Feb. 10, 1953 M. BUONO 2,627,828

SEWING MACHINE

Filed March 1, 1951 3 Sheets-Sheet 1

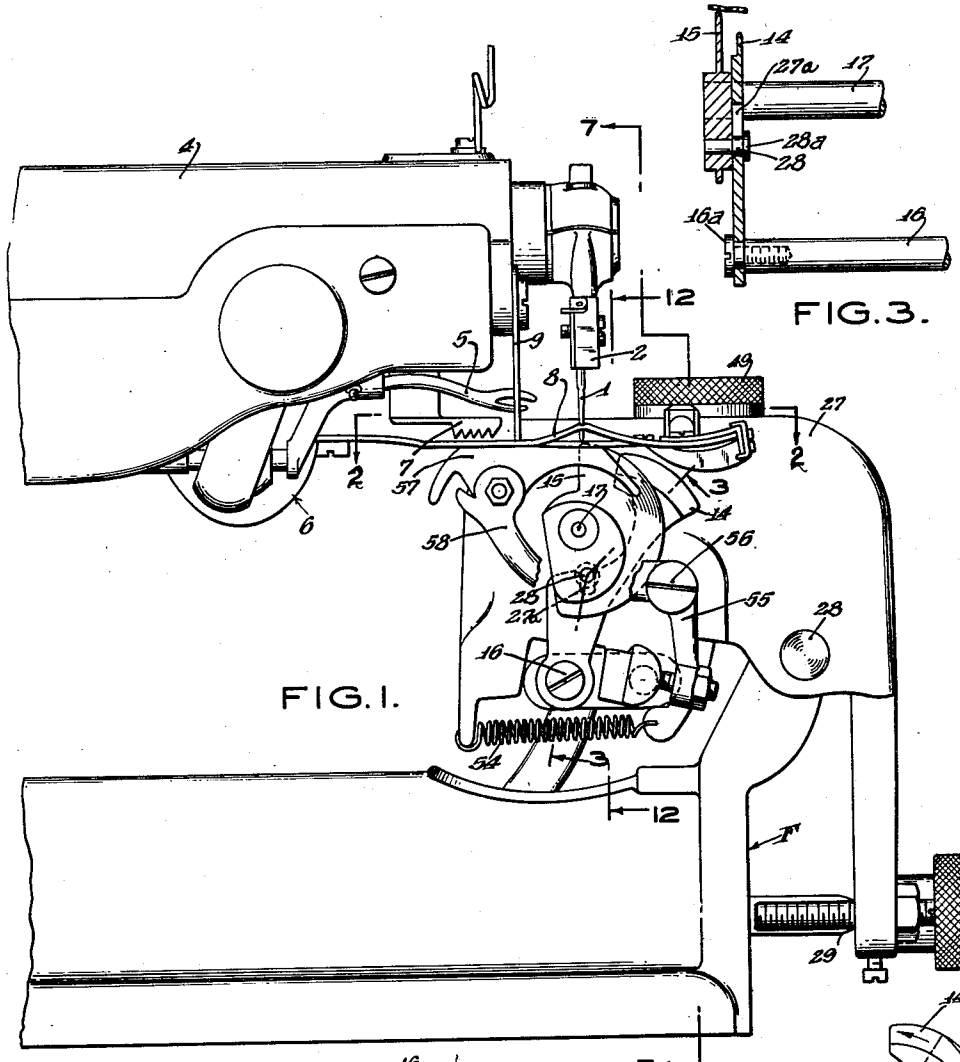


FIG. 1.

FIG. 3.

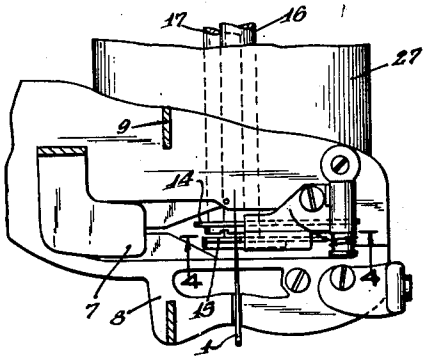


FIG. 2.

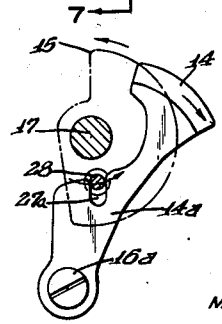


FIG. 4.

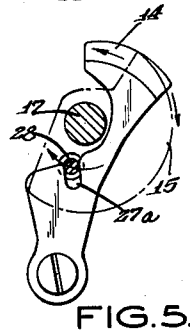


FIG. 5.

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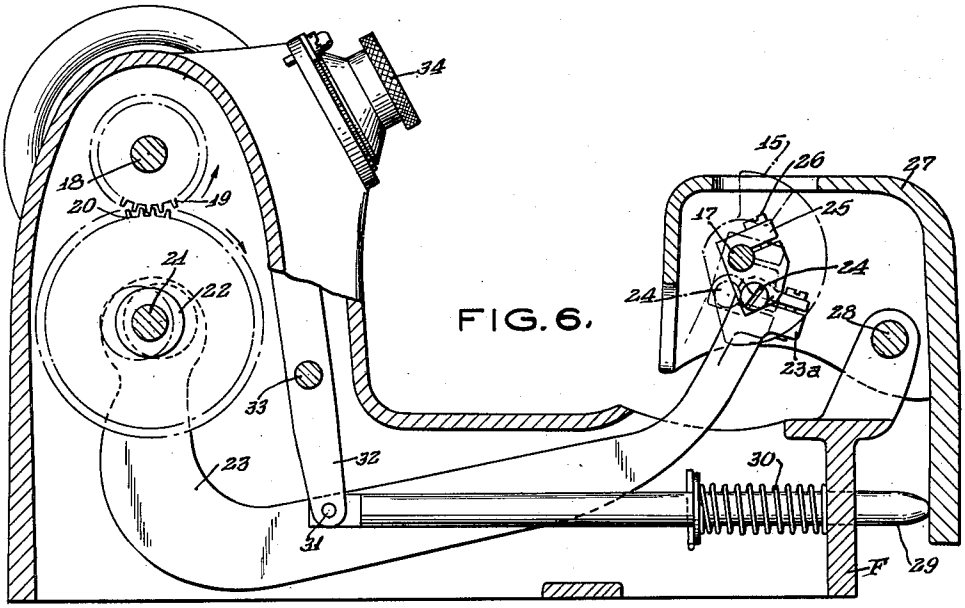


FIG. 6.

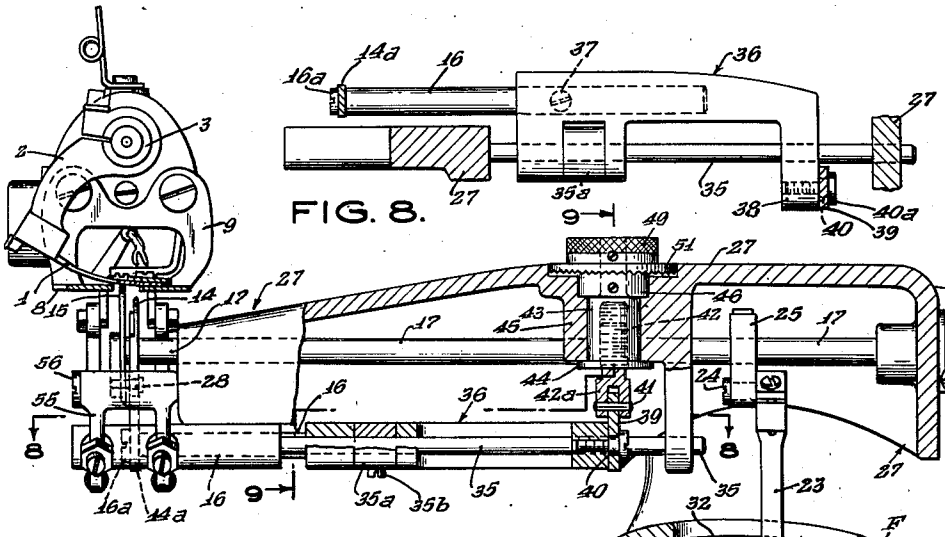


FIG. 8.

FIG. 7.

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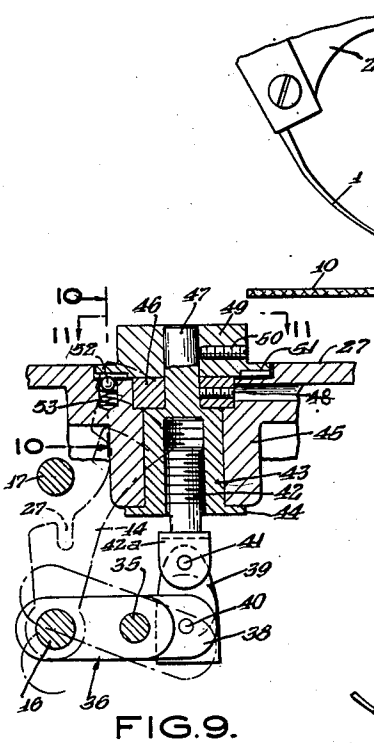


FIG. 9.

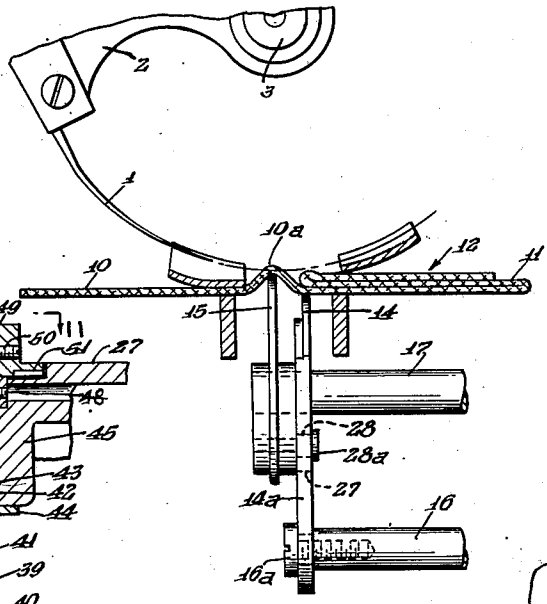


FIG. 12.

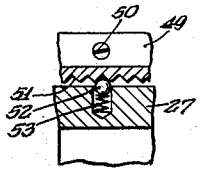


FIG. 10.

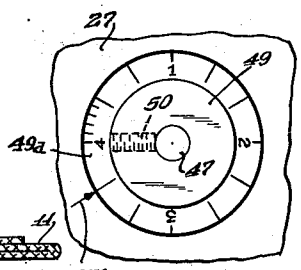


FIG. 11.

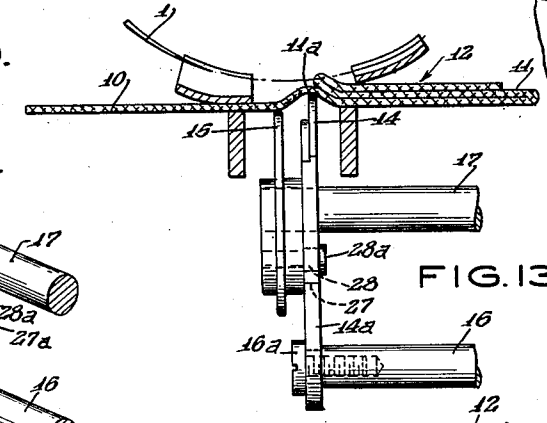


FIG. 13.

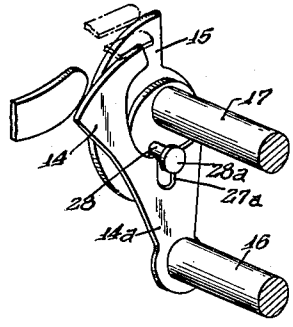


FIG. 14.

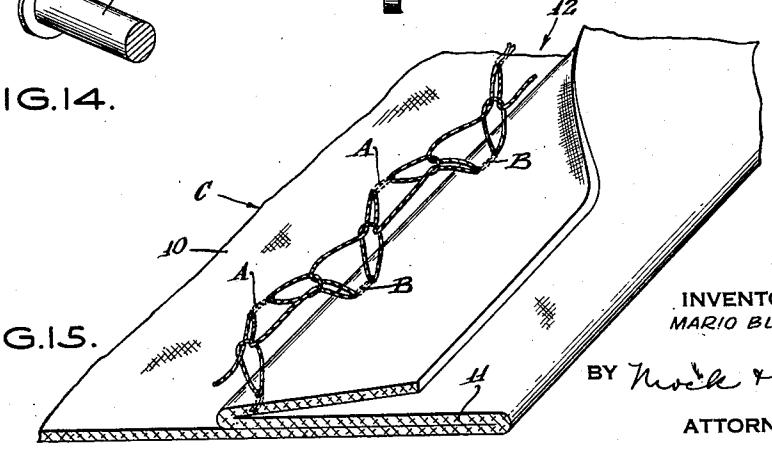


FIG. 15.

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UNITED STATES PATENT OFFICE

2,627,828

SEWING MACHINE

Mario Buono, New York, N. Y., assignor to U. S. Blind Stitch Machine Corp., New York, N. Y., a corporation of New York

Application March 1, 1951, Serial No. 213,390

6 Claims. (Cl. 112—178)

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My invention relates to a new and improved sewing machine.

One of the objects of my invention is to provide an improved sewing machine for providing two parallel and longitudinal lines of stitches. The work in which such two parallel and longitudinal lines of stitches are formed, consists optionally and preferably of a single layer in which one of said lines of stitches is formed, and a multiple folded layer which has a fold in which or near which the other line of stitches is formed. This type of stitch is designated as a tacking stitch.

Another object of my invention is to form the stitches alternately or in other selected relation in said single layer and in or near said fold.

Another object of my invention is to provide a machine which has a work-support along which the work is fed longitudinally, a main rib which is turnably connected to said work-support, and an auxiliary rib. The main rib is oscillated and the auxiliary rib is also oscillated. The respective simultaneous strokes of said ribs are in respective reverse directions. These ribs are spaced laterally from each other and each rib has a lower non-stitch-forming position in which it does not present the respective part of the work to the needle, and each rib has an upper stitch-forming position in which it presents the respective part of the work to the needle. One rib is in its lower position when the other rib is in its upper position. While the invention is not limited to this type of sewing machine, such type is greatly preferred.

Another object of my invention is to use the main rib as drive means to oscillate the auxiliary rib.

Another object of my invention is to form the stitches in said two rows, using a single transversely oscillating needle, and to skip or alternate the stitches in said two rows by reversely oscillating said ribs, without changing the position of the work-support.

Another object of my invention is to regulate the positions and depths of the stitches in one of said rows, by regulating the top position of the auxiliary rib, without changing the position of the work-support.

Another object of my invention is to improve the sewing machine which is disclosed in Buono U. S. Patent No. 1,926,644 dated September 12, 1933, and Buono U. S. Patent No. 2,108,100 dated February 15, 1938, and to provide a stitch which is an improvement over the stitches disclosed in said patents.

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The invention is not limited to the above, and numerous additional objects and features and advantages are stated in the annexed description and drawings, which illustrate a preferred embodiment thereof. Without limitation thereto, the invention is illustrated in connection with a well-known type of blind-stitch sewing machine, whose essential parts are described in said prior patents.

The stitches illustrated herein are blind-stitches, but the stitches may be visible at a face of the work.

Fig. 1 is a side or longitudinal elevation of the blind-stitch sewing machine in which my improvements are incorporated, in this embodiment of my invention. In this view, the main rib 15 is shown in its top or stitch-forming position, and the auxiliary rib 14 is shown in its lower or non-stitch-forming position, in which the respective stitch which corresponds to auxiliary rib 14 is skipped;

Fig. 2 is a top plan view, partially in horizontal section, on the line 2—2 of Fig. 1;

Fig. 3 is a transverse section, partially in transverse elevation, on the line 3—3 of Fig. 1;

Fig. 4 is a longitudinal section, partially in longitudinal elevation, on the line 4—4 of Fig. 2. The main rib 15 is shown in broken lines in its upper, stitch-forming position, which corresponds to the position of main rib 15 in Figs. 1, 3, 6 and 12. The auxiliary rib 14 is shown in its lower-skip-stitching position. As shown by the arrows, main rib 15 is turned counterclockwise while auxiliary rib 14 is simultaneously turned clockwise, so that their respective strokes are in respective opposed directions;

Fig. 5 is similar to Fig. 4 showing the auxiliary rib 14 in its top, stitch-forming position and showing main rib 15 in its bottom, stitch-skipping position;

Fig. 6 is a longitudinal vertical section, partially in longitudinal elevation, which shows the mechanism for oscillating the main rib 15 by power driven means. In this embodiment, there is one complete oscillation of the needle per two complete oscillations of the main rib 15, so that stitches are alternately made and skipped at each of the ribs 15 and 14;

Fig. 7 is a transverse vertical section, partially in transverse elevation, on the line 7—7 of Fig. 1;

Figs. 8 and 9 are respectively sections on the lines 8—8 and 9—9 of Fig. 7;

Fig. 10 is a section on the line 10—10 of Fig. 9;

Fig. 11 is a plan view on the line 11—11 of Fig. 9;

Fig. 12 is a transverse vertical section, partially in transverse elevation, on the line 12—12 of Fig. 1, showing main rib 15 in its upper, stitch-forming position and showing auxiliary rib 14 in its lower, skip-stitch position;

Fig. 13 is similar to Fig. 12, showing the positions of the ribs reversed from the positions of Fig. 12;

Fig. 14 is a perspective view which shows the ribs and the means whereby the oscillation of main rib 15 simultaneously and reversely oscillates auxiliary rib 14; and,

Fig. 15 is a perspective view which shows the two longitudinal and parallel lines of stitches. These lines of stitches are parallel to the longitudinal direction which is parallel to arrow 12. The work is fed in said longitudinal direction.

Many of the parts illustrated herein are well-known in the trade and are illustrated in said prior patents. The usual curved needle 1 is oscillated in opposed transverse strokes. Said needle 1 is fixed releasably to the usual needle-holder 2, which is fixed to the usual longitudinal rock-shaft 3, which is oscillated by conventional means. The machine also has the usual head 4 and the usual looper 5 for forming the chain stitches of this type of sewing machine. The looper 5 is actuated by the conventional mechanism 6. The usual longitudinal feed-dog 7 operates longitudinally in a slot of the usual needle-plate 8, which is fixed to the head 4 by the usual yoke 9.

Fig. 15 shows the work C. This may be any kind of work, such as the work illustrated in said U. S. Patent No. 2,108,100 issued February 15, 1938. For convenience of illustration, the work C is shown as consisting of a bottom layer 10 and a top folded layer 11, so that part of the work C consists of one ply or layer, and another part of the work C consists of three plies or layers, during the sewing operation. Fig. 15 shows stitches A and B which are in two longitudinal and parallel and laterally spaced rows, which are parallel to the longitudinal direction which is indicated by or is parallel to arrow 12. In this embodiment the stitches A and B are chain stitches which are formed alternately. The work is fed in the longitudinal direction which is parallel to arrow 12.

The main rib or finger 15 forms a succession of bights 10*a* in the single bottom layer 10. The auxiliary rib 14 forms a succession of bights 11*a* in the work C, directly at the fold in the two top layers of the work.

The main rib 15 is fixed to the transverse rock-shaft 17, which is turnably mounted in the work-support 27. The work C is fed longitudinally while it rests upon the top surface of work-support 27.

Fig. 6 shows the means for oscillating the transverse rock-shaft 17 and the longitudinal main rib 15 which is fixed releasably and adjustably to rock-shaft 17. The resilient arms of a yoke 25 are releasably and adjustably fixed to rock-shaft 17 by a clamping screw 26. An arm 23 is turnably connected to yoke 25 by a pivot 24. Said arm 23 has an eccentric strap or collar which surrounds and abuts the eccentric 22, which is fixed to driven shaft 21. Said shaft 21 and its eccentric 22 are rotated by gears 20 and 19 and the main driving shaft 18. Gears 19 and 20 are fixed respectively to shafts 18 and 21.

Fig. 6 shows the extreme positions of eccentric 22 in broken lines and in full lines, corresponding to the positions of pivot 24 which are shown respectively in broken lines and in full lines.

The arm 23 has a yoke 23*a* which is clamped by a clamping screw to pivot 24, which is turnable in yoke 25.

In this embodiment, the pitch diameter of gear 19 is one-half the pitch diameter of gear 20. The needle 1 is given a complete transverse oscillation, which consists of a stitching stroke and a reverse stroke, for each complete revolution of shaft 18, and hence for each half-revolution of driven shaft 21. This ratio may be different, such as one to three, one to four, etc.

In this specific embodiment, the longitudinal main rib 15 will form a respective stitch-forming bight 10*a*, during alternate oscillations of the needle 1, so that one stitch A is formed for each two oscillations of needle 1.

The work-support 27 is not oscillated in this machine to produce skip-stitches. Said work-support is connected to frame F by pivot 28*p*. As viewed in Fig. 6, the work-support 27 is biased to turn clockwise at pivot 28*p*, in order to elevate its top, longitudinal supporting surface which slidingly supports the work C. By turnably adjusting the work-support 27, the height of bight 10*a* can be regulated, thus regulating the depths of stitches A in layer C, and providing for an adjustment for cloth layers of different thicknesses. If the cloth is thin, the stitches will not be blind stitches.

The work-support 27 is thus biased to turn clockwise as viewed in Fig. 6, by the usual longitudinal tension springs which are not shown. The longitudinal rod 29 is longitudinally adjustable in order to regulate the position of the top surface of work-support 27 relative to the transverse reciprocating movement of needle 1. The longitudinal rod 29 is longitudinally slidable in a longitudinal guide opening of the frame F of the machine. A compression spring 30 biases rod 29 to move towards the left, as viewed in Fig. 6. One end of compression spring 30 abuts frame F. The other end of compression spring 30 abuts a collar or head of adjusting rod 29.

One end of rod 29 abuts the transverse wall of work-support 27. The other end of rod 29 is connected by pivot 31 to lever 32, which is pivoted at pivot 33 to the frame F of the machine. The lever 32 and rod 29 are adjusted by knob 34, by means shown in said U. S. Patent No. 1,926,644 dated September 12, 1933.

The longitudinal auxiliary rib 14 has a body or shank 14*a*, as shown in Figs. 4, 5 and 14. As shown in Fig. 3 and Fig. 12, said body or shank 14*a* is connected by a pivot screw 16*a*, to one end of a transverse and non-turnable stud-shaft or rod 16. As shown in Fig. 7, this rod 16 is parallel to a stud-shaft or rod 35, which is non-turnable, and which is fixed to the frame F of the machine. As shown in Fig. 14, the shank of a transverse pin 28 is fixed to main rib 15. Said pin has a head 28*a*. The body or shank 14*a* of auxiliary rib 14 has a recess 27*a*, in which the shank of pin 28 is located. The rod 16 is located below the rock-shaft 17. Hence, when main rib 15 is turned counterclockwise as viewed in Fig. 4, its pin 28 and the recess 27*a* operate to turn auxiliary rib 14 clockwise around the axis of rod 16, so that main rib 15 is in its extreme upper end-position shown in Fig. 12, when auxiliary rib 14 is in its extreme lower end-position shown in Fig. 12. Similarly, when main rib 15 is turned clockwise as viewed in Fig. 4, it turns auxiliary rib 14 counterclockwise, so that auxiliary rib 14 is in its top

position of Fig. 13 when main rib 15 is in its bottom position of Fig. 13. The bights 10*a* and 11*a* are thus alternately formed and the stitches A and B are alternately formed.

The depths of stitches B are regulated by regulating the vertical position of rod 16. This also makes it possible to form the stitches B exactly at the inner fold of layer 11, or along a selected line which is intermediate the inner fold of layer 11 and the fold between layers 10 and 11. The pin 28 is always spaced from the inner end of recess 27*a*.

As shown in Fig. 8, a yoke 36 is turnably mounted on the non-turnable rod 35. The rod 35 extends through arms of said yoke 36, between which a collar 35*a* is located. This collar 35*a* consists of two parts which are assembled and fixed releasably to rod 35 by a clamping screw 35*b*. The collar 35*a* prevents the yoke 36 from shifting along rod 35. A part of rod 16 is located in a recess of yoke 36. Rod 16 is releasably fixed to yoke 36 by clamping screw 37.

Yoke 36 has an arm 38, to which one end of a link 39 is turnably connected by a pivot screw 40, which has a head 40*a*. The other end of link 39 is located between and pivotally connected by a pivot 41 to the arms of a head 42*a*, which is fixed to one end of a rod 42, which has an external thread which engages the internal thread of the tapped recess of bushing 43. One end of said bushing 43 has a head 44, which abuts an end of a boss 45 which is integral with work-support 27. The other end of said bushing 43 has an integral pin-extension 47, thus providing bushing 43 with a shoulder which abuts a spacer collar 46. The pin 47 extends through collar 46 and is releasably fixed to collar 46 by a clamping screw 48.

Said pin 47 also extends through a knob 49, to which pin 47 is releasably fixed by a clamping screw 50. The inner end of knob 49 has an enlarged flange 49*a*, which is located in a recess of work-support 27. Said flange 49*a* has a circular row of teeth 51 at the inner face of said flange. A ball detent 52 fits slidably in a recess of work-support 27. A compression spring 53 biases ball detent 52 to engage the inner face of the flange 49*a*, between two respective teeth 51. As shown in Fig. 11, the outer face of flange 49*a* has a scale, and an index 27*b* for said scale is provided on work-support 27.

When the position of the work-support 27 is regulated by means of the adjusting rod 29, the link 39 is raised or lowered, thus vertically adjusting rod 16 relative to the rock-shaft 17.

When the top work-supporting surface of work-suport 27 is lowered by means of the adjusting rod 29, the rock-shaft 17 is simultaneously lowered, because rock-shaft 17 is journalled in work-support 27. Hence the relation between the top position of main rib 15 and the top work-supporting surface of work-support remains the same, and there is an adjustment between the top position of main rib 15 and the path of the needle 1, so that the stitch A is closer to the top of layer 10. The lowering of the top surface of work-support 27 turns yoke 36 about the transverse axis of rod 35, thus raising rod 16, and moving the axis of oscillation of auxiliary rib 14 closer to pin 28, thus increasing the amplitude of the oscillation of auxiliary rib 14, and also raising the top position of the outer arcuate bight-forming surface of auxiliary rib 14, thus forming higher bights 11*a* in the work C. Similarly, if rod 29 is adjusted so as to raise the top surface of work-support 27, the rod 16 is lowered relative to rock-shaft 17. However, the main adjustment of auxiliary rib 14 relative to the work-support 27 is done by turning knob 49, thus raising or lowering rod 16 relative to rock-shaft 17.

The work C is supported on the usual fingers 57 at the feed-dog 7 and adjacent the transverse path of the needle 1. These fingers 57 are pivoted to the usual arms 58, and the usual torsion springs are provided at the pivots between fingers 57 and arms 58. The arms 58 are pivoted by respective pivots 56 to work-support 27, and said arms 58 have the usual integral extensions 55 which are biased by the usual tension springs 54 against the well-known adjustable stops. These parts are well-known and are illustrated in said prior patents.

The outer bight-forming surface of main rib 15 is optionally and preferably concentric with the axis of rock-shaft 17, although the radius of said surface may increase or decrease between its ends. This applies to the outer bight-forming surface of auxiliary rib 14.

The pin 28 optionally and preferably always remains spaced from the inner end of recess 27*a*.

The zig-zag or skip tacking stitches are particularly useful in tacking cloth which is impregnated or coated with plastic, and other types of cloth which are very smooth and have a very low coefficient of friction.

It is well-known to provide stitch-forming bights in the work by means of vertically reciprocating plungers and other bight-forming means, which require no description. In its broadest aspect, the invention is not limited to the bight-forming means disclosed herein, but such bight-forming means are greatly preferred.

In one aspect of the invention, it is embodied in a sewing machine of the type in which a needle is moved to-and-fro in a needle-path which is lateral or transverse to the direction of feed of the work. Said machine optionally and preferably has a frame to which a mount for a first bight-forming member is connected. This mount is exemplified by work-support 27 and said first bight-forming member is exemplified by main rib 15. This first bight-forming member is movable to-and-fro or otherwise relative to the frame, to respective operating bight-forming positions and non-operating non-bight-forming positions. Said first bight-forming member may be assembled movably with said frame in any manner, so that the invention is not limited to the use of a mount for said first bight-forming member. The machine has a second bight-forming member which is exemplified by auxiliary rib 14. The first and second bight-forming members are spaced laterally or transversely relative to each other, in order to form respective stitches which are spaced laterally or transversely relative to each other. There are stitch-forming periods in which only one of said bight-forming members is in bight-forming position. Optionally and preferably, one of said bight-forming members operates the other bight-forming member, and said bight-forming members are simultaneously operated in opposed strokes in order to produce zig-zag stitches, which may be tacking stitches.

As previously noted, the invention includes a sewing machine which forms lock-stitches or any other kind of stitch, although chain stitches are greatly preferred.

In one broad aspect of the invention, it is not limited to the use of two bight-forming members which are movable vertically or transversely

relative to the feed-path, and which are spaced from each other to a direction which is lateral or horizontal relative to said feed path. It is sufficient if the automatic operating mechanism for said bight-forming members keeps at least one bight-forming member out of bight-forming position while at least one of said bight-forming members is kept out of bight-forming position.

A preferred embodiment of the invention has been disclosed, but numerous changes and omissions and additions and substitutions can be made without departing from its scope.

I claim:

1. In a sewing machine of the type which has a frame and a work-support which is pivoted to said frame and feed-means which operate in a selected longitudinal feed-path and a needle which is moved to-and-fro in a selected needle-path which is transverse relative to said feed-path, said work-support having a top-surface which is provided with an opening, a main rib which is turnably connected to said work-support below said top-surface, said main rib being turnable about a transverse axis relative to said work-support, automatic operating means for oscillating said main rib around said transverse axis to a bight-forming position in which said main rib extends through and above said opening and to a lower non-bight-forming position, an auxiliary rib which is turnably connected to said frame, said auxiliary rib being turnable relative to said frame and relative to said main rib about a transverse axis and being spaced transversely from said first rib, said auxiliary rib being turnable about its transverse axis to a bight-forming position in which said auxiliary rib extends through and above said opening and to a lower non-bight-forming position, said main rib having and operating drive means which are connected to said auxiliary rib, said drive means oscillating said auxiliary rib reversely to said main rib.

2. In a sewing machine of the type which has a frame and a work-support which is pivoted to said frame and feed-means which operate in a selected longitudinal feed-path and a needle which is moved to-and-fro in a selected needle-path which is transverse relative to said feed-path, said work-support having a top-surface which is provided with an opening, a main rib which is turnably connected to said work-support below said top-surface, said main rib being turnable about a transverse axis relative to said work-support, automatic operating means for oscillating said main rib around said transverse axis to a bight-forming position in which said main rib extends through and above said opening and to a lower non-bight-forming position, an auxiliary rib which is turnably connected to said frame, said auxiliary rib being turnable relative to said frame and relative to said main rib about a transverse axis and being spaced transversely from said first rib, said auxiliary rib being turnable about its transverse axis to a bight-forming position in which said auxiliary rib extends through and above said opening and to a lower non-bight-forming position, said main rib having and operating drive means for oscillating said auxiliary rib, said drive means oscillating said auxiliary rib reversely to said main rib, said drive means comprising a transverse pin which is fixed to said main rib, said auxiliary rib having a recess in which said pin is located.

3. In a sewing machine of the type which has a frame and a work-support which is pivoted to said frame and feed-means which operate in a selected longitudinal feed-path and a needle which is moved to-and-fro in a selected needle-path which is transverse relative to said feed-path, said work-support having a top-surface which is provided with an opening, a main rib which is turnably connected to said work-support below said top-surface, said main rib being turnable about a transverse axis relative to said work-support, automatic operating means for oscillating said main rib around said transverse axis to a bight-forming position in which said main rib extends through and above said opening and to a lower non-bight-forming position, an auxiliary rib which is turnably connected to said frame, said auxiliary rib being turnable relative to said frame and relative to said main rib about a transverse axis and being spaced transversely from said first rib, said auxiliary rib being turnable about its transverse axis to a bight-forming position in which said auxiliary rib extends through and above said opening and to a lower non-bight-forming position, said main rib having an operating means for oscillating said auxiliary rib, said drive means oscillating said auxiliary rib reversely to said main rib, said connecting drive means comprising a transverse pin which is fixed to said main rib, said auxiliary rib having a recess in which said pin is located, said transverse axis of said auxiliary rib being lower than said transverse axis of said main rib.

4. In a sewing machine of the chain-stitch type which has a frame and a drive shaft and a work-support which is pivoted to said frame and in which said work-support has a top work-supporting surface and in which the machine has a feed-dog which is operated in a longitudinal feed-path and in which said machine has a curved needle which is oscillated in a needle-path transversely relative to said feed-path and said machine has a looper which cooperates with said needle to form a succession of chain stitches, said work-supporting surface having a top opening, a longitudinal main rib, a transverse rock-shaft to which said main rib is fixed, said rock-shaft being journaled in said pivoted work-support below said work-supporting surface, a longitudinal auxiliary rib which is turnable relative to said main rib and which is spaced from said main rib in a direction which is lateral relative to said feed-path, a lateral transverse rod on which said auxiliary rib is turnably mounted, said transverse rod being spaced transversely from said rock-shaft and being connected to said work-support, regulating means for regulating the position of said work-supporting surface vertically relative to said needle-path, said needle-path being transversely above said work-supporting surface, connecting means between said drive shaft and said rock-shaft to oscillate said rock-shaft, drive means fixed to said main rib and connected to said auxiliary rib to oscillate said auxiliary rib, each said rib being turnable in a respective bight-forming forward stroke to a bight-forming position in which said rib extends through and transversely above said opening, each said rib being turnable in a reverse stroke below said opening out of its said bight-forming position, said drive means being adapted to turn said auxiliary rib in its reverse stroke when said main rib is turned in its forward stroke and to turn said auxiliary rib in its forward stroke when said main rib is turned in its reverse stroke, and additional regulating means movably mounted on said work-support

and adapted to regulate the transverse spacing between said rock-shaft and said rod.

5. In a sewing machine of the chain-stitch type which has a frame and a drive shaft and a work-support which is pivoted to said frame and in which said work-support has a top work-supporting surface and in which the machine has a feed-dog which is operated in a longitudinal feed-path and in which said machine has a curved needle which is oscillated in a needle-path transversely relative to said feed-path and said machine has a looper which cooperates with said needle to form a succession of chain stitches, said work-support surface having a top opening, a longitudinal main rib, a transverse rock-shaft to which said main rib is fixed, said rock-shaft being journaled in said pivoted work-support below said work-supporting surface, a longitudinal auxiliary rib which is turnable relative to said main rib and which is spaced from said main rib in a direction which is lateral relative to said feed-path, a lateral transverse rod on which said auixilary rib is turnably mounted, said lateral rod being spaced transversely from said rock-shaft and being connected to said work-support, regulating means for regulating the position of said work-supporting surface transversely relative to said needle-path being transversely above said work-supporting surface, connecting means between said drive shaft and said rock-shaft to oscillate said rock-shaft, drive means fixed to said main rib and adapted to oscillate said auxiliary rib, each said rib being turnable in a respective bight-forming forward stroke to a bight-forming position in which said rib extends through and above said opening, each said rib being turnable in a reverse stroke out of its said bight-forming position to a non-bight-forming position below said opening, said drive means being adapted to turn said auxiliary rib in its reverse stroke when said main rib is turned in its forward stroke and to turn said auxiliary rib in its forward stroke when said main rib is turned in its reverse stroke, and additional regulating means movably mounted on said work-support and adapted to regulate the transverse spacing between said rock-shaft and said rod, said drive means being a drive pin which is fixed to said main rib, said auxiliary rib having a recess through which said drive pin extends, said transverse rod being below said rock-shaft.

6. In a sewing machine of the type which has a frame and a work-support and feed-means which operate in a selected longitudinal feed-path to feed the work along the top surface of said work-support and a needle which is moved to-and-fro above said top surface in a selected needle-path which is transverse relative to said feed-path, said machine having a transverse rock-shaft which is located below said top surface, means for oscillating said rock-shaft, a first rib fixed to said rock-shaft, a second rib which is turnably mounted on a second rib-axis which is parallel to and which is spaced transversely from the axis of said rock-shaft, and drive means operated by said rock-shaft and adapted and operative to turn said second rib simultaneously with said first rib and in a direction opposed to the direction of turning of said first rib, each said rib being turnable to a bight-forming position and to a non-bight-forming position, said drive means turning said second rib to its non-bight-forming position when said rock-shaft turns said first rib to bight-forming position, said drive means turning said second rib to its bight-forming position when said rock-shaft turns said first rib to non-bight-forming position.

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The following references are of record in the file of this patent:

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