3 Sheets--Sheet 1.

T. K. REED.

Sewing-Machines.

No. 146,280. Patented Jan. 6, 1874.

Fig. 1.

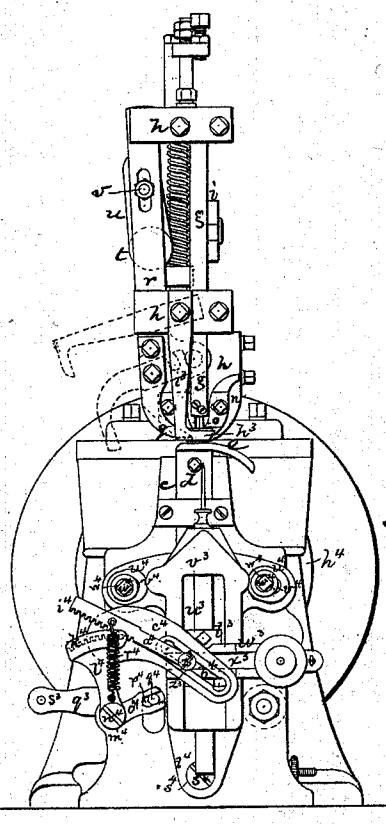
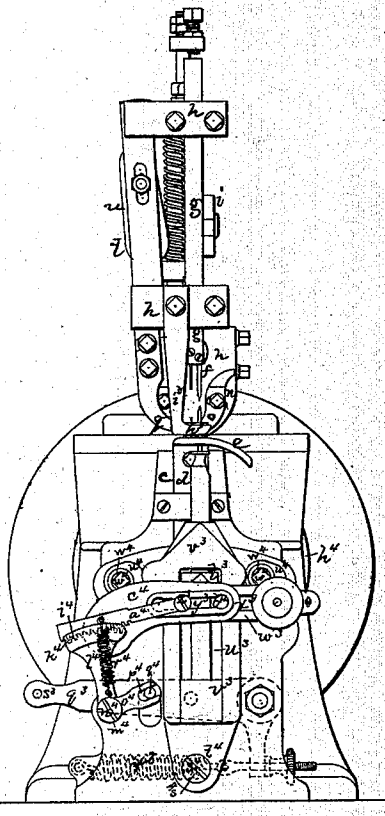
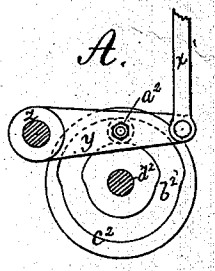


Fig. 2.



A.



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3 Sheets--Sheet 2.

T. K. REED.

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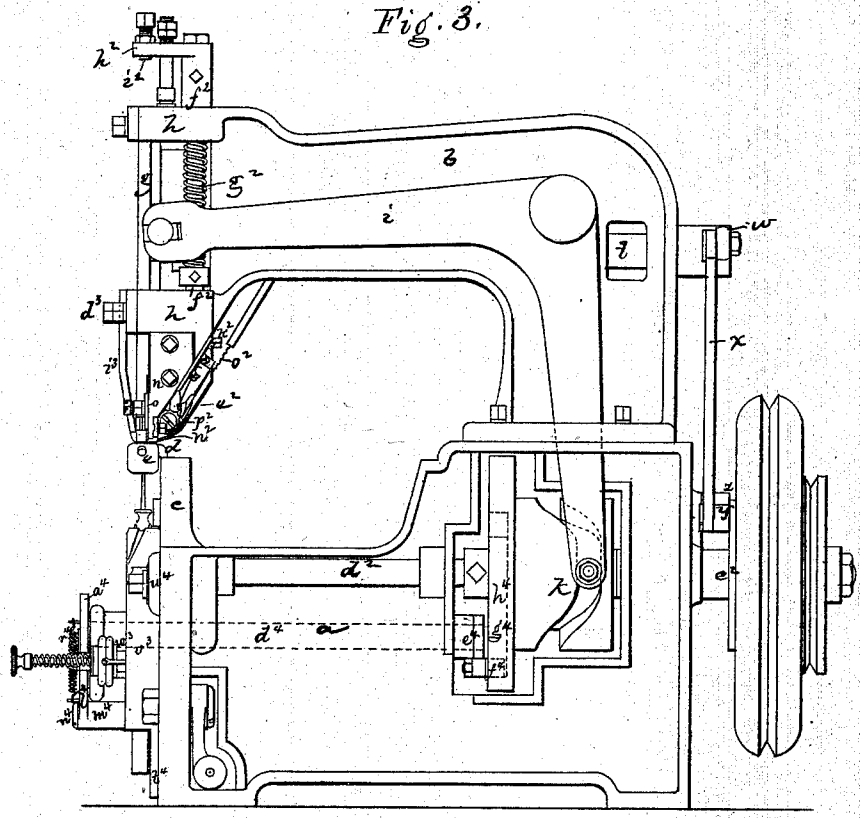
Fig. 3.



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3 Sheets--Sheet 3.

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Sewing-Machines.

No. 146,280. Patented Jan. 6, 1874.

Fig. 4.

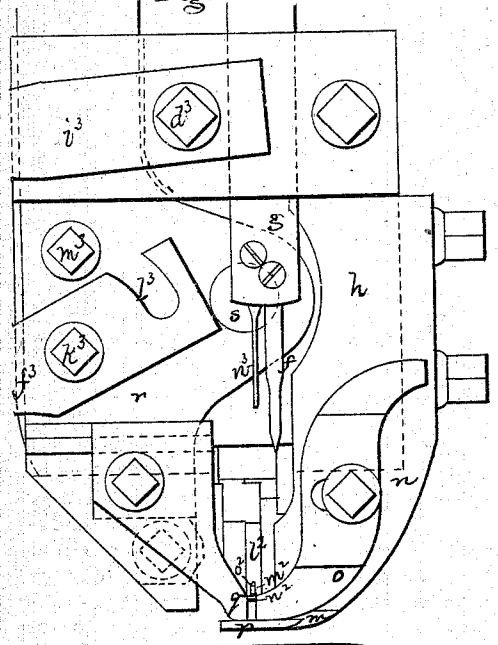
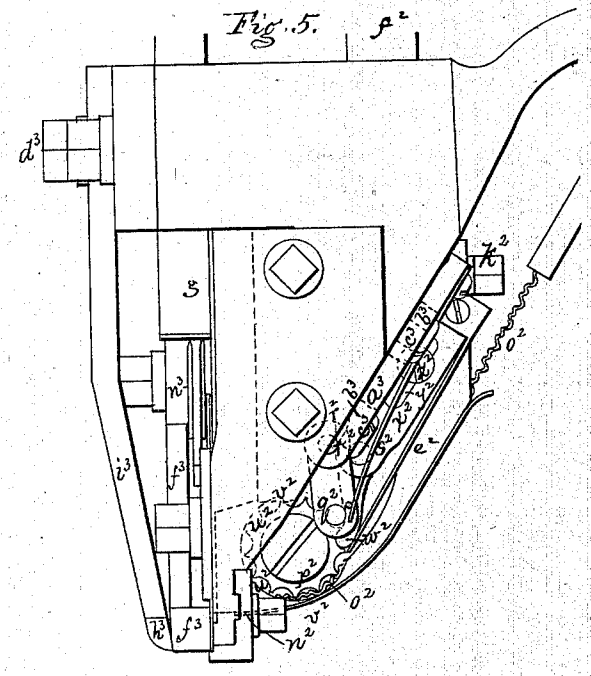
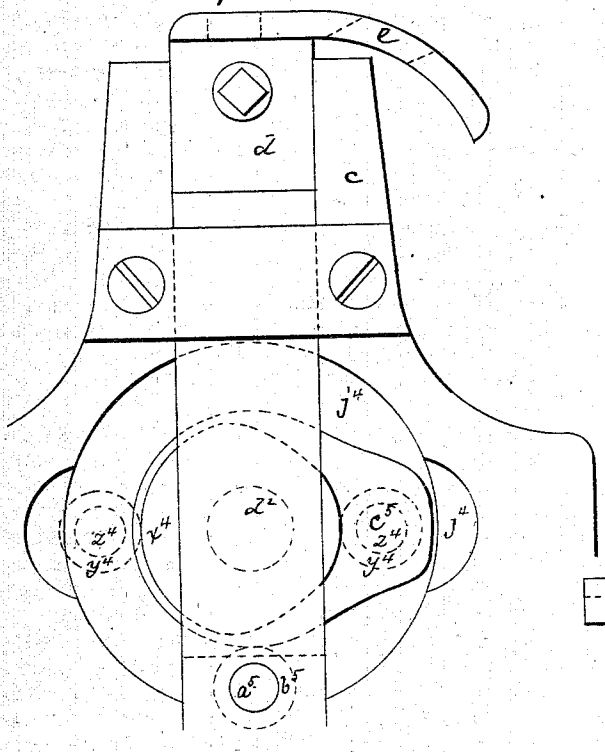


Fig. 5.





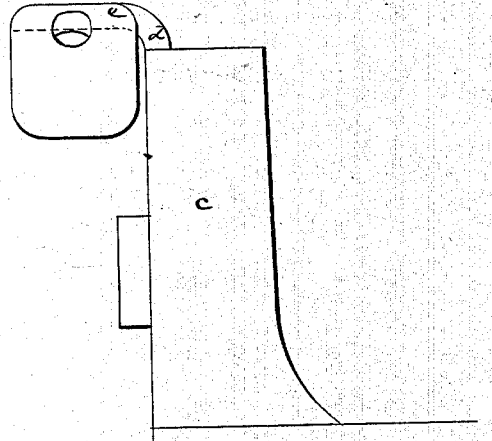


Fig. 6.

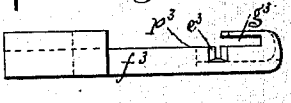
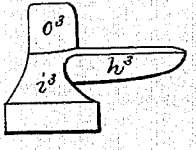


Fig. 7.



Witnesses.
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Le B. Latimer.

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Timothy K. Reed.
By his Attys.
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UNITED STATES PATENT OFFICE.

TIMOTHY K. REED, OF EAST BRIDGEWATER, ASSIGNOR TO ARZA B. KEITH, TRUSTEE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **146,280**, dated January 6, 1874; application filed November 26, 1873.

To all whom it may concern:

Be it known that I, TIMOTHY K. REED, of East Bridgewater, in the county of Plymouth and State of Massachusetts, have invented an Improved Wire-Lock-Stitch Sewing-Machine; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

86,892 United States Letters Patent No. ~~86,952,~~ dated February 2, 1869, have been granted to me for an "improvement in the process of and mechanism for forming stitched seams;" and my present invention relates to certain details of construction and organization of the mechanism shown and described in said patent.

The various improvements constituting the invention will be so well understood by the specific description of the mechanism and its operation that I need not point out by general description the novel features in the organization.

The drawing represents a machine and parts of a machine embodying my invention.

Figures 1 and 2 show the machine in front elevation. Fig. 3 is a side elevation of it. Fig. 4 is a front view. Fig. 5 is a side view of the wire-box and adjacent mechanism. Fig. 6 is a plan of the wire-carrier. Fig. 7 is a plan of the toe-piece.

a denotes the frame; *b*, the goose-neck; *c*, a stationary post, in a vertical slot in which slides a bar, *d*, having extending from its top a plate, *e*, that constitutes the work-support under the downward thrust of the awl *f*, the awl-bar *g* sliding in the head *h*, and being reciprocated vertically by the bell-crank lever *i* and cam *k*, or by any other suitable means. The work-support plate *e* rises and falls, and when in its highest position the work is clamped between it and the bottom of a stationary toe-piece, *m*, fixed to a block, *n*, to which block is also affixed the stationary wire cutter or punch *o*. The toe-piece *m* has a horizontal lip, *p*, down to which the vertical cutting-edge of the punch extends, the wire feeding over this lip into position to be severed, and the severing being effected by the movable cutter plate or die *q*, acting in conjunction with the stationary cutter or punch *o*, and against the wire presented between them, the edge of the stationary cutter or punch being in, or nearly in, the path of movement of the side of the wire, so that the wire is but slightly moved laterally, either to be cut or in being cut. The cutter or die *q* is grooved, and presses the wire squarely against the punch, which punch, in cutting, enters the groove in the movable cutter or die *q*, a piece of the wire being cut out, as described in my aforesaid patent. The shank of the cutter *q* is fastened to a vertical bar, *r*, pivoted at *s*, and the bar is swung upon said pivot to advance and draw back the cutter *q* by a rocker-shaft, *t*, having at one end an arm, *u*, jointed to the bar *r*, as seen at *v*, and at its opposite end an arm, *w*, connected, by a link, *x*, to an arm, *y*, pivoted at *z*, and having a pin, a^2, extending into a cam-groove, b^2, of a cam-wheel, c^2, on the driving-shaft d^2, as seen at A. Just back of the cutters is the wire-box or wire feeding, guiding, and presenting mechanism, consisting of a box, e^2, which, with its appendages, is fixed to the foot of a rod, f^2, which rod slides in the head *h*, and is held down by a spring, g^2. The box has an upward movement to bring it into position to introduce the wire into the loop; a downward movement to carry the wire down to the stock, and a lateral movement to follow the movement of the cutter-die *q*, as will be hereafter explained, and its upward movement is imparted by the awl-bar, the top of which, in the latter part of the rise of the bar, strikes an arm, h^2, extending from the box-rod f^2, or, preferably, a set-screw, i^2, extending from said arm. As the awl-bar descends the spring g^2 forces down the rod f^2 and brings the box to position for the action of the cutters upon the wire. For the lateral movement of the box, it is pivoted to the rod by a pivot-pin, k^2, and the cutter-die strikes a shoulder, l^2, of the box to move it forward with the cutter, a suitable spring throwing it back as the cutter recedes. The wire enters the loop at the side of the needle, and as the needle-eyes of different needles do not always reach the same point, (as the needle rises,) the wire-box is made with provision for adjustment as to its extent of rise, this provision being the set-screw i^2, by adjusting which the awl-bar

may be made to lift the wire-box sooner or later, as may be required by the position of the needle-eye at its highest point.

The appendages of the wire-box are as follows: The box has a groove or roadway, m^2, of width just sufficient to permit the wire to pass freely through, the bottom of said way being a plate or spring, n^2, which extends to the extreme front of the box. Through this groove and over this spring passes the wire o^2, the wire passing through a suitable passage in and under the goose-neck arm to the roadway m^2. As the wire approaches to the front of the plate, it passes under a feed-wheel, p^2, by the action of which regular, intermittent, and uniform forward movements are imparted to it. The rotative movement of the wheel is effected by a pawl, q^2, acting, for this purpose, in conjunction with the upward movement of the box, the pawl being pivoted on a stationary pivot, r^2, and acting negatively, a spring, s^2, pressing the pawl-pin into position to stand over one of the notches w^2 of the feed-wheel, and said notch straddling the pin and, by its contact therewith, causing the wheel to turn as it continues to move upward, the bottom teeth v^2 of the wheel entering the bows of the wire, and by their rotative movement pushing the wire forward, a spring detainer-pawl, w^2, entering one of the notches of the wheel, as the wheel completes its rise, and thus insuring the exact extent of feed of the wire, and the consequent presentation of the point of severance in the line of the cutter punch and die. As the rise of the box is made variable in accordance with the varying position of the eyes of different needles at the time the wire is to enter the loop, the action of the detainer-pawl must be correspondingly varied to cause it to properly determine the extent of feed of the wire. For this purpose the pawl w^2 is pivoted to a bar, x^2, that, by means of a slot, y^2, and screw z^2, is made adjustable in position. The feed-pawl q^2 is made with similar provision for adjustment by being jointed to a plate, a^3, made adjustable by slots b^3 and screws c^3. When the end of the wire to be cut off is projected beyond the wire-box, the projection stands over a flaring slot, e^3, of a wire-carrier, f^3, which carrier is fastened to the cutter-lever r, and as the wire, after entering the loop at the side of the needle, descends, it falls to the bottom of this slot, the slot narrowing so that at bottom it is simply wide enough to receive the wire and enable it to pass freely through the slot. The projected end of the wire being held between and by the opposite walls of the slot, the carrier moves forward with the cutter-die, supports the wire under the cutting operation, and prevents any bending of the wire. The carrier has another slot, g^3, through which the needle and awl play, and outside of the carrier is a toe-piece, h^3, extending from a shank, i^3, said outer toe-piece supporting the work against the pressure of the work-support e on one side of the seam, while the inner toe-piece m supports the work against the pressure of the work-support on the opposite side of the seam. To enable the cutters and adjacent mechanism to be readily inspected, adjusted, and removed, the toe-piece bar i^3 and carrier-bar f^3 are hung to the head h and lever r, respectively, so that they may be swung up and out of position, as seen in Fig. 1 by dotted lines, the carrier-bar swinging on the pin k^3, by which it is confined to the cutter-lever r when said pin is loosened, and having a slot, l^3, into which a pin, m^3, enters, the carrier being brought to position by swinging it down until the back of the slot meets the pin, in connection with the movement through the slot of the bar of a "spotter" or sinker, n^3, which is attached to and reciprocates with the awl-bar. In like manner, the toe-piece bar is brought to position by swinging it down upon its pin d^3, and then bringing a gage-piece, o^3, extending from it, against a shoulder, p^3, of the carrier. After the wire is cut, and as the needle is drawing down the loop, the spotter n^3 descends upon the wire, sinking it into the surface of the stock, such sink being made greater or less by adjustment of the spotter.

In forming the stitch with the thread and wire, it is desirable that the machine should be so organized as to feed from thick to thin stock, and vice versa, and that in all changes in thickness of the stock, however abrupt, the amount of thread taken from the spool shall change in accordance with such change in thickness, so that for all the stitching the thread shall be uniformly drawn into the stock to uniformly secure the wires and bind the stitch. To accomplish this it is necessary that the needle, in drawing down the thread, shall move to a uniform distance from the bottom face of the stock, which face rests or is clamped against the top of the movable work-support plate e, it being, however, also necessary that the needle shall always move upward to the same point. I therefore so arrange the mechanism that the needle has an invariable upward movement and a variable downward movement, but always in a uniform distance from the face of the rest, and so that its downward movement is always contingent upon the position of the work-support plate e—or, in other words, upon the plane of the bottom surface of the stock—the toe-pieces being stationary and the work-plate e following the changes in thickness of the stock, the stock being, at all times, clamped between the toe-pieces and the work-plate e under the upward pressure of the plate, except when the plate is moved down for the work to be fed. The work-plate is strictly a presser-plate, it being a projection from the top of the slide-bar d, and such bar being jointed to a lever, q^3, subjected to the stress of a strong spring, r^3, to press the bar upward. To enter the work, the work-plate is thrown down by depressing the lever-arm s^3. The needle-bar extends through and is fixed to a slide, t^3, that slides vertically in a slot, u^3, cut through a swiveling plate, v^3, in bearings

in which the needle-bar is guided in its vertical movements. On the front of the slide t^3 is a horizontal plate, w^3, in which is cut a slot, x^3. In this slot runs a slide, y^3, into which a pin, z^3, extends from an arm, a^4, the pin passing through a slot, b^4, in an arm, c^4, extending from one end of a horizontal rocker-shaft, d^4, at the opposite end of which is another arm, e^4, having a pin, f^4, extending from it into a cam-slot, g^4, of a cam-wheel, h^4, on the driving-shaft d^2. The movement of the rocker-shaft by the cam imparts reciprocating vertical movement to slide y^3 and the needle-bar connected therewith. The arm a^4 is a lever, having gear-teeth i^4, which teeth engage with a segment-gear, k^4, on the top of a rocker-arm, l^4, extending from a sleeve, m^4, which is mounted on a stationary pin, n^4, and has extending from its inner end an arm, o^4, into a slot, p^4, of which a pin, q^4, extends from the work-plate lever q^3. By this connection, the position of the slide y^3 is varied, as the thickness of the stock clamped between the work-plate and the toe-pieces varies, and such variation changes the amount of downward throw of the needle-bar, because such throw depends upon the position of the pin z^3, by which the rocker-arm l^4 communicates movement to the needle-bar.

When the needle-bar is in its uppermost position, the rocker-arm slot b^4 will be always brought to horizontal position, so that the continued movement of the pin z^3 in the slot b^4 as the work-plate moves down imparts no movement to the needle-bar.

The gear-rack i^4 is held in engagement with the segment-gear k^4 by a suitable spring, r^4; and by the gear and segment connection a positive forward and back movement is imparted to the pin z^3 as the throat-plate moves up or down.

The feed of the work is imparted by the needle; and to move the needle laterally, the needle-bar bearing-plate is mounted on a stationary pin, s^4, extending through its foot t^4, the upper part of the plate having ears u^4 through curved guide-slots v^4, in which guide-pins w^4 extend. Back of the plate the frame-recess j^4 contains a cam, x^4, on the driving-shaft d^2, which cam, in its rotation, acts alternately against two rolls or trucks, y^4, turning on pins z^4, extending from the plate v^3, and thereby imparts positive forward feed movement and back movement to the plate, needle-bar, and needle. The work-plate bar d has extending from its rear face a pin, a^5, upon which is a roll, b^5, and against this roll a cam, c^5, on the driving-shaft acts at each rotation of the shaft; and while the needle is in the work the cam strikes the wheel, and thereby depresses the work-plate to unclamp the work, so that it may be readily fed by the needle.

I claim—

1. The stationary toe-piece m, stationary punch o, and movable cutter-die q, in combination with the vertically-moving work-plate, substantially as described.

2. The vertically-moving wire-box e^2, in combination with the stationary and movable cutting mechanism, substantially as described.

3. The toe-piece lip p, in combination with the cutters and wire-box, substantially as described.

4. The wire-carrier f^3, with its slot e^3, for receiving, supporting, and guiding the wire, substantially as described.

5. The outer and movable toe-piece h^3, in combination with the stationary toe-piece m, substantially as described.

6. The combination, with the movable wire-box, of the feed-pawl q^2, operating to turn the wire-feed wheel p^2 as the wire-box moves upward, substantially as described.

7. The combination, with the movable wire-box, of the impelling-pawl q^2 and detainer-pawl w^2, acting in combination to produce the proper movement and arrest of the feed-wheel, substantially as described.

8. The arm h^2 (extending from the feed-box bar) and its set-screw i^2, (operated upon by the awl-bar g to raise the feed-box,) and the spring g^2, in combination, and for throwing down said feed-box, substantially as described.

9. The impelling-pawl q^2 and detainer-pawl w^2, pivoted, respectively, to plates a^3 x^2, made adjustable, as and for the purpose described.

10. The vertically-yielding and releasing work-plate e, substantially as described, in combination with the stationary toe-piece m and the cutting mechanism.

11. In combination with the vertically-moving work-plate e and the wire mechanism, a needle-bar operated, substantially as described, so that it has an invariable upward movement and a variable downward movement, contingent upon the position of the work-plate at the time of such downward movement.

12. The needle-bar slide t^3 and its grooved front plate w^3, the slide y^3, lever a^4, and slotted arm c^4, combined for actuating the needle-bar, substantially as described.

13. The pin z^3, (the position of which determines the downward movement of the needle-bar,) when connected and combined with the work-plate lever q^3, the sleeve m^4, its slotted arm o^4, and gear-segment arm l^4, and the lever a^4 with its gear-rack, substantially as described.

Executed this 22d day of November, A. D. 1873.

T. K. REED.

Witnesses:

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FRANCIS GOULD.