

J. HINKLEY,
Sewing Machine.

No. 21,592.

Patented Sept. 21, 1858.

Fig. 3,

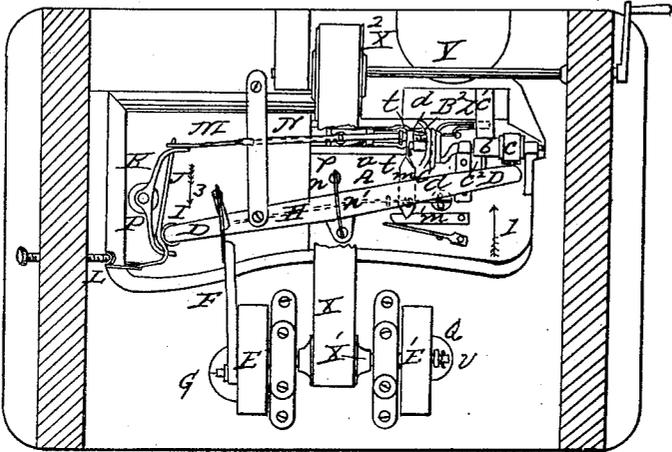


Fig. 4,

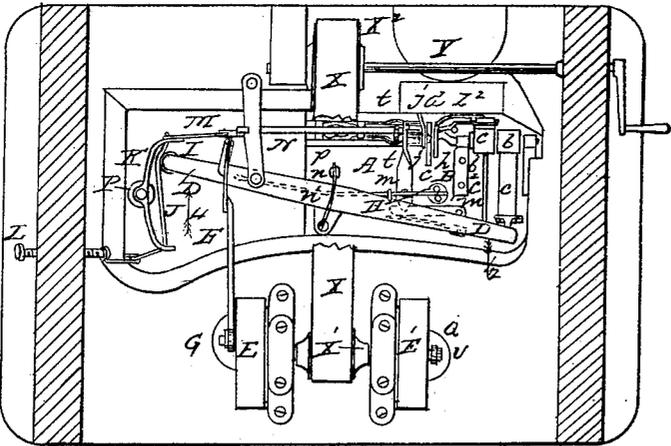


Fig. 5,

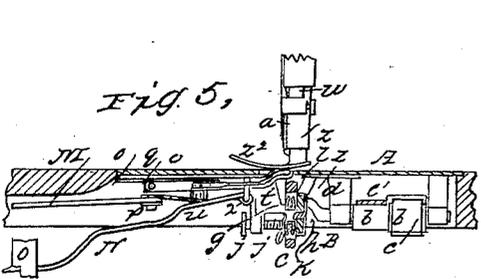
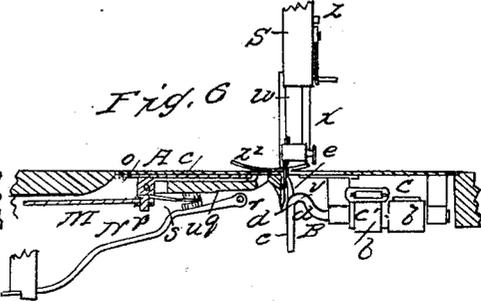


Fig. 6,



UNITED STATES PATENT OFFICE.

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OF NORWALK, OHIO.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 21,592, dated September 21, 1858:

To all whom it may concern:

Be it known that I, JONAS HINKLEY, of Huron, in the county of Erie and State of Ohio, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a view in perspective, and Fig. 2 a transverse section, of a machine embracing my improvements, one side of the casing of the needle-arm being removed to expose the walking-beam and the spring by which it is attached to the needle-arm. Fig. 3 represents a view of the machine turned bottom side uppermost, and Fig. 4 a similar view, but showing the several parts in positions different from that they occupy in Fig. 3. Fig. 5 represents a longitudinal sectional view, the several parts occupying the positions of the corresponding parts seen in Fig. 3, and Fig. 6 a similar view, the several parts corresponding in positions to those seen in Fig. 4. Fig. 7 represents a fragment of the bed-plate, showing the toothed cloth-mover and the spring to hold the lower thread, principally by dotted lines. Fig. 8 represents a section of the spool and its holding-spring, and Fig. 9 a side view of said spring detached from the spool. Fig. 10 represents a view of a portion of the needle-arm case, to show the eccentric for raising and holding the foot or cloth-holder. Fig. 11 represents a section of the bobbin and bobbin-case, and Fig. 12 a face view of said case. Figs. 13 and 14 represent, respectively, the two first stages of forming the loop by the hook.

The accompanying drawings represent a machine in which the acting and fixed parts are secured to a table and bed-plate, and in which two threads are employed in the formation of what is well known as the "lock-stitch."

The mechanism for forming the loop and feeding the cloth to receive the successive stitches is secured to the under side of the bed-plate A. To this plate is also secured, in suitable bearings, a horizontal shaft, B, so that its axis is at one side of the vertical plane in which the needle *a* moves. This shaft carries two pulleys, *b b*, on one end, to each of which a band, *c c'*, is secured, so that the winding of one por-

tion of the band round its pulley insures the unwinding of the other portion, for a purpose hereinafter explained, and at the other or left end of this shaft a segmental hook, C, is mounted, by which the loop from the needle-thread is formed. In speaking of a divided band (*c c'*) is implied two reverse bands. This hook C resembles a ring flattened on its left side or face and convex on its opposite face, as shown in the section in Fig. 5. It is not united to its shaft in the line of its axis, but by a gooseneck or arch, *d*, in such manner as to leave a space, *d'*, between said arch and the end of the hook for the loop to pass into the ring. The point *e* of the hook oscillates about three-quarters of a circle in a vertical plane and parallel with that in which the needle *a* moves. A notch is made in the hook near the point on its inner side, into which the thread passes and by which the thread is carried round beneath the bobbin, when the loop slips out of the notch and is left to be drawn up by the next stitch, as hereinafter explained.

The bobbin *g*, which carries the lower thread, has an eye through its center, and is held in a vertical position by a fixed head or case, *h*, on one side, and on the other by an adjusting-spring, *j*, so as to be surrounded by and directly in the vertical plane in which the hook oscillates, but perfectly independent of the latter. The inner side of the bobbin-case *h* is faced with leather and has a nipple, *k*, in its center, and a segmental flange, *l*, extending over the bobbin from the upper side of its circumference. The leather prevents rattling noise of the bobbin, and acts as a friction-pad to hold that side of the loop between the leather and the bobbin each time the needle descends, to allow the other side of the loop to be drawn out of the way of the point of the hook when delivering the next loop. The nipple *k* and segmental flange *l*, in connection with the spring *j*, hold the bobbin in its place. The spring *j* bears against the left face of the bobbin, and is mounted in an arm, *m*, pivoted to the bed-plate, and held in its proper position by a spring-catch, *m'*, whereby the spring *j* and its arm can be swung out from the bobbin to give free access thereto when necessary to replace the bobbin by a filled one, or for other purposes, and by which the proper tension is

given to the lower thread, regulated, as required, by a set-screw, *j'*, passing through the spring-arm *m*.

From the bed-plate a vertical stud, *n*, projects, to which is secured, by two horizontal spring-arms, *n' n'*, a vibrating plate, *D*, extending longitudinally at one side of the hook, and nearly equal in length to the distance between the legs of the table, and whose center of vibration, being the center of the spring-arms, is about the middle of its length. From the opposite ends of this vibrating plate *D* are derived, respectively, the oscillations of the hook and the movements of the feeding-slide. The former is effected by means of the two bands *c c'*, before described, one end of each band being secured to the pulleys *b b*, and their other ends attached—the one band *c'* by a long arm, *c'*, and the other band *c* by a short arm to the end of the vibrating plate *D*—so that although the plate *D* is at one side of the pulleys *b b*, yet by this arrangement one of the bands leads, in unwinding, toward the front, and the other toward the rear of the machine, but not at the same time, as the unwinding of one band winds up the other, so that it is plain each vibration of the plate *D* causes the hook to travel or oscillate through an arc of, say, two hundred and sixty degrees of a circle. When the vibration of the end of the plate *D* is in the direction of the arrow 1 in Fig. 3, the point of the hook catches the loop and carries it down under and round the bobbin; and when the end of the plate vibrates, as indicated by the arrow 2 in Fig. 4, the point of the hook is again brought up and passes a little in rear of the needle, so as to enter the loop when the motion again changes. In order that the motion thus imparted to the hook shall be perfectly regular and continuous, the lengths of the bands *c c'* and the stroke of the crank-pin, from which the motion of the vibrating plate *D* is derived, must be adjusted so as to prevent any irregular or waste motion, so that each reverse oscillation of the hook will be effected without the slightest jerking.

The vibratory motion of the plate *D* is derived from a secondary shaft, upon each end of which a balance-wheel, *EE'*, is mounted, and motion imparted to the plate *D* through a connecting-rod, *F*, united at one end to a wrist-pin, *G*, on one of the balance-wheels, and united at the other end to the end of the vibrating plate farthest from the hook. To render the motion of the vibrating plate *D* steady, a long spring, *H*, is secured by one end to the table, and by the other end to said plate, at right angles to the spring-arms *n' n'*, so as to act in such manner as to balance the vibrations of the plate. The motion of this end of the plate *D* is employed to effect the feeding of the cloth in the following manner: An anti-friction roller, *I*, is mounted upon and vibrates with the end of the plate in such manner as constantly to press against a strap, *J*, secured in the curved

ends of a pivoted piece, *K*, like a bow. One end of this bow is attached to an adjusting-screw, *L*, and the other end to a slide, *o*, by means of a connecting-rod, *M*. The slide *o* is fitted in and held by rabbets to the under side of the bed-plate. From one end of the slide a stud, *p*, projects, to which the rear end of the cloth-feeder *q* is hinged, and from the other end a staple, *r*, projects, to which the right end of a pressing lever, *N*, is also hinged. The feeding-arm *q* is divided and curved upward at one end and notched so as to project through two parallel openings in the bed-plate for grasping the cloth. Said arm is constantly pressed upward by a light spring, *s*, attached to the stud *p*, though not so hard but that two side springs, *t*, attached to the slide, will just hold the teeth clear of the cloth when moving back ready to feed; but, simultaneously with the forward feed and when the needle is rising out of the cloth, the teeth of the arm *q* are pressed up above the side springs into the cloth, grasping the cloth against the foot while feeding. The pressing-lever *N* extends toward the bow *K*, and is connected to the middle of a strap, *O*, one end of which is secured to the table and the other end to the roller end of the vibrating plate *D*. Said lever has an india-rubber pad, *u*, which acts against a corresponding pad on the cloth-mover to press it upward when required. By the joint action, therefore, of the foregoing parts, it is evident that as the plate *D* vibrates, as indicated by the arrow 3 in Fig. 3, the roller *I*, pressing against the strap *J*, causes the bow *K* to turn upon its pivot *P*, and thus vibrate the ends of the bow, so as to push forward the cloth-arm *q* and simultaneously to tighten and straighten the strap *O*, and thereby bring the pad of the lever *N* in contact with the feeding-arm, so as to cause it to grasp the cloth at the commencement of its feed, as also shown in Fig. 5. The vibration of the plate *D* in the opposite direction, as indicated by the arrow 4 in Fig. 4, causes the same end of the bow *K* which had before advanced to recede and bring back the cloth-mover, and, simultaneously with this movement, to flex the strap *O*, and thus release the pressure of the lever upon the cloth-mover, and consequently draw the teeth of the latter from the cloth, and thus the cloth receives the necessary movement to enable the needle in its successive descents to perforate it at suitable distances. This method of operating the feeding mechanism possesses many advantages, among which may be mentioned that it does not produce any rattling or other noise, maintains the uniformity of the stitch in changing from a high to a low speed by reason of the cloth-mover not depending upon a spring to throw it back, prevents it making longer stitches by pulling the cloth, or shorter ones by holding it or helping to retard its proper feed by grasping the cloth before the needle leaves it, and by holding it until the needle has passed down through the cloth and bed-plate. Moreover, and in par-

ticular, it matters not which way the driving balance-wheel E is started or turns, the motion of the several parts will be right. This latter feature is of considerable importance, especially when operating the machine by treadle. The length of the stitch is regulated by a screw, L, which, when screwed in far enough to allow the bow K to play clear of any strain, admits of the longest stitch being made; but when the screw is turned so as by its connection with the strap J at one end (which establishes the attachment of the screw and bow) to strain on—tighten or straighten, as it were—the strap, a lesser amount or extent of vibration is given to the bow and a diminished feed or finer stitch thereby produced. The motion of the needle is derived from the secondary shaft by a connecting-rod, Q, attached at one end to a crank-pin, v, on the balance-wheel E', and at the other end to one end of a horizontal walking-beam, R, mounted on a pivot, R', in a case, S, rising from the table. The opposite end of this beam carries the needle-arm w, to which it is connected by means of a spring, w', whose lower end is attached, near the lower end of said arm, by dividing the latter longitudinally for that purpose. The arm w is guided in its vertical motion by a sleeve which incloses it. This method of connecting and operating the needle-arm works much easier and lighter than if a pitman or long mortise-joint were used. The needle is adjusted and held properly by a ferule and screw in the manner represented.

The foot or cloth-holder Z' is perforated with a number of small and distinct holes, as seen in Fig. 1. Such open-work foot, while it avoids the defects of a slotted foot, and gives, as it were, an uninterrupted bearing or spread of bearing-surface on the cloth, enables the operator to see the basting-thread or other mark on the cloth to be chased by the needle and to equalize the work. Said foot is also curved upward to allow seams and other irregularities in the thickness of the cloth to pass under it without liability to catch and hang. The shank of the foot projects up into a sleeve, x, in the case, and is constantly pressed down to hold the cloth by a spring surrounding it. Said foot, however, can be elevated and held up to adjust or remove the cloth by an eccentric, y, operating on a pin, z, projecting from the stem of the foot through a slit in the sleeve and case.

The spool T, which supplies the needle-thread, is mounted between two brackets on the walking-beam case. Various devices, both rigid and elastic, have been contrived to hold the spool, as well as to prevent slack thread above the cloth; but there are none with which I am acquainted as simple and efficient as those here shown. The vertical spindle, upon which the spool is mounted, is fitted with and surrounded by four, say, elliptical-shaped springs, U, attached to a hub, U', on which the spool rests. These springs extend into and through

the eye of the spool, so as to bear with equal force on all sides of the spool and thus hold it tight, and possessing the advantage of fitting different-sized holes in different spools. The spool, however, turns freely with its spindle, and, to produce the proper tension on the thread from which the loop is formed a pulley, V, is mounted between the spool and thread-guide W, as shown in Fig. 1, said guide being attached to the end of the walking-beam and playing in a vertical slit in the case through which it projects. A tension-wheel thus situated, having a concave circumferential groove round which the thread must pass several times, has been used, but the threads or lines of thread ride on each other, and consequently produce uneven tension; and to remedy this evil an additional wheel has been used whose circumference was the converse of the first or concave wheel, but this too produces unequal tension on the thread; and while the arrangement here shown possesses the advantages of the single pulley, it obviates the difficulties of both, and consists in making a single deep sharp crease round the wheel V which will admit any-sized thread to pass once round and be drawn into it sufficiently to bind it there, so that it shall not render or slip, but turn the wheel with it, and thus maintain the proper tension on the thread. The lower edge of this tension-wheel must be opposite the center of motion of the walking beam R, as shown in Fig. 2. A spring, V', is arranged to bear upon the periphery of said wheel with more or less pressure by a set-screw, to prevent the wheel turning too freely and to regulate the tension. The machine is driven by a band, X, leading from a pulley, X', on the secondary shaft to a pulley, X'', on a first or driving shaft, Y. The latter I have represented as being driven by a hand-crank, but I provide this shaft with the usual appliances to be operated by the foot of the attendant. The crank-pins G v of the secondary shaft are placed at right angles to each other, and, as before shown, they are so connected to and operate the several moving parts of the machine as to make no difference which way the first shaft is turned in commencing the operation, as all the parts will be alike operated whether the shaft be turned to the right or left. This method of operating sewing-machines is a desideratum. It relieves the necessity of starting the balance-wheel with the hand in order to turn it in the proper direction, and facilitates the working of a sewing-machine to a beginner. I also provide the first shaft, Y, with a balance-wheel, which, with those on the secondary shaft, prevents the latter from being affected by the spring of the driving-band. The thread from the lower bobbin passes up from the front side thereof through a slit which leads from the needle-hole in the bed-plate. In the bottom of this slit a spring, z', is placed, so that the thread passes through the slit and between the spring, and is held in the proper

position before and after the work is cut loose. The threads from the spool and bobbin being properly adjusted for operation, the needle carries its thread through the cloth, and when it rises sufficient to open the loop or thread from the needle, the point of the hook passes between the two and catches the thread in the notch, as shown in Fig. 13, and as the needle continues to rise and the point of the hook to descend, a loop is formed and opened, so as to allow one side to pass behind the bobbin or between it and the leather pad, and the other beneath the bobbin and by the spring *j*, when it is left hanging on the nipple *k* on one side, while the other side of the loop, by the descent of the needle the next time, (and while the point of the hook is rising,) is drawn entirely on the right side of the hook and round the lower thread, to be drawn tight by the hook in taking the next loop, and thereby complete the stitch by locking the thread from the bobbin. The needle passes twice through the cloth while one stitch is being completed; but these two movements, however, do more than form one stitch, as the second stitch is begun before the first is finished, and the extension of the loop round the bobbin for the second stitch completes the first by drawing it tight. Before the needle descends the cloth is moved the required distance for the next stitch, and this movement unwinds enough thread from the bobbin for the next stitch.

It should have been stated that as the oscillating hook is composed of an open ring, and as the bobbin is held independent of the mo-

tion thereof by a fixed case on one side, it would be impossible to unite the shaft B in the center of said ring without closing the space within the ring and removing the bobbin-case. Therefore, to allow of the use of an independent bobbin and case with a ring-like hook, the axis of the latter is joined to the circumference of the hook by the arch *d* extending over the case *h*, so that as the hook oscillates the arch sweeps back and forth without touching the case or interfering with the thread from the bobbin.

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

1. The method of operating the feeding-arm or cloth-mover by the combined action of the pivoted bow K, pressing-lever N, flexing-strap O, and vibrating plate D, or its equivalent, as set forth.

2. Mounting the vibrating plate D, which imparts motion to the loop-forming hook and feeding mechanism, upon spring-arms *n*, arranged at right angles to a longitudinal spring, H, for balancing said plate in its vibration.

3. Mounting the spool T upon a spindle having elliptical-shaped springs, which extend into and through the eye of the spool, as and for the purposes specified.

In testimony whereof I have hereunto subscribed my name.

JONAS HINKLEY.

Witnesses:

JOHN SMITH,
R. R. WEBBER.