

(No Model.)

C. F. HARLOW.
SEWING MACHINE.

No. 418,716.

Patented Jan. 7, 1890.

Fig. 3,

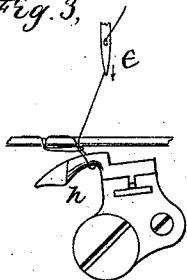


Fig. 4,

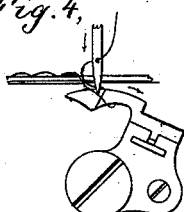


Fig. 5,



Fig. 6,

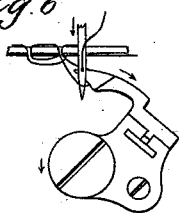


Fig. 7,

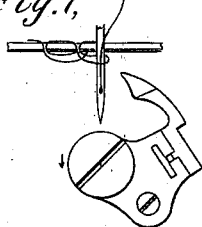
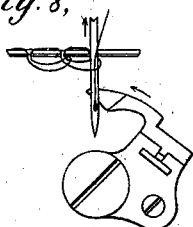


Fig. 8,



Witnesses,
Jas. J. Maloney.
M. E. Hill

Fig. 1,

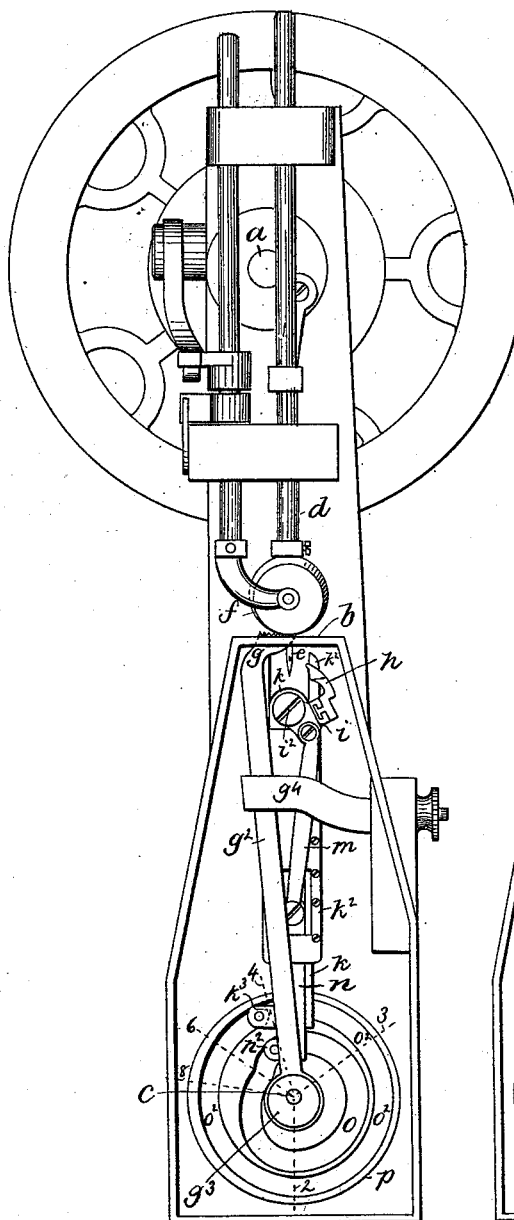


Fig. 9,

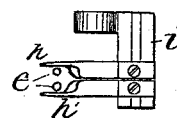


Fig. 10,

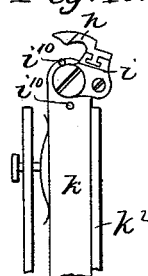
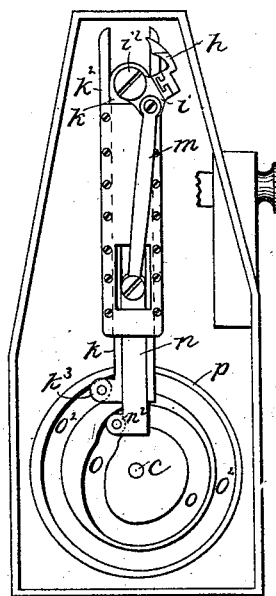


Fig. 2,



Inventor,
Charles F. Harlow,
by J. P. Divermore
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES F. HARLOW, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE SEAM MACHINE COMPANY, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 418,716, dated January 7, 1890.

Application filed November 7, 1888. Serial No. 290,196. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. HARLOW, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improve-
ment in Sewing-Machines, of which the fol-
lowing description, in connection with the ac-
companying drawings, is a specification, like
letters on the drawings representing like
parts.

My invention is embodied in a sewing-ma-
chine of that class in which an enchaind or
looped stitch is made by means of an eye-
pointed needle and loop-holder, the machine
being adapted for operating with waxed
thread as well as with dry thread.

The invention relates, mainly, to the loop-
holder or device that engages the loop of
thread extending from the fabric to the eye
of the needle and holds the same while the
needle is being withdrawn and again passed
through the fabric or material being sewed
and into the loop thus held by the loop-
holder, which latter is then withdrawn, leav-
ing the loop previously held by it around the
shank of the needle, and is then again car-
ried forward to engage the new loop extend-
ing from the material to the eye of the nee-
dle below the loop previously held by the
loop-holder.

In chain-stitch sewing-machines having a
vibrating or reciprocating loop-holder as
heretofore made, so far as known to me, the
forward movement of the loop-holder into the
new loop is in the same path as the rearward
movement out from the previously-held loop,
and in such construction and mode of opera-
tion there is danger that the loop-holder in
coming forward to engage the new loop will
also catch again in the old loop and prevent
it from being drawn up properly to make the
stitch.

The main object of the present invention
is to overcome this objection; and the inven-
tion consists, mainly, in means for operating
the loop-holder in such manner that it ad-
vances to engage the new loop in a different
path from that which it followed in leaving
the old loop, the said loop-holder having, in
addition to its vibrating or reciprocating
movement into and out from the loop, also a
lateral motion, which takes place just after

it leaves the old loop and before it enters the
new loop, said lateral motion being, as shown
in this instance, in a vertical plane and the
loop-holder moving forward to engage the
new loop at a lower level than that at which
it leaves the old loop around the shank of the
needle. In the construction shown in this
instance the loop-holder is a curved hook or
finger, and is pivoted on an axis about which
it oscillates in its vibratory endwise move-
ment toward and from the said needle, and
the said pivot is itself supported on a slide-
bar having a reciprocating movement by
which the entire loop-holder is moved bodily
in its plane of vibratory or oscillating move-
ment.

The loop-holder occupies but little space in
a direction at right angles to the seam in the
material being sewed, and a number of said
loop-holders may be mounted side by side on
a single pivoted carrying-block, so that all
will partake of the same movement, each co-
operating with a corresponding needle, a num-
ber of which needles may be carried by a sin-
gle needle-bar for the purpose of sewing two
or more parallel seams simultaneously.

Figure 1 is a front elevation showing the
main operative parts of a sewing-machine
embodying this invention; Fig. 2, a simi-
lar elevation with the feed mechanism re-
moved in order to show more clearly the loop-
holder and its operating mechanism; Figs. 3
to 8, inclusive, details showing the relative
position of the needle at different points in
the operation of making the stitch; and Figs.
9 and 10, modifications to be referred to.

The invention is embodied in a machine
having a shaft *a* above the plate or work sup-
port *b*, and a shaft *c* below the said work-
support, the said shafts *a* and *c* being con-
nected to rotate simultaneously and operate
the stitch-forming devices above and below
the fabric, respectively. The parts operated
by the shaft above the fabric may all be of
usual construction, the said shaft being con-
nected by a crank and pitman, or otherwise,
with the needle-bar *d*, which may carry one
or more eye-pointed needles *e* in the usual
manner, forcing the needle down and carry-
ing its point below the fabric and then with-
drawing the needle until its point is some

distance above the fabric at each rotation of the said shaft. The presser-foot f and feeding devices g may also be of any suitable construction, the latter being shown as a foot formed at the end of a bar g^2 , connected at its lower end with a crank or eccentric g^3 on the shaft c , the said bar working in a guide g^4 , which is adjustable along the bar, the upper end of which thus has a lateral and vertical movement produced by the rotary movement of its lower end, and the amount of lateral movement depending on the position of its guide g^4 , which is adjustable up and down the bar g^2 for the purpose of shortening or lengthening the feed, as will be readily understood.

The loop-holder h consists of a curved hook or finger, the end of which is made very thin, and passes close by the side of the needle when the latter is projected downward below the under surface of the fabric, while the shank of the said loop-holder is thicker or wider than its point, and thus spreads the loop open when around the shank, so that the needle will pass through the loop held on the loop-holder when the needle descends, while the loop-holder is moving backward from its forward position, as shown in Figs. 4, 5, and 6. The said loop-holder h is supported on a block i , pivoted at i^2 , upon the slide-bar k , working in its guide k^2 upon the frame-work of the sewing-machine, and the said looper-block is oscillated upon its pivot i^2 , so as to throw the loop-holding finger forward toward the needle and back from the needle by means of a pitman m , connected with the said block i at one side of its pivot, and also connected with a slide-bar n , that works in a guide-groove in the slide-bar k , the said slide-bar n being provided with a cam roller or projection n^2 , working in a cam-groove o in a cam-disk p on the shaft c . Assuming that the slide-bar k were stationary, or that the pivot i^2 were stationary on the frame-work of the machine, the cam-groove o , in connection with the slide-bar n and pitman m , would give the loop-holder finger h an oscillating movement at each rotation of the main shaft by which its point would be thrown forward into the loop of thread extending from the eye of the needle to the fabric just as the needle was rising, and thus tending to open the said loop, which would remain held by the loop-holder until the needle again descended and passed through the loop thus held by the loop-holder, which would, immediately after the needle had passed through the loop, be vibrated back out from said loop and leave it around the shank of the needle, and would then be vibrated forward again just as the needle began to rise, so as to engage the new loop at the eye of the needle, as before described.

The cam-groove o and intermediate devices between it and the looper do, in fact, give it substantially the movements just described; but in addition to such oscillating or end-

wise movement of the loop-holder h around its pivot i^2 the said pivot itself is also given a reciprocating movement by means of a cam projection or roller k^3 , working in a cam-groove o^2 , being so shaped and arranged with relation to the groove o , which vibrates the loop-holder, that the said pivot i^2 descends in the interval between the backward and forward movements of the loop-holder, so that its forward movement is made at a lower level than its backward movement, or, in other words, it enters the new loop, as shown in Fig. 8, below the point at which it left the old loop, as shown in Fig. 6. The cam o^2 then causes the pivot i^2 to rise gradually while the loop-holder is coming to and remains in its forward position, during which time the needle is being withdrawn from the fabric and the last loop is being drawn up, so that when the needle again enters the fabric the loop-holder will be in its higher position, and the loop, which is at all times held tightly by it, will be left by it around the shank of the needle at such point that when the loop-holder again advances at the lower level it is impossible for it to engage the loop previously cast off from it, as might take place if the loop-holder advanced and receded in the same path.

If desired, the looper-block i might carry a number of different looper-hooks, as shown in Fig. 9, co-operating with a number of different needles to form several seams or lines of stitching simultaneously, and when two such seams are to be placed very near together the loop-holding fingers will be made right and left handed with relation to one another, as shown in Fig. 9, and their thin points will be adjacent to one another, so as to require but very small space between the needles.

The relative positions of the needle and the loop-holder in the process of forming the stitch are illustrated in Figs. 3 to 8, inclusive.

The substantially-concentric portions of the cam-grooves in the cam-plate p , between the radial lines 2 and 3 thereof, (see Fig. 1,) in passing the cam-rollers retain the pivot of the loop-holder in its highest position and the loop-holding finger in its forward position, as shown in Fig. 3, during the greater part of the rise and descent of the needle while its point is above the fabric. In the latter part of the descent of the needle the portion of the cam-groove o between the lines 3 and 4 throws the loop-holder back to the position shown in Fig. 4 just as the point of the needle passes through and below the fabric, and thus enters within the loop, as will be understood from Figs. 4 and 5, the latter showing a plan view of the loop-holding finger and section of the needle. During this part of the movement the cam-groove o^2 has not changed the position of the pivot i^2 . Then while the portion of the cams between the lines 4 and 6 passes over the cam-rollers the slide-bar k and pivot i^2 will be drawn down; but the pitman m will be drawn down

much more rapidly, so that the loop-holder will continue to be oscillated back from the position shown in Fig. 4 to the position shown in Fig. 6 and then to that shown in Fig. 7, while at the same time the pivot i^2 will have descended, so that, in addition to the endwise backward movement of the loop-holding finger it also has a bodily or lateral downward movement. Then in the portion of the cam between the lines 6 and 8 the groove o will have thrown the loop-holder forward, while the groove o^2 will have produced but slight, if any, change in the position of the looper-pivot i^2 , such movement projecting the point of the finger into the loop of thread which is then being formed by the beginning of the rise of the needle, as will be understood from Fig. 8, after which the portion of the cam-grooves between the lines 8 and 2 will cause the pivot i^2 to rise, but will cause the pitman m to rise more rapidly, so that the loop-holder will have a bodily lateral upward movement simultaneous with its endwise forward vibrating or oscillating movement, by which it is again brought to the position shown in Fig. 8.

It is obvious that the mechanical construction of the loop-holder and its operating devices may be widely varied while retaining substantially the same mode of operation, and various other devices might be substituted for the specific ones shown for giving the loop-holder the movements described with relation to the needle.

The pivot i^2 practically constitutes a guide which determines the path of the reciprocating or vibrating movement of the loop-holder, and the said guide, instead of being stationary, as heretofore practiced, is itself made movable, so that the path of movement of the loop-holder is shifted with relation to the frame-work of the machine during the said movements of the loop-holder on its guide.

Fig. 10 represents a mechanical modification by which a similar result is attained. In this case the cam o^2 for the slide-bar k is dispensed with, and the said slide-bar has a slight frictional resistance to its movement, and the pivotal movement of the looper-block i thereon is limited by suitable stops i^{10} . By this construction a single cam-groove that acts on the pitman or equivalent connection with the looper-block, gives the latter both of its movements, first rocking the same forward on its pivot until such rocking movement is arrested by the stop, when the further upward movement of the pitman will cause an endwise upward movement of the

slide-bar, which will remain in its uppermost position until the loop-holder is moved back until arrested by the stop, after which a further downward movement of the pitman will cause the slide-bar to move downward, so that the endwise and lateral movements of the loop-holder will alternate with one another.

It is considered preferable to move both the looper-block and its guide separately and positively, as herein shown, and so that the lateral movement may in part accompany the endwise movement instead of having one movement wholly finished before the other begins.

I claim—

1. In a sewing-machine, the combination of a reciprocating eye-pointed needle and work-support with a vibrating loop-holding finger at the opposite side of said work-support from that at which the needle enters the work, said loop-holding finger having a thin point portion and a wider shank portion, a supporting-guide on which said loop-holding finger vibrates, said guide being movable substantially in line with the needle, and two cam-surfaces, one co-operating with and vibrating the said loop-holding finger and the other co-operating with and reciprocating its supporting-guide, substantially as described.

2. The combination of a reciprocating eye-pointed needle and work-support with the loop-holding finger at the opposite side of said work-support from that at which the needle enters the work, said loop-holding finger having a thin point portion and wider shank portion, a pivoted carrying-block for said loop-holding finger, and a reciprocating slide-bar upon which said block is pivoted, substantially as described.

3. The combination of a reciprocating needle-bar and two or more eye-pointed needles carried thereby with a pivoted looper-block and two or more loop-holding fingers supported thereon, each of said fingers having a thin point portion substantially in line with one side of the shank portion, said point portions on two adjacent fingers being at opposite sides of the shank portions, respectively, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES F. HARLOW.

Witnesses:

JOS. P. LIVERMORE,
JAS. J. MALONEY.