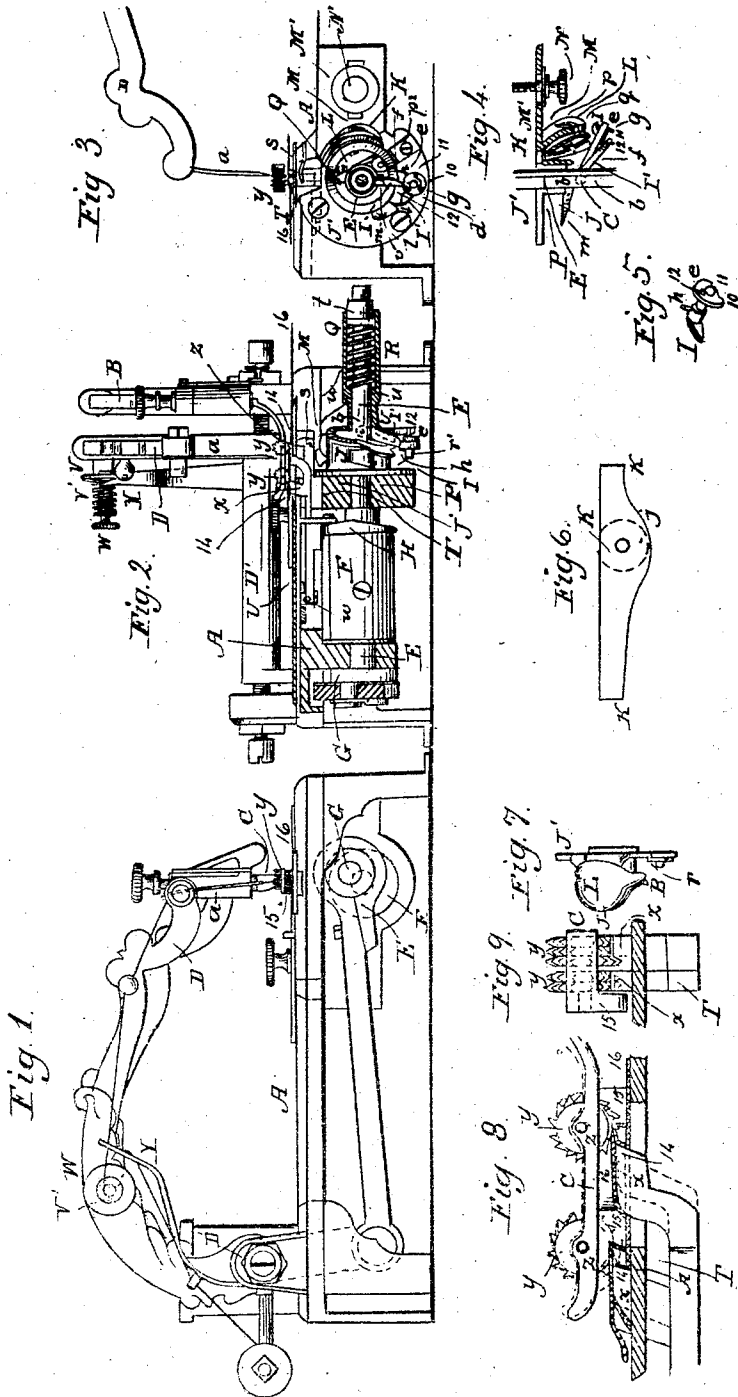


H. W. HAYDEN.

Sewing Machine.

No. 24,937.

Patented Aug. 2, 1859.



Witnesses:  
 Theodore S. Buel  
 Arthur J. Buel.

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# UNITED STATES PATENT OFFICE.

HIRAM W. HAYDEN, OF WATERBURY, CONNECTICUT.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 24,937, dated August 2, 1859.

### To all whom it may concern:

Be it known that I, HIRAM W. HAYDEN, of Waterbury, in the county of New Haven and State of Connecticut, 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—

Figure 1 is a back view of a sewing-machine with my improvements. Fig. 2 is a vertical section of the same at right angles to Fig. 1. Fig. 3 is a front view of the needle, rotating hook, bobbin, and their appendages. Fig. 4 exhibits a horizontal sectional view of some of the principal parts of the machine. Figs. 5, 6, 7, 8, and 9 are detail views which will be hereinafter described.

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

My invention relates to the formation of what is known as the "lock-stitch" by means of a revolving and vibrating arm and hook for extending the loops of the needle-thread and a peculiarly-arranged bobbin for supplying the locking-thread, operating in combination with each other and with the needle, substantially as hereinafter described.

It also relates to the method or means for producing the operation of the said revolving and vibrating arm and hook; also to an improved device for taking up the slack of the loop between the bobbin and the revolving vibrating hook; and, further, to a new contrivance for feeding the cloth or material to be sewed.

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

A, Figs. 1, 2, 3, is the bed-plate of the machine upon which the cloth or other material is placed to be sewed.

B is the stationary arm holding the presser C.

D is the needle-arm attached to a rocker, D', carrying a curved needle, a; but in place of this needle a straight needle bar or slide and a straight needle may be used.

E, Figs. 1, 2, 3, 4, is the main shaft, or as it is sometimes termed, the "rotating mandrel" from which all the operating parts derive motion, arranged directly under the needle in bearings beneath the plate A, having fast upon it the pulley F, through which it receives mo-

tion, the eccentric or crank G for driving the needle-rocker D', and the feed-cam H, Fig. 2, and carrying also the revolving and vibrating arm I', Figs. 1, 2, 3, which carries the looping-hook I, which is represented in Fig. 5, in perspective, detached from the machine. The said arm I' is fitted into a slot, b, that is cut centrally and longitudinally through the mandrel, and secured by a pin, c, upon which it is capable of vibrating in a plane or planes parallel with the axis of the mandrel while it is caused to revolve with the latter. The hook I is made with a pivot, d, in front, which is fitted to turn or oscillate in a bearing provided for it in the arm I', near the end thereof, and to the opposite or front end of the said pivot d, to the hook, there is secured a plate, e, of the form of a circle having a recess, 10 11, extending about one-fourth of the way round it, and carrying a pin or projection, 12, against which a spring, f, which is secured to the arm I', presses in such a manner as to exert a tendency to turn the hook I in the direction of the arrow (shown near it in Fig. 3) as far as permitted by a pin, g, which is secured in the arm I, and which serves as a stop to the end 10 of the recess 10 11 of the plate e. The said spring f keeps the hook I, when the latter is not otherwise influenced, standing out from the arm I' in the direction of a circle described from the center of the mandrel. At the back of the arm I' there is, fast to the stem or pivot of the hook, a pin or projection, h, the duty of which will be presently explained.

J, Figs. 2, 3, 4, is a stationary cam in the form of a ring encircling the mandrel E, and having a broad flange, J', to receive screws l l, by which it is secured to a portion of the bed-plate. This cam has its operating-face i j k, whose form will be presently explained, presented toward the front of the machine. A part of the exterior of the said cam also constitutes one half of the bobbin-holder L M, for holding the thin bobbin K from which the locking-thread is supplied. The other half, M, of the bobbin-holder consists of a disk-shaped projection from an adjustable sliding plate, M', which is secured by a screw-bolt, N, to a part of the bed-plate A. The bobbin, which, being outside of the cam J, is some distance from the center of the mandrel E, is also arranged obliquely both to the needle and to the axis of the mandrel, as illustrated in Figs. 2 and 4.

Its front portion, which is the portion to which the rotary hook approaches the nearest, is the farthest from the axis of the mandrel. The form of the face *ij k* of the cam and the relation of the said face to the bobbin K are illustrated in Fig. 6, which exhibits the cam as though projected on a plane. The duty of the cam is to produce the necessary vibrating motion of the arm I' and hook I on the pin *e*, as they revolve with the mandrel, to carry the loops over the bobbin K; and to enable this to be effected the arm I' is confined to the face of the cam by means of a sleeve, Q, Fig. 2, and a spiral spring, R, both fitted to a portion of the mandrel F that is extended forward of the cam, hook, and bobbin on purpose to receive them, the said spring being within the said sleeve and resting against a collar, *t*, on the mandrel, and pressing against a seat, *u*, formed for it at the back of the said sleeve, and the said sleeve having a finger, *v*, which presses upon the arm I' at some distance from the mandrel. At the least prominent point in the face of the cam there is an abrupt lateral projection, *m*, which serves as a stop to operate upon the before-mentioned pin or projection *h* on the stem of the hook I, for the purpose of operating the hook to throw off the loops, as will be presently explained. *p*, Fig. 4, is a spring attached to the exterior of the piece M of the bobbin-holder, and having a small round tongue, *q*, near its extremity, passing through a hole in the piece M and pressing against the bobbin for the purpose of preventing the bobbin from rattling and of temporarily detaining one side of the loop while it is passing over the bobbin.

*r*, Figs. 2 and 3, is a stationary but adjustable pin standing across a space, P, that is provided behind the lower part of the cam. This pin, which is for the purpose of preventing any slackening of the loop between the bobbin and the pin, is attached to a plate, *r'*, which is secured by a screw, *r''*, to the flange J' of the cam, the said plate being capable of being moved to adjust the said pin to the proper position to prevent the loops getting slack, but at the same time to prevent any excessive drag upon them. S is a stationary loop-guide placed near the needle-hole in the cloth-plate. This guide, however, forms no part of my invention.

The operation of forming the stitch is as follows: The needle-thread having been carried by the needle through the cloth or material to be sewed, in the usual manner, and retracted sufficiently to commence the opening of the loop, the hook I, in its revolution with the arm I', and mandrel, pass between the needle and thread, and as the needle continues to rise, draws the thread downward in the form of a loop, and the said loop, by reason of the forward swinging movement of the arm and hook, produced by the rising portion *i* of the swelling *ij* of the cam, is carried on to the front of the bobbin K, with one half on either side of the said bobbin. At the revolution of the arm

I' continues over the receding portion *j*, of the swelling of the cam, the outer side of the loop—that is to say, the side which passes farthest from the mandrel—is carried over the outer side of the bobbin, and after it has passed completely over the bobbin, comes in contact with the pin *r*, while the side of the loop which is nearest the mandrel slips into and is retained in a notch provided in the bottom of the part L, of the bobbin-holder. This notch is shown in Fig. 7, which is an opposite side view of the cam I to that exhibited in Fig. 2. The loop remains in the notch 13, and in contact with the pin *r*, the latter taking up the slack as the hook moves onward till, in the revolution of the hook, the pin *h* strikes the projection *m*, and the continued revolution of the hook, while the said pin is arrested, causes the pivot of the hook to turn in its bearing in the arm I, and the point of the hook to be turned far enough toward the center of the mandrel for the loop to slip off it. The hook, after thus letting the loop go, is instantly thrown back by the spring *f* to the position relatively to the arm I represented in Fig. 3, to be in readiness to catch a new loop as it passes the needle again, the old loop remaining slack after escaping from the hook, till the extension of the new one is commenced, when the old one is drawn up through the cloth, to furnish thread for the new one, and so drawn tight.

T, Fig. 2, is the feed-bar, attached by a pin, *w*, to a slide, U, which works horizontally below the bed-plate A. The said bar has two projections, *x x*, which pass through holes provided for them in the bed-plate. The said bar and the said slide U, are both operated upon by the double feed-cam H, to give the former a rising and falling motion, to cause the projections *x x* to be raised above, and to permit them to descend below the upper surface of the bed-plate, and to give the slide a horizontal motion. This slide and feed-bar are substantially like the slide and feed-bar of other sewing-machines, and the length of the movement of the slide may be controlled in the usual or any well known manner, to vary the length of feed for longer or shorter stitches; but it is only in the character of its own movement that my feed-apparatus resembles the feed-apparatus heretofore used for sewing-machines, and the manner in which the cloth or material to be sewed is laid hold of to be moved along differs very essentially from the modes heretofore used, as I will proceed to explain, with particular reference to Figs. 8 and 9, which are enlarged views of the essential elements of this part of my invention, the former being a side view corresponding with Fig. 2, and the latter a section corresponding with Fig. 3. The two projections *x x*, have their upper surfaces smooth and nearly flat, and parallel with the upper surface of the bed-plate, being only slightly beveled or rounded toward the rear ends, and having the front ends, or those ends from which the material is moved in feeding, terminate in a square form or in a very slight

ly acute angle, as shown at 14 14. These projections operate in combination with two wheels, *y y*, which have ratchet-like notches in their peripheries, and which are fitted to slots in the foot of the presser C, and secured therein by pins *z z*, which constitute axles upon which the said wheels are capable of rotating in planes parallel with the movement of the slide U, each wheel being arranged a little in front of its respective projection *x*, and with the radial faces of its lower notches toward the said projection. The bottoms of the wheels are slightly elevated above the upper surface of the bed-plate or of the material 16, Figs. 1, 2, 3, 8, and 9, when the bottom part, 15, of the foot bears upon it. When the projections *x x* are raised preparatory to the feeding movement, each forces the cloth or other material into a notch in its respective wheel, and when the projection afterward moves forward to feed, it forces the material into the angle of the notch, and its continued movement causes the ratchet-wheel to turn along with it, and as the cloth passes along and the projection approaches a position below the center of the wheel, the presser is lifted and the cloth that was pressed into the notch rolls along until the angle of the projection arrives directly under the center of the wheel where it is stopped. The feed-movement is greater or less, according as the feed-bar is allowed to recede to a position in which it will raise the cloth higher or not so high up the periphery of the wheel. The condition of the parts at the commencement of the feeding operation is shown in black outline, and their condition as the feed terminates in red outline, in Fig. 8. The wheels *y y* do not touch the material when the projections *x x* are below the upper surface of the bed-plate. A single projection, *x*, on the feed-bar, and a single ratchet-wheel on the presser may be used; but I prefer to use the two projections and two wheels as represented in the drawings.

V V' are a pair of friction-clamps of disk form for producing tension on the needle-thread. V is stationary, and V' is fitted to a hub produced on V, and is screwed up toward V by a thumb-screw, W, with an interposed spring, X. The thread on its way to and from these clamps is conducted by a guide, Y, in such a manner that it passes round the hub of V and forms nearly a complete circle within the clamps. The tension is regulated by screwing up the disk V' with more or less tightness.

I do not claim the use in a sewing-machine of a hook revolving in a fixed plane, in combination with a bobbin arranged within or concentric to the circle of revolution of the said

hook, as this is used in the machine of A. B. Wilson, patented June 15, 1852. Nor do I claim the feeding of the material by means of projecting teeth working up through the bed-plate and forcing the cloth against a presser; nor yet the use of wheels acting on the upper surface of the material to move it along; but,

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

1. The attachment of the looping-hook I to an arm, I', or its equivalent, which has a revolving motion and also a vibrating motion in a direction transverse to its revolution, and operates, substantially as herein described, in combination with a bobbin, K, arranged relatively to it, substantially in the manner herein set forth.

2. The stationary cam J, applied in combination with the revolving arm I, which carries the looping-hook, and with a spring, R, and sleeve Q, or their equivalent, for holding the said arm in contact with the said cam to produce the vibrating motion of the said hook, substantially as herein described.

3. The combination of the stationary cam J and the fixed portion L of the bobbin-holder, substantially as herein described.

4. The looping-hook made and fitted to turn in the revolving and vibrating arm I, as described, and provided with a pin or projection, *h*, operating in combination with a fixed stop, *m*, substantially as and for the purpose herein set forth.

5. The extension of the mandrel E forward of the rotating hook, as herein described, for the purpose of carrying the spring R and a sleeve, Q, or its equivalent, by which the revolving and vibrating arm I', which carries the hook, is kept in contact with the cam from which it derives its vibrating motion.

6. The adjustable pin *r*, applied and operating, substantially as herein described, in combination with the revolving and vibrating looping-hook and the bobbin, for the purpose set forth.

7. Feeding the cloth or material to be sewed by means of one or more smooth-faced angular projections, 14 14, on the feed-bar, or its equivalent, and one or more ratchet-like wheels, *y y*, attached to the presser, said wheels being arranged with the lowest portions of their peripheries above the bottom of the presser-foot, and the said projections pressing the material into one notch at a time of each wheel, and operating in combination therewith, substantially as herein described.

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Witnesses:

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