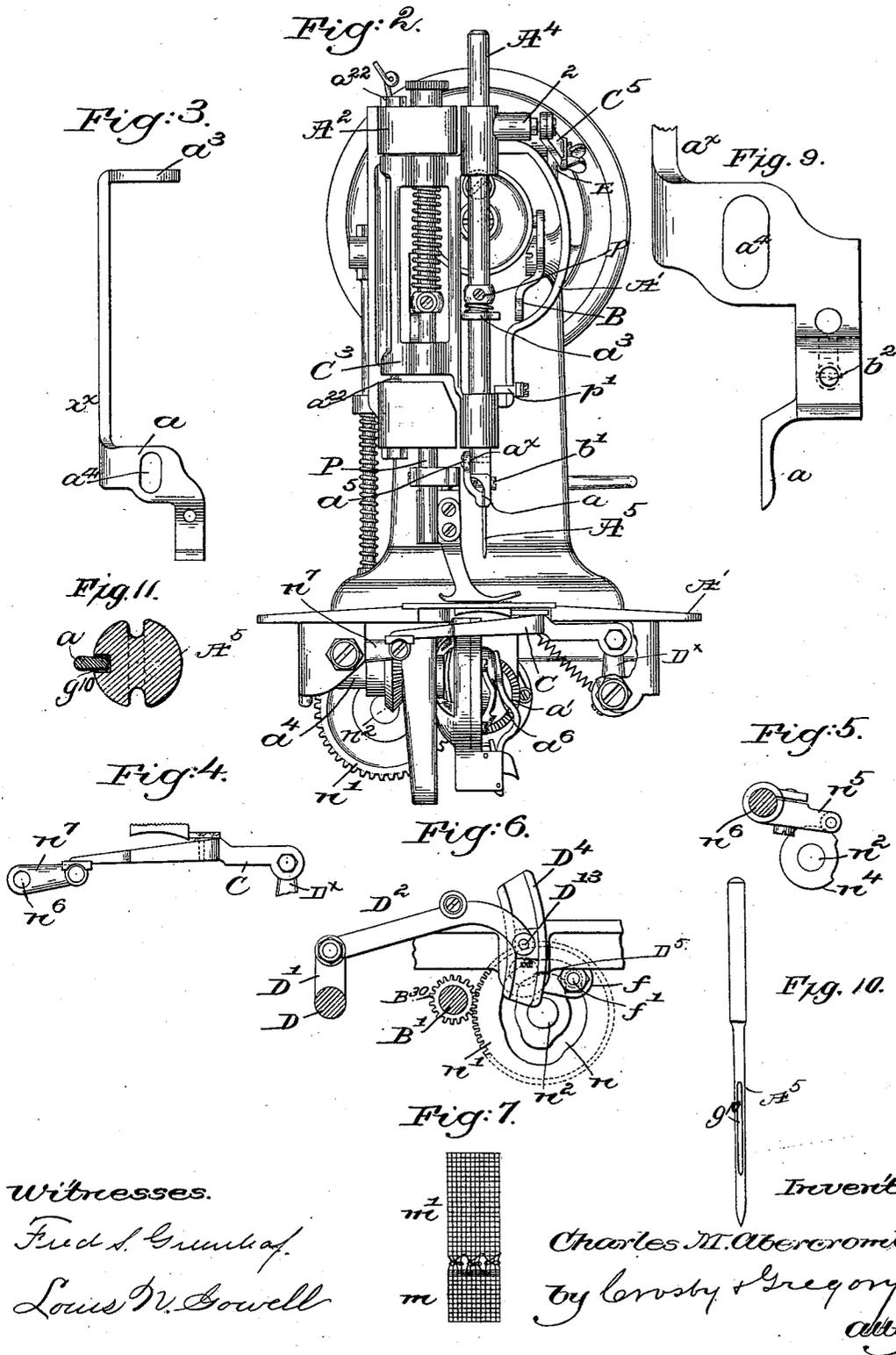




C. M. ABERCROMBIE.  
HEMSTITCH SEWING MACHINE.

No. 520,977.

Patented June 5, 1894.



Witnesses.  
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 Louis W. Howell

Inventor:  
 Charles M. Abercrombie  
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 Attys.

# UNITED STATES PATENT OFFICE.

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## HEMSTITCH SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 520,977, dated June 5, 1894.

Application filed December 27, 1892. Serial No. 456,450. (Model.)

*To all whom it may concern:*

Be it known that I, CHARLES M. ABERCROMBIE, of Bridgeport, county of Fairfield, State of Connecticut, have invented an Improvement in Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

Heretofore in the production of hem-stitch seams in handkerchief and other work the fabric to be hem-stitched has had its warp and weft disturbed close to the inner edge of the hem to be made so as to make therein elongated openings close to and parallel with the said edge, both by a needle, and by a series of piercers carried by a bar parallel with the needle-bar and actuated thereby at certain descents of the needle-bar; and so also the threads adjacent to the inturned edge of the hem have been separated by giving to the needle, or the fabric, while the needle is yet in it, a movement substantially at right angles to the length of the hem being stitched. Where the holes are parallel with the inner edge of the hem great difficulty is experienced in doing good work, and the hem-stitch looks quite differently from that done by hand as regards the shape of the hem-stitch openings. In the plan where the needle is moved laterally away from the inner edge of the hem while in a portion of the material of single thickness, the work on some classes of goods is satisfactory, but in other classes of goods, the needle, the machine being run rapidly, is apt to be injured. It is a great desideratum to relieve the needle of all work except that of merely putting the thread through the material, and hence in my invention I have aimed to improve the class of machine last referred to so that the strain on the needle for hem-stitch work is reduced to the minimum, and so that the strain will not be materially different from that to which the needle is subjected in ordinary sewing. With this in view, I have devised a device which I denominate a "spreader," and have combined it operatively with the needle so that the spreader enters the material of single thickness close to the needle each time that the latter enters the material of single thickness,

the spreader being arrested in its descent with the needle bar and needle or put out of action when the needle descends through the two or more layers of material constituting the over-lapped part of the hem, it being understood that the stitch used to effect what is denominated hem-stitch work, is made up of a three-stitch figure, or a figure of the zig-zag order as employed for button-hole or over-stitching.

One part of my invention consists in a sewing machine containing the following instrumentalities, viz:—a needle-gate, means to move it laterally, a needle-bar mounted in said gate and provided with a needle, devices to reciprocate the said needle bar vertically in said gate; a spreader carrier connected loosely with said needle bar and moved laterally and up and down therewith, a spreader connected to said spreader-carrier and arranged close to one side of the needle, a yielding abutment movable with said needle bar to depress the spreader-carrier in a yielding manner, and an arresting device adapted to be struck by said carrier during some but not at other descents of the carrier, as described with the needle-bar, whereby the entrance of the spreader into that part of the material forming the hem is prevented, but is permitted to enter the body of the material whenever the needle enters said body beyond the edge of the hem, substantially as will be described.

Other features of my invention will be hereinafter described and pointed out in the claims at the end of this specification.

Figure 1, in side elevation, partially broken out, shows a sewing machine of the Wheeler & Wilson pattern on which I have chosen to illustrate my invention, the fly wheel being, however, omitted; Fig. 2, a front end view thereof with the cap removed and fly wheel added; Fig. 3, a detail showing the carrier and spreader detached from the machine. Fig. 4, shows the feed device and the arm for lifting it. Figs. 5 and 6, show parts of the feeding device. Fig. 7, shows a piece of a handkerchief. Fig. 8 shows part of the lower end of the needle-bar and needle, and part of the spreader-carrier and spreader much enlarged. Fig. 9 shows the lower end

of the spreader-carrier and spreader much enlarged. Fig. 10 shows the needle enlarged, the view being at that side having the groove for the spreader. Fig. 11 is an enlarged view showing in cross section the needle with the usual thread grooves, and with the spreader in its guide groove.

Referring to the drawings, A represents the bed-plate and A' the overhanging arm of a Wheeler & Wilson machine upon which I have herein chosen to embody my invention.

The machine referred to has a main or needle-bar actuating shaft A<sup>3</sup> provided at its front end, in usual manner, with a crank and link, to reciprocate the needle-bar A<sup>4</sup> provided with an eye-pointed needle A<sup>5</sup>. The needle-bar is mounted in a needle-gate C<sup>3</sup> having suitable bearings for said bar, said gate being adapted to be swung about suitable vertical pivots connected with the head A<sup>2</sup> of the frame, a link C<sup>5</sup> connecting a projection 2 of the said gate with a block having a screw 12, said block being adjustably mounted in a groove of a lever arm E pivoted at 13<sup>x</sup> and having at its inner side a suitable roll or projection *d* to enter a cam groove in the cam wheel *h* deriving its movement from a pinion *e'* mounted loosely on a stud *e*<sup>2</sup> fixed to the plate *e*<sup>3</sup> employed to cover the wheel *h*, said pinion *e'* having fixed to it a bevel gear *e*<sup>5</sup> which in turn is engaged and rotated by a bevel gear *e*<sup>6</sup> fast on the main shaft A<sup>3</sup>; and B represents a take-up operated by a suitable cam in the usual manner. The needle-bar actuating shaft has, it will be supposed, a double crank, which, through like connecting rods B<sup>2</sup>, B<sup>3</sup>, joins with a like double crank on an under shaft B' having at its end a disk B<sup>10</sup>, which through a suitable link rotates a shortshaft having a pinion *a'*, which, through other suitable pinions rotates another short shaft *a*<sup>4</sup> which is provided with a loop-taker driver adapted to rotate in a circular race a loop-taker *a*<sup>6</sup>.

The parts so far referred to and described by letter are common to the Wheeler & Wilson over-seaming machine, and common to United States Patent No. 479,739, dated July 26, 1892, except as to the needle A<sup>5</sup> which has at one side an additional groove *g*<sup>10</sup>, to be described, in which the spreader, to be described, enters and by which its point is guided. The needle A<sup>5</sup> has the usual long and short grooves commonly found in sewing machine needles such as used in the Wheeler & Wilson machines, and in addition, it has at one side a groove *g*<sup>10</sup>, best shown in Figs. 8 and 10, said groove acting as a guide for the lower end of the spreader *a*, to be described, said spreader, by entering said groove, being able to get into and spread the hole made by the needle while the latter is yet in the material. The feeding mechanism to be employed herein is and may be substantially such as common to the said patent, and in practice, it will be understood that the stitch made will, for the best results, be a three-stitch figure such as

may be made by the feed described in the patent referred to.

My invention does not require any alteration of the feed, and hence the feed need not be herein particularly described except to say that D is a rock-shaft mounted on suitable pivot studs, and provided near one end with an arm D<sup>x</sup> joined to the rear or right-hand end, viewing Fig. 4, of the feed bar C adapted to engage and move the material. The rock-shaft D at its rear end has an arm D' see Fig. 6 which is joined to a lever D<sup>2</sup> provided at its front end with a stud D<sup>13</sup> having a suitable shoe or block to enter a groove in the rock-shaft feed-rocker D<sup>4</sup> fast on a short shaft D<sup>5</sup> having at its opposite end an attached arm *f* provided with a stud or finger *f'* to enter a cam groove *n* in a toothed pattern wheel *n'* fast on a shaft *n*<sup>2</sup> provided at its front end with a cam *n*<sup>4</sup>, see Fig. 5, on which rests an arm *n*<sup>5</sup> fast to a shaft *n*<sup>6</sup>, the latter shaft at its forward end see Figs. 2 and 4 being provided with an arm *n'* against which bears the free end of the feed bar C. The pattern wheel *n'* derives its rotation from a toothed gear B<sup>20</sup> on the shaft B'. The shape of the cam groove *h*<sup>2x</sup> of the wheel *h* will be substantially as represented in the drawings, so that the needle-gate will be put into position to let the needle descend twice through the material *m'* where the same is of single thickness or at a point just beyond the edge of the folded material constituting the hem *m'* and to then put the gate into position to let the needle descend once through the said hem part, the feed being operated, as provided for in the said patent, so that one movement out of three in the production of the three-stitch figure, will be a movement in the direction opposite the direction in which the material is ultimately fed by the feeding mechanism, or in other words, there will be two forward feed strokes and one backward feed stroke in the production of each three-stitch figure.

Referring now to my invention, I have devised a spreader which I have designated *a*, said spreader being confined in suitable manner to a carrier *a*<sup>x</sup>, herein represented as so shaped as to be connected with and follow the needle-bar in its lateral movements with the needle-gate.

In the form in which I have illustrated my invention, the carrier has at its upper end an ear *a*<sup>3</sup> which is provided with a hole through which the needle-bar is extended, and the lower end of the carrier is bent forward toward the front of the machine and is provided with a slot *a*<sup>4</sup>, see Fig. 3, which embraces and slides on a suitable screw or projection *a*<sup>5</sup>, shown partially in Fig. 8, and by dotted lines Fig. 2, attached to the needle-bar A<sup>4</sup> and projecting therefrom at its side next the presser-bar P. The lower end of the carrier is adapted to receive the shank of the spreader, and the spreader is held by its shank between the carrier and a suitable clamp device *b* by a suitable screw *b'*, the spreader being prefer-

ably slotted in its upper end to embrace a stud screw  $b^2$  to thus aid in keeping the spreader at the proper distance from the needle.

The spreader has a tapering point, and to keep the spreader as close to the longitudinal center of the needle as possible, I have slightly grooved the needle as at  $g^{10}$  at its side next the spreader. I have surrounded the needle-bar between the upper end of the carrier and the collar  $p$ , to which is connected the usual link which moves the needle-bar vertically, with a spiral or other suitable spring which acts upon the upper end of the carrier and serves to force the spreader into the material at that side of the needle farthest from the inner edge of the hem as the needle-bar descends, said spring enabling the spreader to act in a yielding manner and to adapt itself to the particular material being acted upon, and also allow it to be arrested in its descent when desired, said spreader making in the material of single thickness an opening at right angles to and away from the inner edge of the hem.

I have provided the head of the machine with a suitable stop or arresting device, as  $p'$ , against which the portion  $a^3$  of the carrier  $a^x$  strikes whenever the needle-bar gate is drawn in toward the upright portion of the over-hanging arm, as when the needle is to descend, for instance, through the hem portion  $m'$  of the material, said stop during such descent of the needle-bar, which in a three-stitch figure will be each third descent, arresting the descent of the carrier and preventing the spreader  $a$  from entering the folded material  $m'$ , the spring referred to, during such time yielding.

From the foregoing, it will be understood that to operate the carrier properly it should be depressed by a yielding abutment in order that at predetermined times it may travel in unison with the needle-bar in its descent, and at other times be arrested or be kept from descending.

In practice, let it be assumed that the needle-bar is descending and that the needle is about to enter into the hem  $m'$  just within the inturned edge. In this descent of the needle-bar the carrier will be arrested by the stop  $p'$  and the spreader will not enter the material. Prior to the next descent of the needle-bar and needle to penetrate the material  $m$  of single thickness, the needle-gate will be moved outward about its pivots  $a^{22}$ , and the needle, having nearly completed its descent, the spreader will enter the material within the hole therein in which the needle rests and with its beveled back will push the threads, making up part of the material where it is of single thickness, away laterally from the inturned inner edge of the hem  $m'$ , thus making a somewhat elongated hole, as represented in Fig. 7, but without destroying the threads composing the fabric, the spreader merely displacing some of the threads or forcing them closer together. After this, the needle-bar is raised, and the needle and

spreader are withdrawn from the material, and the feed is operated, this time with its back stroke for one step, so that the needle, at its next descent may pass through a hole previously made in the part  $m$  of single thickness, the spreader descending with the needle to thus aid in enlarging said hole,—the said hole being one of the holes of a previous three-stitch figure,—and the loop of needle thread having been again caught, as it is at every descent of the needle, the needle is again elevated from the material and the feed takes place one step, but this time in the forward direction, and at the same time the needle gate is turned inwardly so that the needle in its next descent enters the folded part  $m'$  of the hem, but at this third descent of the needle-bar, the descent of the carrier is so arrested that the spreader will not enter the material as it did in the second and third stitches. When the needle and spreader entered the hole made in a previous three-stitch figure, as stated, the said spreader did less work than at its previous descent, but the spreader by its second movement through the material of single thickness aided in better defining the opening to be left for the production of a uniform hem-stitch. The carrier is lifted by the screw  $a^3$  of the needle bar, resting in the opening  $a^4$  of the carrier.

In this my invention, it will be seen that the needle when in the material is not moved laterally, and consequently is not subjected to any strain whatever in deflecting the warp or weft of the material in order to form the elongated openings referred to, and shown in Fig. 7, but the spreader itself performs this operation.

The stitch-forming mechanism complementary to the eye-pointed needle is and may be all as provided for in the said patent, or instead any usual equivalent shuttle or hook may be used.

This invention is not limited to the particular shape herein shown for the carrier, nor for the spreader, nor to the particular device or devices employed to reciprocate the carrier, as the same may be variously modified without departing from my invention, but the simplest form of my invention known to me is that herein illustrated.

I prefer that some part of the needle-bar actuating mechanism, or some devices moving in time with the same, shall operate to depress the carrier, and I prefer that the collar  $p$  on the needle-bar constitute the means for depressing the carrier, it acting through a suitable spring as represented.

I am aware that it has been proposed to provide a sewing machine with a bar partaking of the vertical movements of the needle bar at every thrust, said needle bar having one or more dividers, but in such machine there was no provision made for arresting the action of the bar carrying the dividers at some descents of the needle and not at other descents, so that the dividers fail at some one

descent of the needle during the making of a fancy stitch to make a hole in the material.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sewing machine the following instrumentalities, viz:—a needle-gate, means to move it laterally, a needle-bar mounted in said gate and provided with a needle, devices to reciprocate the said needle bar vertically in said gate; a spreader-carrier connected loosely with said needle-bar and moved laterally and up and down therewith, a spreader connected to said spreader-carrier and arranged close to one side of the needle, a yielding abutment movable with said needle-bar to depress the spreader-carrier in a yielding manner, and an arresting device adapted to be struck by said carrier during some but not at other descents of the carrier as described with the needle-bar, whereby the entrance of the spreader into that part of the material forming the hem is prevented, but is permitted to enter the body of the material whenever the needle enters said body beyond the edge of the hem, substantially as described.

2. A sewing machine containing the following instrumentalities, viz:—a needle-gate, means to move it laterally, a needle-bar mounted in said gate and provided with a needle, devices to reciprocate the said needle-bar in said gate, a spreader-carrier connected loosely with said needle-bar, a spreader attached to said carrier and adapted to slide up and down close to said needle at one side thereof, and an arresting device for said spreader, said arresting device being supported substantially as described independ-

ently of the gate, whereby it may arrest the spreader-carrier before completing its full down stroke with the needle-bar, said spreader-carrier being arrested only when the gate occupies its position nearest to the head of the machine, substantially as described.

3. In a sewing machine for hem-stitch work, a work-support, an eye-pointed needle grooved as usual for the passage of the needle thread and having an independent spreader-groove  $g^{10}$  near the usual thread groove, and stitch-forming mechanism located below said work-support and complementary to said needle, a spreader-carrier provided with a spreader to enter said groove  $g^{10}$ , devices to cause said spreader-carrier to be reciprocated with said needle-bar, devices to partially arrest the descent of said spreader at regular intervals during hem-stitching as when the said spreader is not to enlarge the hole made by the needle, and feeding mechanism for the material, substantially as described.

4. The needle-bar, its eye-pointed needle grooved as usual for the passage of the needle thread, and having a distinct independent groove  $g^{10}$ , combined with a spreader-carrier and spreader, the lower end of the said spreader entering said groove  $g^{10}$ , and means whereby the spreader is adapted to be reciprocated in said groove, substantially as described.

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

CHARLES M. ABERCROMBIE.

Witnesses:

ISAAC HOLDEN,  
A. E. PORTER.