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1,483,184 2/1924 McCann..... 112/264X

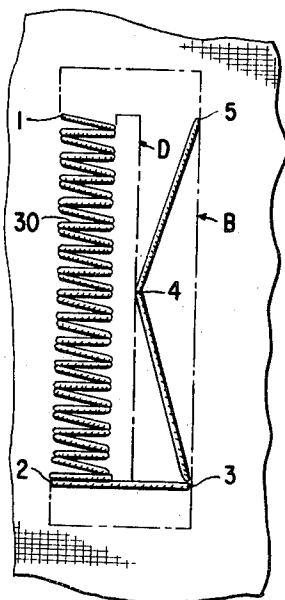
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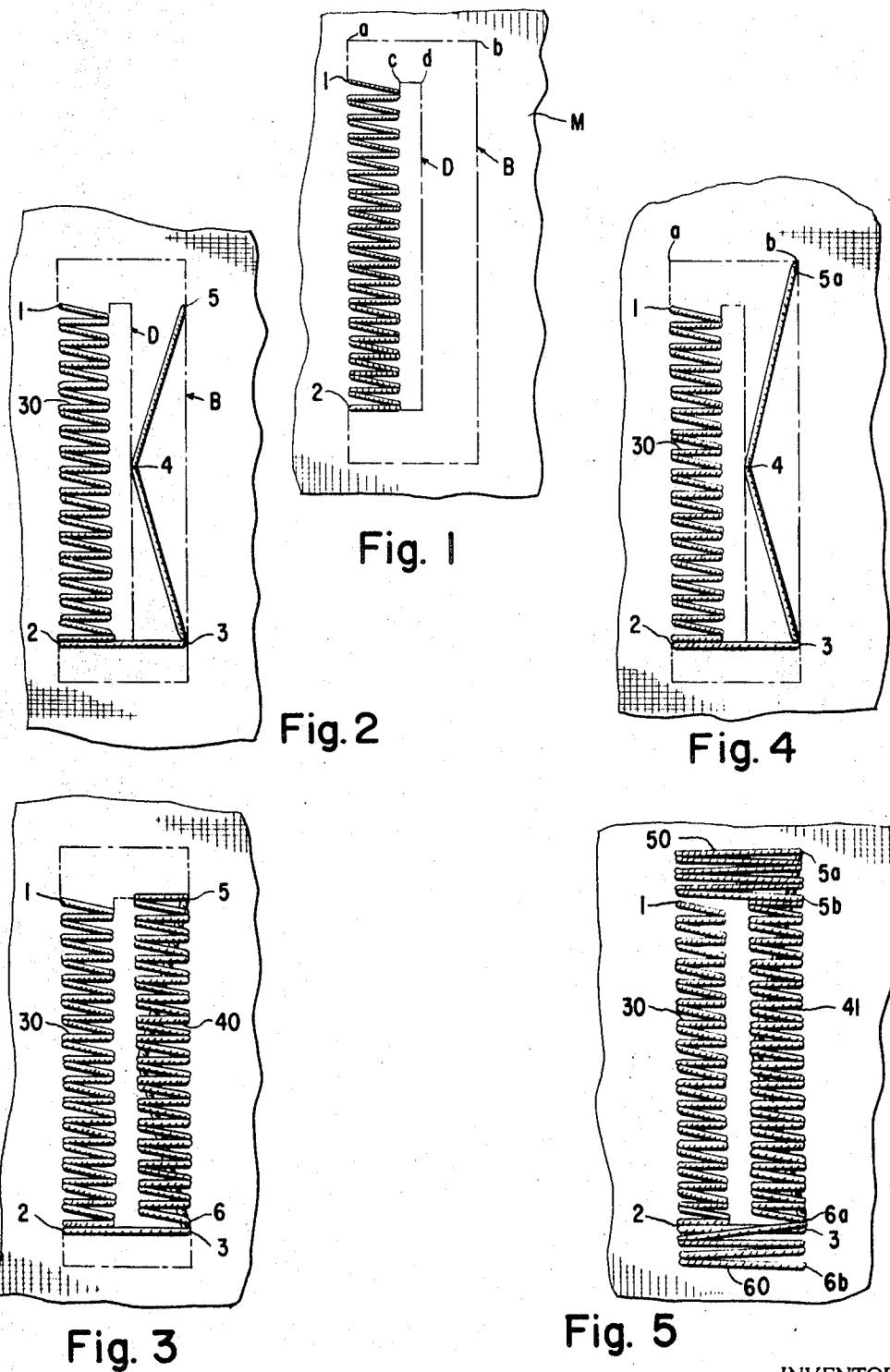
[54] METHOD OF SEWING PARALLEL ROWS OF ZIG-
ZAG STITCHES
2 Claims, 10 Drawing Figs.

[52] U.S. Cl..... 112/264
[51] Int. Cl..... D05b 3/06
[50] Field of Search..... 112/264,
65, 158; 24/(-NA)

[56] References Cited
UNITED STATES PATENTS
2,977,913 4/1961 Schenkengel 112/264

ABSTRACT: A method of sewing parallel rows of zigzag stitches for the formation of a buttonhole so that each row is formed in a like manner. Each row of zigzag stitches is formed using the same direction of feed. By means of a skip-stitching technique, a line of exceedingly long stitches is formed in the opposite direction of feed within the bight of the zigzag stitches of one row in order to return a work fabric to a common starting point for the formation of the rows. The process may start with a line of stitches formed in the opposite direction of feed in order to position the work fabric at the common starting point so that the rows are uniform, each having zigzag stitches which overlie the line of stitches formed in the opposite direction of feed.





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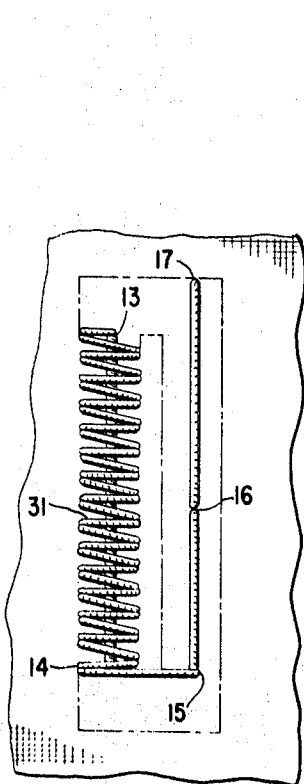


Fig. 7

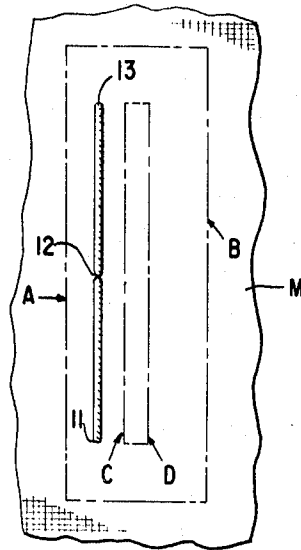


Fig. 6

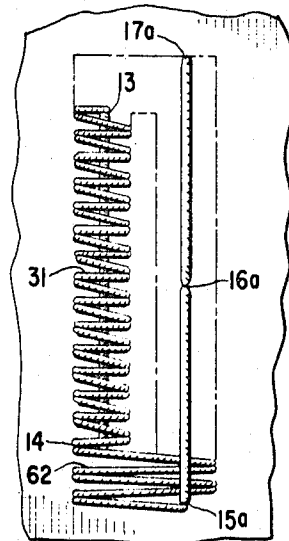


Fig. 9

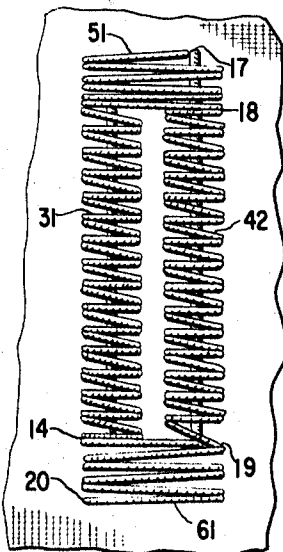


Fig. 8

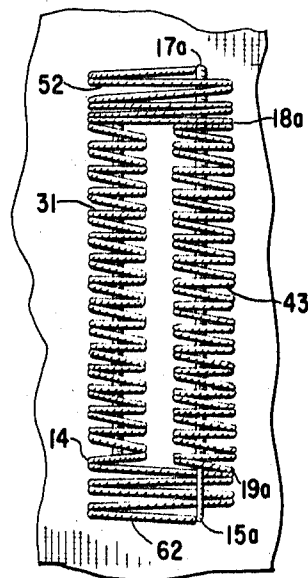


Fig. 10

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METHOD OF SEWING PARALLEL ROWS OF ZIG-ZAG STITCHES

BACKGROUND OF THE INVENTION

Many attempts have been made with household sewing machines to produce buttonholes which are not distinguishable from commercially fabricated buttonholes characterized by the uniformity of the structure and appearance of both rows of side stitches. The usual manner of producing a buttonhole with the aid of conventional zigzag stitch household sewing machines, as described for instance, by U.S. Pat. Nos. 2,378,534 and 2,682,845, is by first sewing one row of zigzag side stitches in one direction and subsequently, upon reversal of the stitching direction and completion of the barring stitches, sewing the adjacent row of side stitches in the opposite direction. It is found that the reverse stitches tend to differ in spacing and regularity as compared with the forward stitches thus producing a buttonhole which is unsatisfactory from an appearance point of view.

One method used to avoid the above-mentioned disadvantage is to reverse the work or material by 180° upon completion of the first row of zigzag side stitches. This procedure is highly cumbersome and impractical in cases of relatively large work pieces or large sizes of sewing material.

Another method consists in lifting the presser foot upon completion of the first row of zigzag stitches and pulling back the work to a position in line with and spaced laterally from the starting point, and then sewing a second row of zigzag stitches parallel to and in the same direction as the first row. This results in the final buttonhole having an obliquely extending crossover thread from the end of the first row to the beginning of the second row due to the pulling back of the work, which is considered an impairment of the appearance of the buttonhole as well as causing other difficulties and defects.

Still another method is disclosed in U.S. Pat. No. 2,977,913 wherein a first row of zigzag stitches is sewn in one direction, a line of straight short stitches is sewn in the opposite direction in laterally spaced and parallel relationship to the first row, and then a second row of zigzag stitches is sewn in the same direction as the first row to overlie the line of straight short stitches. Depending upon the thread used, the row of zigzag stitches sewn over the line of straight short stitches may be visibly different from the simple row of zigzag stitches sewn without underlying straight stitches. The sewing machine operator must make many sewing machine adjustments to produce a simple buttonhole, which is time consuming and a burden on the operator. Also, because the controls of the sewing machine must be changed from a first zigzag stitch position to a second straight stitch position and then back to a third zigzag stitch position, the rows of zigzag stitches may not be uniform due to a slight difference in the setting of the zigzag stitch position between making the first row and second row of zigzag stitches.

SUMMARY OF THE INVENTION

This invention relates to an improved method of sewing parallel rows of zigzag stitches with the aid of a zigzag sewing machine, such as required in the sewing of buttonholes, including at least one pair of parallel rows of zigzag stitches. The present invention involves producing parallel rows of zigzag stitches sewn in the same direction of feed, each row overlying a line of stitches formed in the opposite direction of feed to form uniform rows.

Zigzag sewing machines as described in applications Ser. Nos. 621,311 and 671,663, now U.S. Pat. Nos. 3,433,190 and 3,433,189, respectively, both assigned to the assignee of the present invention, have a skip-stitch mechanism to produce exceedingly long stitches without changing the setting of the zigzag stitch control of the sewing machine. The present invention involved using long stitches, as produced by the latter-mentioned sewing machines, for the underlying stitches of the buttonhole to simplify the adjustments to the controls of the sewing machine which are necessary to produce a buttonhole.

Accordingly, an object of the present invention is the provision of an improved method of producing parallel rows of zigzag stitches by means of a zigzag sewing machine, whereby the above-mentioned and related difficulties and drawbacks are substantially avoided.

Another object of the invention is the provision of an improved method of producing parallel rows of zigzag stitches, where the individual rows are characterized both by an exact parallelism as well as by an equal structure and uniform appearance of the stitches, whereby said parallel rows could be produced by hand sewing as well as by using a sewing machine.

Yet another object of the invention is the provision of a novel method of producing parallel zigzag stitches without displacement of the work and without placing a burden on the sewing machine operator of additional time consuming labors and other disadvantages connected therewith.

BRIEF DESCRIPTION OF THE DRAWINGS

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it, when read in conjunction with the accompanying drawings in which:

FIG. 1 represents a row of zigzag stitches produced as the first step of the improved method according to the invention;

FIG. 2 represents an intermediate step of the improved method showing the formation of exceedingly long stitches;

FIG. 3. represents two rows of zigzag stitches produced by the improved method according to the invention, using the steps shown in FIGS. 1 and 2;

FIG. 4 represents a modification of the intermediate step shown in FIG. 2;

FIG. 5 represents a buttonhole produced by a modification of the improved method according to the invention, using the steps shown in FIGS. 1 and 4;

FIG. 6 represents a line of stitches produced as the first step of a second modification of the improved method according to the invention;

FIG. 7 represents an intermediate step of the second modification of the improved method;

FIG. 8 represents a buttonhole produced by the second modification of the improved method according to the invention, using the steps shown in FIGS. 6 and 7;

FIG. 9 represents a modification of the intermediate step shown in FIG. 7; and

FIG. 10 represents a buttonhole produced by a third modification of the improved method according to the invention, using the steps shown in FIGS. 6 and 9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, FIGS. 1 to 3 illustrate the method, according to the invention, of sewing parallel rows of zigzag stitches. FIG. 1 shows the first step of sewing a row 30 of zigzag stitches on a fabric or material M in one direction, such as the forward operating direction of a sewing machine, from point 1 to point 2. The width of row 30, and each additional row to be made, is less than one-half of the length from a to b, so that a width between the rows from c to d is left unsewn.

The sewing machine feed, upon completion of the first row 30, is adjusted to a reverse direction, the zigzag stitching position is laterally shifted, and the skip-stitch mechanism is employed to convert from the zigzag stitch mode to a skip-stitch mode, being carried out either manually or automatically by means well known and readily understood, as shown by the above-mentioned applications, Ser. Nos. 621,311 and 671,663. FIG. 2 shows a long lateral barring stitch from point 2 to point 3 and a line of exceedingly long stitches in a reverse operating direction from point 3 to point 4 to point 5. The points 3, 4 and 5, forming widely spaced zigzag stitches as

shown in FIG. 2, are approximate. However, these points formed by the skip-stitch mode will always be positioned between parallel lines B and D, where point 3 will be laterally spaced from point 2, and point 5 will be laterally spaced from point 1.

When point 5 is reached, the sewing machine feed is adjusted to a forward operating direction and the skip-stitch mechanism is thrown out of engagement to convert back to the zigzag stitch mode from the skip-stitch mode. Row 40 of zigzag stitches, as shown in FIG. 3, is then sewn from point 5 to point 6 in the same direction of sewing machine feed as used in sewing row 30, where row 40 is superimposed upon or overlies the line of long stitches. Both rows 30 and 40 of zigzag stitches result in an exact parallelism as well as a uniformity of both rows as to a substantially equal structure and uniform appearance of the stitches, without the drawbacks and defects of previously known stitching methods and operations.

It is noted that the sewing machine is always set for zigzag stitching. The only changes made by the sewing machine operator is in the direction of the feed using either forward or reverse, in the lateral zigzag stitching position from left to right, and in the skip-stitch mechanism by throwing it in or out of engagement.

After both rows of stitches 30 and 40 have been completed, the material between the closely adjoining stitches may be slit to form a buttonhole, such as by the operation of a buttonhole cutting mechanism in the usual manner. The zigzag stitches of a buttonhole are usually closely spaced to form satin stitches. The ends of the rows may be joined by barring zigzag stitches of greater width extending across both rows between the outer edges of the rows, in a manner described in greater detail hereafter.

FIGS. 1, 4 and 5 illustrate the method of sewing a buttonhole having bar stitches at each end. As shown in FIG. 4, the sewing machine operator follows the same steps, as used above to make the parallel rows, until point 4 is reached. The operator, in the present case, sews the line of long stitches beyond a position laterally spaced from point 1 and continues sewing to point 5a.

When point 5a is reached, the sewing machine feed is adjusted to a forward direction, the skip-stitch mechanism is thrown out of engagement, and the width of the zigzag stitch is made greater to extend from a to b. Barring zigzag stitches 50, as shown in FIG. 5, are then sewn from point 5a to point 5b which is laterally spaced from point 1. At point 5b the sewing machine controls are adjusted for the narrow zigzag stitch and row 41 of zigzag stitches is then sewn from point 5b to point 6a which is laterally spaced from point 2. At point 6a the sewing machine controls are again adjusted for the wide zigzag stitches. Barring zigzag stitches 60 are then sewn between the outer edges of the rows 30 and 41, from point 6a to point 6b, to result in a final buttonhole upon slitting of the space between rows 30 and 41.

The steps used to make the buttonhole shown in FIG. 8 are similar to the steps used to make the buttonhole shown in FIG. 5, differing only in the addition of the first step shown in FIG. 6. FIG. 6 shows the first step of sewing a line of stitches on a material M in one direction, such as the reverse operating direction of feed of a sewing machine, from point 11 to point 12 to point 13 between the parallel lines A and C.

The steps followed from point 13, as shown in FIGS. 7 and 8, are similar to those used in FIGS. 1, 4 and 5. The sewing machine operator sews a row 31 of zigzag stitches in a forward operating direction of feed from point 13 to point 14, sews a lateral barring stitch from point 14 to point 15, sews a line of stitches in a reverse operating direction of feed from point 15 to point 16 to point 17, sews wide barring zigzag stitches 51 in a forward operating direction of feed from point 17 to point 18, sews a narrow row 42 of zigzag stitches, similar to row 31, from point 18 to point 19, and then sews wide barring zigzag stitches 61 from point 19 to point 20 to result in a final buttonhole upon slitting of the space between rows 31 and 42.

The finished buttonhole of FIG. 8 has parallel rows 31 and 42 of zigzag stitches sewn in the same direction of feed, each row overlying a line of stitches formed in the opposite direction of feed to form uniform rows. Though the skip-stitch mode is preferred in the forming the underlying lines of stitches used in the buttonhole of FIG. 8, other forms of stitches may be used, such as short straight stitches, because the overlying rows of zigzag stitches are closely spaced to form satin stitches through which the underlying lines are not visible. Whereas, in the finished buttonhole of FIG. 5, depending upon the thread used, the row of zigzag stitches sewn over a line of stitches may visibly differ from the simple row of zigzag stitches sewn without underlying stitches. The above methods, though mainly being set forth as being performed by a sewing machine, may equally be performed by hand sewing when uniform parallel rows are desired.

Obviously, a buttonhole can be made by changing the order of the steps, such as shown in FIGS. 9 and 10. As shown in FIG. 9, the operator sews wide barring zigzag stitches 62 in a forward operating direction of feed from point 14 to point 15a directly after forming the row 31 of zigzag stitches. The operator then sews a line of stitches in a reverse operating direction of feed from point 15a to point 16a to point 17a, sews wide barring zigzag stitches 52 in a forward operating direction of feed from point 17a to point 18a, and finally sews a narrow row 43 of zigzag stitches, similar to row 31, from point 18a to point 19 to result in a final buttonhole upon slitting of the space between rows 31 and 43.

As pointed out, the steps of the invention may be carried out manually either by hand sewing or by the operation of a sewing machine having separate means controlling the operating direction of feed, the lateral position of zigzag stitching, and the skip-stitch mechanism engagement, and also having means for adjusting the width of the zigzag stitches, all known per se in connection with zigzag stitching, as shown by the above-mentioned applications, Ser. Nos. 621,311 and 671,663.

As is evident, the method of the invention may also etc., be carried into effect mechanically by use of a sewing machine equipped with means for automatic lateral zigzag stitch position, zigzag stitch width, sewing direction, and skip-stitch mechanism control. In machines of this type, the controls may be effected by suitable separate control devices, such as cams etc., or by a single control device.

In the foregoing the invention has been described with reference to specific illustrative methods. It will be evident, however, to those skilled in the art, that variations and modifications, as well as the substitution of equivalent steps for those shown and disclosed for illustration, may be made without departing from the broader scope and spirit of the invention, as set forth in the appended claims. The specification and drawing are accordingly to be regarded in an illustrative rather than in a limiting sense.

We claim:

1. A method of producing a buttonhole on a piece of material by sewing two spaced-apart rows of zigzag stitches, each row having a width less than one half the total width of the two parallel rows side by side, and using a zigzag sewing machine having means for reversing the direction of feed of the material, means to control the width of the zigzag stitches, and means to control the width of the zigzag stitches, and means to provide for skip-stitching, the method comprising the sequential steps of:

- sewing a first row of zigzag stitches on the material in a predetermined direction;
- increasing the width of the zigzag stitch to a width equal to the total width of the two parallel rows of stitches side by side;
- sewing one, or any other odd number of zigzag barring stitches;
- operating the means for reversing the direction of feed of the material;
- shifting laterally the zigzag stitching position;

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- f. decreasing the width of the zigzag stitch to a width equal to the width of the first parallel row of zigzag stitches;
- g. operating said means for skip-stitching while remaining in the zigzag mode to form a row of long zigzag stitches parallel to the first row of zigzag stitches and spaced apart therefrom, and having a length equal to the length of the first row of zigzag stitches;
- h. operating the means for reversing the direction of feed, thereby returning to the first predetermined direction of feed; and

- i. sewing a second row of parallel zigzag stitches, to overlie the long zigzag stitches sewn in the row of skip stitches, and equal to the length of the first parallel row of zigzag stitches.
- 2. The method as recited in claim 1 wherein the length of the skip-stitch row may be increased so that any even number of zigzag barring stitches may be formed above the parallel rows of stitches.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,570,433

Dated March 16, 1971

Inventor(s) William Weisz and Charles R. Odermann

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 13, change "an" to --and-- ,
line 17, change "an" to --and-- ,

Col. 4, line 39, delete "etc.",
lines 62 and 63, delete "and means to
control the width of the zigzag stitches,".

Signed and sealed this 22nd day of June 1971.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents