

(Model.)

4 Sheets—Sheet 1.

E. THIMONNIER, FILS, & C. VERNAY.

SINGLE THREAD SEWING MACHINE.

No. 287,592.

Patented Oct. 30, 1883.

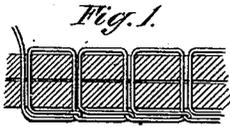


Fig. 2.

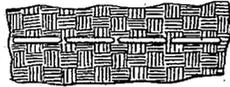


Fig. 3.



Fig. 4.



Fig. 5.

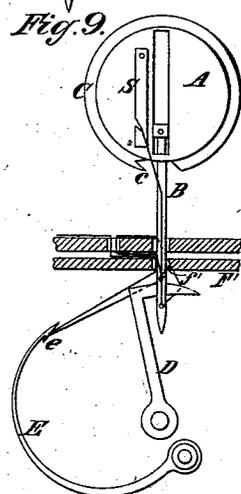
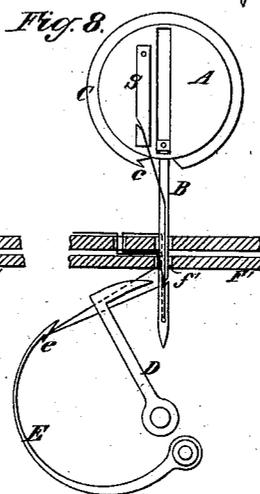
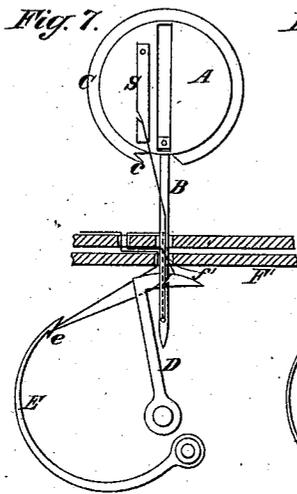
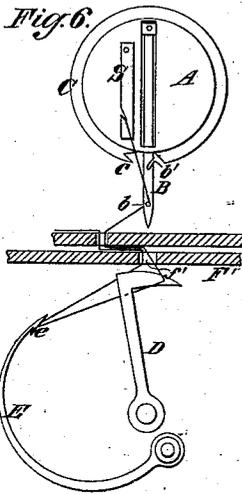


Fig. 10.

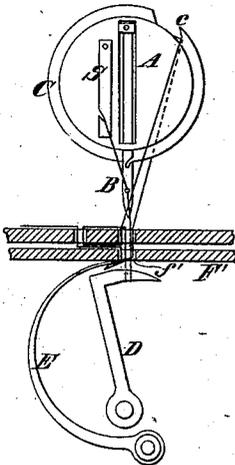


Fig. 11.

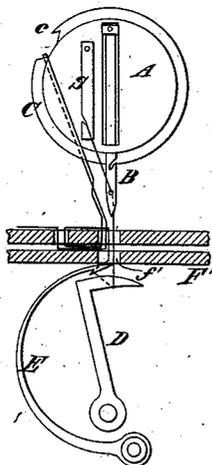


Fig. 12.

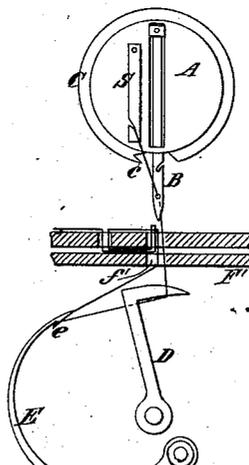
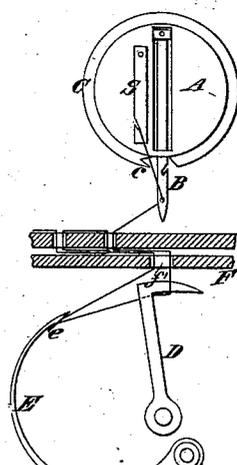


Fig. 13.



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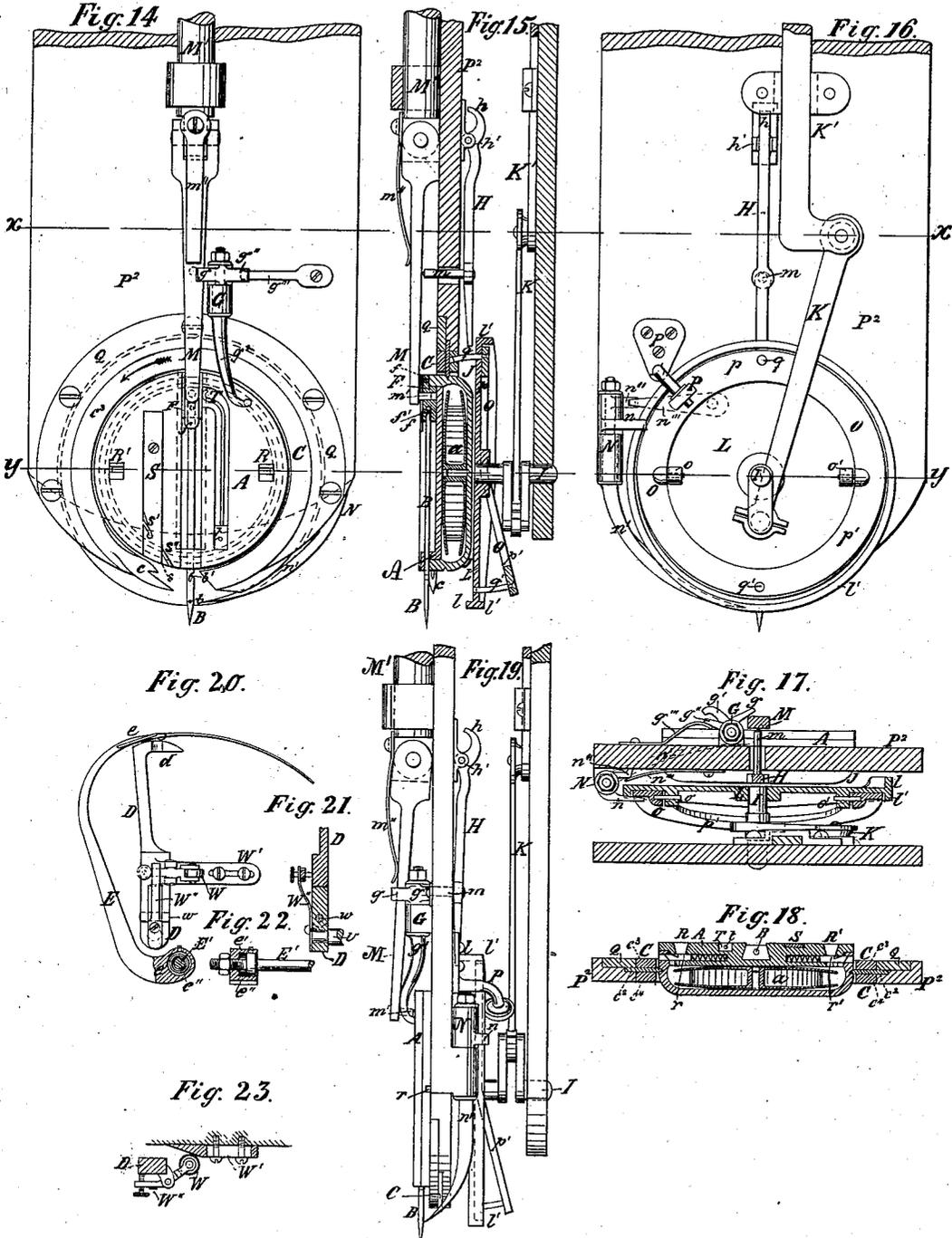
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SINGLE THREAD SEWING MACHINE.

No. 287,592.

Patented Oct. 30, 1883.



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(Model.)

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Fig. 25.

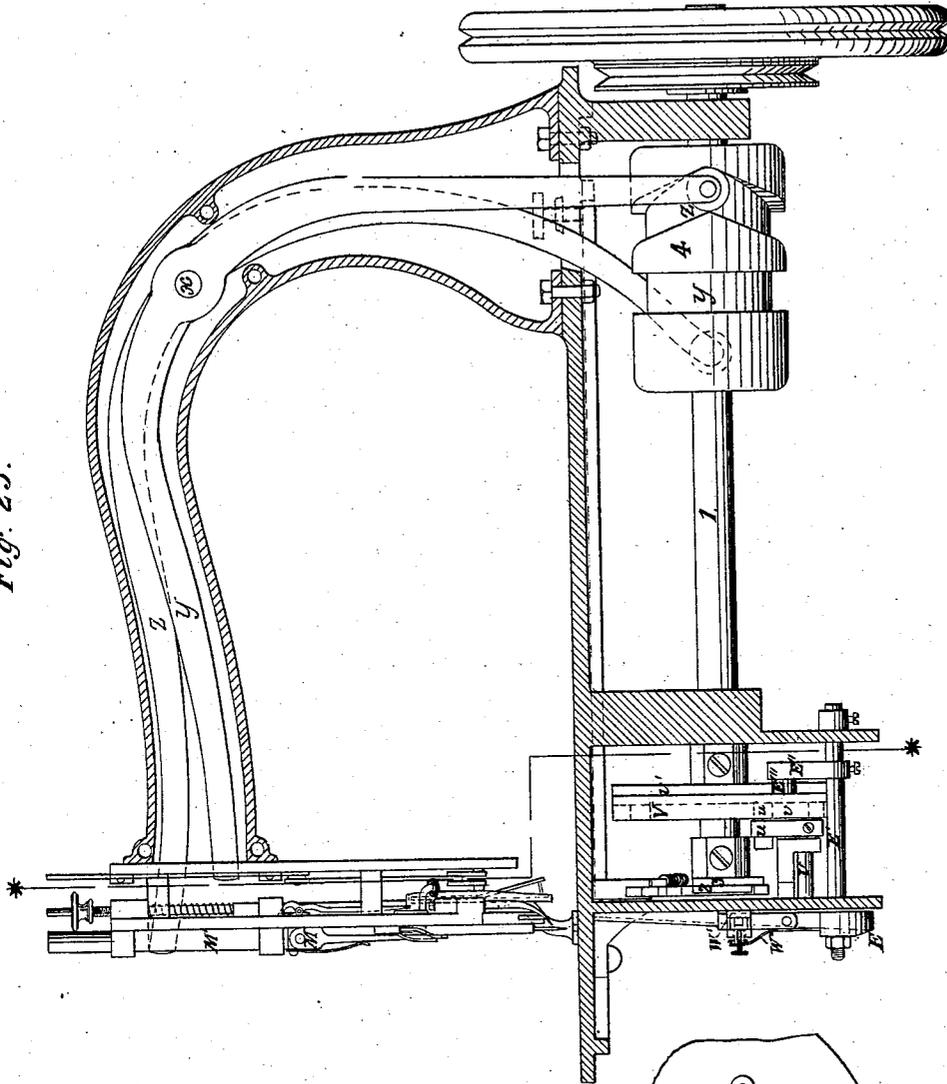
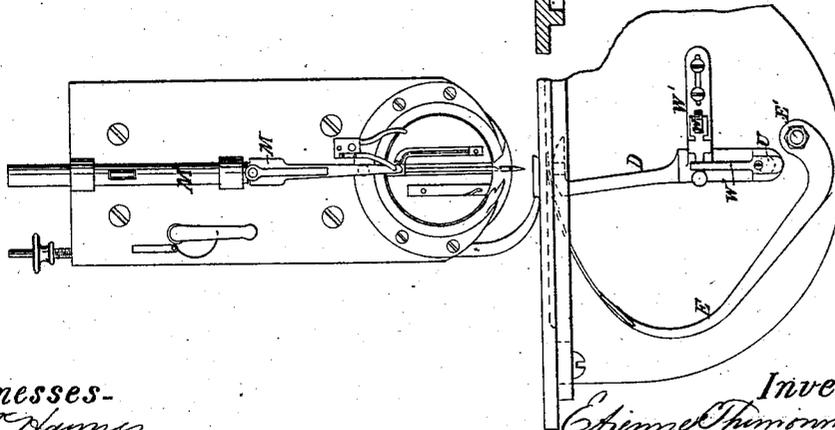


Fig. 24



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(Model.)

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Fig. 26.

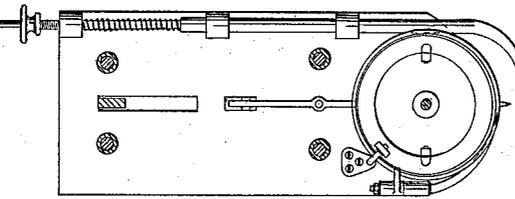


Fig. 27

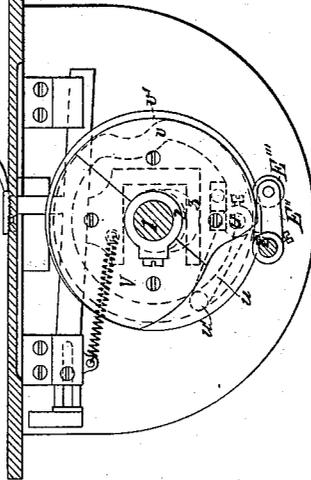
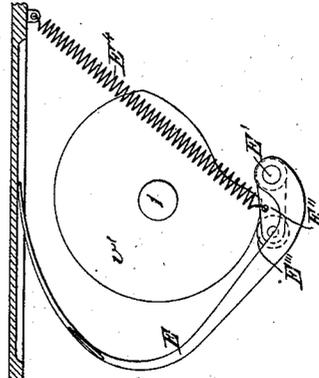
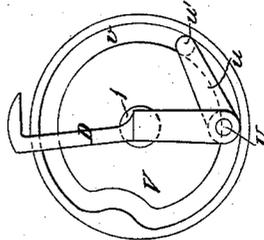


Fig. 28.



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# UNITED STATES PATENT OFFICE.

ETIENNE THIMONNIER, FILS, AND CLAUDE VERNAY, OF LYONS, FRANCE;  
SAID THIMONNIER, FILS, ASSIGNOR TO SAID VERNAY.

## SINGLE-THREAD SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 287,592, dated October 30, 1883.

Application filed February 18, 1882. (Model.) Patented in France January 6, 1882, No. 146,719; in England January 11, 1882, No. 158; in Belgium January 14, 1882, No. 56,768, and in Germany January 20, 1882, No. 19,115.

*To all whom it may concern:*

Be it known that we, ETIENNE THIMONNIER, the son, and CLAUDE VERNAY, both of Lyons, in the Republic of France, have invented certain new and useful Improvements in Single-Thread Sewing-Machines, of which the following is a specification, reference being had to the accompanying drawings.

Our improvements in sewing-machines relate to that class of machines which sew with a single thread, and provide for making with such a machine and thread a stitch which will not draw out or rip, thereby dispensing with the use of a shuttle and the inconveniences consequent upon the use of a second thread. In short, by our improvements we make a stitch which in some degree resembles the stitch made by hand, and which will not come undone, even in case of breakage of the thread.

Figure 1 represents larger than the usual size the stitch made by our invention as it might appear in a section of the cloth taken in the line of the seam. Fig. 2 is a view of the stitch as it appears on the face of the cloth. Fig. 3 is a view of the same as it appears on the back of the cloth. Figs. 4 and 5 represent on a scale larger than the usual size two kinds of needles which may be used in the machine. Figs. 6, 7, 8, 9, 10, 11, 12, and 13 are simple diagrams representing, half-size, the thread-enchaining devices in several different relative positions illustrating the process of making the stitch. Fig. 14 is a front view, full size, of the lower part of the head of the machine. Fig. 15 is a central section taken at right angles to and corresponding with Fig. 14. Fig. 16 is a view, corresponding with Figs. 14 and 15, of the working parts within the head, taken in the opposite direction to Fig. 14. Fig. 17 is an irregular horizontal section of the head of the machine, taken partly on the line  $xx$  and partly on the line  $yy$  of Figs. 14, 15, and 16, but deviating slightly from both of those lines in such way as to best show mechanism within and connected with the head. Fig. 18 is a horizontal section in the line  $yy$  of Figs. 14, 15, and 16, showing the thread-bobbin and the bobbin-holder, and illustrating the method of supporting the latter. Fig. 19 is a side view

of the part of the machine-head corresponding with Figs. 14, 15, 16. Fig. 20 is a front view of the oscillating looper and loop-extender. Fig. 21 is a vertical section of part of the oscillating looper. Fig. 22 is a side view of parts of the loop-extender. Fig. 23 is a horizontal section of the oscillating looper and its appurtenances. Fig. 24 is a face view of the machine, half-size. Fig. 25 is a vertical section of the machine, corresponding with and at right angles to Fig. 24. Fig. 26 is a vertical section corresponding with Fig. 25 in the line \*\*, as seen looking from the right of the latter figure. Fig. 27 is a front view of what is hereinafter termed the "loop-extender" and its operating mechanism. Fig. 28 is a front view of what is hereinafter termed the "looper" and a part of its operating mechanism.

We will first describe the stitch-making devices, which constitute the principal elements of the machine. These devices for making the stitch shown in Fig. 1 are as follows: first, a hollow bobbin-holder, A, containing the bobbin  $a$ , and carrying a thread-clamp, which regulates the issue of the thread, and provided with a vertical diametral groove or guide in which the needle works; second, a needle, B, sliding in the vertical groove or guide and operated by a needle-carrier, and from which it is capable of disconnection in the operation of the machine, as will be hereinafter described; third, a circular hook, C, surrounding the bobbin-holder and having a rotary movement, and intended to pass the thread above the needle in such a manner as to form the knot of the stitch; fourth, an oscillating hook, D, which may be termed the "looper," arranged under the table of the machine; fifth, a hooked loop-extender, E, also placed under the table of the machine.

The needle B, which we employ, may be of either of the two forms shown in Figs. 4 and 5. That shown in Fig. 4 has an eye,  $b$ , near its point, and a hook,  $b'$ , at a certain distance above the said eye. That shown in Fig. 5 only differs in that, instead of the eye  $b$ , there is an opening forming a hook,  $b^*$ . The eye  $b$  is intended to receive the thread in the same way as the eye of an ordinary needle, and the

opening  $b^*$  may be considered as an eye with an opening in the side for the convenience of threading. The peculiarity of the needle is in the hook  $b'$ , the point or extremity of which 5 turns upward or away from the point of the needle, so that as the needle moves upward or is withdrawn from the cloth the hook will catch a thread presented across it, but the throat of which is sloped outward in an upward direction, or a direction backward from 10 the front, so that as the needle moves downward or forward through the cloth a thread in the hook  $b'$ , being, checked by any means, would slip easily out of the said hook.

15 We will now proceed to describe the movements made and the successive positions taken by the several devices hereinabove mentioned during the formation of the stitch, having reference to Figs. 6, 7, 8, 9, 10, 11, 12, and 13 of 20 the drawings.

Position 1: In this position (represented in Fig. 6) the thread leaving the bobbin passes the clamp on the bobbin-carrier through the hole  $b$  of the needle B, and through the cloth 25 at the place where it has been previously perforated, descends through the hole  $f'$  in the throat-plate  $F'$  or bed-plate of the machine, below which, in the form of a loop, it surrounds the oscillating hook or looper D, and is caught 30 by the hook  $e$  of the loop-extender, whence it repasses through the hole  $f'$  to rejoin the stitch previously made.

Position 2: In this position (shown in Fig. 7) all the devices remain in the position last 35 mentioned, except the needle B, which has descended through the cloth and through the loop formed around the looper D, in which there is a notch or cavity, to be hereinafter more fully described, in which the needle has 40 just descended. The needle now having arrived at the bottom of its stroke, its hook  $b'$  is placed in juxtaposition with the portion of the loop retained at the time by the hook D and the extender E.

Position 3: In this position (shown in Fig. 8) the needle and the thread-extender E remain stationary; but the looper D has moved 45 back, and at the same time moved a little laterally to disengage itself from the needle, and has abandoned the loop to the extender E, which, by the aid of a spiral spring adapted to the interior of its head, maintains a tension on the thread thus abandoned, and obliges 50 it to enter into the hook  $b'$  of the needle.

Position 4: In this position (shown in Fig. 9) the extender E has not moved; but the looper D has advanced and engaged itself in a new loop which has been presented to it by the 55 needle, and the latter is beginning to rise with the loop in its hook  $b'$ .

Position 5: This is shown in Fig. 10. The needle has completed its upward movement, during which by its hook  $b'$  it pulls the loop 60 through the cloth far enough for it to be caught by the beak  $e$  of the rotary hook C, which has now taken it, and is carrying it over the bob-

bin-holder A in such a manner that one part remains in front of and the other part passes behind the said holder, which is so arranged as to permit the passage of the thread. 70 This operation is facilitated by a "throw-over" lever, which will be hereinafter described, which conducts one of the sides of the loop behind the bobbin-holder, or by any other suitable means, such as a helical wing 75 provided on the bobbin-holder. While the beak of the hook C is rising circularly, the extender E advances and delivers up the loop which it had previously kept extended. This delivery is effected simply by the point of the 80 hook  $e$  passing beyond the loop at the time when the latter has been drawn nearly close up to the plate  $F'$  by the rotary circular hook C.

Position 6: This is shown in Fig. 11. The point of the rotary hook C has passed the 85 vertical position, and the loop which is being carried over by the said hook has passed between the bobbin-holder and the needle-carrier, the needle having been momentarily disconnected from the carrier to permit of such 90 passage, and immediately thereafter reconnected, and the loop having passed over the head of the needle. The extender E is now moving back and has caught upon its hook 95 the new loop, which has been engaged by the looper D, and which it now opens, taking the thread from the preceding loop, abandoned by the rotary hook C.

Position 7: This is represented in Fig. 12. The needle A and the looper D remaining stationary, 100 the beak  $e$  of the rotary hook C continues its downward movement at the same time that the extender, moving back, rapidly extends the new loop, thereby tightening the stitch previously formed. 105

Position 8: In this position, which is shown in Fig. 13, the extender E has continued to tighten the stitch and the feed has taken 110 place, the cloth having been moved to the left a distance equal to the length of stitch, by which movement the tightening of the stitch is continued and the cloth is replaced in position to receive a new stitch.

It may now be easily and briefly explained how the stitch is made. 115

The needle in descending pierces the cloth and passes through the loop, which is retained by the looper D, and which is engaged also on the hook of the extender E. The looper D 120 retires, and thus abandons to the extender alone the loop which they had together retained. Then it advances again to seize the new loop brought down by the needle. The needle then rises, and when it has arrived at its highest position the circular hook C 125 again seizes the needle-thread and causes the loop which it forms to pass around the bobbin-carrier and the needle, the extender E yielding the thread in proportion to this movement up to the time when the beak  $e$  of 130 the hook C arrives at its vertical or highest position, at which instant the hook  $e$  of the

extender, having itself passed the vertical, abandons the thread of the first loop, which had been yielded to it by the looper D, and then, in returning, seizes the second loop placed upon the looper D. At this instant the rotary hook C, having in its turn passed the vertical, abandons the loop, which is returned, and of which the thread is drawn under the plate of the machine by the extender E, which, moving backward, tightens the stitch and obliges it to pass under the cloth at the same time as the feed-movement, which completes the tightening of the knot and places the cloth in position to receive a new stitch.

It may be seen that in this machine the thread is never abandoned to itself, the extender E having for its object the maintenance of a certain tension in all the positions which it successively takes, which prevents entanglement and assures the formation of a stitch.

We will now describe the mechanism for moving the several stitch-making devices.

*Bobbin-holder.*—The bobbin-holder A, Figs. 14, 15, 16, 17, 18, consists of a circular box with rounded edges, made of two pieces fitted one into the other at the rim, and secured together by means of two small bolts,  $r r'$ , (see Fig. 18,) which are fitted to one part, and are pressed out into holes in the other by means of small spiral springs arranged behind them. These bolts may be drawn back, to allow the opening of the box or holder for inserting or changing the bobbin, by the insertion of a small instrument through openings R R in the back of the box into notches in the said bolts. The bobbin  $a$ , which is contained in the said holder, is capable of turning freely about its axis and furnishes the thread as required by the machine. The thread passes out of the box A through an opening in its periphery situated opposite the point  $s$ , Fig. 14, and very near its face, and passes thence under the thread-clamp S, formed by a metal spring, and through a notch,  $s'$ , in the said clamp, thence through a small guide,  $s''$ , consisting of a groove in the face of the box, and thence to the eye  $b$  or  $b^*$  of the needle. This guide  $s''$  may, however, be dispensed with. The front part of this bobbin-holder A, forming the cover, has in its middle a vertical slide-way, in which works the slide F, which forms the head of the needle. This slide or head is bored out from the bottom to form a socket for the reception of the upper part of the shank of the needle, which may be secured therein by a set-screw or other convenient means, but is represented in Figs. 14, 15 as secured therein by a spring-catch,  $f f'$ , which consists of a small plate-spring,  $f$ , which is secured at its upper end by riveting or otherwise to the upper part of the face of the said slide or head, and which has secured in it a tooth or pin,  $f'$ , which passes through a hole provided for it in the socketed part of the said slide or head and enters a notch in the upper part of the needle-shank and has also provided in it a hole or

notch for the reception of a small pin or tenon,  $m'$ , provided on the movable portion or finger M of the needle-carrier M M', which will presently be described. The said slide or head also has in it a lateral groove, into which enters a small spring-stop,  $t$ , which is placed in a groove, T, provided in the front face of the bobbin-holder, and which holds the needle immovable while it is disconnected from the needle-carrier. The bobbin-holder A is supported by the circular hook C, which surrounds it almost completely, and isolates it on all sides, in order to permit the passage of the loop of thread which is to form the knot. The circular movement of the said holder with the hook is prevented by the slider F, while the latter is connected with the needle-carrier M M', and when the slider F is disconnected the holder is held stationary by a special oscillating piece, G, (see Figs. 14, 18, 19,) pivoted to the front plate of the head of the sewing-machine. This oscillating piece has three arms,  $g g' g''$ , of which the first,  $g$ , is operated upon by the movable portion M of the needle-carrier when the latter is thrown out to detach the needle, the second,  $g'$ , holds the bobbin-holder by entering a hole in its front face, and the third,  $g''$ , is acted upon by a return-spring,  $g'''$ .

*Circular rotating hook.*—The hook shown in detail in Figs. 14, 15, 18 is formed of a disk, C, having an opening at the place where is formed the beak  $c$ , which takes the thread from the needle. This disk, for facility of construction, may be made, as shown in the section, Fig. 18, of three concentric rings,  $c^1 c^2 c^3$ , screwed or otherwise fastened together. The middle one,  $c^2$ , has a larger external diameter and smaller internal diameter than the front and back ones,  $c^1 c^3$ , in order to form inner and outer flanges. The outer flange is fitted to turn freely in an opening in the front plate, P<sup>2</sup>, of the head of the machine, and confined therein by a ring, Q, which is open in its lower part, and which is secured to the said plate by means of screws. The inner flange formed by the said ring enters a groove in the periphery of the bobbin-holder and forms a bearing for the latter. The beak  $c$  may be formed upon the front ring,  $c^1$ , itself, or be made of a separate piece secured to the face thereof. Rotary motion is given to the hook C in the following manner: A lever, Y, placed in the curved supporting-arm of the head of the machine, operates through a sliding rod, K', and a pitman, K, (see Figs. 15, 16, 17, 19, 25,) to produce the rotary motion of a crank-shaft, I, which carries at one end a disk, L, on the rear face of which is arranged a crown, O, (see Figs. 15, 16, 17,) which consists of a ring bent on a diametral line, so that the two halves or segments  $p p'$  are in two planes oblique to each other, as shown in Fig. 15. This crown is attached to the disk L by two pivots,  $o o'$ , which are parallel with the diametral line of junction of the planes of its two segments,  $p p'$ . The crank-shaft I in turning turns the disk L,

which is keyed to it, and which communicates its rotation to the disk or crown O, of which the two portions situated in two different planes pass successively under a roller, P, 5 which turns on a fixed stud secured to the back of the front plate of the machine-head. The segments  $p p'$  carry one or more tenons,  $q q'$ , which engage successively in corresponding holes made in the rear face of the rotary hook 10 C. One or other of these tenons is always engaged with the hook, of which the continuous rotation is assured, while the thread may pass freely into the empty space J, provided immediately behind the bobbin-holder, one or other 15 of the two tenons  $q q'$  being always separated from the hook C at the proper time for the loop to pass. The disk L, of which we have just explained one of the functions, is, moreover, terminated by a rim, of which the two sides form two cams,  $l l'$ , of which one effects the detachment of the needle-carrier from the needle-head, and the other effects the movement of the "throw-over" lever, which will be hereinafter more fully described.

25 *Needle-carrier.*—This carrier consists of a reciprocating bar or piece, M', and a finger or lever, M, (see Figs. 14, 15, 17, 19,) pivoted to the lower end of the said bar, and having at its lower extremity a small tenon,  $m'$ , to engage in a hole or notch in the slider F. A spring,  $m''$ , attached to the bar M', serves to keep the tenon in the said hole or notch and the needle connected with the carrier all the 30 time the finger M' is not thrown out by mechanism provided for the purpose. This throwing out is produced by a pin,  $m$ , attached to a lever, H, which is pivoted at  $h'$  to the back of the front plate of the machine-head, and of which the lower part is acted 35 upon at proper time by the cam  $l$  on the edge of the disk L. The upper extremity,  $h$ , of this lever H, by abutting against the front plate of the machine-head, prevents the lower extremity of this lever from remaining in contact 45 with the disk L longer than is necessary.

*Throw-over lever.*—In order to assure the passage around the bobbin-holder of the loop extended by the beak  $c$  of the rotary hook C, we have arranged under the bobbin-holder 50 the throw-over lever N, Figs. 14, 16, 17, 19, which is inserted into the loop seized by the said hook, and which is actuated by the cam  $l'$  on the back of the disk L. This lever has three arms,  $n n' n''$ , of which one,  $n$ , is acted upon by the cam  $l'$ , another,  $n'$ , conducts the thread of the loop behind the bobbin-holder and draws it into the free space J at the back thereof, and the third arm,  $n''$ , receives the action of a return-spring,  $n'''$ , which returns it 60 to its initial position.

*Oscillating hook or looper.*—This hook D (represented in detail in Figs. 20, 21, 23) is arranged under the cloth plate or bed of the machine, and receives a compound movement. 65 It oscillates to take and leave the loop which has been presented to it by the needle, and at

the same time it draws back in a direction parallel to the axis of oscillation at the proper moment to escape the needle which has been 70 in its notch  $d$ , Fig. 20. The oscillating movement is communicated to the looper D by the arbor U, (see Figs. 21, 24, 25, 26, 28,) which works in fixed bearings under the table, and to one end of which the looper is attached, and which carries at its other end an arm,  $u$ , 75 which has a wrist,  $u'$ , working in the groove  $v$  of a cam, V, keyed upon the main shaft 1 of the machine. Continuous rotary motion being given to the shaft 1 by the treadle or other means, the cam V by its rotary motion produces the oscillation of the arm  $u$ , and through it a corresponding movement of the looper D, 80 by which the latter is made to take and leave the loop. The backward movement of the looper, which enables it to escape the needle 85 which has been working in its groove  $d$ , is produced in the following manner, (illustrated by Figs. 20, 23, 24, 25.) The looper is made in two pieces, of which one, constituting a stock, is secured rigidly on the arbor U, and the other, which is the upper or principal piece, 90 and has on it the hook, is pivoted to the first piece or stock by a pivot,  $w$ . The upper piece has attached to it by means of a small adjusting-piece and adjusting-screw an anti-friction 95 roller, W, (best shown in Fig. 23,) which, during the swinging movement of the whole looper about the axis of its arbor U, comes into and out of contact with an inclined plane, W', secured adjustably to a fixed portion of the machine 100 below the bed, and so causes the hook to swing on its pivot  $w$ . The proper relation of the looper D and the roller W with the inclined plane W' is maintained by a spring, W'', which is secured to the stock and presses against the 105 upper piece of the hook.

*Loop-extender.*—The extender E, intended to give to the thread a constant tension, is represented in Figs. 20, 22, 24, 25, 26, and 27. It has at one of its extremities the hook  $e$ , for seizing 110 the thread. The other extremity,  $e'$ , is secured to its arbor E' by means of a spiral spring,  $e''$ , (see Figs. 20 and 22,) coiled around the said arbor and intended to exert a yielding or elastic tension on the thread of the loop 115 when the looper D retires, as has been above described. Upon the arbor E' is keyed a crank-arm, E'', carrying an anti-friction roller, E''', which by a spiral spring, E<sup>4</sup>, connecting the arm E'' with the bed-plate or some fixed 120 portion of the machine, as shown in Fig. 27, is held against the perimetrical portion  $v'$  of the cam V, which is of such form (shown in Figs. 26 and 27) as to produce the necessary movements of the loop-extender, as herein 125 above described.

A machine constructed according to our invention may have a feeding device of any suitable kind. That represented is a drop-feed operated by two eccentrics, 2 and 3, keyed 130 upon the main shaft 1. The levers Z and Y, by which the needle-carrier and the rotating

hook C are operated, derive motion from a cam, 4, which is keyed on the main shaft, and which contains two grooves, *z* and *y*, which receive anti-friction rollers on the lower ends of said levers.

We do not claim as a part of this invention either of the two forms of needle herein described as suitable for our machine, as these may be the subject of another or other applications to be made by us for Letters Patent.

We do not claim, broadly, a needle with an eye near the point and a hook above said eye.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, in a sewing-machine, with a needle-carrier placed above the work-table, and a needle detachable from said carrier, of a circular rotating hook, and a thread-bobbin and bobbin-holder contained within said hook, all arranged above the work-table, and operating for the production of a stitch from a single thread, substantially as herein described.

2. The combination, with the needle having its head fitted with or composed of a slide, F, of the bobbin-holder, A, containing a slide-way for the said head or slide, substantially as and for the purpose herein set forth.

3. The combination of the needle, the needle-bar M', the finger M, lever H, and cam I, substantially as and for the purpose herein set forth.

4. The combination, with the oscillating looper D, of the loop-extender E, arranged behind said oscillating looper, the spindle or arbor E', carrying the said loop-extender, the coiled spring e'', between said arbor or spindle and loop-extender, and a cam for producing the oscillating movement of said spindle or arbor, substantially as herein described.

5. The combination, with the needle and

the rotating circular hook C, bobbin-holder A, and bobbin *a*, all arranged above the work-table or support, of the throw-over lever N, for throwing over the bobbin-holder the loop delivered by said hook, substantially as herein described.

6. The combination of the oscillating looper D, made of two pieces jointed at *w*, and attached to an arbor, U, the cam V, for producing the oscillation of the arbor U, and the inclined plane W', for producing a movement of the said hook in a direction transverse to that of its oscillation with the shaft, all substantially as herein described.

7. The combination, with needle-carrier constructed with a movable portion for attaching the needle thereto and detaching it therefrom, and the bobbin-holder A, containing a slide-way to receive and guide the head of the needle, of the lever G, actuated by the needle-carrier to prevent the turning of the bobbin-holder while the needle is detached from its carrier, substantially as herein described.

8. The combination, in a sewing-machine, of the following elements, viz: first, a needle having an eye or opening near the point and a hook above the said eye or opening, and arranged above the work-support; second, a bobbin-holder and contained bobbin, also arranged above the work-support; third, a rotating hook surrounding the said bobbin-holder; fourth, an oscillating looper arranged below the work-support; fifth, an oscillating loop-extender arranged below the work-support; and, sixth, mechanism for operating the said needle, rotating hook, looper, and loop-extender, all substantially as herein described.

ETIENNE THIMONNIER, FILS.  
CLAUDE VERNAY.

Witnesses:

EUG. DUBOIS,  
SORT. VERDIERT.