

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 25,692, dated October 4, 1859.

To all whom it may concern:

Be it known that I, KASIMIR VOGEL, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Sewing-Machine; 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 front view of a machine with all my improvements, but representing the bed-plate in section and part of the stationary arm broken away to expose the working parts. Fig. 2 is an end view of the same, with the bed-plate in section. Fig. 3 is an inverted plan of the same. Fig. 4 is a section of one of the needles employed. Fig. 5 is a plan view of all the stitch-making apparatus that can be seen above the plate on which the sewing is performed. Fig. 6 is a front view of the mere stitch-making parts of the machine in a different position to that shown in Fig. 1. Fig. 7 is a side view corresponding with Fig. 6. Fig. 8 is an inverted plan of the parts below the work-plate corresponding with Figs. 6 and 7. Fig. 9 will be hereinafter explained. Figs. 10, 11, 12, and 13 are views of some of the different kinds of stitches made by the machine.

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

My invention consists in a finger or thread-conductor operating in combination with two or more needles which perforate or pass from one side to the other of the cloth or other material to be operated upon for the purpose of effecting the interlacing of the threads of such needles on one side of the material before they are interlaced with a locking-thread on the opposite side, and thus producing stitches of novel character, suitable for working button-holes, working over the edges of cloth or other goods, embroidering, and for other purposes.

It further consists in a movable needle-plate, made adjustable in the bed or cloth plate of the sewing-machine, and containing two or more needle-holes of different size or form, or differently arranged, either of which may by adjusting the plate be presented in a position for the needle to work through.

To enable others skilled in the art to make

and use my invention, I will proceed to describe its construction and operation.

A is the horizontal plate or bed on which the material is placed to be sewed.

B is the stationary arm, to which is secured a stationary guide-block, B', containing a vertical guide for the slider C, which carries the two perforating-needles *a b*, and also a guide for a slider, E, to which the feed-wheel E', operating on the upper surface of the material, is attached. The material is represented in brown color in Figs. 1 and 2, and marked 20. The needles are of the ordinary eye-pointed kind, and *b* is considerably longer than *a*.

The feeding apparatus represented is what may be termed a "positive top-wheel elastic-pressure feed," and though I do not intend here to claim any portion of it, I will describe it as far as is necessary to prevent confusion of its parts in the drawings with other parts of the machine. The slider E has the feed-wheel E' attached by the pin or axle *c*, on which the latter rotates, and has applied to its upper end a spring, E², which operates substantially like the springs applied to the pressure-pads of most sewing-machines, and presses the wheel down upon the material. The feed-wheel E' has securely attached to it a spur-wheel, *d*, which gears with another spur-wheel, *e'*, on one end of a short shaft, *e*, which is fitted to turn in a bearing in the slider E, and at the other end of the said shaft there is a ratchet-wheel, *e²*, which is acted upon to produce the rotation of the feed-wheel at proper intervals by means of a pawl, *f*, Fig. 2, attached to a lever, G G', Figs. 1 and 2, which works upon the shaft *e* as a fulcrum, and which is operated by a pin, *g*, working in its slot *g'*, said pin being carried by a lever, H, which works at the back of the stationary arm B on a fulcrum-pin, *h*, which passes through and projects on both sides of the said arm, the said lever H passing down through an opening in the bed-plate, and being connected by a rod, H', with a crank or wrist pin, *k*, carried by the main shaft I of the machine, which is arranged in bearings *i i* below the plate A. The ratchet-wheel *e²* has a stop-pawl, *f'*, Fig. 1, applied to prevent it being turned in the wrong direction. The upper portion, G', Fig. 2, of the lever G G' is made adjustable by its attachment to the lower part by a hinge, *j*, set-screw

j' , and slot j'' , to give the upper part of the slot g' different inclinations for the purpose of varying the feed. The lever H serves another purpose, as will be presently described, besides that of operating the feed-wheel once at every revolution of the main shaft I.

J is the lever for operating the needle-slider C, which carries the perforating-needles $a b$, said lever working at the front of the stationary arm B on the same fulcrum-pin h as the lever H. This lever J is connected by a link, J' , with the needle-slider C, and by a rod, J'' , with the same crank or wrist pin k that drives the lever H. The needles are represented arranged side by side in a plane forming right angles with the line of direction of the feed; but my invention is not limited strictly to this arrangement. The perforating-needles in their operation pass through the plate A in the usual manner, and where the said needles pass through a large opening is made in the said plate, covered by a thin steel plate, K, containing a hole, l , Figs. 1, 2, and 3, no larger than is necessary for the two needles and their threads to work through. This needle-plate K is not a fixed plate containing but the one hole—such as is used in many other machines—but is fitted to turn in a circular cavity provided for it in the plate A, and is provided with several holes, $n n$, of different size and form, and differently arranged to suit needles of different size, some of the said holes being for single needles and some for two. By turning the said plate in the cavity of the plate A either of its different holes $l n n$ may be presented in position to receive the needle or needles for which it is adapted. When the needle-slider C has such needle or needles fitted to it, and when the said plate is properly adjusted, it is prevented turning by means of a spring-stop, p , Figs. 2 and 3, attached to the bottom of the plate A, and entering one of a series of holes, $q q$, provided in it, and it is still further secured by a set-screw, m , which passes through a hole in its center and screws into the plate A. The same result may be obtained by providing several holes in a straight needle-plate and fitting it to slide lengthwise in the plate A, so that it may be adjusted to present either hole in position to receive the needle or needles.

L, Figs. 1, 2, and 3, is what I have before spoken of as the "non-perforating needle," also represented detached and in section in Fig. 4. This needle is substantially like what is used in some machines, making what is known as the "double-loop stitch," having its eye v , Fig. 4, running in a longitudinal direction with both orifices on the upper side of the needle. The said needle is attached to or formed of the same piece of steel with the small lever L' , which works on a fixed fulcrum, s , carried by a bracket, L'' , below the plate A, and derives its motion in as nearly a horizontal direction as is permitted by the said lever from a grooved cam, I', on the shaft I, the connection with the said cam being made by

a rod, L^3 , carrying a stud, t , which works in the groove t' of the said cam, the said rod being guided in its movement by a slot, t'' , provided in it to receive the shaft I. The said needle L commences its advance in the direction of the arrow (shown near it in Fig. 1) as soon as the perforating-needles have completed their descent, and completes its advance before the perforating-needles have been drawn out of the material, and then remains stationary till the needles have again entered the material.

M M' are two spools of thread for supplying the perforating-needles $a b$, placed on the fixed spindles $u u'$, arranged in line with each other, the former in front of and the latter at the back of the stationary arm B. From these spools the two threads, which are represented respectively of red and green color for the sake of distinction, pass through a thread-controller, N, of well-known construction, over a guide, v , attached to the needle-slider C under a spring, v' , attached to the arm B, and down to the eyes of the needles $a b$. The requisite tension is produced upon the said threads by the friction of springs O O', applied to press upon the body of thread on the spools. P is a spool of thread for supplying the under needle, L, placed upon a fixed spindle, w , at the back of the arm B. From this spool the thread (represented in blue color) passes down through an opening in the plate A, under a guide, x , attached to the lever H, and along a groove, $y y$, in the top of the plate A, and from thence down through an opening in the said plate to the needle. The necessary tension on this thread is produced by the friction of a spring, Q, pressing upon the body of thread on the spool P.

R is a spool of thread, placed on a spindle, z , at the front of the arm B, for supplying a thread for barring button-holes and for other purposes, about which more will be hereinafter said.

R* is a spring for pressing on the spool R to produce the necessary tension on its thread.

S, Figs. 1, 2, and 3, is the hook by whose aid the needle L effects the interlacing of its thread with the threads of the needles $a b$, the long stem S' of said hook being carried by two vibrating arms, T U, of different length, which work horizontally below the plate A on fixed pins 11 and 12, secured in the said plate. The movement of the said hook, whose character will presently be described, is produced under the control of these arms T U by the connection of its stem by a link, V, with a rod, W, which is operated upon by a grooved cam, I', on the shaft I, the groove 13 of the said cam receiving a stud, 14, on the said rod, and the said rod being guided in the operation thus produced by its having a slot, 15, provided in it to receive the shaft I.

Z, Fig. 2, is a spring-presser, attached by a set-screw, 17, to a bent arm, 18, that is secured rigidly to the slider E, to press upon the material being sewed, close in front of the nee-

dles, for the purpose of pressing the material firm and flat as it passes on toward the needles. This presser has a small tooth-like downward projection, 21, Fig. 2, at one side of its extremity, to enter a button-hole and serve as a guide to the edge thereof, and enable the material in which the button-hole is being worked to be turned to work all around the hole. This form of presser is useful in all operations of sewing over an edge; but for other kinds of work a presser without a tooth, 21, but otherwise similar to Z, is used.

Y, Figs. 1, 2, and 5, is the finger or thread-conductor, working on that side of the material at which the needles enter—viz., the upper side for the purpose of causing the interlacing of the two needle-threads on that side. This finger is carried by a plate, Y', attached to the lower end of an elastic arm, Y², which is arranged to swing transversely to the direction of the feed movement on a pin, 19, which attaches it to the back of the guide-block B'. The said spring by its flexure also permits the plate to swing back and forth in a direction parallel with the feed movement and toward and from the needles, and hence the plate Y' and attached finger are capable of two horizontal movements at right angles to each other. The finger Y is pointed at its lower extremity, and has a recess, 30, Fig. 5, in one side near the point. It is in itself elastic in an upward and downward direction; but in order that its point may move downward with great freedom, as it is required to do in the formation of the stitch, as will be presently described, the said finger is made in the form of a lever, and attached to the plate Y' by a horizontal fulcrum-pin, 22, Fig. 2, and a light spring, 23, is applied to it above the said fulcrum to hold it back against the said plate; but this pin permits the descent of the lower extremity of the finger to be effected by a very gentle downward pressure. The upper part of the plate Y' has a horizontal section of the form of three sides of a quadrangle, as shown in Fig. 9, which is given to illustrate this form. In the front and back of the said plate there are two curved slots, 24, Figs. 1 and 6, to receive the two projecting ends of a pin, 25, which passes through and is secured in a vertical sliding bar, 26, which receives a vertical motion in a guide within the guide-block B' from the lever H, before described as operating the feed, the said sliding bar 26 being connected with the said lever by a link, 27, Fig. 1. In the left-hand side of the said plate Y' there is a slot, 28, Figs. 2 and 5, which receives a pin, 29, which is secured to the sliding bar 26, but arranged at right angles to the pin 25. The vertical movement of the pins 25 and 29, with the bar 26, produces the two horizontal movements of the plate Y' and attached finger Y, before mentioned as being permitted by the elastic swinging arm Y². At the bottom of the front of the plate Y' there is a small projection, 31, which is operated upon by the movement of the needle-slider C,

and the elasticity of the arm Y² to produce a movement toward and from the needles in addition to that produced by the pin 29 and slot 38.

Having described the construction of the several parts of the machine, I will proceed to describe its operation for the various kinds of sewing of which it is capable, first describing its operation to produce the stitch represented in Figs. 10 and 11. In this stitch the threads of the perforating-needles are interlaced on that side of the material at which they enter. I will first suppose the stitch-making parts to be in the condition represented in Fig. 6, and partly represented in Figs. 7 and 8, and also by the bold outline in Fig. 5. The perforating-needles *a* *b*, which have a regular reciprocating motion produced by the crank-pin *k*, are rising, and the longer one, *b*, is withdrawn but a short distance from the material. The needle L has just previously advanced to the position in which it is stationary during about two-thirds of the time occupied in the ascent and descent of the perforating-needles, and has received upon it a loop of the thread of each perforating-needle. The hook S is also stationary between the top of the needle L and the plate K, with its point just behind the said needle, and the finger Y has just been moved forward by the action of the pin 29 in the slot 28 of the plate Y', and brought its recess 30 to a position to receive within it the thread, which is extended between the point of the needle *a* and the material. As the perforating-needles complete their ascent the finger Y commences to be moved laterally across their path below their points by the action of the pins 25 in the slots 24, and at the same time it is permitted to be moved rapidly forward by the spring Y as the end of the slider C passes the projection 31. During the first part of the descent of the perforating-needles the lateral movement of the finger Y across the path of the needles continues, and the finger commences to move backward, and by these operations of the finger and the operation of the feed which takes place in a direction away from the front of the machine the thread of the needle *a* is bent in such a manner between the material and its eye, as shown in Figs. 1 and 2, which represent the needles *a* *b* descending and in dotted outline in Fig. 5, that the longer needle, *b*, will pass into the said bend and so cause a loop of the thread of the needle *a* to be formed around the needle *b* and to be retained by the thread of the latter needle after the said needle itself is withdrawn. During the first part of the descent of the needles and the above-described simultaneous operation of the finger Y the hook S moves round the front of the needles, from the position shown in Fig. 8 to that shown in Fig. 3, for the purpose of catching the thread of the needle L between the said needle and the plate Y and drawing it into the form of a loop into a suitable position (represented in Fig. 3) for the perforating-needles to enter, and

when the points of the said needles have entered the said loop the hook returns again to the first-described position and there again becomes stationary. The needle L retires again from the loops of the perforating-needle threads which it has previously retained, just as those needles have entered the loop of its own thread, and so draws its loop tightly round those needles, and immediately afterward advances again to pass between them and their threads as their upward movement commences, and so forms new loops of those threads, which it retains until the perforating-needles have again entered the loop of its own thread, when it retires again, as above mentioned.

By the above operation the thread of one of the perforating-needles is made to pass round the thread of the other one on the upper side of the material, and both the said threads are formed into loops, which are made to protrude through the material to pass into one loop and receive the succeeding one formed on the opposite side by the third thread carried by the needle L.

I have attempted in Figs. 10 and 11 to represent the kind of stitch or manner of interlacing the threads thus produced, Fig. 10 being a view of the upper side and Fig. 11 a view of the under side. This kind of stitch may be made on any part of a piece of goods, both perforating-needles passing through the goods, or one of said needles passing through and the other passing over the edge, the latter mode of operation serving for button-hole working or for finishing any edge, and the former for making seams, embroidering, or any other kind of work. A button-hole or edge may be "barred" by conducting the thread from the spool R through a guide suitably arranged to lay it along within the sewing, and in a similar manner a thread may be laid within the stitch on the upper surface of the material, to raise or fill it up to produce the appearance of a braid.

By simply making the shorter perforating-needle *a* so much shorter than *b* that in its descent its point will not arrive low enough to enter the loop of the thread of the needle L till that needle has retired and taken its loop out of the way, making no further alteration whatever in the machine, the thread of the needle *a* will not be carried into the loops of L, and the latter will consequently only be locked by that of the other perforating-needle, *b*; but this, if the needle *a* is not too much shortened, will not prevent the needle L entering and placing its loops in the loops of *a* as well as in those of *b*, and so making a secure stitch. This stitch will present on the upper surface of the material the same structure (represented in Fig. 10) as that previously described, but will present on the under side of the material the totally different structure represented in Fig. 12.

By taking away the finger or thread-conductor Y the threads of the perforating-needles are prevented being interlaced on the un-

der side of the material, and the said threads are caused to present on that side the appearance of two rows of plain stitching, as represented in Fig. 13. In connection with this mode of operation the shorter perforating-needle may be long enough to enter the loop of the thread of the needle L, or short enough to escape it, as above described, and accordingly the work will present on the under side either the structure represented in Fig. 11 or that represented in Fig. 12.

By taking away one of the perforating-needles, as well as the finger Y, the machine is brought to a condition for making the well-known double-looped stitch. By using more than two perforating-needles further varieties of fancy stitches can be produced.

The movement of the needle L is so timed relatively to the movements of the perforating-needle-slider C that by using the said needle without thread, in combination with one or more perforating-needles carrying thread, it may at each perforation catch the thread of each perforating-needle and retain it in the form of a loop until the next perforation is commenced, and so cause the thread of each perforating-needle to be left in the cloth or other material in the form shown in Fig. 14, which represents a section of the material through the perforations made by one of the needles. The loops 32 33 protruded through the material may be left whole or cut to produce a pile, and in either form, if the rows of loops are made very close together, a very beautiful nap-like appearance will be produced which will be very effective in embroidery. In doing this kind of stitching the material should be placed in the machine with its face downward, that the perforating needle or needles may enter from the back.

I do not claim the use of two or more perforating-needles for carrying two or more threads through a piece of cloth or other material in the form of loops, in combination with a shuttle or a needle for carrying a locking-thread through both or all of the said loops, as I am aware that such a combination of two needles and a shuttle has been used; neither do I claim of itself the employment of a hook below the needle-plate to extend a loop of a locking-thread, nor do I claim, substantially, a thread-conductor above the cloth to carry a thread around either needle, as I am aware that such a hook and an equivalent thread-conductor has been used; but

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

1. The employment, in combination with two or more needles, *a b*, or their equivalents, which work together to perforate or pass from one side to the other of the cloth or other material to be operated upon, and with suitable means of carrying a locking-thread through the loops of the threads of those needles, of a thread-conductor, Y, so applied and operated as to effect the interlacing of the threads of said needles on the opposite side of the ma-

material to that on which they are interlaced with the locking-thread, substantially as described, whereby they are made to produce the different kinds of stitching represented in Figs. 10, 11, and 12.

2. The employment of a movable needle-plate, K, containing two or more needle-holes of different size, form, or arrangement applied to the bed-plate or work-plate of a sewing-

machine in such a manner as to be capable of adjustment to bring either of its holes into position for the proper needles to work in it, substantially as herein described.

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Witnesses:

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