May 13, 1958 H. W. RUSSELL ET AL 2,834,309

OVEREDGE SEWING MACHINE FOR MAKING SAFETY SEAM

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Fig. 2

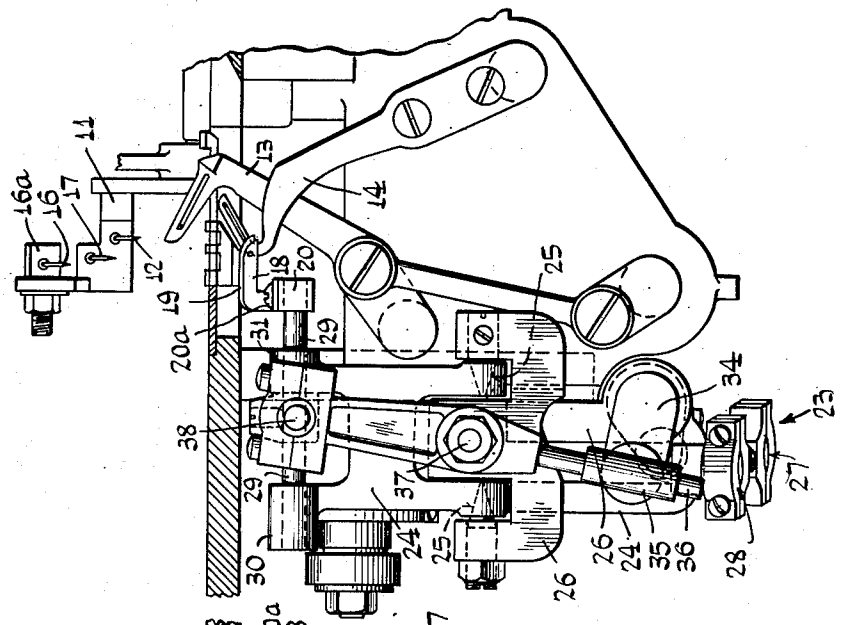
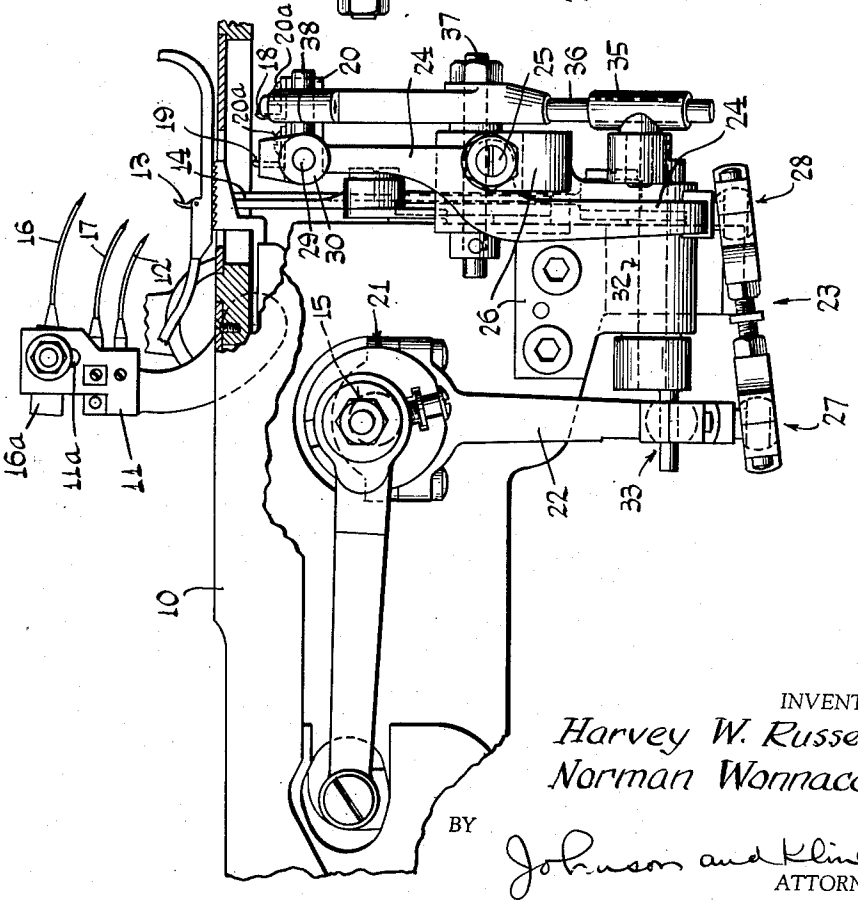


Fig. 1



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Fig. 3

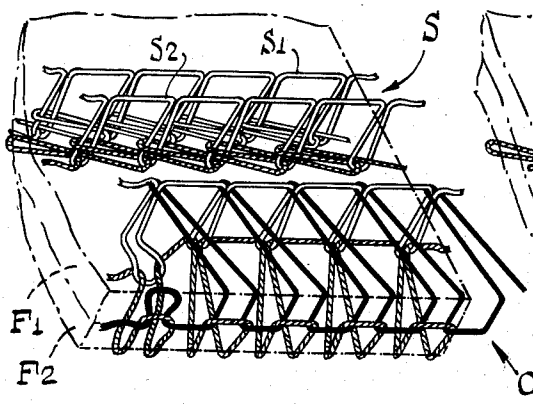


Fig. 4

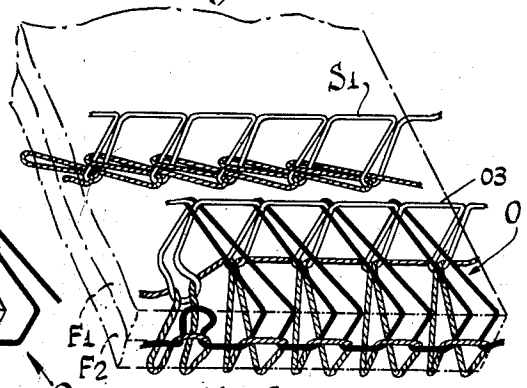


Fig. 5

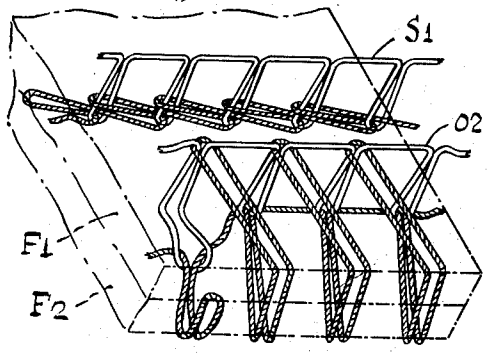


Fig. 6

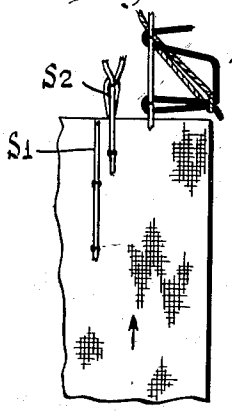
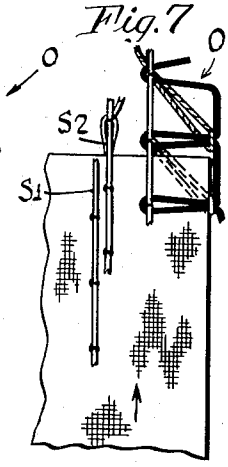


Fig. 7



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OVEREDGE SEWING MACHINE FOR MAKING SAFETY SEAM

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Application August 5, 1954, Serial No. 448,071

9 Claims. (Cl. 112—163)

The present invention relates to an improved safety seam and the method and apparatus for producing the same.

It is an object of the present invention to provide an improved safety seam construction for securing the edges of a plurality of fabrics together and a method of making the same which includes the provision of securing stitches spaced inwardly from the edge for securing the pieces of fabric together, and overedge stitches predeterminately correlated, preferably in offset relation with the securing stitches, to provide a protective binding about the secured-together edge portions.

Another object of the present invention is to provide a sewing machine capable of securing the edges of pieces of fabric together and providing the secured-together edges with an overedge binding in a single sewing operation.

A still further object of the invention is to provide a sewing machine of great versatility and capable of producing one or more rows of securing stitches and/or a row of desired overedge stitches along the edge of the seam without substantial alteration of the machine.

A feature of the invention resides in the formation of the safety seam in a single operation, and more particularly in the securing together of the fabrics by the securing stitch prior to the formation of the binding edge thereon.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the drawings in which:

Figure 1 shows a side view of the machine partly in section showing the safety seam-forming mechanism.

Fig. 2 is a front view, partially in section, showing the safety seam mechanism.

Fig. 3 is a perspective of a safety seam showing the double row of securing stitches and a three thread overedge binding for the edge.

Fig. 4 is a view similar to Fig. 3 showing a single row of securing stitches.

Fig. 5 is a perspective of a safety seam showing the single row of securing stitches and a two thread overedge binding stitch.

Fig. 6 shows the start of the formation of the safety seam, as shown in Fig. 3, showing the fabric secured together by the securing stitches prior to the formation of the overedge stitch.

Fig. 7 is a view similar to Fig. 6 showing the binding stitch located in place.

Heretofore, it was proposed to join the edges of superposed fabrics by means of an overedge stitch when extended around the edge of the fabric so as to produce a binding around the edge of the fabrics. This required the stitch to perform two functions, namely, of securing the fabrics together as well as providing an edge protective function for the binding. The difficulty with such a stitch was that it did not provide the strongest securement of the fabric and there was a tendency to permit the seam to open up. To overcome this difficulty, a row

of stitching was provided inwardly of the binding stitch in a separate operation. It will be appreciated that this is a costly operation involving double handling of the fabric and in producing such second row of stitching there was no coordinated relationship between the stitches in the two rows of stitching.

The present invention overcomes these difficulties by providing a seam in which the securing stitches and binding stitches are formed in a single operation in a predetermined relationship, preferably in offset relationship, in which the fabrics are secured together adjacent the edge immediately prior to the formation of the overedge stitch about the edge.

While the present invention may be accomplished by various types of machines, it is herein illustrated as being applied to an overedge stitching machine, such as disclosed in Weis Patent No. 2,157,373, in which there is mounted on the frame **10** at a stitching station a needle carrier **11** having an overedge needle **12** adapted to cooperate with loopers **13**, **14** all actuated in timed relation from a main or drive shaft **15** to produce a single, double or three thread overedge stitch as is fully set forth in said patent. In carrying out the present invention, mechanism is provided for securing the fabrics together inwardly of the edge in a single sewing operation. This is accomplished by providing suitable securing-stitch forming mechanism. In the herein illustrated form of the invention, the needle carrier **11** is provided with a plurality of needles **16**, **17** which are spaced laterally, as shown in Fig. 2, so as to be located inwardly from the edge of the seam and to be operated simultaneously with the overedge needle **12**. Since the needle carrier is oscillated during the stitch forming operation the needles are illustrated as being of the curved type.

Preferably, the needles **16**, **17** are also offset with respect to one another in the direction of stitching, as shown in Fig. 1, so that when two rows of securing stitches are employed, as shown in Fig. 3, the stitches in one row will be overlapped by the stitches in the second row. If desired, one or both of the needles can be adjustably mounted on the carrier so as to maintain a proper position and overlap in the stitches to accommodate variations in feed, i. e., the number of stitches per inch. As herein illustrated, only needle **16** is so mounted by being carried by a holder member **16***a* which is movable with respect to needles **12** and **17** and is secured in various adjusted positions in slot **11***a* of the needle carrier.

The needles **16** and **17** are also offset with respect to needle **12** in the direction of stitching so that they can engage the fabric in advance of the needle **12** to secure the fabric together before the overedge stitch is started as is best illustrated in Figs. 6 and 7. In Fig. 6 it will be noted that the fabric moving in the direction of the arrow will have the securing stitches **S1** and **S2** formed therein by needles **16**, **17** and the edges firmly secured together before the overedge needle **12** reaches the fabric. As the sewing operation continues, the overedge needle moves into operative relation and the overedge stitch is formed about the secured-together edges, as shown in Fig. 7, and the simultaneous formation of the securing stitches and overedge stitches continues in this relation throughout the sewing operation.

In the illustrated form of the invention, loopers **18**, **19** are mounted on a looper carrier **20** and located forwardly of loopers **13**, **14** so as to cooperate with needles **16**, **17**.

The loopers are secured by screws **20***a* on the carrier in spaced and offset relation in accordance with the similar relation of the needles, the screws permitting adjustment of the loopers in accordance with the position of their cooperating needles. Preferably these loopers are

actuated in predetermined timed relation to the needle carrier and loopers 13, 14 from the main operating shaft 15 of the machine so that the stitches will be properly correlated during the sewing operation. This is accomplished by means of an eccentric 21 mounted on the shaft having a crank arm 22 connected thereto and extending therefrom. The crank arm has its lower end connected by an adjustable connector arm 23 to the lower end of a looper support 24 pivotally carried by pivots 25 mounted on a bracket 26 on the frame, the connector arm being connected to the crank arm and looper support by ball and socket joints 27, 28 so that the looper support is rocked forwardly and rearwardly during each operation of the shaft 15. If it is desired to change the zone of movement of the looper support, this can be accomplished by adjustment of the adjustable connector arm 23.

The looper carrier 20 is mounted on the upper end of the looper support by means of a looper shaft 29 slidable in bearings 30, 31 to reciprocate laterally of the machine in timed relation to the operation of the needles. The reciprocatory movement is produced by an actuating shaft 32 mounted on the bracket 26 and having at one end an eccentric drive connection 33 with the crank arm and having its other end provided with a crank arm 34 pivotally carrying a driver sleeve 35 slidably mounted on the lower end of an actuator lever 36 pivoted on pivot pin 37 on the bracket 26 to rock back and forth for each operation of shaft 15 about an axis extending 90° with respect to the pivot axis of the looper support. The upper end of the actuator lever is connected to a pin 38 on the looper shaft to reciprocate the shaft. The combined rocking actions of the looper support and actuator lever move the loopers relative to the needles in a substantially rectangular path for each operation of the crank arm 22.

Referring to Figs. 3 to 7, there is illustrated the novel safety seam of the present invention for securing together the superposed edge portions of pieces of fabric which in essence comprises a row or rows of securing stitches S spaced inwardly from the edge and securing the fabrics F1, F2 together and a row of overedge stitches O extending around the edges of the fabric to provide a protective binding therearound with the stitches O having a predetermined fixed relation to the securing stitches.

While the securing stitches may be of any suitable type, e. g. Federal standard stitch types 101, 201, 301 and 401, they are herein illustrated as being Federal standard stitch 401, and while the overedge stitches may be any type of stitch of the 500 class, the stitch 03 as illustrated in Figs. 3, 4, 6 and 7 is a Federal standard stitch 503 and the stitch 02 as illustrated in Fig. 5 is a Federal standard stitch 502.

In forming the safety seam of the present invention, the securing stitches can be arranged in a double row S1, S2, as shown in Figs. 3, 6 and 7, in which case the stitches are in overlapped relation so that they do not pierce the fabric on the same line perpendicular to the edge or can be in a single row S1, as shown in Figs. 4 and 5, and the overedge stitches are formed along the edge so that they are in offset relation with at least one row of the securing stitches so that they too do not pierce the fabric on the same line perpendicular to the edge as do the securing stitches so that if there is a missing perpendicular thread or a cut or weakness in the fabric it will not release both of the stitches and thus open up the safety seam.

In forming the safety seam of the present invention a novel method is employed wherein the securing stitches are offset from the overedge stitches in the direction of stitching so that as the fabric moves in the direction of the arrow in Figs. 6 and 7 they will pierce the fabric and secure the superposed portions of the fabrics together so that when the overedge stitch is formed around the secured-together edges of the fabric there will be no displacement of the material during the overedge operation. This is true whether a single or double row of securing stitches is employed. This relationship is clearly shown in Figs. 6 and 7. In Fig. 6, the two rows of securing stitches have started in the fabric and have secured the superposed pieces of fabric together before the fabric reaches the overedge stitch forming mechanism to form the stitch 0. Fig. 7 shows the relationship of the stitches after the overedge stitch has started its row along the edge and the stitches are continued in this relation with the fabric being secured together prior to the formation of the overedge stitch about the edge so that a strong, neat seam is provided.

From the foregoing it will be apparent that the sewing machine of the present invention with its novel combination and relation of elements has great versatility which is a substantial asset, particularly in commercial machines for with the present machine without substantially altering the machine the operator can sew a single row of securing stitches, a double row of securing stitches in overlapped relation, an overedge stitch of the single, double or three thread type and any combination of these stitches merely by removing the unused needles and unthreading the unused loopers, all of which can be accomplished by an operator without the requirement of any skill.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

We claim:

1. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching; means driven by said main shaft for actuating said needles; secondary looper mechanism driven from said main shaft and cooperating with the needle adjacent the edge to form an overedge binding stitch extending around the edges of the fabric; and looper mechanism driven from said main shaft and cooperating with remaining needles to secure the pieces of fabric together, said last-named mechanism comprising a crank arm and eccentric connected to the main shaft, a pivotally mounted looper support connected to said crank arm for forward and rearward rocking movement, a looper carrier having a looper thereon for each remaining needle mounted on the support for transverse sliding movement, and a pivotally mounted actuator lever driven from said crank arm and reciprocating the carrier in timed relation to the rocking of the looper support.

2. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching and means driven by said main shaft for actuating said needles, the improvement wherein there is a looper mechanism driven from said main shaft and cooperating with remaining needles to secure the pieces of fabric together, the drive for said looper mechanism comprising a crank arm and eccentric connected to the main shaft, a pivotally mounted looper support connected to said crank arm for forward and rearward rocking movement, a looper carrier having a looper thereon for each needle, said carrier being mounted on the support for transverse sliding movement, and a pivotally mounted actuator lever driven from said crank arm and reciprocating the carrier in timed relation to the rocking of the looper support.

3. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching; means driven by said main shaft for actuating said needles; secondary looper mechanism driven from said main shaft and cooperating with the needle adjacent the edge to form an overedge binding stitch extending around the

edges of the fabric; and looper mechanism driven from a crank arm actuated by an eccentric on said main shaft and cooperating with remaining needles to secure the pieces of fabric together, said last-named mechanism comprising a bracket mounted on the frame, a pivotally mounted looper support on the bracket and connected to said crank arm for forward and rearward rocking movement, a looper carrier having a looper thereon for each remaining needle mounted on the support for transverse sliding movement, and an actuator lever pivotally mounted on the bracket and also driven from said crank arm to reciprocate the carrier in timed relation to the rocking of the looper support.

4. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching, and means driven by said main shaft for actuating said needles; the improvement wherein a detachable looper mechanism unit is mounted on the frame and is driven from said main shaft and cooperates with the needles to secure the pieces of fabric together, said unit comprising a bracket adapted to be mounted on the frame, a looper support pivotally mounted on the bracket to rock about an axis perpendicular to the line of stitching, an eccentric connected to the main shaft, a crank arm driven by the eccentric, an adjustable connector arm connecting said looper support to said crank arm for imparting forward and rearward rocking movement to the support, a looper shaft having a looper carrier thereon provided with a looper for each remaining needle mounted on the support for transverse sliding movement, and an actuator lever pivotally mounted on the bracket and having one end connected to the looper shaft, a driver sleeve slidable on the other end of the lever, an actuating shaft mounted on the bracket and having one end connected by an eccentric drive connection to said crank arm and the other end drivingly connected to said driver sleeve to cause said lever to oscillate about the pivot and reciprocate the carrier in timed relation to the rocking of the looper support.

5. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having three curved needles disposed in laterally spaced relation and also offset in the direction of stitching; means driven by said main shaft for actuating said needles; secondary looper mechanism driven from said main shaft and cooperating with the needle adjacent the edge to form an overedge binding stitch extending around the edges of the fabric; and looper mechanism driven from said main shaft and cooperating with the remaining two needles to secure the pieces of fabric together, said last-named mechanism comprising a looper support pivotally carried by the frame to rock about an axis perpendicular to the line of stitching, an eccentric connected to the main shaft, a crank arm driven by the eccentric and connected to said looper support for imparting forward and rearward rocking movement to the support, a looper shaft having a looper carrier thereon provided with a looper for each remaining needle mounted on the support for transverse sliding movement, and an actuator lever pivotally carried by the frame and having one end connected to the looper shaft, an actuating shaft for the lever having one end connected by an eccentric drive connection to said crank arm and the other end drivingly connected to said lever to cause said lever to oscillate about its pivot and reciprocate the carrier in timed relation to the rocking of the looper support.

6. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching; means driven by said main shaft for actuating said needles; secondary looper mechanism driven from said main shaft and cooperating with the needle adjacent the edge to form an overedge binding stitch extending around the edges of the fabric; and looper mechanism driven from said main shaft and cooperating with remaining needles to secure the pieces of fabric together, said last-named mechanism comprising a looper support pivotally carried by the frame to rock forwardly and rearwardly about an axis perpendicular to the line of stitching and having a looper shaft mounted for transverse sliding movement and carrying a looper for each remaining needle, and an actuator lever pivotally carried by the frame to oscillate about an axis transverse to the rocker axis for the support and having one end connected to the looper shaft, and drive means for the support and actuating lever comprising an eccentric driven by the main shaft, a crank arm actuated by the eccentric, a drive connector between the arm and the support and a second drive connector between the arm and lever to rock the support and oscillate the lever in timed relation with one another and with the operation of the sewing needles.

7. In a sewing machine having a frame and a main shaft, means feeding the superposed edge portions of a plurality of pieces of fabric through a stitching station having at least two needles disposed in laterally spaced relation and also offset in the direction of stitching; means driven by said main shaft for actuating said needles; secondary looper mechanism driven from said main shaft and cooperating with the needle adjacent the edge to form an overedge binding stitch extending around the edges of the fabric; and looper mechanism driven from said main shaft and cooperating with remaining needles to secure the pieces of fabric together, said last-named mechanism comprising a bracket mounted on the frame, a looper support pivotally mounted on the bracket to rock about an axis perpendicular to the line of stitching, an eccentric connected to the main shaft, a crank arm driven by the eccentric, an adjustable connector arm connecting said looper support to said crank arm for imparting forward and rearward rocking movement to the support, a looper shaft having a looper carrier thereon provided with a looper for each remaining needle mounted on the support for transverse sliding movement, and an actuator lever pivotally mounted on the bracket and having one end connected to the looper shaft, a driver sleeve slidable on the other end of the lever, an actuating shaft mounted on the bracket and having one end connected by an eccentric drive connection to said crank arm and the other end drivingly connected to said driver sleeve to cause said lever to oscillate about the pivot and reciprocate the carrier in timed relation to the rocking of the looper support.

8. In a sewing machine, means feeding the superposed edge portion of a plurality of pieces of fabric through a stitching station; three needles located at the stitching station and disposed in laterally spaced relation and longitudinally offset diagonally in the direction of the line of feed to stitch through the superposed edge portion, one pair of the needles being adapted to stitch the superposed edge portion inwardly of said edge thereof and the third needle being adapted to form stitches at the edge; means for actuating said needles; looper mechanism cooperating with said pair of needles to secure the pieces of fabric together with longitudinally offset stitches; secondary looper mechanism cooperating with the third needle located adjacent the edge of the fabric to form a separate binding stitch extending around the superposed edges of the fabric and displaced longitudinally from said other stitches; and a common drive means for the means for actuating the needles and said looper mechanism.

9. In a sewing machine, a main shaft, means feeding the superposed edge portion of a plurality of pieces of fabric through a stitching station; three needles located at the stitching station and disposed in laterally spaced

relation and longitudinally offset diagonally in the direction of the line of feed to stitch through the superposed edge portion, one pair of the needles being adapted to stitch the superposed edge portion inwardly of said edge and the third needle being adapted to form stitches at the edge; means for actuating said needles; looper mechanism cooperating with said pair of needles to secure the pieces of fabric together with longitudinally offset stitches; secondary looper mechanism cooperating with the third needle located adjacent the edge of the fabric the means for actuating the needles and said looper to form an independent binding stitch extending around the superposed edges of the fabric; and means for driving mechanisms in predetermined timed relation from said main shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

936,426 Diehl et al. ---------- Oct. 12, 1909

1,054,295 Hughes ---------- Feb. 25, 1913
1,221,253 Weis ---------- Apr. 3, 1917
1,528,499 Moffatt ---------- Mar. 3, 1925
1,587,957 Huber ---------- June 8, 1926
1,640,201 Maier ---------- Aug. 23, 1927
1,949,073 Gruman et al. ---------- Feb. 27, 1934
2,157,373 Weis ---------- May 9, 1939
2,249,615 Lutz ---------- July 14, 1941
2,323,507 Wood ---------- July 6, 1943
2,426,057 Schweich ---------- Aug. 19, 1947

FOREIGN PATENTS

904,854 Great Britain ---------- Nov. 24, 1908

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 2,834,309 May 13, 1958

Harvey W. Russell et al.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 11, strike out "the means for actuating the needles and said looper" and insert the same after "driving" in line 13, same column; column 8, line 8, list of references cited, for "July 14, 1941" read --July 15, 1941--.

Signed and sealed this 15th day of July 1958.

(SEAL)
Attest:
KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents