-shaft motion is imparted from a cam on the main shaft G, through the medium of lever U and connecting-rod *u*, as shown at the left of Fig. 1. As the spring 3 holds the jaws *s s* together the bars R and R' will move together laterally, except at that end of the stroke where the stop V, which is attached to the bar R, strikes the stationary lug *r*, at which point a still further backward motion of the arm T will compress spring 3 and open jaws *s s*. This takes place at the proper moment to allow the thread-carrier to pass between them, after which, by a forward motion of the arm T, the jaws close upon the thread, leaving it held taut between the thread-guide *d* and the thread-controller Q, as shown in Fig. 3. From this position the thread is moved at the proper time by the motion of thread-controller, as hereinafter described.

The operation of mechanism below the bed-plate is as follows: I have arranged parallel with each other, and at equal distances apart, a series of vertically-reciprocating bars, W W W W, each carrying at its upper end a barbed needle. These needle-bars are operated by cams on the shaft A^2, Fig. 2, through the medium of horizontal levers and vertical connecting-rods. I have shown four needles, though a greater or less number might be employed. In operation, the right-hand needle, Fig. 1, rises through the material, and when at its extreme height the thread-controller moves backward, thus bending the thread against the barbed side of the needle, which on its descent brings with it a loop, as shown in Fig. 16.

The following is a description of double-loop-turning device:

B^2, Figs. 1, 2, 8, and 9, is a guide-block rigidly attached to the frame of machine. Sliding horizontally in this guide-block is the carriage C^2, which is moved by the arm D^2 on the rock-shaft E^2, shown in section at Fig. 9, and in plan, Fig. 2, in connection with its cam on shaft A^2. The sliding carriage C^2 has pivoted to its upper side two horizontally-oscillating bars, c^2 c^2. At their forward ends these bars carry each a short shaft, *b*, having rigidly attached to their outer ends small segmental gears. (See Figs. 8 and 9.) I have shown the mode of construction which I now consider preferable, though the bars c^2 c^2 might be dispensed with and a single shaft, mounted on suitable bearings, be made to take the place of the two shafts *b b* by attaching the gears and circular inclines *g g* to sleeves arranged to turn upon or with said shaft, or the circular inclines might be dispensed with and the bars c^2 c^2 made to separate by means of other suitable mechanism. The said shafts *b b* are capable of being partially revolved by the action of the larger segmental gears, which are attached to a single shaft, F^2, which has its bearings in the front end of carriage C^2. This latter shaft has upon its outer end a crank, G^2, the pin of which engages in the horizontal slot at the top of vertically-sliding bar H^2, shown in Fig. 1, and its upper part enlarged at Fig. 9. This bar receives its motion in the same manner as the needle-bars at its left. As will be seen in Fig. 9, the ascent or descent of bar H^2 will cause a partial revolution of the shafts *b b*, and this motion, owing to the length of slot, will be the same, regardless of the horizontal location of carriage C^2. The shafts *b b* have attached to each of their inner ends a circular incline, *g g*, and also the radial arms 9 9, terminating in the points *i i*, which are, when at their lowest point, closed together by the action of springs 5 5, Fig. 8. When the loop of

thread is drawn down by needle *w*, as in Fig. 16, the carriage C^2 moves forward, thus pushing the points *i i* through the loop, as shown. The barbed needle then rises in the space between rear parts of points *i i*, thus disengaging itself from the thread.

Immediately over, and so arranged that the barbed needle passes between its points, is the forked loop-controller I^2. This device has a horizontal reciprocating motion imparted to it from a cam on shaft A^2 by means of the vertical lever attached to its rear end, Fig. 2. It is moved vertically by the crank J^2 upon rock-shaft K^2, which shaft is partially revolved by a cam on shaft A^2 by means of lever and connecting-rod. (Shown in Fig. 2.) Upon the points *i i* entering the loop of thread the shafts *b b* revolve partially, as shown in Fig. 17. As they revolve they are forced apart by the circular inclines *g g* moving upon the stationary plate L^2, Fig. 19. The closing together of these points is accomplished by means of springs 5 5 acting against the outside of oscillating bars c^2 c^2. The gears *b b* are of sufficient thickness to admit of their engagement with the gears on shaft F^2, whether the points *i i* are open or closed. As these points separate the forked loop-controller I^2 is lowered, as in Fig. 17, allowing the middle of loop to pass over it, when it immediately rises, while the points *i i* continue their revolution, thus putting loop into the form shown in Fig. 18.

The operation of the three remaining barbed needles is as follows: After perforating the paper and receiving their loop of thread they descend successively through the material, and in so doing are turned one-fourth of a revolution by means of the spiral slots and pins *w' w' w' w'*. (See Fig. 1.) The object of this movement is to turn the loops at right angles to the long tension-needle M^2, as shown in Fig. 13. The body of this said tension-needle consists of a steel rod, having a deep slot in its upper side, in which is fitted a strip of steel, as shown in section at Fig. 12. This strip or slide has the diameter of its front end enlarged to correspond in size with the main body, and is fitted thereto, as shown in Figs. 10 and 11. The opening S^2, between the two parts, Fig. 11, when partially closed, is designed to hold the thread, as shown in Fig. 19. Near the point of this needle, and extending vertically through it, is a slot or eye. (See Fig. 10.) After the first loop has been doubled, as in Fig. 18, the long needle M^2 passes through it, its point entering the loop previously drawn down by the second barbed needle, as shown in Fig. 13. When the long needle has entered said loop until its eye is directly over the barbed needle *w* the long needle pauses, while the barbed needle rises into its slot or eye, thus disengaging itself from the thread, as shown in Fig. 14. The barbed needle then descends out of the way, leaving loop of thread upon the needle M^2, which moves forward and takes loops from the remaining barbed needles, in the manner above described. After needle M^2 has received the last loop it advances until the tension-opening S^2 is directly opposite the loop, at which moment the thread-controller above the paper moves forward, thus drawing said loop into the tension-opening S^2, after which needle M^2 is withdrawn, taking with it the thread. The closing of tension-opening S^2 is incident to the backward movement of the horizontal needle-bar N^2, as follows, (see Fig. 15:)

T^2 is a short rock-shaft, having its bearing through the needle-bar N^2. To one end of this shaft is attached a vertical arm, the upper forked end of which engages with a pin upon the rear end of slide *v*. Upon the opposite end of this rock-shaft is a horizontal arm, T^3, having upon its other end a roller, *j*. The operation of this arrangement is as follows: When the tension-needle M^2 is at the forward end of its stroke the roller *j* rises upon the highest part of incline U^2, thus pushing forward the slide *v* and opening the tension-opening S^2. After the thread is drawn into said opening, and while the needle M^2 is being withdrawn, the roller *j* will descend the incline U^2, thus closing the tension-opening S^2 upon the thread with a pressure equal to the force exerted by spring 4, which may be varied to any desired extent. When the needle M^2 is withdrawn from all the loops it holds the thread in the position shown in Fig. 19. At this moment the loop-turners revolve backward until their points assume a horizontal position, as shown in same figure, when the carriage C^2 moves forward until the points *i i* are pushed out of the loop, leaving it upon the loop-controller I^2. The thread-carrier above the goods having taken hold of thread, as above described, draws the thread upward and closely around the loop-controller, which prevents the knot from being drawn tight until all slack thread shall have been taken up. Next, the tension-needle M^2 moves forward, bending the lower thread around the loop of upper thread, as shown in Fig. 21. At the proper moment the loop-controller backs out of loop, (see Fig. 19,) thus allowing that part of loop marked 7, Fig. 21, to turn over and form a square knot, as in Fig. 22.

The only remaining operation is to cut off the thread, which is done simultaneously above and below the material by the device shown at Fig. 20, which consists of a piece of steel shaped as shown at A^3, one pivoted near the end of slot above the presser-clamp and the other under the bed-plate. Their operation is as follows: After the stitch is formed, and before it is tightened, the part A^3 is moved until the rounded projection B^3 is across the slot. The thread is then tightened by drawing over said projection, and at the proper time the cutter is caused to move forward until the cutting-edge *x* is brought in contact with the thread, which severs it, and thus completes the stitch. Motion is imparted to the thread-cutter through the connecting-rod C^3, which

may be connected to any moving part of machine or operated by a suitable cam. After the thread is cut the thread-carrier above the paper moves forward to the point shown at the right of Fig. 3, thus carrying off thread for the next stitch. The needle M^2 returns to the position shown in Fig. 1. Meanwhile the carriage C^2 has receded to the position shown in Fig. 9. The presser D rises by the withdrawal of bar E. The material containing the finished stitch is thereby liberated and the machine left in readiness to repeat the operation, as above described.

I have shown the arrangement of shafts and cams which I prefer to employ, though I do not wish to confine myself to any special location of shafts or connections, as other combinations of levers and cams might be made to produce the same movements without constituting a material departure from my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a pamphlet-stitching machine, a horizontally-reciprocating thread-carrier consisting of a guide-block, H, vertical bar K, and jaws L and *l*, in combination with mechanism, substantially as described, for imparting a vertical reciprocating motion to the bar K independently of the horizontal position of guide-block H, substantially as shown.

2. In combination with presser D, having oblique slots, as shown, and bar E, having pins *e e*, a compression-joint which consists of spring 1 and stop *f*, arranged to operate as shown.

3. A thread-controller consisting of two bars, R and R′, terminating in jaws *s s*, the same held together by a suitable spring and movable together in a line at an angle with the direction of the thread horizontally by means of a connection with one of said bars, substantially as shown.

4. A loop-turning device consisting of two parallel points, *i i*, attached at an angle to radial arms 9 9, said arms being each connected to a separate shaft and caused to rotate by means of a third shaft, F^2, through the medium of gears, substantially as shown and described.

5. In combination with the points *i i*, radial arms 9 9, the circular inclines *g g*, bars c^2 c^2, and springs 5 5, arranged to operate as shown, and for the purpose specified.

6. The vertically-operating bar H^2, having at its upper end a horizontal slot, in connection with the crank and rock-shaft F^2, as shown.

7. The combination of points *i i*, shafts *b b*, inclines *g g*, and stationary plate L^2, as and for the purpose specified.

8. The process of tying a square knot, which consists in first forming in the cord to be tied a single loop, secondly, doubling the loop so formed upon and around itself, passing another end of thread through the doubled loop, then returning the said loop to its original position, as shown and described.

STERLING ELLIOTT.

Witnesses:

WILLIAM HADDOW,

JESSE FEWKES.