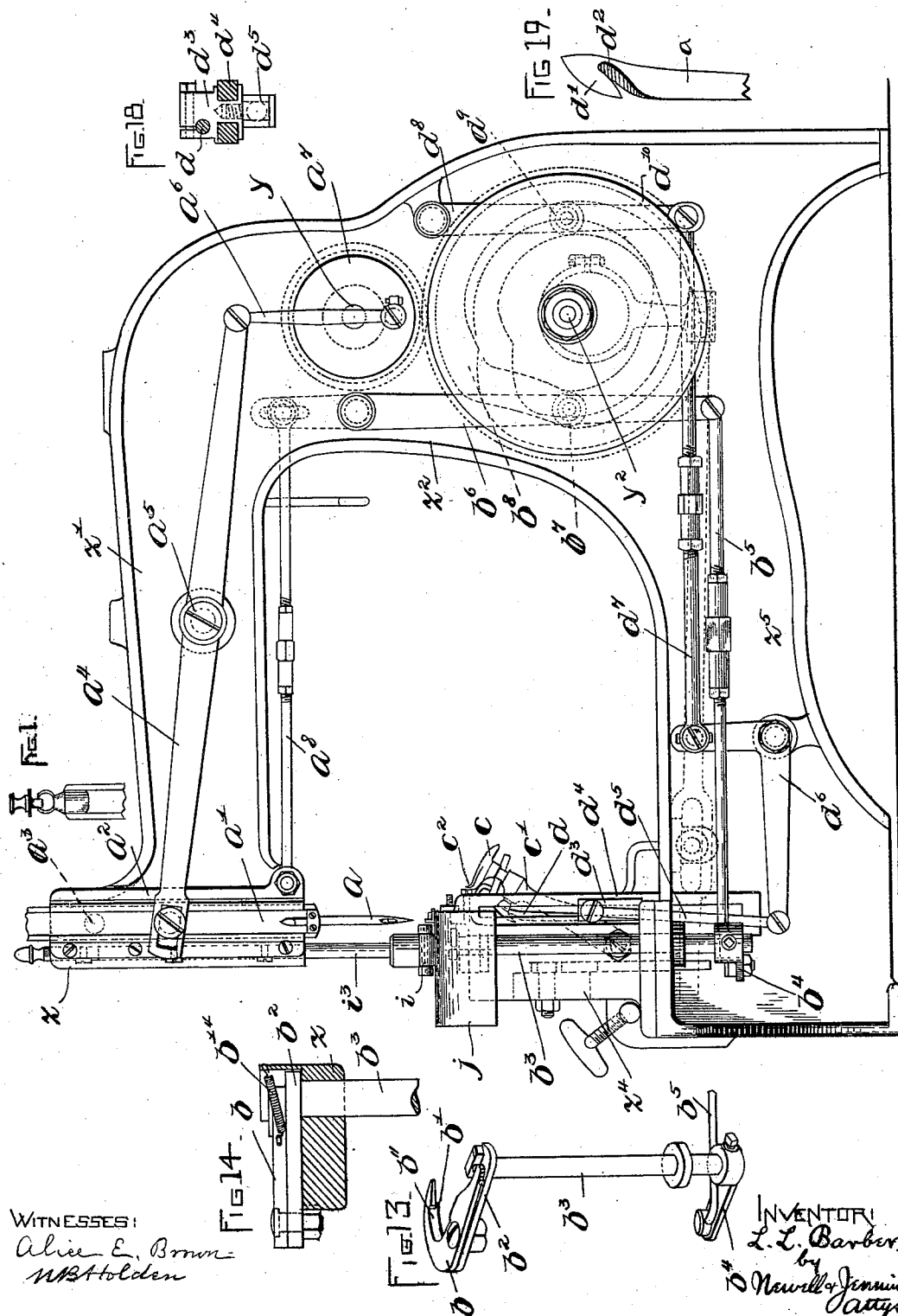


9 Sheets—Sheet 1.

SEWING MACHINE FOR ATTACHING LOOPS TO FABRICS.

Patented Apr. 2, 1895.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

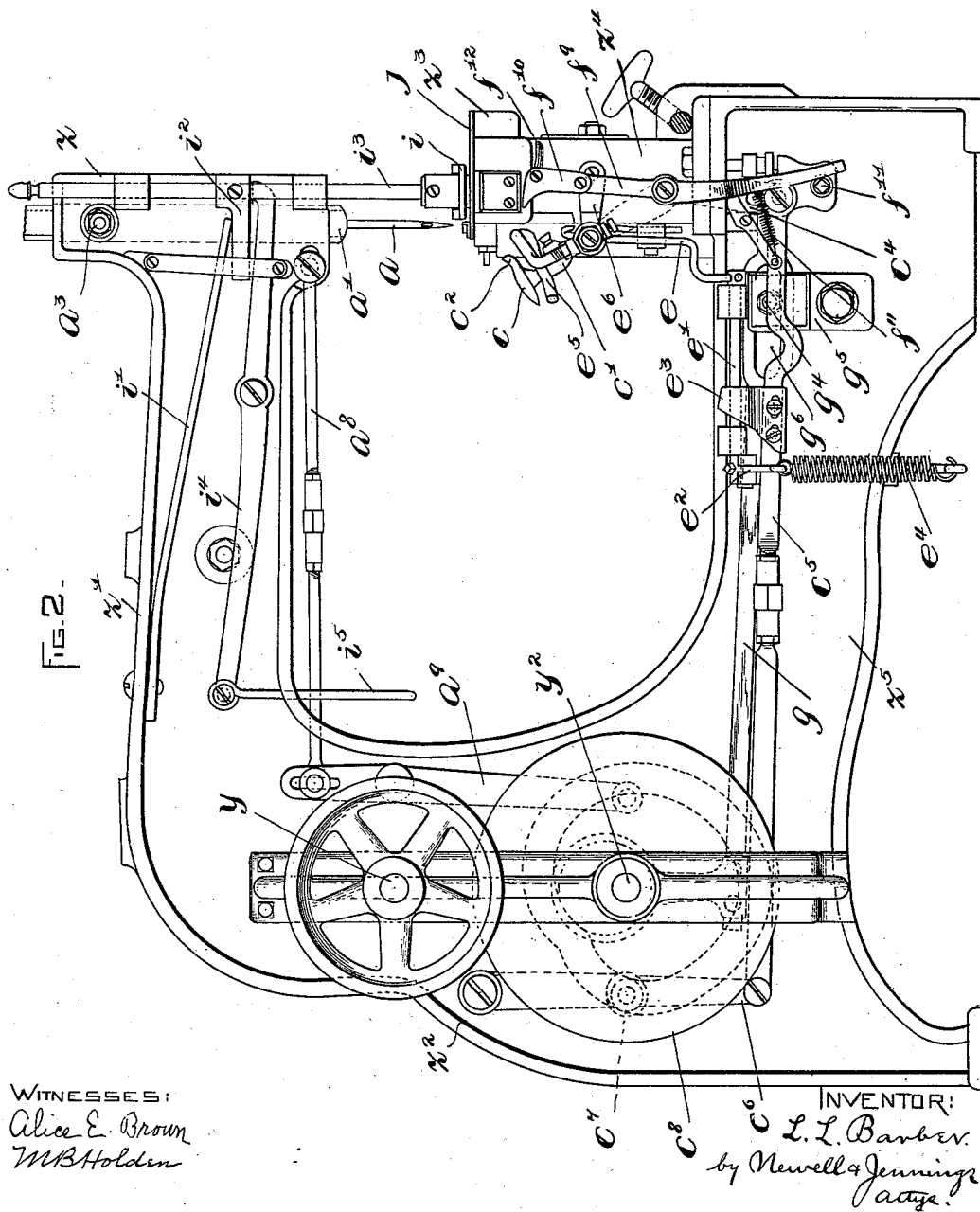
9 Sheets—Sheet 2.

L. L. BARBER.

SEWING MACHINE FOR ATTACHING LOOPS TO FABRICS.

No. 536,946.

Patented Apr. 2, 1895.

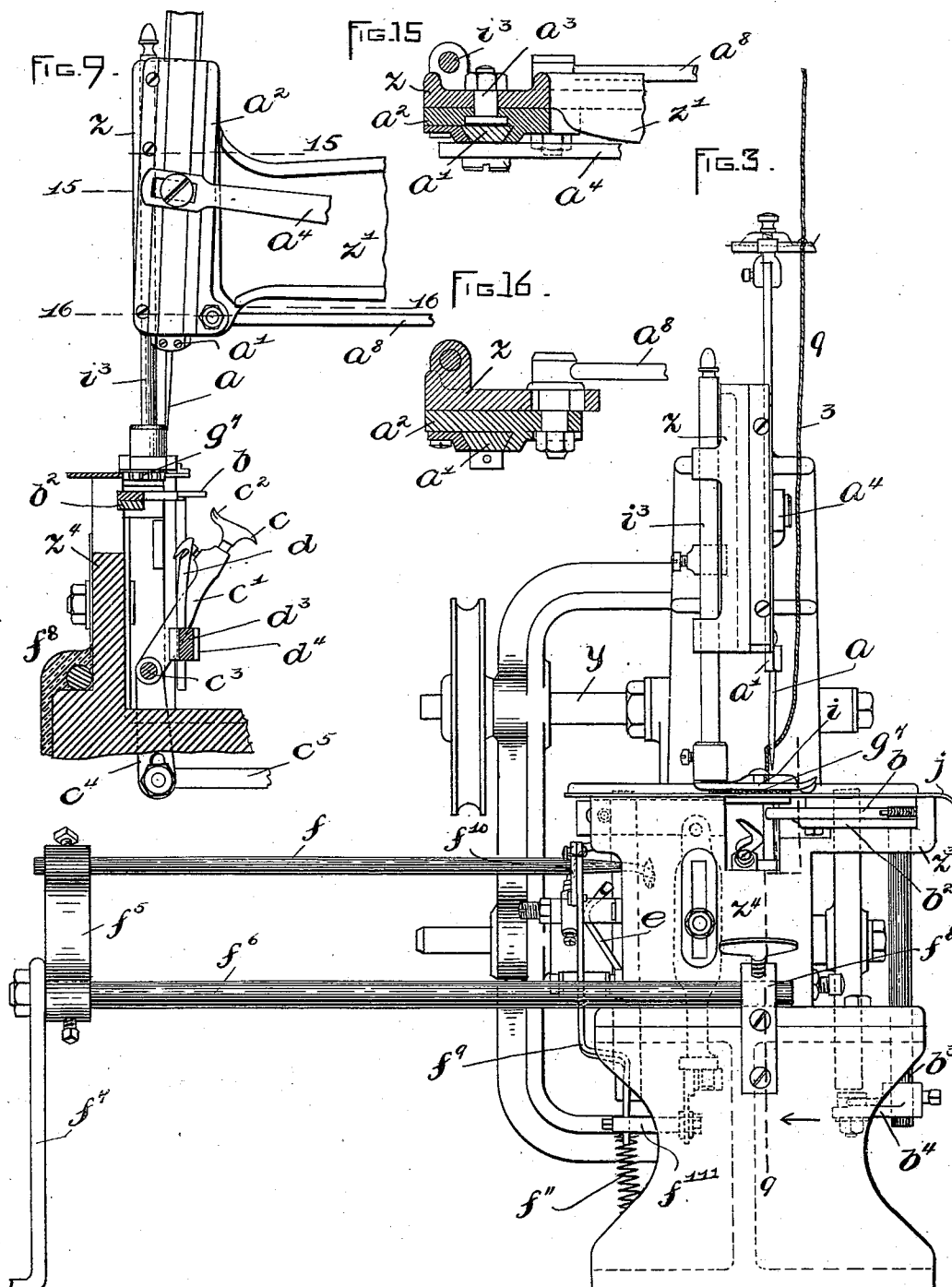


L. L. BARBER.

SEWING MACHINE FOR ATTACHING LOOPS TO FABRICS.

No. 536,946.

Patented Apr. 2, 1895.



WITNESSES:

Alice E. Brown
M.B. Holden

INVENTOR:

L. L. Barber
by Newell & Jennings
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(No Model.)

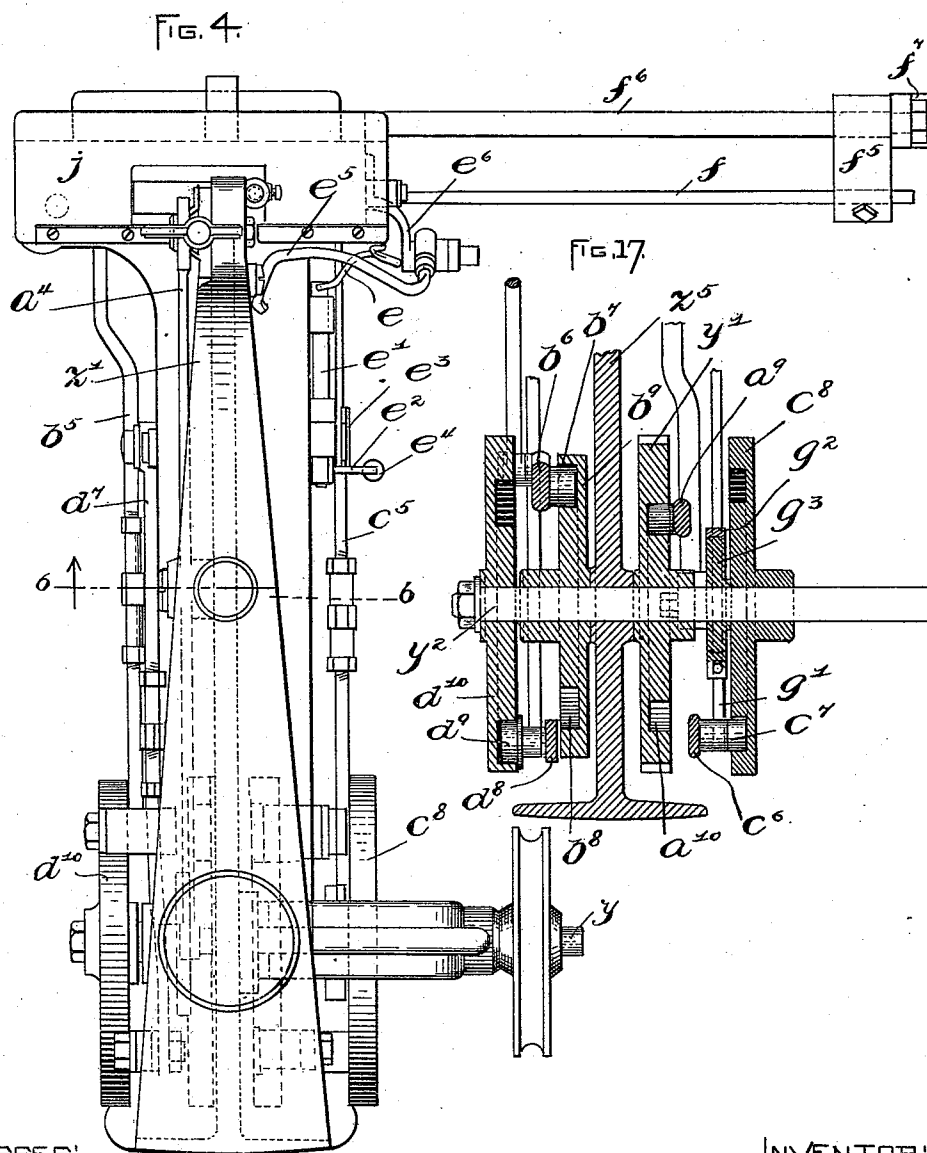
9 Sheets—Sheet 4.

L. L. BARBER.

SEWING MACHINE FOR ATTACHING LOOPS TO FABRICS.

No. 536,946.

Patented Apr. 2, 1895.



WITNESSES:

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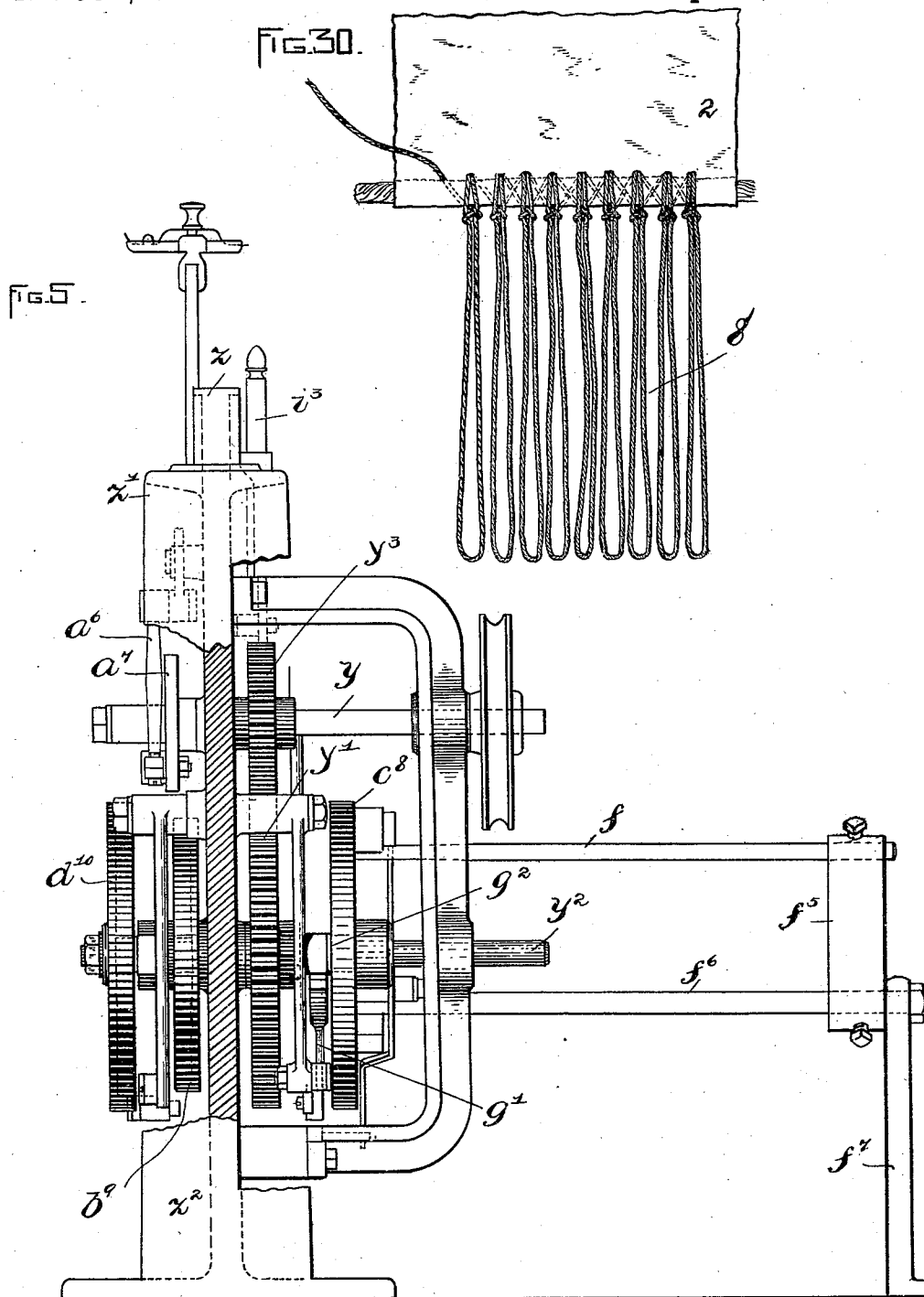
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WITNESSES:

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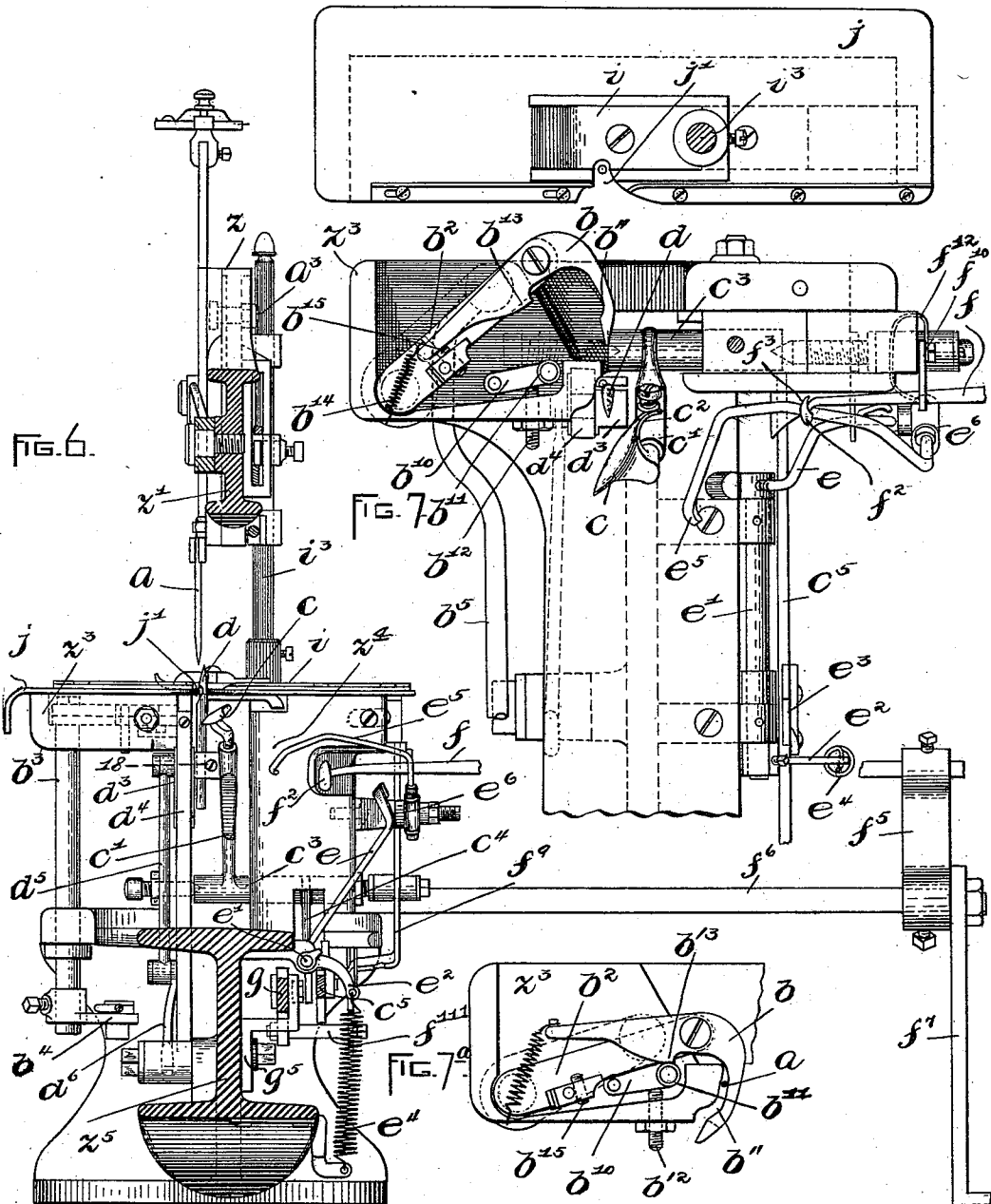
L. L. BARBER.

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Patented Apr. 2, 1895.

FIG. 8.



WITNESSES.

Alice E. Brown
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(No Model.)

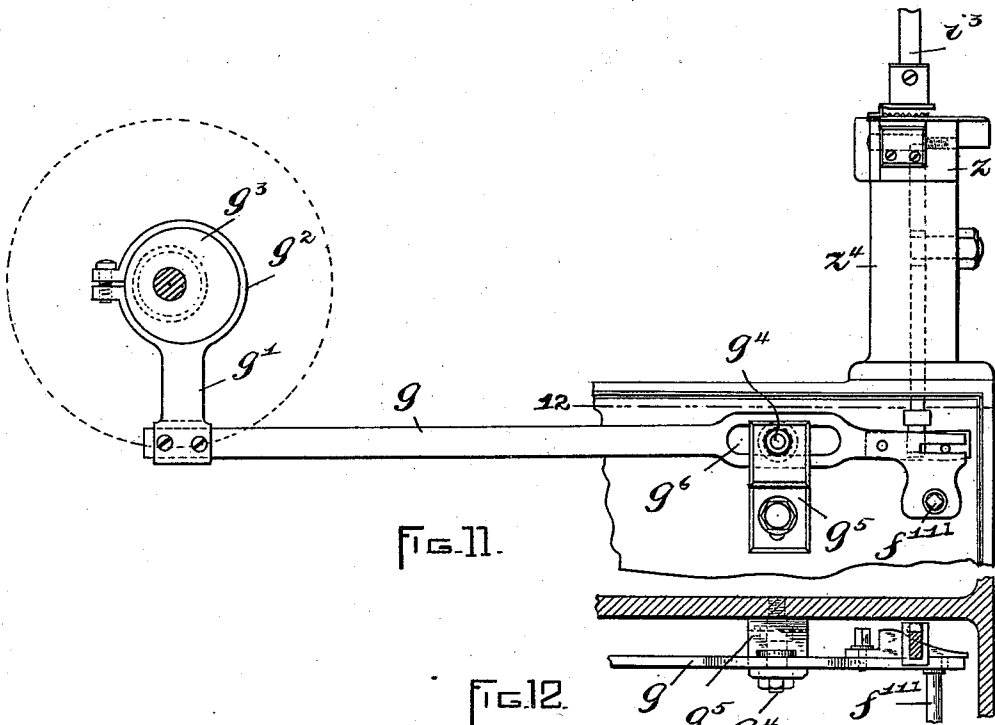
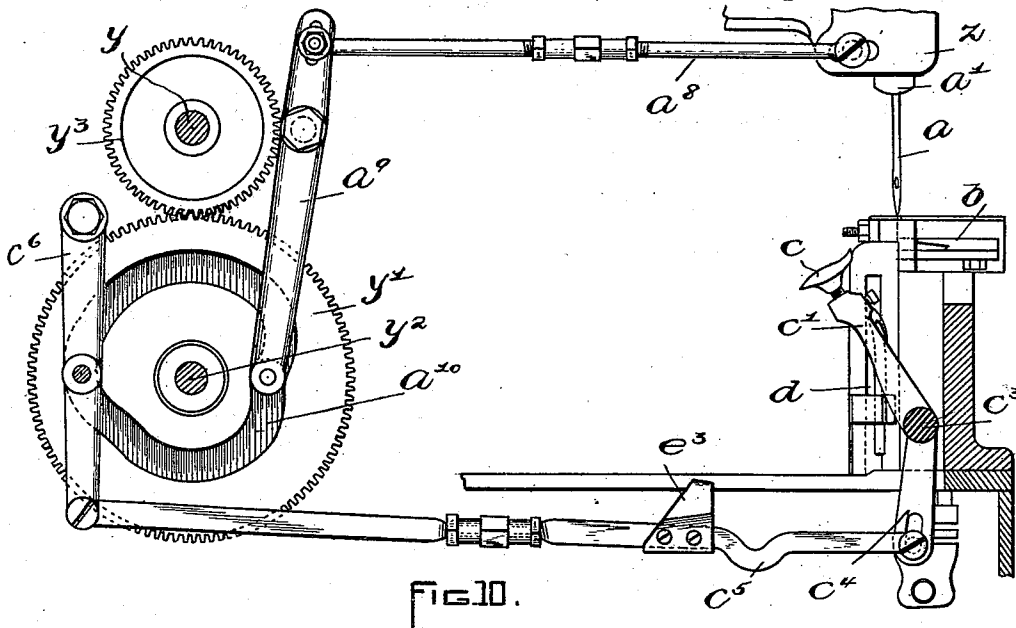
9 Sheets—Sheet 7.

L. L. BARBER.

SEWING MACHINE FOR ATTACHING LOOPS TO FABRICS.

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Patented Apr. 2, 1895.



WITNESSES.

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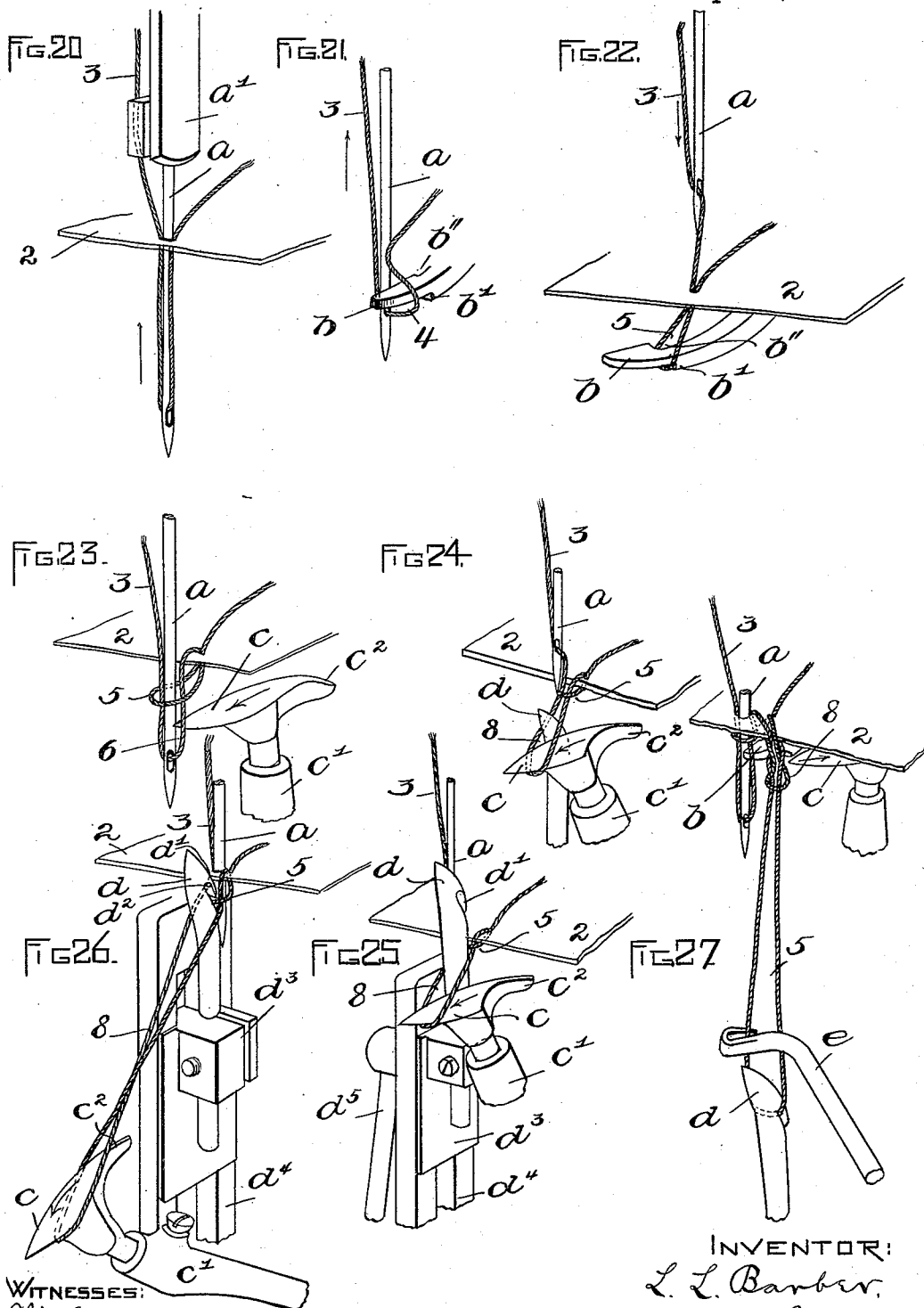
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WITNESSES:
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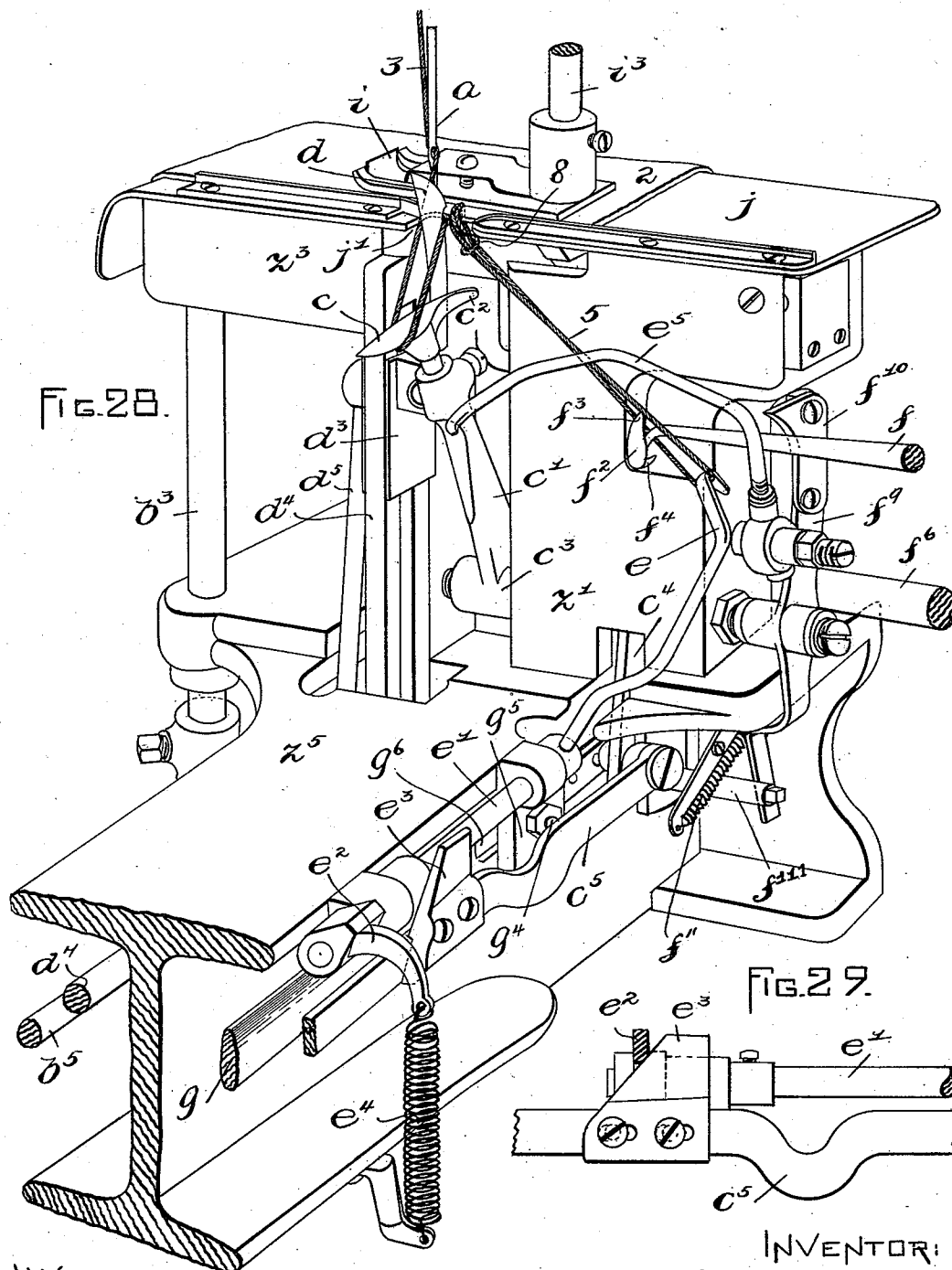
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WITNESSES:
Alice E. Brown
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INVENTOR:
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UNITED STATES PATENT OFFICE.

LYMAN L. BARBER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

SEWING-MACHINE FOR ATTACHING LOOPS TO FABRICS.

SPECIFICATION forming part of Letters Patent No. 536,946, dated April 2, 1895.

Application filed March 17, 1894. Serial No. 504,044. (No model.)

To all whom it may concern:

Be it known that I, LYMAN L. BARBER, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Sewing-Machines for Attaching Loops to Fabrics, of which the following is a specification.

This invention relates to a machine for attaching rows of elongated loops to the edges of fabric, such for example, as the loops commonly applied to the edges of hammocks composed of textile fabric.

The object of the invention is to provide means whereby such loops may be formed of and attached by a continuous cord employed in such a manner as both to constitute the loops and the means of attachment.

A further object is to assemble the loops as they are made, in such a way as to prevent entanglement thereof.

The invention therefore may be said to consist broadly in means substantially as embraced in claim 1 whereby the above-named objects may be accomplished, and also in numerous novel combinations and constructions of parts hereinafter described and pointed out in the claims.

The accompanying drawings illustrate a machine embodying the invention, and form part of this specification, the same letters and numerals of reference indicating the same parts throughout.

Figure 1 shows an elevation of one side of the machine, a tension head being removed to one side on account of limited space. Fig. 2 shows an elevation of the other side of the machine. Fig. 3 shows a front elevation of the machine. Fig. 4 shows a top plan view. Fig. 5 shows a rear elevation with part of the frame broken out. Fig. 6 is a vertical cross-section on line 6—6 of Fig. 4 looking toward the front of the machine. Fig. 7 is a top plan view of the work-supporting bed with the cover-plate removed. Fig. 7^a shows a plan view of the horizontal looper in the adjustment it assumes when holding a loop for the needle to enter. Fig. 8 shows a plan of the cover-plate and presser-foot with the presser-foot bar in section. Fig. 9 shows a vertical section on the line 9—9 of Fig. 3. Fig. 10 shows in side elevation the means for vibrat-

ing the needle and the measuring-looper. Fig. 11 shows in side elevation the means for operating the work-holding rod. Fig. 12 shows a section on line 12—12 of Fig. 11 looking downward. Fig. 13 shows a detail in perspective of a horizontally swinging looper. Fig. 14 shows an edge view of said looper with the supporting-bed in section. Fig. 15 shows a section on line 15—15 of Fig. 9. Fig. 16 shows a section on line 16—16 of Fig. 9. Fig. 17 shows a sectional view of the actuating cams. Fig. 18 shows a sectional detail taken on line 18 of Fig. 6. Fig. 19 shows a detail of a final looper and knot-tightener. Figs. 20, 21, 22, 23, 24, 25, 26, 27 and 28 are views illustrating the steps in one cycle of the machine's operation. Fig. 29 shows a detail side elevation of means for operating a hook which removes the completed loop laterally. Fig. 30 shows a sample of work of which the machine is capable.

In the description of the machine the various parts contributing to the formation of the loops and tying the same in the fabric will be first enumerated and their actuating means described, and afterward their co-operative action explained.

A straight needle, *a*, which may be flattened on one side to facilitate entrance of loopers hereinafter described, is fastened to a bar, *a'*, (see Fig. 1,) which fits a vertical slide-way in an oscillating holder, *a²*, pivoted to the head, *z*, of the fixed arm, *z'*, of the machine frame as shown at *a³*. The needle is reciprocated vertically by a lever, *a⁴*, centrally pivoted as shown at *a⁵*, to the arm, *z'*, and slotted at one end to receive a stud fastened in the bar, *a'*, and connected at the opposite end by a link, *a⁶*, with a crank-pin on a disk, *a⁷*, affixed to the driving shaft, *y*. The needle is vibrated forward and back by means of a rod, *a⁸*, connected with the holder, *a²*, through a slot in the head, *z*, (see Fig. 16,) and a vertically disposed lever, *a⁹*, (see Figs. 2 and 10,) centrally pivoted to the upright portion, *z²*, of the machine-frame and connected at its upper end with said rod and carrying a roll, at its lower end in engagement with a cam-groove, *a¹⁰*, in one side of a gear, *y'*, affixed on a counter-shaft, *y²*, and meshing with a gear, *y³*, on the driving-shaft, *y*.

A horizontally swinging looper or loop-holder, b , (see Fig. 7,) is arranged in a recess of the work-supporting bed, z^3 , and is designed to swing back and forth past the needle and
 5 around behind the same, the said loop-holder being of angular form, as shown, and tapered at the outer end to facilitate its entrance into the loop, and formed on the under side a short distance back of the tapered end with a lip,
 10 b' , (see Fig. 13) adapted to engage the loop and cause it to be carried on with the looper. The inner side of the outer arm of the looper back of the lip, b' , is cut away, as shown at b'' , to permit passage of the needle through the loop.
 15 The looper, b , is pivoted to an arm, b^2 , affixed to the upper end of a vertical rock-shaft, b^3 , (see Fig. 1) and to an arm, b^4 , affixed on the lower end of said shaft is attached a rod, b^5 , the rear end of which connects with a pendent lever, b^6 , pivoted to the portion, z^2 , of the
 20 frame and carrying a roll, b^7 , in engagement with a cam-groove, b^8 , in a disk, b^9 , affixed to the counter-shaft, y^2 . The oscillations of the looper, b , produced through the agencies just recited carry it back and forth past the needle.
 25 An additional movement to carry the looper around behind the needle's path is imparted through the following means: An arm, b^{10} , is pivoted to the bed and carries a roller, b^{11} , and bears against a set-screw, b^{12} , and the looper is formed with a shoe, b^{13} , which as the looper approaches the end of its rearward stroke encounters the roller, b^{11} , and the looper is caused thereby to turn on its
 35 pivot which carries its outer end around behind the needle's path. When the arm, b^2 , swings forward again, a spring, b^{14} , returns the looper to normal position with respect to the said arm, b^2 , said spring carrying the looper against a set-screw, b^{15} , entered through a lug on the arm.

A second looper or loop-carrier, c , which is also a loop-measurer is affixed in the upper end of an arm, c' , (see Figs. 2 and 10,) and is
 45 designed to swing forward and back in a vertical plane. Said looper has a tapered end to enter the loop and a laterally and upturned tail, c^2 , to hold the loop properly on and allow the looper to properly cast the loop. The arm, c' , is affixed to a shaft, c^3 , journaled in the
 50 lower end of a vertically extending recess in the standard, z^4 , of the machine-frame, and having affixed to it an arm, c^4 , to which is connected a rod or bar, c^5 , extending rearwardly and joining a pendent lever, c^6 , pivoted to the machine-frame and carrying a roll, c^7 , in engagement with a cam-groove in a disk, c^8 , on the counter-shaft, y^2 . Through these agencies the second looper is swung forward and back.

60 A third looper or loop-carrier, d , (Fig. 19,) which also constitutes a knot-tightener, is arranged to travel rectilinearly up and down below the needle and is formed with a beard, d' , to slide up over the loop and press against it so that on the return downward movement it will take over the loop and carry it down. It is to be observed that the throat, d^2 , under

the beard, d' , is askew, the object of which is to twist the loop and throw its sides out of transverse alignment. Said loop carrier, d , 70 is fastened to a slide, d^3 , which engages a slotted vertical slide-way, d^4 , fastened to the standard, z^4 , (Figs. 1 and 18,) and a pitman, d^5 , connects said slide, d^3 , with one arm of a bell-crank lever, d^6 , pivoted to the lower horizontal portion, z^5 , of the machine-frame. The
 75 other arm of this lever is connected by a rod, d^7 , with a pendent lever, d^8 , carrying a roll, d^9 , in engagement with a cam-groove in a disk, d^{10} , on the shaft, y^2 . Through these means 80 the third looper is reciprocated.

A hook, e , (Figs. 2 and 6,) is arranged to swing laterally in a vertical plane and take the formed loop from the looper, d , and remove it to one side. Said hook is affixed to 85 a rock-shaft, e' , journaled in bearings on the side of the frame, z^4 , and having affixed to it a curved arm, e^2 , extending in the path of an inclined block, e^3 , fastened to the bar, c^5 , and designed to be elevated thereby to throw the
 90 hook over to the loop. A spring, e^4 , connecting said arm, e^2 , with a fixed support, returns the hook to its outward position. A bent rod, e^5 , fixed to a bracket, e^6 , fastened to the standard, z^4 , extends over the back of the stand- 95 ard and outward therefrom and serves to guide the loop when brought over by the hook, e .

The loops as completed are strung on a rod, f , which extends out laterally from the standard, z^4 , (Figs. 3 and 6,) and is received at the 100 inner end in a recess in said standard. The inner end of the said rod is formed with a head, f^2 , having interturned hooks, f^3 and f^4 , (see Fig. 28,) at the upper and the lower sides so that when the loop has been cast over said 105 head it will be retained behind the same, and the lower hook, f^4 , extends nearly parallel with the neck of the head so as to hold the loop while the hook, e , disengages itself therefrom. The rod, f , is rigidly supported at its 110 outer end by an arm, f^5 , affixed to a bar, f^6 , which is supported at the outer end by a leg, f^7 , and at its inner end is fastened to the frame of the machine as shown at f^8 . The rod, f , has sufficient resiliency to permit the 115 movement necessary to take the loop over the head, f^2 , the movement being a compound one, *i. e.*, backward and downward, and imparted through the following instrumentalities: A lever, f^9 , (see Fig. 2,) is pivoted to the 120 standard, z^4 , and carries a shoe, f^{10} , at its upper end with a curved edge to act against the rod, f , and said lever is normally retracted by a spring, f^{11} . A pin f^{11} , projecting from a pitman, g , acts against the lever, f^9 , to move 125 the shoe, f^{10} , against the rod, f . A guard, f^{12} , prevents the loops from catching on the shoe, f^{10} . The pitman is fastened to an arm, g' , of a strap, g^2 , embracing an eccentric, g^3 , on the shaft y^2 . (See Fig. 11.) The pitman g is also 130 a lever, its fulcrum being a pin, g^4 , fastened in a fixed bracket, g^5 , and engaging a longitudinal slot, g^6 , in the pitman. It will be seen that the bar g will have a compound up-and-

down and forward-and-back movement, and this is employed to operate the toothed feeder, g^7 , through suitable connections.

A cover plate, j , is fastened over the bed, z^3 , and is suitably slotted for the feeder, and formed with a throat, j' , for the needle to pass through, said throat being so formed as to cause a slight binding of the cord or thread on one side to insure formation of a bight therein upon the withdrawal or upward movement of the needle, and flaring to allow easy movement of the knotted loops out of the throat.

The presser-foot, i , is depressed upon the goods by a spring, i' , bearing on an arm, i^2 , fastened to the presser-foot bar, i^3 ; and elevated by means of a lever, i^4 , bearing against the under side of the boss of said arm, i^5 , said lever being connected by a rod, i^5 , with a treadle, (not shown.)

Having now described the construction of the machine here illustrated, I shall next proceed to explain the performance of the parts through a cycle of the machine's operation, reference being had more particularly to Figs. 20 to 28.

The needle, a , descends through the fabric, 2, carrying the cord, 3, therethrough, as shown in Fig. 20, and then ascends, a bight 4 being formed of the cord at one side of the needle. As the needle ascends the looper, b , enters the bight 4, as shown in Fig. 21, and the lip, b' , engages the cord and forms a loop 5 of it, as shown in Fig. 22, drawing off the cord somewhat, the needle in the meantime traveling up along the cord. The movement of the looper on its own pivot as hereinbefore explained carries the loop 5 over behind the needle's first path of movement, as shown in Fig. 7^a. The needle now vibrates laterally, and takes the cord over the edge of the fabric and down through the loop 5 held by the looper, b , and the latter then retires leaving said loop 5 encircling the new cord brought down by the needle, as shown in Fig. 23. The needle moves upward forming a bight 6, of the cord on one side and the second looper, c , enters said bight, and moves off a short distance with it, as shown in Fig. 24, thereby taking up the loop 5 around the new loop 8. The third looper, d , now ascends through the loop 8 and its beard presses against the loop 5 so that as soon as it passes this loop, the latter takes under the beard and stands ready to be taken thereby upon the descent of the looper, as shown in Fig. 25. The looper, d , moves down until its beard is between the loop 5 and the edge of the fabric and then stoops while the looper, c , continues its rearward movement and measures off the thread to form the final loop, and the needle vibrates to position over the fabric and descends through the same. (See Fig. 26.) It will be noted that the two loops 5 and 8 form a slip-knot. The next step, therefore, is to tighten this knot on the fabric and leave one loop extending, and this is accomplished by the descent of the looper, d , which now

takes place while at the same time the looper, c , moves forward so that the loop 8 can be taken up and said looper, c , passes out of its loop, the looper, d , dwelling momentarily at this point. Looper, d , then continues downward to tighten the knot and the hook, e , comes across and takes over the off-side of the loop 5, (see Fig. 27,) which has now been brought down by the looper, d , and also twisted slightly, and said hook goes back carrying said side of the loop with it, while the looper, d , ascends and at a certain point in its ascent casts the loop which will then be held by the hook, e , as shown in Fig. 28, the knot being further tightened while the loop is thus held by the downward movement of the looper, d , in the formation of the succeeding loop. The hook has taken the loop across the lower outer corner of the head, f^2 , and said head is next moved outward and downward through the loop, (see Fig. 28,) said loop taking behind said head around its contracted neck. The head, f^2 , moves back, its lower hook, f^4 , passing under the lower side of the loop. The hook, e , moves inward and out of the loop which is held back by said hook, f^4 , and goes over for the next loop. This completes one cycle of the machine's operation.

As the loops are made they are strung along on the rod, f , and thereby prevented from becoming entangled.

A series of loops, as attached to the edge of a piece of fabric by the machine, is illustrated in Fig. 30. It will be observed that the loops are formed of and attached to the fabric by a single continuous thread or cord.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, it is declared that what is claimed is—

1. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, means for interlocking loops of cord around the fabric, means for drawing out one loop to a pre-determined length and holding it in its extended position, and means for taking up the adjacent loop and tightening the knot while the first mentioned loop is held extended, whereby said loop is permanently attached to the fabric and left pendent by the knot thus formed.

2. A machine of the character described comprising in its construction means for forming and attaching to fabric a series of loops, an elongated rod for holding the completed loops having its outer end fixed and the other end free and provided with a head for confining the loops, an independent carrier to take the loops to the said head, and means for moving the rod to pass the head through the loops.

3. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, an

elongated rod for holding the completed loops having one end fixed and the other free and provided with a head for confining the loops, a carrier to take the loops to the said head, a lever having a shoe to act against said rod, whose acting surface is formed to produce a compound movement of the rod, and means for vibrating the lever.

4. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally movable looper adapted to hold a loop for the needle to enter, a measuring looper, and a final looper adapted to take the first loop down through that held by the measuring looper and tighten the knot formed.

5. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally swinging looper adapted to pass alongside the needle and to travel behind the needle's path and hold a loop for the needle to enter, a measuring looper, and a final looper adapted to take the first loop down through that carried by the measuring looper and tighten the knot formed.

6. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally movable looper adapted to hold a loop for the needle to enter, a measuring looper pivoted to oscillate forward and back in a vertical plane and take a loop from the needle while in the first loop, and a final looper adapted to take the first loop down through that carried by the measuring looper and tighten the knot formed.

7. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally movable looper adapted to hold a loop for the needle to enter, a measuring looper and a vertically reciprocating final looper adapted to take the first loop through that held by the measuring looper and tighten the knot formed.

8. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally swinging looper adapted to pass alongside the needle and to travel behind the needle's path and hold a loop for the needle to enter, a measuring looper pivoted to oscillate forward and back in a vertical plane and take a loop from the needle while in the first

loop, and a final looper adapted to take the first loop down through that carried by the measuring looper and tighten the knot formed.

9. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally swinging looper adapted to pass alongside the needle and to travel behind the needle's path and hold a loop for the needle to enter, a measuring looper pivoted to oscillate forward and back in a vertical plane and take a loop from the needle while in the first loop, and a vertically reciprocating final looper adapted to take the first loop through that carried by the measuring looper.

10. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a looper adapted to hold a loop for the needle to enter, a measuring looper, a vertically reciprocating looper adapted to take the first loop through that held by the measuring looper, and a laterally swinging hook adapted to take the loop held by the said final looper.

11. A machine of the character described comprising in its construction a vertically reciprocating and laterally vibrating needle, a horizontally swinging looper adapted to pass alongside the needle and to travel behind the needle's path and hold a loop for the needle to enter, a measuring looper pivoted to oscillate forward and back in a vertical plane and take a loop from the needle while in the first loop, and a vertically reciprocating final looper adapted to take the first loop through that carried by the measuring looper, said final looper being constructed to hold the sides of the loop out of alignment in the plane of the hook's movement.

12. In a machine of the character described, the combination of a vertically reciprocating and laterally vibrating needle, a swinging looper-supporting arm, an angular looper pivoted to said arm and yieldingly held, means for vibrating the arm, and an abutment for the looper whereby it is caused to turn on its pivot, for the purpose described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of March, A. D. 1894.

LYMAN L. BARBER.

Witnesses:

ARTHUR W. CROSSLEY,
F. P. DAVIS.