

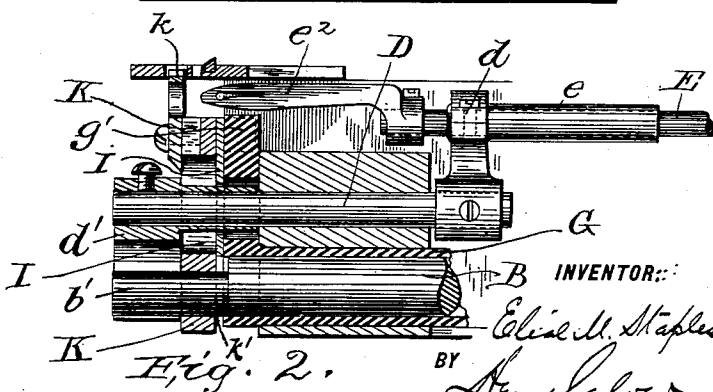
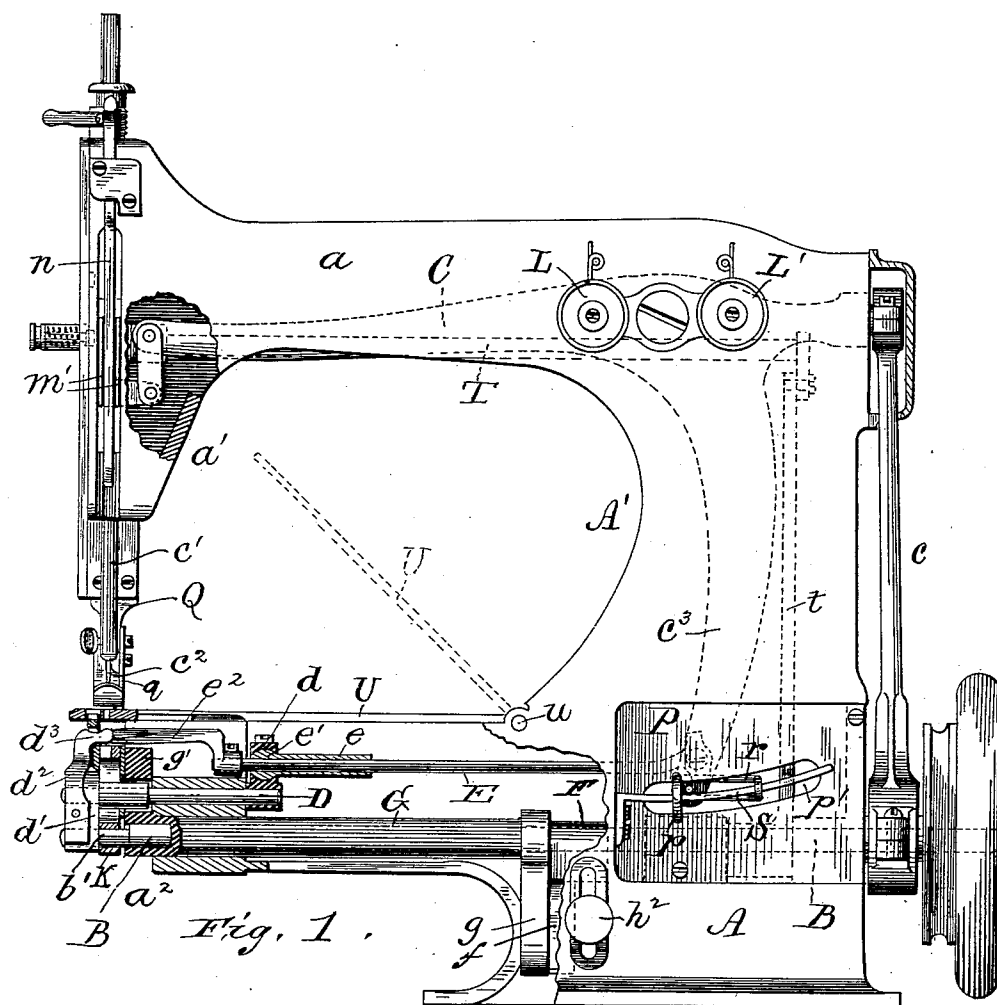
(No Model.)

2 Sheets—Sheet 1.

E. M. STAPLES.  
SEWING MACHINE.

No. 580,015.

Patented Apr. 6, 1897.



**WITNESSES:**

C. M. Benjamin.  
C. M. Sweeney.

**INVENTOR::**

-Elias M. Staples

BY *Amy Calver*  
ATTORNEY.

(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

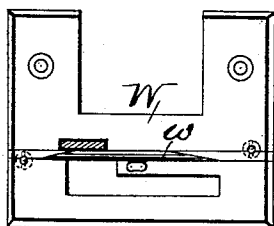


Fig. 6.

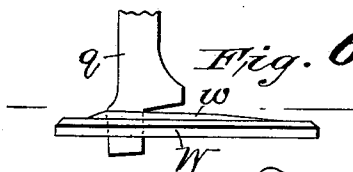


Fig. 7.

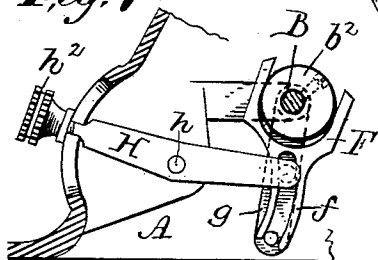


Fig. 4.

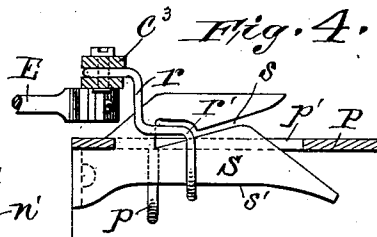


Fig. 8.

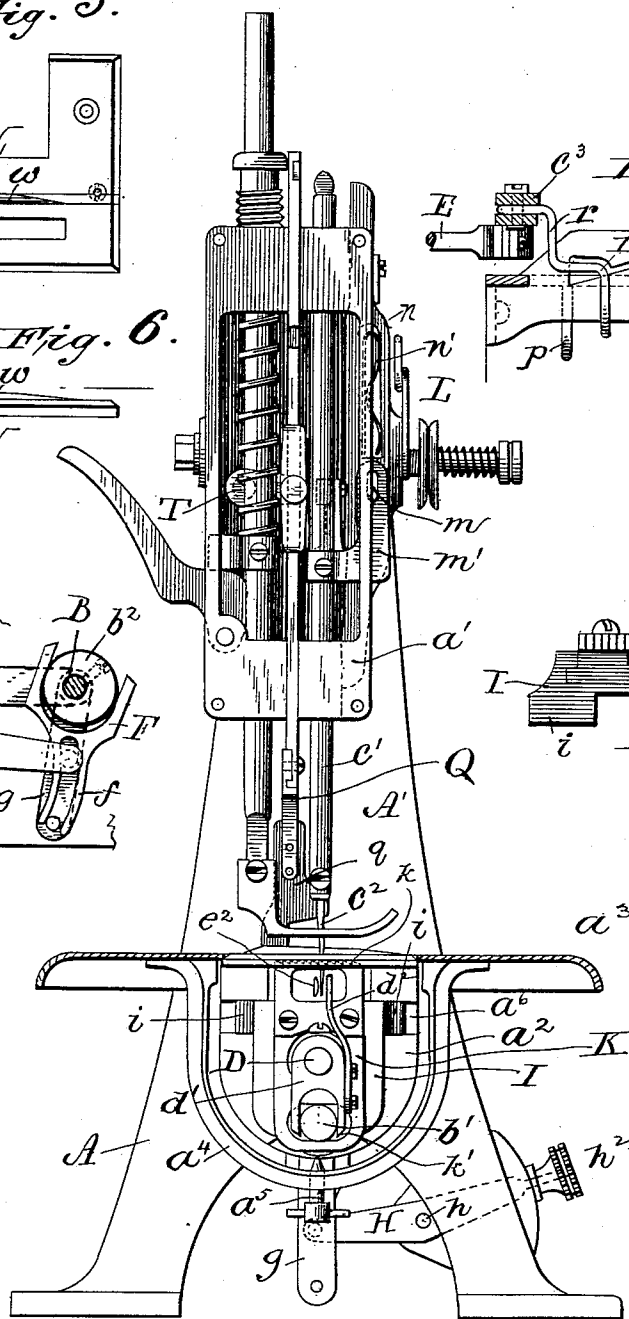
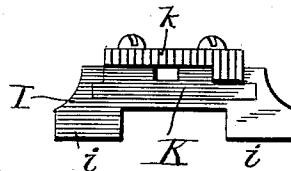


Fig. 3.

WITNESSES:

C. W. Benjamin.

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# UNITED STATES PATENT OFFICE.

ELIAL M. STAPLES, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF NEW JERSEY.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 580,015, dated April 6, 1897.

Application filed September 18, 1894. Serial No. 523,383. (No model.)

*To all whom it may concern:*

Be it known that I, ELIAL M. STAPLES, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to that class of sewing-machines which form the double-chain or "Grover & Baker" stitch, and has for its object to provide a machine of the class referred to which will be simple in construction, so that it will be inexpensive to make, and in which the movements are strong and positive, so that the machine will be capable of running at high speed and with but little noise.

In the drawings, Figure 1 is a side view, partly in section, of my improved machine. Fig. 2 is a sectional view at the forward end of the work-supporting arm on a larger scale than in Fig. 1. Fig. 3 is a front end view of the machine with the face-plate removed. Fig. 4 is a detail view of the lower-thread-take-up device. Figs. 5 and 6 are detail views to show the trimming-blades. Figs. 7 and 8 are detail views of the feeding mechanism.

The framework of the machine consists of the base A, the standard A', the overhanging arm  $a$ , having the head  $a'$  at its forward end, and the lower or work-supporting arm  $a^2$ . For some kinds of work a flat work-plate is desirable, and this "arm" machine may be converted into a bed-plate machine by means of the flat work-plate  $a^3$ , having a yoke  $a^4$ , by which and the set-screw  $a^5$  said work-plate may be removably attached to the arm  $a^2$ .

B is the driving-shaft, journaled in the lower part of the framework and provided near its rear end with an eccentric connected by a pitman  $c$  to the rear end or arm of the needle-operating lever C, to the forward end of which the needle-bar  $c'$  is connected to be reciprocated vertically in the head  $a'$ , said needle-bar carrying the usual eye-pointed needle  $c^2$ .

D is a small rock-shaft journaled in a bearing in the forward end of the arm  $a^2$  and having an upwardly-extending arm  $d$ , which supports a sleeve  $e$ , having a rounded or ball-like

portion  $e'$  to prevent binding at its point of connection to the arm  $d$ . The needle-operating lever C has a depending arm  $c^3$ , to the lower end of which is jointed the rear end of a rod E, carrying at its forward end the thread-carrying looper  $e^2$ , said rod E passing through the sleeve  $e$ . The rock-shaft D is provided at its forward end with an arm  $d'$ , slotted to embrace an eccentric  $b'$  on the forward end of the driving-shaft B, so that rotation of said driving-shaft causes a rocking movement to be imparted to the shaft D, and thus the looper-carrying rod E, passing through the sleeve  $e$ , carried by the arm  $d$  of said rock-shaft, will be moved to and fro laterally by said arm as said rod is reciprocated longitudinally by reason of its connection with the arm  $c^3$  of the needle-lever, thus causing the looper  $e^2$  to be moved forward on one side of the needle and backward on the other side thereof, as is usual in double-chain-stitch machines.

To the arm  $d'$  of the rock-shaft D is attached a plate  $d^2$ , having a finger  $d^3$ , which, as the needle is rising, is moved against or closely adjacent to the front side of said needle to throw out or open the loop of needle-thread on the rear or opposite side of the needle, so that the loop will be entered with certainty by the looper  $e^2$ , which moves forward as the needle rises on the side of said needle opposite to that on which said loop-forming finger  $d^3$  is placed.

The shaft B is provided with an eccentric  $b^2$ , embraced by a yoke F, having a slotted arm  $f$ , jointed at its lower end to an arm  $g$ , fast on the rear end of a tubular rock-shaft G, surrounding said shaft B, and provided at its forward end with a second rigid arm  $g'$ . The slot of the arm  $f$  is entered by a pin or roller-stud to be carried by a feed-regulating lever H, pivoted at  $h$  to a part of the machine-frame and provided at its outer end with a milled set-nut  $h^2$  to hold said regulating-lever in any desired position of adjustment.

The arm  $g'$  is embraced by lugs  $i$  on a horizontally-movable block or slide I, said lugs entering a horizontal guide-groove  $a^6$  in the front end of the arm  $a^2$ . The block or slide I is recessed for the reception of a block K, vertically movable in said block I and carry-

ing the feed-dog *k*. The block K is provided with a horizontal slot *k'*, in which the eccentric *b'* works, said eccentric thus serving to impart positive up and down movements to the feed-block K, and the latter being moved back and forth horizontally with the block I, which is operated positively in both directions by the arm *g'* of the rock-shaft G. This construction secures a strong and positive "square" four-motioned feed well adapted for a high-speed machine.

The needle thread passes from the tension device L through thread-take-up eyes *m*, formed in plates *m'*, carried by the needle-bar *c'* and working on opposite sides of a bar *n*, provided with an opening in which is placed a check-tension spring *n'*, pressing lightly against the inner wall of the opening in the bar *n*, so that the needle-thread passing through said opening from one to the other of the eyes in the plates *m'* will be momentarily detained by said spring when the needle is descending, and the slack will thus be controlled so that the thread will not get in the way of the point of the needle. This needle-thread-controlling mechanism is substantially the same as that which has long been in use in the Willcox & Gibbs machine, and its operation is therefore familiar to those skilled in the art to which my invention relates.

Coöperating with the above-described controlling device for the needle-thread is a novel take-up device for the looper-thread which I will now describe.

Attached to the lower end of the arm *c*<sup>3</sup> of the needle-bar-operating lever C is a take-up device consisting, preferably, of a wire loop *r*, bent at right angles to form a shoulder *r'*, and supported by a housing-plate P is a second wire loop *p*, said plate P having an opening or slot *p'*, through which the said loop *r* extends and in which it reciprocates when the machine is in operation.

S is a bent plate attached to the base A outside of the plate P and having a horizontal portion extending inward through the slot or opening *p'* of the said plate P, said horizontal portion of said plate S having an inclined slot *s*, which is so arranged relative to the path of movement of the shoulder *r'* of the loop *r* that as said loop is reciprocated with the arm *c*<sup>3</sup> of the needle-bar-operating lever and with the looper-operating rod E, connected with said arm, said shoulder will cross from the inner to the outer side of said inclined slot.

The looper-thread runs from the tension device L' to the forward side of the upper limb or bar of the loop *p*, thence through said loop around rearward of the loop *r* and down through the inclined slot *s* of the plate S, and thence forward below the said loop *r* and against the front edge *s'* of the plate S and through the hollow work-supporting arm *a*<sup>2</sup> to the looper *e*<sup>2</sup>, working in said arm. Thus as the said looper is making its backward

movement after having passed its thread through a loop of needle-thread the slack of the looper-thread is taken up by the wire loop-take-up device *r* during a portion of the backward travel of the said looper, but when in the backward movement of the said take-up device the shoulder *r'* thereof crosses over far enough to the front side of the inclined slot *s* of the plate S to permit the thread to escape past said shoulder into said slot the thread will be momentarily slackened, so that the stitch will not be drawn too tight, and thus a slack or elastic stitch seam suitable for knit goods will be produced. As the thread after escaping past the shoulder *r'* of the upper limb of the wire loop *r* will still be held by the lower limb of said loop, (owing to the direction the thread takes in running from said loop upward and forward past the front edge *s'* of the plate S,) the thread will be restored to proper position to repeat the above-described operation when the take-up loop *r* moves forward in unison with the looper. It will thus be seen that I not only provide a take-up device for the lower thread which is moved in unison with the looper, but I also provide a take-up device which is in a measure intermittent in its action, so that a slack-stitch seam may be produced. The timing of this slackening of the take-up action of the looper-thread may be varied by providing interchangeable plates S, having slots *s* of varying inclinations, or by any suitable or well-known means of adjustment of the plate S, as will be readily understood.

My improved machine is preferably provided with a trimming mechanism, which, as herein shown, consists of the blade *q*, carried by the trimmer-bar Q, connected to an arm at the forward end of a rock-shaft T, journaled in the overhanging arm A and having an arm at its rear end connected by a pitman *t* with an eccentric on the driving-shaft B. The throat-plate W is provided with a removable stationary blade *w*, coöperating with the movable blade *q* in the usual manner.

The hollow work-supporting arm *a*<sup>2</sup> is open at its top for access to the looping mechanism, and is provided with a longitudinally-extending cover-plate U, hinged at its rear end at *u* to the machine-frame at the rear end of said arm, said hinge being transverse to said arm, so that said plate may be lifted, as denoted by dotted lines in Fig. 1.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a double-chain-stitch sewing-machine, the combination with the needle-bar and its operating-lever C, having the depending arm *c*<sup>3</sup>, of the looper-rod E connected to said arm, the looper carried by said rod, the short rock-shaft D at the forward end of the work-support and having a jointed guide or support through which said rod extends and in which it reciprocates, and means for positively rocking said shaft in both directions to impart

positive back-and-forth lateral movements to said looper-rod and looper.

2. The combination with the needle-bar  $c'$ , of the operating-lever C having the depending arm  $c^3$ , the looper-rod E jointed at its rear end to said arm and provided at its front end with the looper  $e^2$ , the rock-shaft D having the arm  $d$  and the forked arm  $d'$ , the sleeve  $e$  through which said looper-rod extends and which is jointed to and supported by said arm  $d$ , and the driving-shaft B having an eccentric  $b'$  working in the fork of the said arm  $d'$  and serving to impart positive movements in both directions to said rock-shaft.

3. In a double-chain-stitch sewing-machine, the combination with a needle and a looper and their operating mechanism, of a looper-thread-take-up device movable in unison with the said looper, as the latter is reciprocated longitudinally, said take-up device having a cast-off shoulder, and a plate having an inclined slot through which the looper-thread runs, said inclined slot being so arranged as to cross the plane of movement of the said cast-off shoulder on said take-up device.

4. A take-up mechanism for double-chain-stitch sewing-machines consisting of the combination with the needle-bar-operating lever having the depending arm  $c^3$ , of the wire loop or device  $r$  attached to said arm and having the shoulder  $r'$ , the plate P having the slot or opening  $p'$  and the wire loop  $p$ , and the plate S having the inclined slot  $s$  so arranged as to cross the plane in which said shoulder  $r'$  travels as said loop or device  $r$  is moved back and forth with said arm  $c^3$ .

5. The combination with the driving-shaft

B having the eccentric  $b^2$ , of the yoke F embracing said eccentric and having the slotted arm  $f$ , the rock-shaft G having an arm  $g$  to which said arm  $f$  is pivoted near the end of the latter, said shaft G having at its forward end the arm  $g'$ , the feed-regulating lever H pivoted to the machine-frame and having a pin or stud extending into the slot of the arm  $f$ , the horizontally-movable block or slide I having lugs or parts embracing a portion of the said arm  $g'$ , the slide or block K vertically movable in the said slide or block I and carrying the feed-dog  $k$ , and the eccentric  $b'$  for imparting vertical movements to the said slide or block K.

6. The combination with the needle-bar  $c'$ , of the operating-lever C having the depending arm  $c^3$ , the looper-rod E jointed at its rear end to said arm and provided at its front end with the looper  $e^2$ , the rock-shaft D having the rear arm  $d$  and the front forked arm  $d'$ , the latter being provided with the plate  $d^2$  having the loop-forming finger  $d^3$  which extends past the needle on the side thereof opposite to that from which the said looper takes the loops of needle-thread, the sleeve  $e$  through which said looper-rod extends, and which is supported by said arm  $d$ , and the driving-shaft B having the eccentric  $b'$  working in the fork of the said arm  $d'$  and serving to rock said shaft D.

In testimony whereof I affix my signature in presence of two witnesses.

ELIAL M. STAPLES.

Witnesses:

HENRY CALVER,  
J. F. JAQUITH.