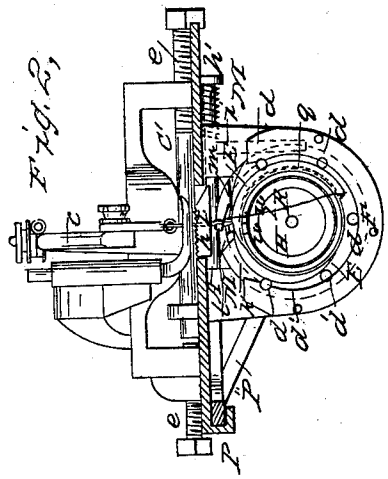
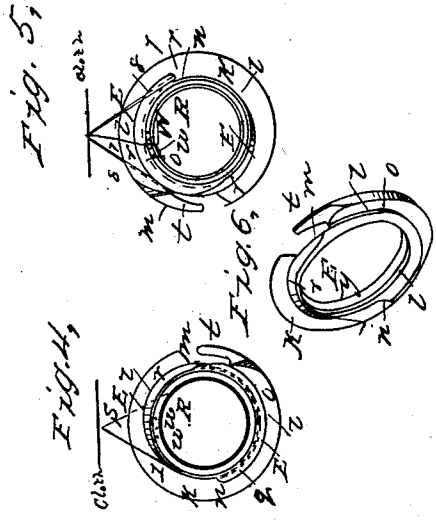
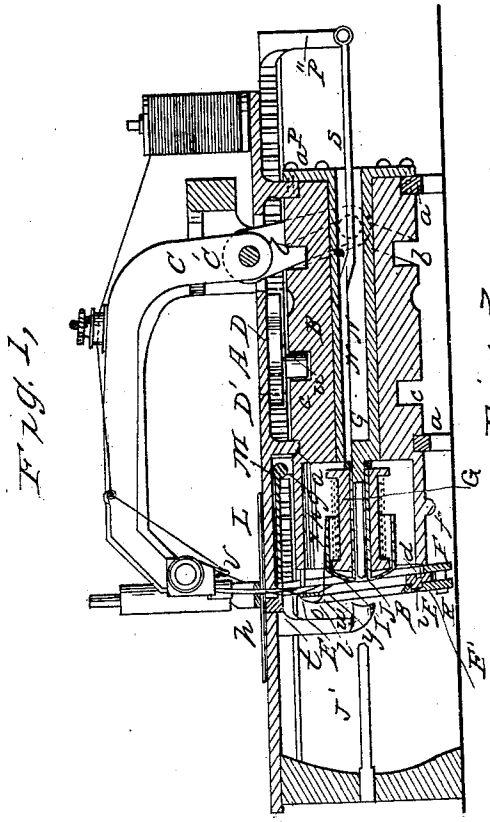
W. MILLAR.

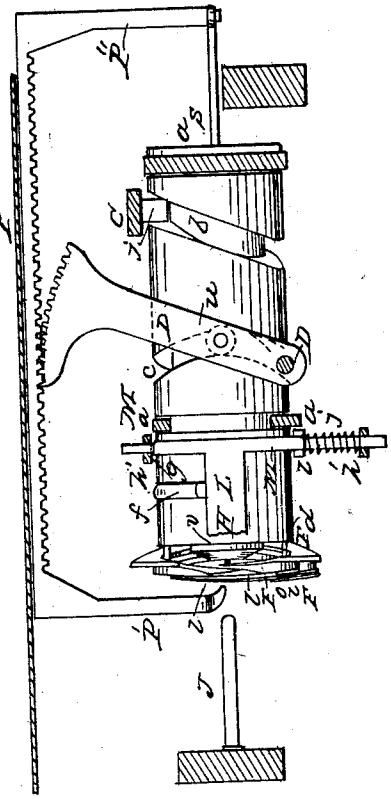
Sewing Machine.

No. 21,800. Patented Oct. 12, 1858.









UNITED STATES PATENT OFFICE.

W. MILLAR, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF AND JOHN NUTT, OF SAME PLACE.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **21,800**, dated October 12, 1858.

To all whom it may concern:

Be it known that I, WARREN MILLAR, of Chicago, in the county of Cook and State of Illinois, 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.

The object of my invention is to avoid the necessity, in sewing with two threads to produce what is known as the "interlocked" stitch—such as is produced by the needle and shuttle—of winding the thread that is used for locking the loops of the needle-thread onto bobbins or into cops, and to use the said thread in the machine on common spools, such as those on which it is generally sold.

My invention consists, principally, in a rotating two-hooked ring of the peculiar construction hereinafter described, operating to extend the loops in the needle-thread, in combination with a reciprocating spool which supplies the locking-thread through the said ring and through the loops extended thereon.

My invention also consists in the employment of a loose ring, applied and operating substantially as hereinafter described, within a cavity in the aforesaid rotating two-hooked ring to produce the necessary tension on the locking-thread.

Figure 1 in the drawings is a vertical section of a machine with my improvements, taken in a plane transverse to the direction in which the cloth is moved in the sewing operation. Fig. 2 is a front view of the same, with part of the stand broken away to expose the working parts. Fig. 3 is a horizontal section of the same just below the table on which the cloth or material to be sewed is placed. Figs. 4 and 5 are front views of the rotating two-hooked ring and tension-ring, showing the former in two other positions than that represented in Fig. 2. Fig. 6 is a perspective view, on a larger scale, of the rotating two-hooked ring.

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

A is the horizontal table or plate on which the cloth is laid to be sewed, and to which the working parts of the machine are attached.

B is a hollow mandrel, arranged horizontally in bearings *a a*, below the plate A, with its axis at right angles to the direction in which it is intended that the cloth or other material to be sewed shall be moved. This mandrel, which is intended to have a rotary motion imparted to it by any convenient means, has in its periphery two cam grooves, *b* and *c*, the first to drive the needle-lever C and the second to drive a lever, D, which operates the reciprocating spool-driver. It has also two cam projections, *f* and *g*, to operate the lever which carries the feeding-dog to produce the feed, and has projecting from its front end a number of pins, *d d*, to drive the rotating two-hooked ring E, which is arranged opposite to the front end of the said mandrel, and nearly concentric therewith.

The needle-lever, having the needle attached, is secured to a rock-shaft, C′, working between centers *e e*, above the plate A, and is arranged to vibrate in a vertical plane parallel with the axis of the hollow mandrel B. It passes through the plate A, and is furnished at its lower end with a stud, *j*, to work in the groove *b* of the hollow mandrel, said groove being of suitable form to give the needle a proper reciprocating motion.

The rotating two-hooked ring E (shown in Figs. 2, 4, 5, and 6) is made with a broad flange, *k*, which is for the most part flat, and with a projection, *l*, on one face, which may be considered as the front, extending all round the inner margin of the ring. One hook, *t*, is formed of a portion of the flange *k* by providing an oblique opening across the said flange and cutting from the bottom of the said opening through the back of the ring, as shown at *m* in Figs. 2, 4, and 5, thus bringing the point of the hook at the extreme back of the ring. The other hook, *n*, is formed on the front projection, *l*, on the front of the ring, by cutting a groove, *o*, in the peripherical surface of the projection, and cutting a notch in the small flange *q*, that has been left on the front of the projection by cutting the groove. This hook *n*, which has a very slight degree of prominence, is situated almost diametrically opposite to the longer hook *t*; but its point sets in an opposite direction (circumferentially considered) to the point of *t*. The projection *l*

has the outer flange cut away on that half of the circumference toward which the two hooks point, and toward the hook *t* it is beveled, as shown at *r*. Within the projection *l* there is, on the front side of the ring E, a circular cavity, *y*, to receive the ring R, by which the necessary tension of the locking-thread is produced. The flange *k* contains a number of holes, *d' d'*, corresponding in size and position and distance apart to the pins *d d* in the end of the hollow rotating mandrel B. The ring thus constructed is fitted loosely between two stationary open plates, F F', which are attached together and to the bottom of the plate A opposite the front end of the rotating mandrel, and which are arranged so that their faces are horizontally perpendicular to the axis of the hollow mandrel, as shown in Fig. 3, but oblique thereto in an upward direction, as shown in Fig. 2, the degree of obliquity being such that, while two or more of the pins *d d* which are at any time below the center of the mandrel enter the holes *d' d'* in the ring, those above the said center will be withdrawn from the said holes, as is shown in Fig. 1. The plates F F' are also so arranged that the needle *v*, in passing down through the plate A, will work close to the back of the flange *k* of the ring E, and the ring is so arranged relatively to the groove *b* in the mandrel that the point of the hook *t* will, in the rotary motion which the ring E derives from the pins *d d* of the mandrel, acting in its holes *d' d'*, pass the needle immediately after the latter has completed its downward stroke.

G is the wooden spool carrying the locking-thread, placed in what I term the "spool-case," H I, which consists of a light metal cap, H, large enough to cover about half the spool, with an attached tubular spindle, I, upon which the spool is capable of rotating easily. The cap H has a small hole, *x*, in it, for the thread to pass through as it comes from the spool.

J J' are two stationary spindles, arranged with their axes in line with the axis of the mandrel B, the former attached firmly to a stationary tube, N, passing through the mandrel, and the other to the front support of the plate A. These spindles, which are of a size to fit easily within the hollow spindle I of the spool-case, serve to support the said case as it passes, with the spool G, back and forth through the ring E. Their adjacent ends are so far apart as to leave ample room for the loops in the needle-thread to pass between them as they pass over the ring E, but not so far but that the spool-case will pass from one to the other without getting out of place.

P P' P'' is what I term the "spool-driver," consisting of a bar, P, of iron, fitted to slide in guides under the plate A, parallel with the axis of the mandrel B, and provided with two arms, P' P'', which project in front and in rear of the mandrel B. The arm P is simply forked to fit the spindle J', and the arm P'' has attached a long rod, *s*, which passes right through the tube N and embraces the spindle J. This bar P has a toothed rack on one edge, which gears with a toothed sector at one end of the before-mentioned lever D, which works below the table A on a fixed fulcrum, D', secured in the said plate, and is furnished with a stud, *u*, to work in the groove *c* of the mandrel B, which groove is of such form and so arranged relatively to the groove *b* that by its action on the lever D it causes the spool-driver to drive the spool-case and spool, which are stationary within the cavity of the mandrel during the greater part of the ascending movement of the needle, forward through the ring E during the completion of such ascending movement, then to keep them stationary in front of the said ring during about the first half of the descent of the needle, and afterward to drive them back through the ring into the mandrel during the completion of the descent of the needle, the movement being produced by the arm P' acting on one end of the spool-case and the rod *s* against the other. The spool-case is, however, allowed enough play between the said arm and rod to allow the loops in the needle-thread ample room to pass between the arm P' and the head of the spool-case. The spool-case and spool, in passing into and through the loops of the needle-thread, enter completely into the hollow mandrel B, in whose front part the cavity is considerably larger than the outside of the spool-case.

The tension-ring R, which produces the tension on the locking-thread supplied from the spool G, is a plain ring without any projections or grooves, and either flat or beveled on its face and back, as shown in Fig. 1. It has several holes, *w w*, near its inner margin, through which the thread coming from the hole *x* in the spool-case can be laced without coming in contact with the interior of the cavity *y* in the ring E. This tension-ring is confined within the cavity *y* by a flange, *z*, on the plate F'.

L is the lever which carries the feeding-dog *h*, by which the cloth is moved, said lever being attached to a horizontal fulcrum-shaft, M, of sufficient length to insure great steadiness of action, the said shaft being arranged transversely to the mandrel B, and working in fixed bearings *h' h'*, under the table, and having a downwardly-projecting arm, *i*. The cam projection *f* of the mandrel B acts to raise the lever and dog and cause the latter to bite the cloth under the pressure-pad T, and the projection *g* acts against the arm *i* to slide the shaft M longitudinally, and thus move the lever and dog in a direction to feed the cloth. The dog is drawn down by the weight of the lever as the projection *f* escapes from the latter, and is forced back by a spring, *j*, applied to the shaft M, as the projection *g* escapes from the arm I.

To operate the machine, the needle-thread, supplied from a spool, U, which may be placed on a spindle attached to the back of the nee-

dle-arm or to the plate A, is brought through suitable guides on the needle-arm and through the eye of the needle in the usual manner, entering the needle at the back side, and the locking-thread is brought from the spool G through the hole *x* in the spool-case and laced through any number of the holes *w w* of the tension-ring R. The needle-thread is shown in the several figures in red color, and the locking-thread in blue. The operation is produced as follows: By the rotary motion of the mandrel in the direction of the arrows shown on the ring E, the said ring E deriving motion from the mandrel through the pins *d d*, and the point of its hook *t* passing in front of the needle just as the latter begins to rise and leave the thread slack in front of it, the said hook catches the needle-thread, and as the revolution of the ring continues it extends the said thread in the form of a loop, one side of which passes in front of the flange *f* of the ring and into the groove *o*, as shown at 7 in Fig. 5, and the other passes behind the flat back of the ring, as shown at 8 in the same figure, and across the back of the spool-case and spool G, until, when the ring has made about three-fourths of a revolution, the loop is extended upon the projection *l* in the manner shown in Fig. 4, the side 8 of the loop having passed completely across the back of the ring, and as the ring arrives at about this position the spool-case and spool G begin to move back through the ring to carry the locking-thread through the extended loop. The said movement of the spool-case and spool G is completed as the ring completes its revolution and the point of the hook *t* arrives again at the needle. As the ring arrives in this last-mentioned position the side 7 of the loop is thrown off the projection *l*, as shown in Fig. 2, by the action of the bevel *r* and left slack, and as the ring continues to revolve and the hook *t* commences to extend a new loop in the same manner the said hook draws up all the slack from the preceding loop and carries the side 7 of the said loop across the front of the ring and over the front of the spool-case and spool G. The extension of the new loop is continued by a similar operation to that which extended the preceding one; but the latter is retained by the hook *n*, as shown in Fig. 5, long enough to prevent it interfering with the new one, after which it is permitted to slip off by the approach of the said hook to the stitch-making point of the cloth, after which it is drawn tight up to the cloth by the continued extension of the new loop. It is obvious that as the side 8 of the loop has been passed across the back of the ring E and the side 7 across the front thereof the said ring has passed entirely through the loop, and as the tension-ring R is within a cavity in the said ring, it has done the same thing, and as one side of the loop passed over the front of and the other side over the back of the thread-case and spool G, those also passed through the loop, and hence the interlocking thread must be left in the loop of the needle-thread and drawn up under the cloth by the drawing tight of the loop. The new loop is in turn, like the first one, passed over the rings E and R and the spool-case and spool G and drawn up by the extension of the third, and so on indefinitely, each loop being drawn up by the extension of its successor. The loops are permitted to pass between the back of the ring R and the end of the mandrel by the oblique arrangement of the said ring relatively to the mandrel, which leaves the greater number of the pins *d* clear of the ring, with room for the thread to pass between them. A proper and uniform degree of tension is produced on the needle-thread during the operation by ordinary means, and the locking-thread has the requisite tension produced by being laced through the holes *w w* of the ring R, which keep it tight between the said ring and the cloth, but leave it slack between the said ring and the spool G. The tension of the thread between the tension-ring and the cloth always keeps the part of the said ring containing the holes *w w* uppermost and prevents it turning with the ring E, and though there is no appreciable tension on the locking-thread between the ring R and the thread-case, owing to the free rotation of the spool G, the draft on the thread keeps the thread-case from revolving; or, if this draft be not sufficient, the said case may be weighted to keep the hole *x* at the top.

Having described the construction and operation of my machine, I will proceed to point out that my rotating two-hooked ring possesses a great advantage over the many forms of rotating hooks that have been employed for the same purpose, and which do not pass through the loop—viz., it allows the principal hook *t*, which extends the loops of the needle-thread, to be brought on the opposite side of the peripherical surface on which the loops are extended to that side on which the locking-thread passes up from the bobbin or spool to the cloth, and thereby prevents the possibility of the said hook catching the locking-thread, as it frequently does in machines using the rotating hook; and I will remark that it is only by using a ring that is detached from the mandrel or driver and that passes through the loops that this position of the principal hook can be attained.

It will be observed that the looping-ring rests upon its drivers, whereas in all other machines, as I am at present advised, the circular shuttles or rings rest upon their peripheries. By my improved mode of arranging the ring I avoid the use of oil and friction, thus preventing the soiling of the work, rendering the machine easier to drive, &c. As I intend to apply for a separate patent on this improvement, no further description need now be given.

I do not claim the combination of a rotating hook to extend the loops in the needle-thread

with a reciprocating bobbin to carry the locking-thread through the so-extended loops, as that is claimed in the patent of A. B. Wilson, August 12, 1851; neither do I claim the driving of the reciprocating spool by means of a groove in a rotating hollow mandrel into which the said spool passes, and which carries the rotating hook; nor do I claim placing the hook which takes the loop from the needle on the side of the ring opposite to that where the thread passes from the bobbin or thread-case to the needle-loop, when such bobbin or thread-case is stationary or revolves with the hook, as such construction and arrangement of these devices are employed in the patent of E. Harry Smith, dated November 10, 1857; but

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

1. The revolving hooked ring, constructed as described, when arranged and operating in combination with the needle and the reciprocating spool carrying the locking-thread, for the purpose specified.

2. The loose ring B, applied within the rotating two-hooked ring and operating in combination therewith, substantially as described, to produce a tension on the locking-thread.

WARREN MILLAR.

Witnesses:
HENRY T. BROWN,
WM. TUSCH.