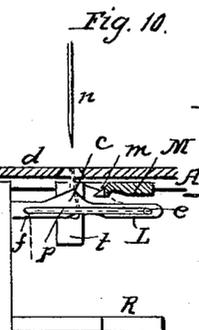
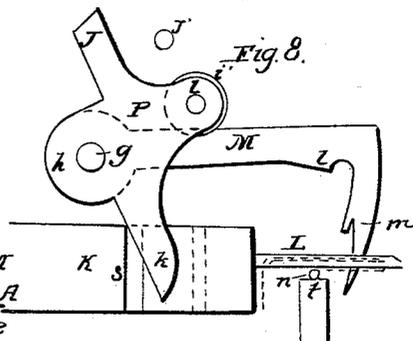
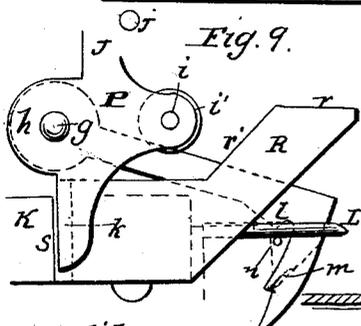
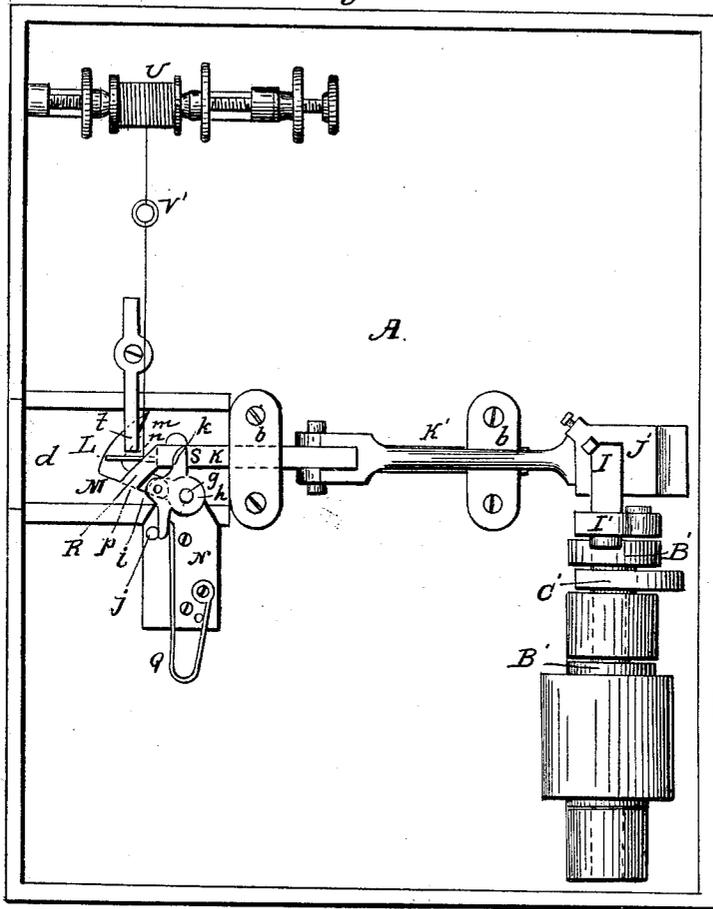


J. M. SMITH
Sewing Machine.

No. 31,334.

Patented Feb. 5, 1861.

Fig. 3.



witnesses:
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UNITED STATES PATENT OFFICE.

JOSIAH M. SMITH, OF SOMERS, NEW YORK.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 31,334, dated February 5, 1861.

To all whom it may concern:

Be it known that I, JOSIAH M. SMITH, of Somers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1 and 2 are vertical sections, at right angles to each other, of a machine with all the improvements, the plane of section in both figures being nearly close to the needle. Fig. 3 is an inverted plan of the machine. Figs. 4, 5, 6, and 7 are plan views of the needles and hook, exhibiting them in different relative positions. Figs. 8 and 9 are inverted plans corresponding with Figs. 6 and 7. Fig. 10 is a vertical sectional view corresponding with Fig. 8. Fig. 11 is a vertical section of the seam-pressing apparatus. Fig. 12 is an inverted plan of the foot of the presser.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists in a hook of novel construction, so applied, in connection with two needles arranged to make the double-looped stitch, as to serve the purpose of opening and extending the loops of the under or locking thread in such manner as to insure the passage through them of the perforating-needle, and the purpose of forcing and holding back upon the under or locking thread needle the loops of the upper or perforating needle during such stages of the stitch-making operation as is requisite.

It also consists in a presser operating upon the cloth or other material independently of the feed apparatus, with a percussive and sliding or rubbing action for the purpose of pressing, or, as it were, "ironing," down the seam and compressing the threads together. This improvement is applicable to sewing-machines of various kinds, but with more especial advantage to machines which make their stitches by the enchainment of loops formed in one or more threads.

To enable others to make and use my invention, I will proceed to describe its construction and operation.

A is the bed of the machine.

A' is the stationary arm, secured to or cast with the bed-plate in the usual manner.

B is the main shaft, arranged horizontally in fixed bearings below the bed-plate, furnished with a crank, B', for working the needles, and a cam, B², for working the feeding apparatus, which may be of any well-known or suitable kind.

The feeding device represented is of the kind known as a "top feed," consisting of a toothed roller, C, attached to a vertically-working slide, C', that is fitted to a guide in the arm A, and to which there is applied a heavy lever, C², for the purpose of producing the necessary pressure on the roller to make it confine the cloth to the bed and bite it with sufficient force to move it along. The axle C³ of the said roller C is furnished with a ratchet-wheel, C⁴, which has applied to it a pawl, D, which is fitted to a pawl-box, D', that is arranged to swing on the axle C; and the said pawl is connected by a rod, E, with one arm, F', of a horizontal rock-shaft, F, which works in fixed bearings attached to the back of the stationary arm, and which has another arm, F², to which is connected a rod, G, to which there is attached a cam-yoke, G', within which the cam B² works. The revolution of the cam B² with the main shaft produces, through the rod G and arm F², an oscillating movement of the rock-shaft F, whose arm F' acts, through the rod E upon the pawl D, to produce the necessary intermittent movement of the ratchet-wheel C⁴, axle C³, and feed-roller C. The length of the feed is varied by shifting the connection *a* of the rod E in the arm F' of the rock-shaft.

H is the arm which carries the perforating-needle *n*, secured to the vertical bar I, which is fitted to slide longitudinally through the bed A and through a guide-box, J, on the top of and a guide-box, J', below the bed. The said bar I derives the necessary reciprocating motion to operate the needle *n* from its connection by a connecting-rod, I', with the crank B' on the main shaft.

K is the bar which carries the under or locking thread needle L, arranged to work horizontally close under the bed A in guides *b b*. This bar K is connected with the bar I by means of a connecting-rod, K', which, as the said bar I descends with the perforating-needle

dle, draws back the said bar K, with the under needle, and, as the bar I rises, drives forward the bar K, with the under needle, by which movements the two needles are made to enter the loops of each other's thread in the same manner as in other machines of the same class, in which similar relative movements are produced by different means. The vertical reciprocating movement of the bar I may be produced by its connection with a treadle below the bed. To provide for the adjustment of the needle *n* to suit different thicknesses of material, the arm H is fitted to the bar I in such a manner as to be adjustable higher or lower, and secured thereto by a set-screw, H². This arrangement for operating the needles constitutes the subject of my Letters Patent of February 7, 1860.

The needle L, which carries the locking-thread, has an eye, *e*, near its point, and another eye, *f*, near where it is attached to the bar, and a groove, *p*, between the said eyes on the opposite side to that which works next the perforating-needle; all of which features are shown in the enlarged side view represented in Fig. 10, and with the exception of the projection *e* on the upper side, which will be presently explained, is substantially like the needles used in many other sewing-machines which make the same kind of stitch. The thread of this needle is shown in the drawings in red color, and that of the perforating-needle in blue.

Between the needle L and the thin plate *d*, which constitutes the portion of the bed through which the perforating-needle *n* works, and close to that plate, there is arranged the hook M, for opening and extending the loops of the locking-thread. This hook is made of a thin piece of steel plate, of a form which is clearly shown in Figs. 3, 4, 5, 6, 7, 8, and 9, having a notch, *m*, near its point, and an inclined projection, *l*, on the inside of its stem, near the bend. It is firmly secured to the upper end of a short upright shaft, *g*, which is fitted to a bearing in a plate, N, which is bolted to the bottom of the bed. To the bottom of this shaft *g* there is secured an irregular cross-shaped piece, P, of whose four arms one, *p*, is attached to the said shaft, another, *i*, carries a small roller, *i'*, a third, *j*, is subject to the pressure of a spring, Q, (shown in Figs. 1 and 3;) secured to the plate N, and the fourth, *k*, is in range of the horizontal needle-bar K. The hook M operates in the following manner: At the time the perforating-needle *n* has completed its descent and the under needle, L, has completed its retiring movement the hook occupies the position shown in the top view, Fig. 4, where it is held by the spring Q keeping the roller in contact with the portion *r* of the horn R, which is secured to the needle-bar K. As the needle-bar I rises with the needle *n* and the needle-bar K advances with the needle L, the straight portion *r* of the horn R passes the roller *i'*, and the oblique portion *r'* comes opposite to the said roller and allows the hook

to be gradually moved in the direction of the arrow shown in Fig. 4 by the pressure of the spring Q upon the arm *j* of the piece P, which brings the hook to the position shown in Fig. 5, where it arrives just after the point of the needle *n* has entered the loop of the thread of the perforating-needle, and where it is arrested by the arm *j* of the piece P coming into contact with a fixed pin, *j'*, that is secured in the plate N. In moving to this position the hook serves as a guard to prevent the twisting of the loop of the perforating-needle thread, and as it arrives in the said position it presses the said loop back over the point of the needle L. The hook remains in this position for a very short time, but yet long enough for the needle L to have advanced so far into the loop as to prevent the possibility of the loop slipping off, and the continued advance of the needle-bar K brings the shoulder *s* on the said bar against the arm *k* of the piece P, and so causes the hook to be thrown back to the position represented in Fig. 6, in which position it arrives as the upper needle, *n*, completes its ascent and the under needle, L, completes its advance. Fig. 8 is an inverted plan, on a larger scale, corresponding with Fig. 6 in the position of the parts. As the needle-bar I commences to ascend again with the needle *n*, and the needle-bar K commences to retire with the needle L, the spring Q forces the hook M back again to the position represented in Fig. 7, which is the same in which it is represented in Fig. 4, and the hook in moving to this position, during this stage of the operation of the needles, catches in its notch *m* the portion of the locking-thread which is between the cloth and the eye *e* of the needle L, and draws it aside in the form of a loop, which it extends in the manner shown in the top view, Fig. 7, and in the larger inverted plan view, Fig. 9. Just as the hook has completed this extension of the loop the point of the needle *n* passes down into it and the hook, immediately retiring while the needle continues its descent, leaves the locking-thread in the form of a loop around the needle *n* and the thread which lies beside it in the form of a loop. The hook, in thus retiring, moves at such a speed proportioned to the movements of the needles that the locking-thread is not left slack, but that the needle L, in retiring, draws the loop of that thread tight round the needle *n*. The hook, in retiring from the position shown in Figs. 7 and 9, arrives at that shown in Fig. 4 before the needle L has completed its retreat and the needle *n* has completed its ascent, but remains stationary till after such ascent and retirement have been completed and all the parts are in the condition shown in Fig. 4, when the repetition of the above-described series of movements of the needles and hook is commenced. In arriving at the position shown in Figs. 7 and 9, the inclined projection *l* on the hook comes into operation on the loop of the thread of the needle *n* which was left upon the needle L on the ascent of the former needle, and holds it back

upon the needle L till the needle *n* has entered the new loop of the locking-thread. It will be understood that in the above-described operation the hook makes two distinct movements during one complete movement of the two needles back and forth—viz., from the position shown in Fig. 4 to that shown in Fig. 5, back to that shown in Figs. 6 and 8, forward again to that shown in Figs. 7 and 9, which is the same shown in Fig. 5, and back again to that shown in Fig. 4.

The projection *c* on the top of the needle L, which is in such a position that its highest point just passes the line of motion of the needle *n* as the needle L completes its advance, operates in the following manner: It may and does sometimes occur in sewing-machines of this class, using two needles, that the under or locking thread, after being carried into the loop of the upper thread, by reason of its becoming snarled, will fail to be drawn up tight between the needle and the cloth, and in such case it might, with an under needle of the usual construction, fail to be caught by the hook M. The projection *c*, however, by passing under this portion of the locking-thread in case of such an occurrence, will raise the said portion to such a position that the hook will not fail to catch it; but except when such an occurrence takes place the projection *c* has no action whatever upon the thread.

t is a guide for the needle *n*, secured to the bottom of the bed A, and preventing the said needle being forced out of place by the needle L. S is a spool for supplying thread to the upper needle, *n*, attached to the top of the needle-bar I.

T is a take-up spring, fitted to a slotted upright guide-rod, T', attached to the needle-arm H, for taking up the slack of the upper-needle thread.

U is the spool for supplying thread to the under needle, attached to the bottom of the bed A.

V is a take-up spring, fitted to a stationary slotted guide-rod below the bed A, to take up the slack of the under-needle thread.

W is the presser, consisting of a flat foot-like piece attached to or forming part of a lever, W', whose fulcrum *v* is attached to the lower end of a vertical slide, W², which is fitted close to the slide C' in a guide in the end of the arm A'. The said slide W² has a projection, *v*, formed upon it to enter a slot, *v'*, in the slide C', as shown in Fig. 11, which is a vertical section parallel with Fig. 2, and a spring, X, is applied within the said slot be-

tween the top of the said projection *v* and a fixed bearing-piece, *w*, which projects from the arm A into the slot *v'*. The said spring X, though applied within the slot of the slide C', is entirely independent of the said slide, and acts only upon the slide W² to press the foot W upon the cloth. The upper part of the lever W' is made with a hook, *y*, as shown in Fig. 1, to receive a pin, *x*, attached to a small rigid arm, H', that is carried by the needle-arm H. Every time the needle-arm H rises with the needle *n* the pin *x* strikes the bend of the hook on the lever W', just before the ascent of the needle is completed, and lifts the said lever and the slide W², thereby raising the foot W from the cloth. As the needle descends again the spring X forces down the slide W² and the lever, and causes the foot to strike upon the seam with a hammer-like action, and as the pin *x* continues to descend after the foot has come in contact with the cloth the said pin passes down the inclined face *y'* of the inside of the hook *y*, and so causes the lever to move on its fulcrum and draw the foot over the seam with a sliding or rubbing action with an effect similar to that of ironing cloth, thereby pressing the two threads of the seam together in such a manner as to lock them more securely and make it more difficult to draw them out. This presser W, though operating independently of the feed-roller, is raised with the said roller by the lever C², for when the slide C' has been raised a short distance the bottom of the slot *v'* in the said slide comes in contact with the projection *v* on the slide W². Fig. 12 exhibits the form of the face of the presser W and its relation to the needle. The part *z* is that which presses directly on the seam.

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

1. The hook M, constructed with an inclined projection, *l*, and notch *m*, substantially as described, and applied to operate in the manner substantially as set forth, in combination with the two needles *n* and L, for the two purposes herein specified.

2. The presser W, applied to operate upon the cloth, independently of the feed mechanism, with a percussive and rubbing action, substantially as and for the purpose herein described.

JOSIAH M. SMITH.

Witnesses:

J. W. COOMBS,
S. H. WALES.