INTERMEDIATE COURSE HEMSTITCHING AND SEWING MACHINE ATTACHMENTS FOR PRODUCING THE SAME

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This invention relates to sewing machines of the type employed for producing ornamental stitching of the hemstitch variety, and the object of the invention is to provide for use in connection with such machines a novel spreader device for the production of a hemstitch pattern in which one or more courses of stitching connect the hemstitch cross bars at points intermediate the ends thereof.

In the art of hemstitching, certain of the fabric threads (warp or weft, as the case may be, according to the direction the hemstitch is to take) are withdrawn from the fabric, leaving only cross threads which are gathered into bundles so as to provide the alternating cross bars and spaces. At their opposite ends where they join the fabric with the undrawn straightaway threads, these cross bars are sewed by courses or runs of hemstitching. The individual cross bars are free of stitching and are substantially of uniform size. In carrying out my invention, the hemstitch course or run connects the cross bars intermediate their ends and crosses the alternating hemstitch spaces. The individual cross bars are confined and constricted intermediate their ends by stitches of the hemstitch course. From the intermediate constrictions, the cross bars spread fan-like toward their opposite ends.

The spreader devices of my invention are so made that when they are attached to the needle holder or piercer holder of the machine their blades or body portions will be disposed edgewise to the direction of the feed of the fabric during the hemstitch operations. Owing to this provision, the cross bars are given the widest spread from one another at the points where the hemstitching takes place, and the course of hemstitching may extend across the hemstitch spaces at the greatest width thereof.

My novel spreader devices may be used as an attachment in connection with any well-known sewing or hemstitching machine having an oscillating feed motion for the fabric and a sewing hook adapted for the production of the lock stitches, to cooperate with a needle having up and down strokes. The devices of my invention may be produced in the manner hereinafter described, either as combination needles and spreaders, or as spreaders capable of cooperating with the sewing needles of the machine. When made in the combination form, the device is provided adjacent its piercing point, with an eye for carrying the stitching thread and it may be attached directly to the needle holder. When made as a spreader only, it can be attached to the usual piercer holder and is provided with a groove for accommodating the needle. Both in the combination form and in the simple spreader form, my devices may be made so as to produce a plurality of courses or runs of hemstitching at one time.

For the use of my devices, no changes need be made in the sewing machines the construction of which includes mechanism for operating the needles up and down (in contradistinction to the lateral vibrating strokes), mechanism for giving the fabric an oscillating feed motion (toward and away from the operator), and mechanism for operating a sewing hook or rotary shuttle capable of cooperating with the needles to produce lock-type stitches.

An important characteristic of the present invention as compared with hitherto known types of machine hemstitching consists therein that the cross bars are constricted intermediate their length by a course of hemstitching which extends across the spaces alternating with the bars.

With the foregoing and other objects in view, the invention consists in the construction and relative arrangement of parts so combined as to cooperate with each other in the performance of the functions herein contemplated, and comprises in its evolution the mode of production and the simple and practical examples hereinafter described and illustrated in the accompanying drawings, wherein similar reference characters designate corresponding parts throughout the several views, and in which:

Figure 1 represents a front view, showing my combination needle and spreader as it appears to an operator when applied to the needle holder for cooperation with the oscillating fabric feed and the sewing hook;

Figure 2 represents a side view of the parts shown in Fig. 1;

Figure 3 represents an exaggerated perspective view of the combination needle and spreader;

Figure 4 is a front view of another form of the combination needle and spreader, showing the same as it appears when applied to the needle holder;

Figure 5 is a side view of the device shown in Fig. 4, parts being broken away and shown in section;

Figure 6 is a front view, showing a spreader for use in conjunction with a needle, the spreader and needle being here shown as applied, respectively, to a piercer holder and a needle holder;

Figure 7 is a side view of the spreader shown in Fig. 6;
Fig. 8 is a front view, showing a spreader constructed for use with two needles; Fig. 9 is a side view of the spreader shown in Fig. 8;

Fig. 10 is a cross section taken on the line 10—10 of Fig. 8;

Fig. 11 is a front view of another form of the spreader for use with two needles;

Fig. 12 is a side view thereof;

Fig. 13 is a cross section on the line 13—13 of Fig. 11;

Fig. 14 is a front view, showing two combination needles and spreaders applied to a double needle clamp;

Fig. 15 is an exaggerated plan view of a fragment of fabric, showing the hemstitch pattern which may be produced by forms of my device such as are shown in Figs. 8 to 10, 11 to 13, and 14, the form of the device illustrated in Figs. 11 to 13 being shown in section in one of the hemstitch spaces; and

Fig. 16 is an exaggerated plan view of a fabric, showing the hemstitch pattern which may be produced by forms of my device such as are shown in Figs. 8 to 10, 11 to 13, and 14, that form of the device illustrated in Figs. 8 to 10 being shown in section in one of the hemstitch spaces.

In describing my invention by the aid of the views above referred to, I desire to point out that I intend such views as illustrative of the variant examples whereby my invention may be applied in practice, and I do not limit myself to the precise construction and arrangement of the parts shown.

The following description is, therefore, to be broadly considered as including substitute arrangements and constructions which are the obvious equivalents of those shown. In referring to the type of hemstitching produced by my novel devices, I shall make use of the expressions “mild-course” stitching and hemstitching and “intermediate course” stitching or hemstitching, and it is to be understood that in the use of these expressions I do not intend to limit my invention in any way, as these expressions are used for purposes of description only, and not as terms of limitation.

With more particular reference to Figs. 1 to 3, 20 denotes in general a combination needle and spreader, formed at its upper end with a stem 21 adapted to be inserted in a suitable opening 22 in the needle holder 23 and therein to be secured by a set screw 24 or equivalent device. The blade or body portion 25 of the device 20 is oblong in form and is made at its lower end with a piercing point 26. It is provided with a thread-carrying eye 27 adjacent the piercing point 26. In the present embodiment, the opposite edges 28 of the blade 25 are in diverging relation to produce an expanded or enlarged portion 29 intermediate the length of the blade; and said edges below the expanded portion 29 converge as at 30 to produce the piercing point 26.

This blade device is called a combination needle and spreader because it is threaded like the conventional needle and in operation spreads the weave of the material, and at the same time acts as the conventional needle in a sewing machine by taking the thread under the throat plate 31 and cooperating with the sewing hook or rotary shuttle 32 for the production of a course or run of hemstitching. In the hemstitching operations, the combination device also cooperates like the conventional needle with the feed dog 33 which is mounted on the feed dog carriage 34 to be given the usual oscillating feed motion for feeding the material forwards, backwards and then forwards again in a manner well understood in the art.

According to an important feature of the present invention, the device 20 is mounted in the needle holder so that the blade will be disposed edgewise with respect to the direction of the feed of the material by the oscillating feed dog. In the use of the combination device, a panel of the straightaway threads such as 35 must be drawn or removed from the fabric so as to leave, where the hemstitch pattern is to be produced, only the cross threads 36, as shown in Fig. 15. The combination device operated by the machine in conjunction with the oscillating feed motion divides or separates the cross threads 36 into cross bars or bundles 37 alternating with hemstitch spaces or openings 38. Owing to the edgewise disposition of the combination device, each cross bar as at 100 is divided off or gathered as constituted at 39 intermediate its length, and the hemstitching of the cross bar takes place at the constituted point so that in the finished product the cross bars from their intermediate constructions spread out fan-like toward their outer ends where they are united with the fabric weave. As a result of the intermediate contractions, the spaces 38 are diamond-shaped.

In the operation of the combination device for the production of the intermediate contractions on the cross bars and alternating spaces, let it be assumed as an example that the combination device is in a space or opening 39a. Under the operation of the machine and the next forward feeding movement of the fabric, the combination device will pierce an opening 39b, carrying the thread across the contraction for the production in connection with the sewing hook of lock-stitches at either side of the contraction so as to tie the same. Then under the backward movement of the fabric, the device will again enter the space 39b and repeat the tying of the contracted 39a; and thereafter under the forward feeding movement of the fabric the device will again enter the space 39b, producing thereby the usual so-called long stitch and lock stitching the same at the next succeeding cross bar. After this the cycle of operation is repeated to lock-stitch the construction of the next succeeding cross bar. By this arrangement, the successive cross bars as they are separated out and constituted intermediate their length, are lock-stitched at their constructions, with the run of the stitching extending across the alternating bars and spaces.

It will be recognized that the blade body need not be made in the form shown in Figs. 1 to 3, but may be varied as may be necessary in order to best meet conditions incident to the character of the fabric, the relative sizes of the cross bars and spaces alternating therewith, and as well the depth of the contractions to be produced. For certain kinds of work, the opposite sides of the combination device may, for instance, be substantially parallel, or may be given such other configuration as will best adapt the device to the production of the character of pattern to be produced.

In Fig. 14, I show two of the combination devices 20 secured in spaced relation by a double 150...
needle clamp 40 which is secured in any convenient or appropriate manner to the needle bar 41. A double combination of this character may be employed for the production of a double row of hemstitching 42, 42, connecting the same cross bars 43, as shown in Fig. 16; or for the production of two rows of hemstitching 44, 45, connecting the rows of cross bars 44', 45', respectively, separated by a panel of straightway fabric threads 46, as shown in Fig. 17. As shown in Fig. 16, the spaces or openings 47 alternating with the cross bars 43 are of oval or oblong shape, owing to the courses of stitching 42, 42, are tied in spaced relation intermediate the length of the cross bars. In Fig. 17, where a course of stitching 44 connects the cross bars 44' and a course of stitching 45 connects a row of cross bars 45', which rows of cross bars 44', 45' are separated by an undrawn panel 46, the alternating spaces 48 are diamond-shaped. It will be observed that the opposite ends of the cross bars 43, 44, and 45' are fan-shaped, the spreading of the bars taking place from their points of constriction to the distance of the distance where they unite with the woven fabric. In the use of the duplex device shown in Fig. 14 for the production of hemstitch patterns as illustrated in Figs. 16 and 17, the moving of the material by the oscillating feed motion and the mode of stitching is the same as in the use of the single device illustrated in Figs. 1 to 3, which single device produces the hemstitch pattern shown in Fig. 15.

In Figs. 4 and 5, I show another form of the combination needle and spreader which may be used singly for the production of the hemstitch pattern shown in Fig. 15, or in duplicate in connection with the double needle clamp of Fig. 14, for the production of hemstitch patterns, such as are shown in Figs. 16 and 17. This form of the needle and spreader, denoted generally by the numeral 49, is produced at its upper end with a stem 50 whereby to be secured to a needle holder or to a double needle clamp. The blade of this embodiment is of channel-shaped form and consists of a substantially straight web 51 which contains parallel blades 63, 63 formed at the opposite edges of the web. Said web terminates at its lower end in a piercing point 53 and is provided with an eye 54 for carrying the sewing or stitching thread.

In Figs. 6 and 7, I show a spreader 55 which may be used in conjunction with a conventional needle 56 for producing the hemstitch patterns. The needle 56 is mounted in the needle holder 57 while the spreader 55 is mounted in any suitable piercer holder 58 which is operated by the mechanism of the sewing machine in conjunction with the operation of the needle holder 57, so that both parts are given up and down strokes. The stem 50 of the spreader is laterally offset in such manner as may be necessary in order that the needle 56 will operate in the vertical needle groove 60 provided in the spreader. The spreader 56 is disposed edgewise to the direction of the feed of the fabric; and it is the equivalent of a drawn-work spreader, its action being similar to that of a piercer on a hemstitch machine. At this point it is in place to remark that in a hemstitch machine, the needle or needles vibrate in and out of the slots or grooves of the piercer, whereas in the use of the spreader 55, the needle does not so vibrate but works only up and down in the groove 60. The function of the spreader 56 in dividing and separating the cross threads into bars is the same as that of the combination needle and spreader devices 20 and 49.

The spreader 55 can be used in connection with a single needle sewing machine or in connection with a machine having two or more needles. It will be recognized that the feeding of the material by the oscillating feed motion of the machine can be arranged to give a larger opening through the use of the devices 20, 49 and 55, by going back on a previous stitch one or more times.

The feed of the material back and forth (to and from the operator) then in advance a stitch or two can be controlled in various ways as will be understood in the art. For instance, as is well known, the sewing machine may be provided with cam for controlling the feed raising mechanism or the feed bar. By means of the oscillating feed motion, the material is fed so as to sew back and forth across the bars, whereupon there is a long advance the length of which is one or more stitches. By using a plain needle the repeated tying of the bars produces a bow effect on the drawn work. The use of devices such as 20, 49 and 55 makes the bow effect more pronounced. For the production of the bow effect on drawn work, the needle bar need not be moved side to side as on the fancy-stitching machines. On a sewing machine using two needles a double bow effect can be made by tying the threads in two rows equivalent to the distance of the needles are apart. The drawing of the material threads can be made at the same time the stitching is performed by using the thread-removing device illustrated and described in the application for Letters Patent of the United States Serial No. 590,432, filed by me on February 4, 1922, and pending herewith. The use of a double blade thread puller and shearer, as illustrated in Figs. 6, 7 and 8 of the above-identified application, will remove the threads of the material equal to the distance of the two needles. To accomplish this purpose, the thread puller and shearer device can be placed in front of the combination device 20 or combination device 49, (when these are substituted for needles) or in front of the spreader devices 55.

In Figs. 8, 9 and 10, I disclose a spreader device of a duplex character, devised for use with a two-needle machine. It will be seen that this device comprises a stem 61 adapted to be attached to the piercer holder, a transverse web 62 depending from the lower end of the stem and two parallel blades 63, 63 formed at the opposite edges of the web. This arrangement is such that when the stem is attached to the piercer holder, the two blades will be edgewise with respect to the direction of the feed of the fabric. For the accommodation of the vertically reciprocating needles 62, 64, the blades are provided in their inner or confronting faces with needle grooves 65, 65. This device may be used with a two-needle machine for the production of a hemstitch pattern of the type illustrated in Fig. 18; and it is equally capable of use, where it is made with the blades sufficiency spaced from one another, to produce a hemstitch pattern of the character illustrated in Fig. 17.

In Figs. 11, 12 and 13, I disclose another form of the spreader device for use with a two-needle machine. This form of the device has a stem 66 for attachment to the piercer holder, a web 67 and two parallel blades 68, 68. In this instance, the needle grooves 69, 69 are formed in the outer faces of the blades. This form of the device is adapted for use in the production of the hem-
stitch pattern shown in Fig. 17; and if the device is produced so that the blades will be sufficiently close to one another, it can also be used for the production of a hemstitch pattern of the type illustrated in Fig. 16. In the present embodiment, the duplex device illustrated in Figs. 8 to 13 have their blades made integral with the web, but it will be evident that, if desired, the blades may be mounted to the web for relative adjustment thereon and towards and away from one another.

In practice, the needle clamp illustrated in Fig. 14 may be made so that it can carry more than two blades for the production of more than two courses or runs of hemstitching at one operation. The spreader devices illustrated in Figs. 9, to 13 may also be produced, if desired, with more than two blades in order to produce at one operation more than two courses or runs of hemstitching.

It will now be apparent that the variant patterns of my novel, useful and ornamental hemstitching embody the same mode of construction that the hemstitch courses are tied to the cross bars at constrained points thereof and so as to extend across the alternating cross bars and spaces; and it will also be apparent that the principles involved in the novel and useful construction of a method for making the patterns may be carried out by hand as well as by the mechanical devices herein disclosed.

While I have described my invention as comprising a certain mode of treatment and have illustrated it with the aid of certain selected forms for carrying it into effect mechanically, it will be understood that the invention may be variously embodied. It has been sought herein to illustrate only such embodiments as suffice to exhibit the character of the invention. Reservations are therefore made to the right and privilege of changing the form of details set forth or otherwise altering the arrangement of the parts without departing from the spirit or scope of the invention or the scope of the appended claims.

I claim: -

1. A sewing machine hemstitch device including, with an oscillating feed motion and a sewing hook, a blade to cooperate with the hook to lockstitch and produce a line of stitching, said blade having a sewing point, spaced edges provided on the blade and extending upwardly from the sewing point, said edges being formed on extensions complementary to the flat portion of the blade and lying in the plane of the blade so that when the blade is disposed edgewise to the feed motion and transversely with respect to the cross threads of the work, its extensions and edges will also be transversely disposed in respect thereto for spreading cross threads in opposite directions to form cross bars constrained between their ends so as to give the bars a fan-shaped form from the points of constriction, and an eye in the blade for carrying to the cooperating hook, thread to be lockstitched to the bars at the points of constriction whereby to maintain the bars in fan-shaped form, with the line of stitching under the oscillating feed motion extended between the lockstitched constructions.

2. Having an oscillating feed motion, of means for producing alternating bars and spaces in the material, comprising a blade attached to the stitching mechanism of the machine and disposed edgewise with respect to the oscillating feed motion to bend and thereby constrict the bars at points intermediate their ends whereby to enlarge the spaces between the bars in the direction of the oscillating feed motion of the machine.

3. The combination with a sewing machine having an oscillating feed motion, of means for producing alternating bars and spaces in the material, comprising a blade attached to the stitching mechanism of the machine and disposed edgewise with respect to the oscillating feed motion to bend and thereby constrict the bars at points intermediate their ends whereby to enlarge the spaces between the bars in the direction of the oscillating feed motion of the machine, and an eye provided in said blade for carrying thread to be lock-stitched on the bars at the points of the constriction and which is to be extended across the enlarged spaces between the points of constriction of the bars.

4. The combination with a sewing machine having stitching mechanism including a needle and a sewing hook to cooperate with it and having an oscillating fabric feed, of means for gathering cross threads of the fabric into cross bars to be stitch by means of the cooperating needle and hook, comprising a blade provided with a groove for the operation of the needle and disposed edgewise with respect to the direction of the feed of the fabric, said blade having a piercing point and an edgewise extension above it complementary to the flat portion of the blade, said extension extending in the plane of the blade transversely with respect to the cross threads and adapted, on entering the fabric, to divide and spread the cross threads into cross bars and subsequently constrict the bars at points intermediate their ends for the stitching of the bars at such constrained points by the stitching produced by the cooperating needle and hook.

5. An article of manufacture, a fabric spreading device of the character described comprising a stem, a transverse web united with the lower end of the stem, a pair of elongated blades attached to the web with the bodies of the blades lying in planes intersecting the plane of the web, said blades being provided with spaced edges adapted, on the spreading movement of the blades, to constrict bars of threads at points intermediate the ends of the bars, whereby to give the bars a fan-shaped form from the points of constriction.

6. An article of manufacture, a fabric spreading device of the character described comprising a stem, a transverse web united with the lower end of the stem, a pair of elongated blades attached to the web with the bodies of the blades lying in planes intersecting the plane of the web, said blades being provided with spaced edges adapted, on the spreading movement of the blades, to constrict bars of threads at points intermediate the ends of the bars, whereby to give the bars a fan-shaped form from the points of constriction, and grooves provided in the blades for the operation of needle mechanism adapted to stitch the bars at the points of constriction.

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