May 4, 1948. J. SCHIFTER ET AL 2,440,811

BLIND STITCH SEWING MACHINE

Filed Aug. 3, 1940 6 Sheets-Sheet 1

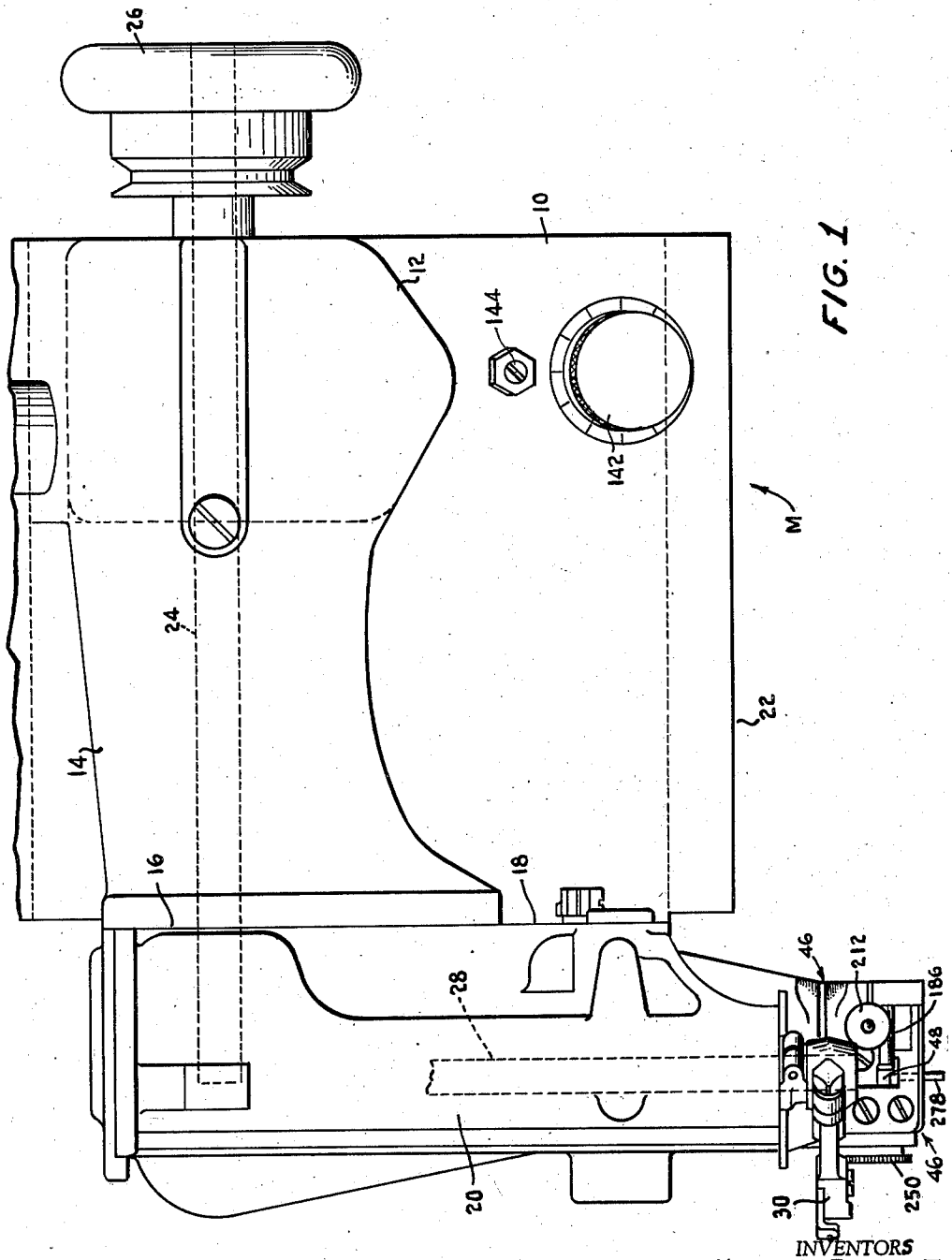


FIG. 1

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BLIND STITCH SEWING MACHINE

Filed Aug. 3, 1940 6 Sheets-Sheet 2

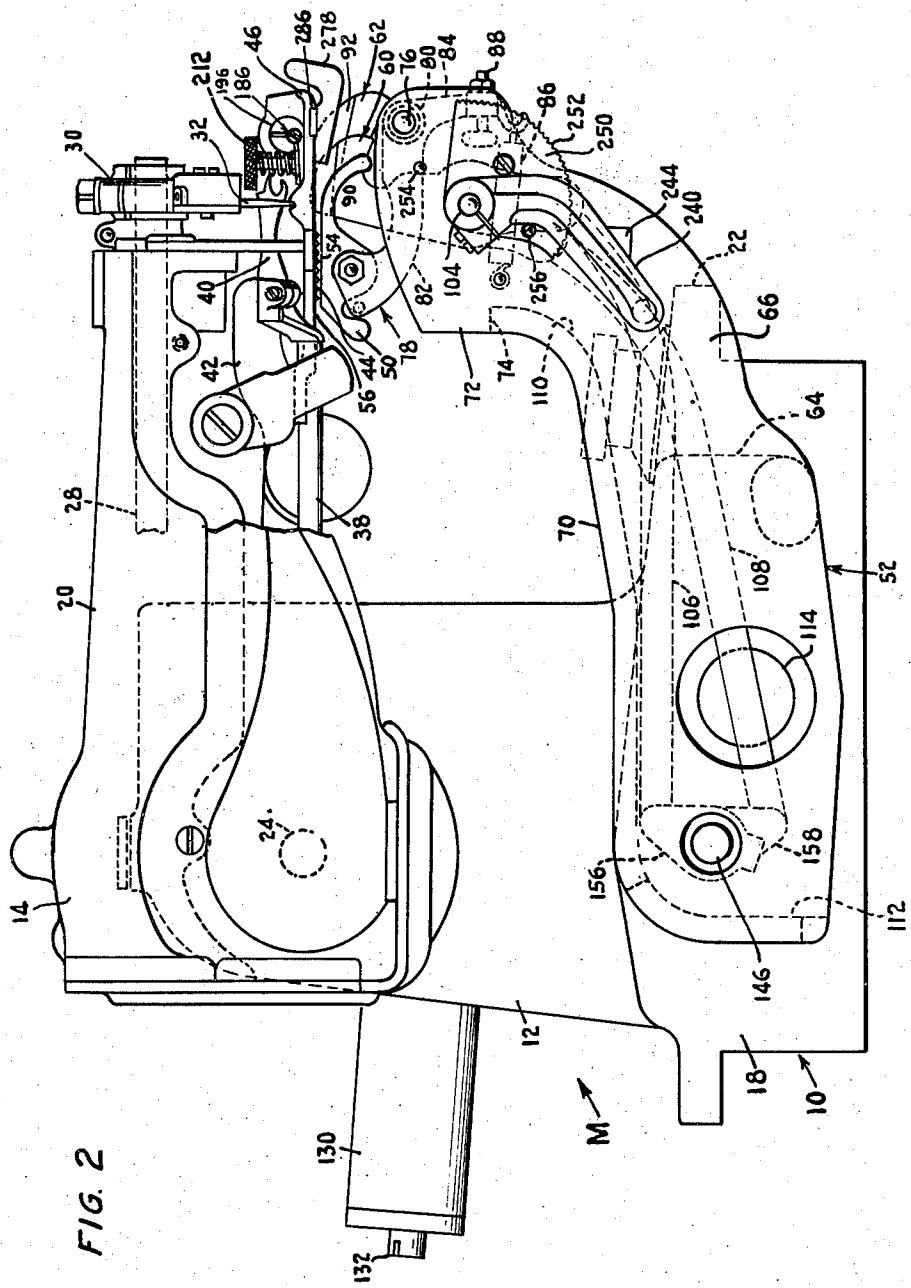


FIG. 2

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BLIND STITCH SEWING MACHINE

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FIG. 3

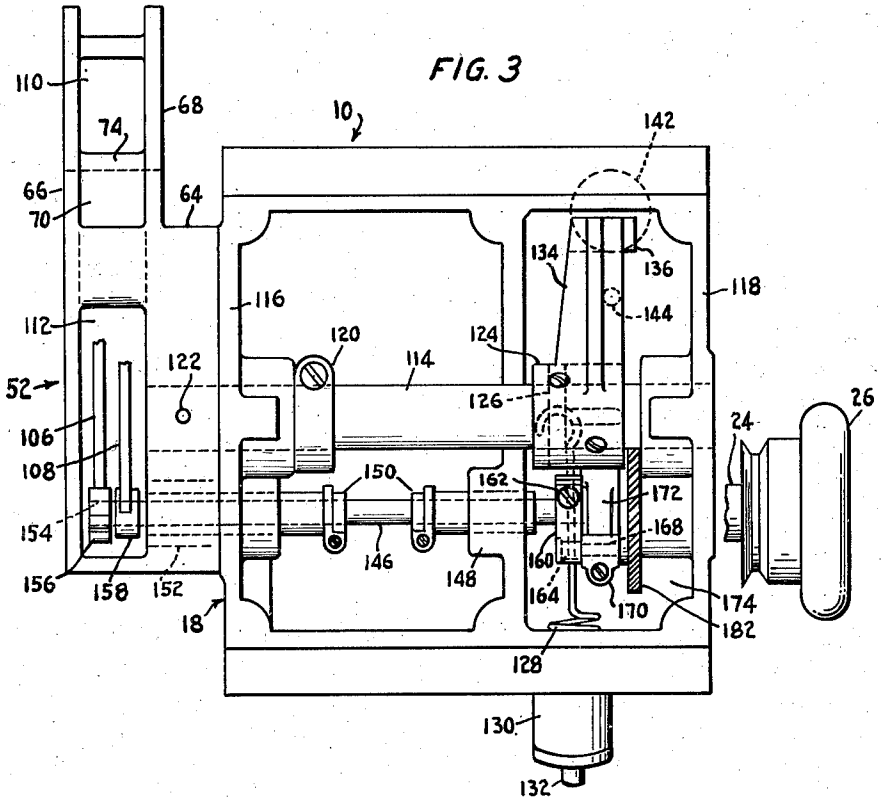
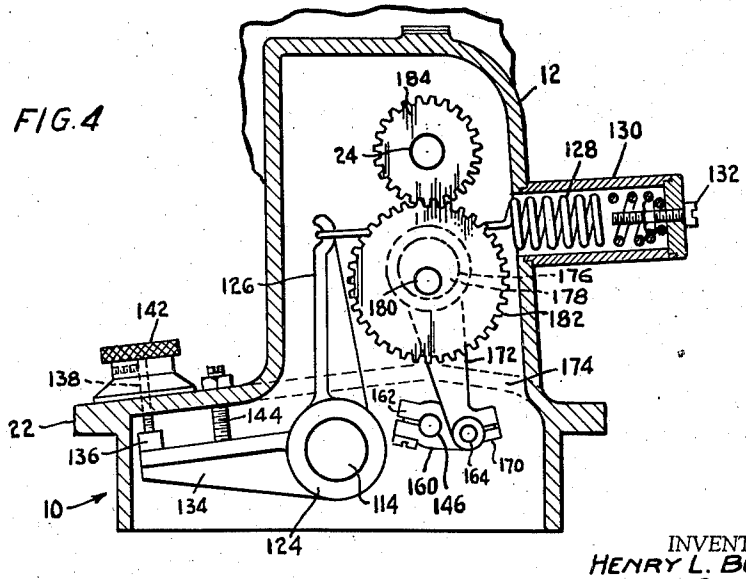


FIG. 4



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BLIND STITCH SEWING MACHINE

Filed Aug. 3, 1940 6 Sheets-Sheet 4

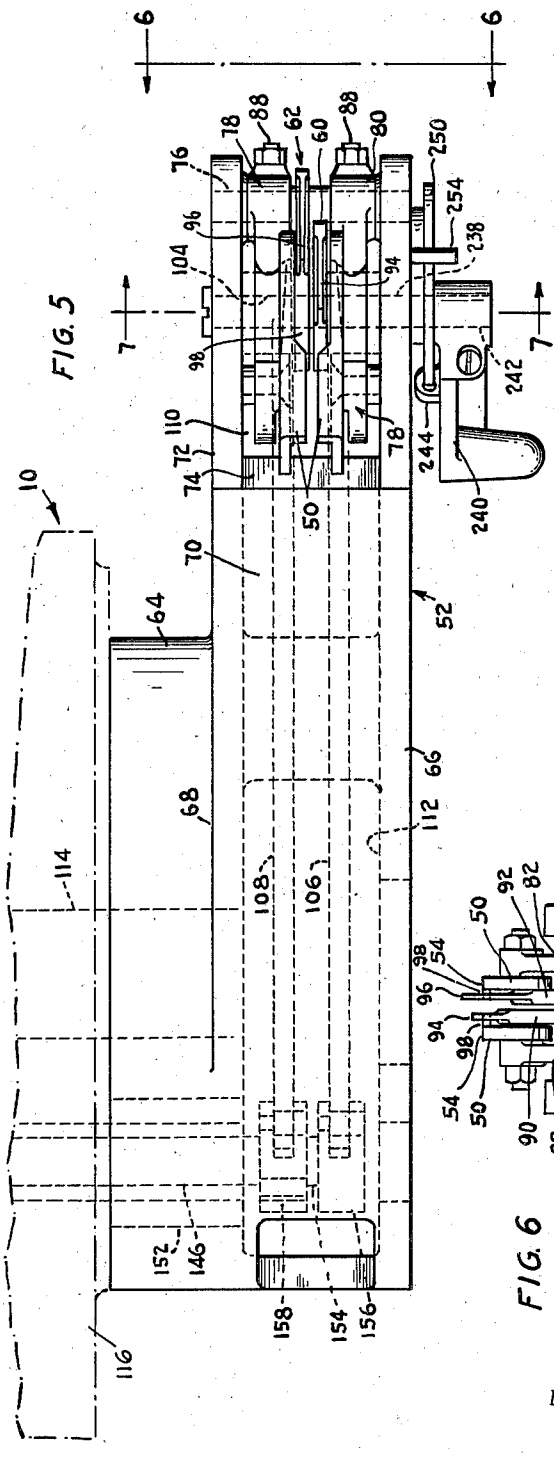


FIG. 5

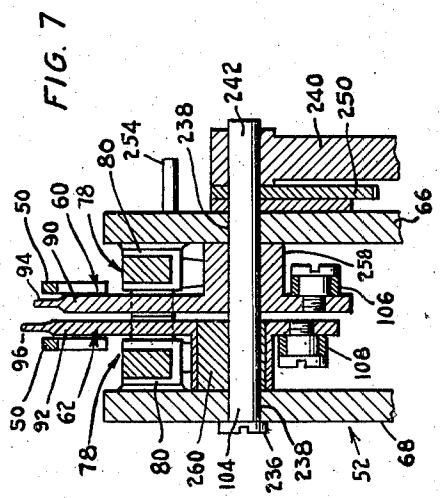


FIG. 7

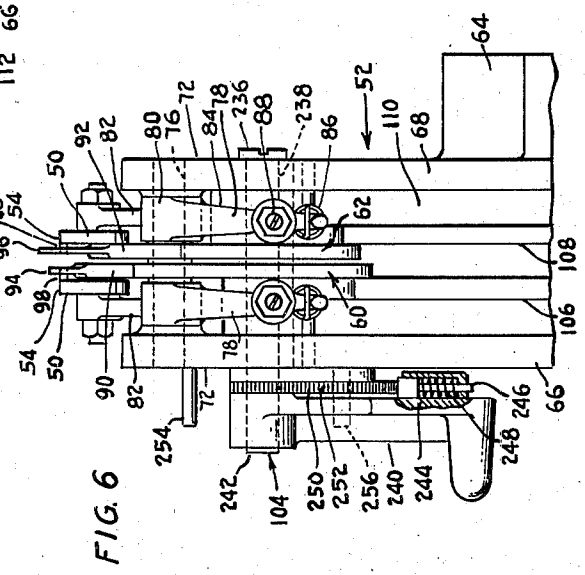


FIG. 6

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May 4, 1948. J. SCHIFTER ET AL 2,440,811

BLIND STITCH SEWING MACHINE

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FIG. 8

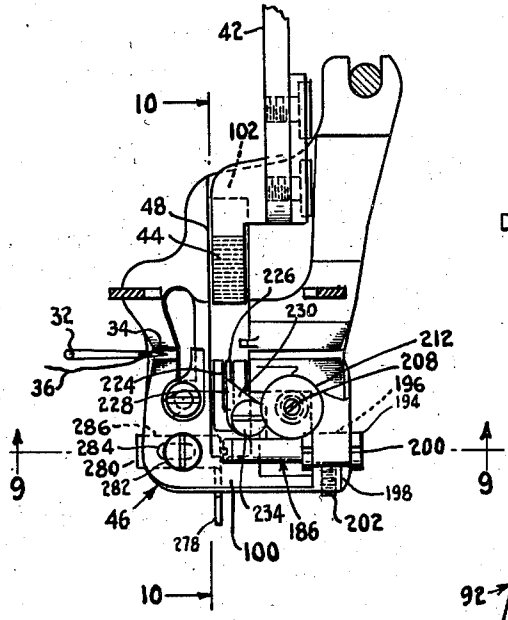


FIG. 10

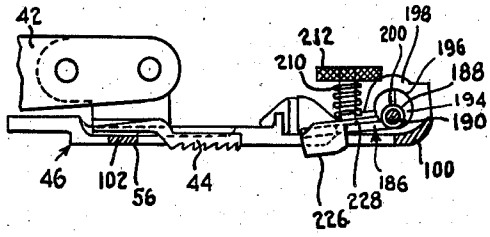


FIG. 12

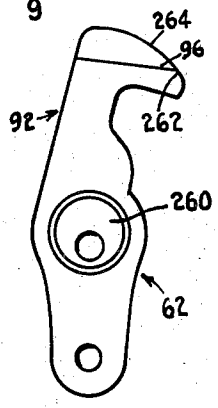


FIG. 13

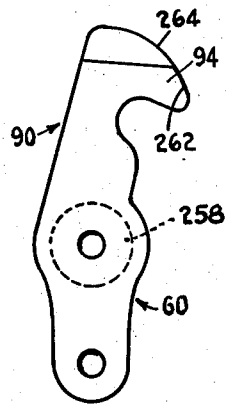


FIG. 9

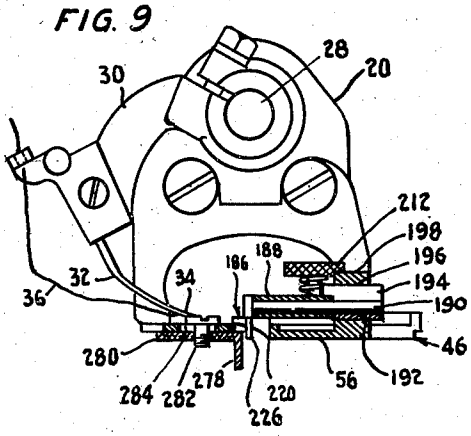


FIG. 14

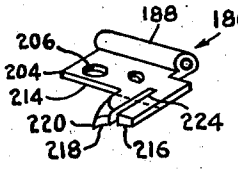


FIG 11

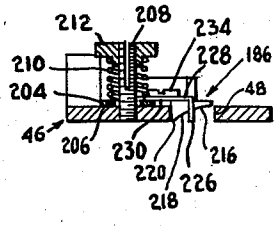


FIG. 15



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May 4, 1948. J. SCHIFTER ET AL 2,440,811

BLIND STITCH SEWING MACHINE

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FIG. 16

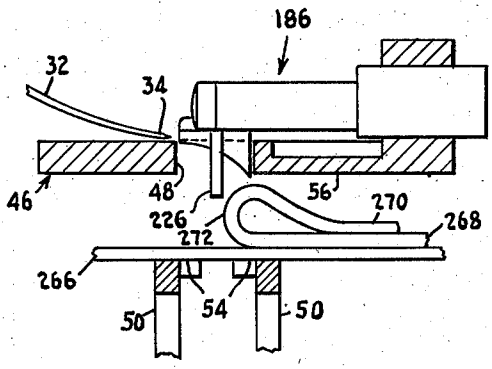


FIG. 17

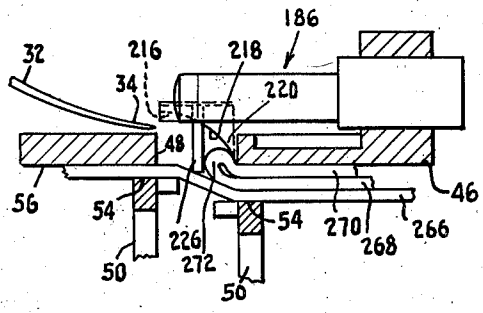


FIG. 18

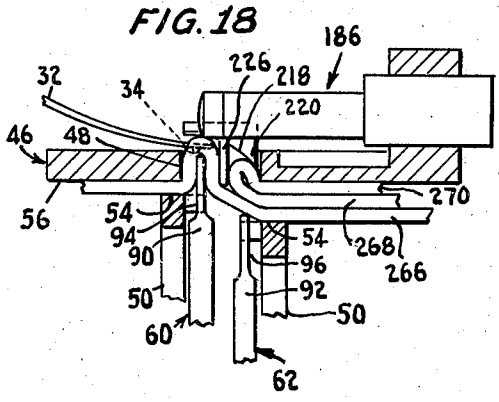


FIG. 19

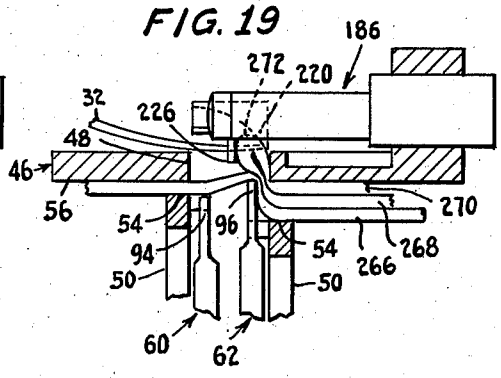


FIG. 20

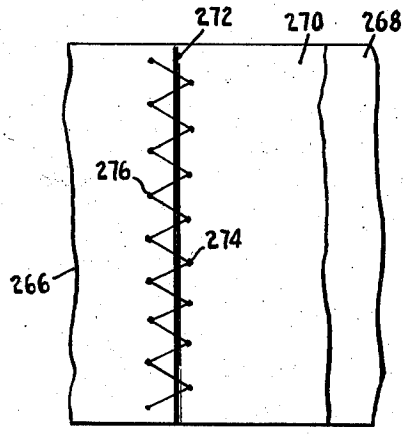
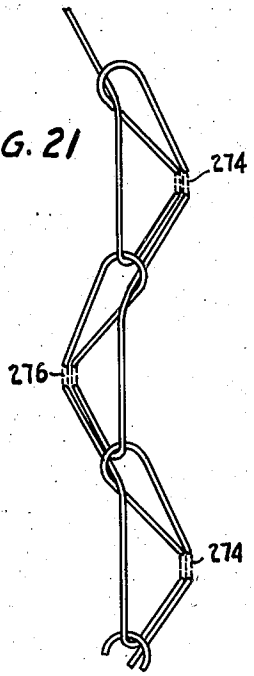


FIG. 21



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Patented May 4, 1948 2,440,811

UNITED STATES PATENT OFFICE

2,440,811

BLIND STITCH SEWING MACHINE

Joseph Schifter and Henry L. Burkitt,
New York, N. Y.

Application August 3, 1940, Serial No. 350,360

22 Claims. (Cl. 112—178)

1

This invention relates to blind stitch sewing machines.

In the particular field of blind stitch sewing machines, manipulation of a garment as a seam passes the stitching zone is of considerable importance. Such machines usually have an upright from which extends an arm carrying some of the stitch-forming means. Very long arms have been used on occasion so that cloth of considerable width may be fed without interference from the upright. That same machine must be capable of working upon small articles.

It is an object of the invention to provide a blind stitch sewing machine having a stitching zone so defined that the machine is capable of coping with the stitching of articles of varied dimensions.

The support for material being stitched is likewise of importance in such machines. In a simple sewing machine, a stationary table is provided, and only a presser foot is manipulated to hold the fabric during stitching, or to release the fabric. In the type of blind stitch sewing machines to be considered here, the movements of the needle and the other mechanism cooperating with the needle make requisite that the presser foot be fixed and stationary substantially at all times. It thus becomes necessary to manipulate other parts of the machine to effect positioning or removal of fabric from the machine.

It is an object of the invention to provide a machine wherein means for supporting fabric to be stitched is capable of manipulation for retaining or releasing the fabric by simplified means, and wherein such supporting means make possible a high degree of mobility of the fabric while it is being stitched.

In the usual blind stitch machine, a table of substantially considerable extent is provided. Such table supports the fabric, and must be moved relatively to the presser foot in adjusting the fabric that is being stitched. This results in lessened mobility, and reduced speed of operation even when working upon small pieces.

It is an object of the invention to reduce the extent of the movable table so that greater flexibility of operation will be attained. At the same time, it is made possible to enclose substantially all the mechanism for operating the table within a very small portion of the interior of the machine, and particularly of the table, without reducing the efficiency of the mechanism.

Blind stitch sewing machines usually operate by forming a bight in cloth to be stitched, the bight being a bend through which the needle

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passes so that the stitch enters and leaves the fabric at the same side of the fabric. Therefore, some form of bender, plunger or other bight-forming means is utilized. Such bight-forming means must operate in timed relationship to the needle and the other stitch-forming members, and at the same time must not interfere with the feeding action of the machine. Such bight-forming means usually receives its operating force from the same driven shaft as drives the needle and its associated members. In such a machine, all of these driven members, if exposed, become a source of danger, requiring guards to reduce such danger to an absolute minimum.

It is an object of the invention to provide a machine of the type indicated, in which bight-forming means is operated directly from the usual drive shaft, and yet substantially all the parts of the bight-forming means are housed completely out of such relationships as might be dangerous to an operator.

One of the types of stitching used in the clothing industry is commonly known as "bluff edge," or "bluff stitch." In such case, the stitch is produced to extend transversely between two immediately contiguous faces of fabric, whether so positioned by folding one piece of fabric, or by superimposing one piece of fabric upon the other. In any case, the stitch is housed completely between the two fabric faces, and is not apparent at the outer, exposed faces of the stitched-together fabric pieces. Such line of stitching generally is spaced away from the edges of the fabric faces so retained, serves to retain the fabric faces substantially in fixed relationship to each other, and yet does not show any seam at the outside of the fabric. Such a "seam" serves to prevent the two faces from moving relatively to each other. The pieces may, in fact, be secured together at associated edges, and by other stitching; in such a construction, the "bluff" seam serves to anchor the pieces together, to prevent the application of any strain upon those edges, and thus to prevent those edges from becoming displaced in their position in a garment where, in fact, they usually define an edge for the garment.

"Bluff edge" seams are used generally in connection with fabric which is quite heavy; manipulation of the fabric in such machines presents a considerable problem. Merely to push all of the layers of fabric at one time into the path of the needle, as is the usual case in blind stitching, is not desirable, since this might involve thicknesses produced by folded layers. Without considering

lining and other materials, there would thus be, in the path of the needle, at least three layers of fabric on one side of the line of stitching, and one layer of fabric on the other side of the line of stitching. This great variation in thickness would require the needle to transfer thread from a three-layer thickness on one side, to a one-layer thickness on the other side. The usual bight-forming means will not function efficiently in such a relationship.

It is an object of the invention to provide mechanism especially adapted for production of such "bluff edge" seams to present, on each single operation of the needle, but one side of the seam and thus make it possible to avoid the necessity that the needle bridge between extreme variations of thickness of fabric, or that the bight-forming means produce two radically different distensions of the fabric for every oscillation of the needle.

In a machine embodying certain features of the invention, a pair of elements are positioned to form bights for cooperation with the needle; however, such elements are operated so that each element, only individually, assumes a bight-forming position in relation to the needle, first one of the elements coming up into position for one complete stitch-forming operation, and then that element moving out of position while the other element comes into position for the next complete stitch-forming operation, and then this second element moving out of position while the first element returns into position.

Such bight-forming means permits accurate adjustment of differential between depths of penetration of the needle for different stitch-forming operations of the needle, and thus the machine becomes useful for operation upon fabrics of different thicknesses, wherein such differences in thicknesses become multiplied many times in connection with the layers presented for penetration by the needle on its different oscillations.

Other objects of this invention will be set forth hereinafter, or will be apparent from the description and the drawings in which is illustrated an embodiment of apparatus for carrying out the invention.

The invention, however, is not intended to be restricted to any particular construction, or to any particular arrangement of parts, or to any particular application of any such construction or any such arrangement of parts, or to any specific method of operation, or to any of the various details thereof, even where specifically shown and described herein, as the same may be modified in various particulars, or may be applied in many varied relations, without departing from the spirit and scope of the claimed invention, a practical construction embodying certain details of the invention being illustrated and described, but only for the purpose of complying with the requirements of the statutes for disclosure of an operative embodiment, but without attempting to disclose all of the various forms and modifications in which the invention might be embodied.

On the drawings, in which the same reference characters refer to the same parts throughout, and in which is disclosed such practical construction:

Fig. 1 is a plan view of a blind stitch sewing machine embodying features of the invention, a part of the body of the machine being broken away, certain of the shafts being shown in dotted lines and broken away;

Fig. 2 is an end elevational view of the machine shown in Fig. 1, a part of the cover plate being broken away to reveal some of the operating parts, and some of the parts being shown in dotted lines;

Fig. 3 is a bottom plan view, to reduced scale, of the machine, parts being removed for clarity, and other parts being broken away;

Fig. 4 is a detail elevational view of certain of the operating parts, the body of the machine being broken away in section to disclose these parts, and other parts of the machine being broken away for clarity;

Fig. 5 is a detail plan view of the supporting arm of the machine, other parts of the machine being removed or broken away or being shown by dot-and-dash lines for clarity;

Fig. 6 is a frontal elevational view of a part of that arm as seen from the line 6—6 of Fig. 5, parts being broken away in section to disclose their relationship;

Fig. 7 is a detail vertical cross-sectional view, substantially on the line 7—7 of Fig. 5;

Fig. 8 is a plan view of the presser foot and some of the related parts, a portion of the needle and parts of the support being shown and being broken away in section, the feed dog and the feed dog bar being shown in their relative positions;

Fig. 9 is a vertical cross-sectional view substantially on the line 9—9 of Fig. 8;

Fig. 10 is a vertical cross-sectional view substantially on the line 10—10 of Fig. 8, one of the guide members not being shown for clarity;

Fig. 11 is a detail cross-sectional view transversely of the shoe and its adjusting means as shown in Fig. 10;

Figs. 12 and 13 are elevational views of the bight-forming members;

Fig. 14 is a view in elevational perspective of a part of the shoe;

Fig. 15 is an end elevational view illustrating the relationship of fabric arranged for feeding through the machine;

Fig. 16 is a view to an enlarged scale, illustrating the relationship of certain of the operating parts and the fabric as it is inserted into the machine;

Fig. 17 is a view, similar to Fig. 16, illustrating the relationship of the parts and the fabric when the machine is ready for the stitching operation;

Figs. 18 and 19 are views similar to Figs. 16 and 17, illustrating two of the steps in the stitching operation;

Fig. 20 is a plan view of a piece of fabric as produced by the machine; and

Fig. 21 is a view to an enlarged scale of the stitch produced by the machine.

The blind stitch machine M shown on the drawings may have a base 10 from which a hollow standard 12 extends upwardly. Substantially at right angles to standard 12, and parallel to base 10, a hollow arm 14 extends to form a face 16 immediately over an edge 18 of base 10. Secured to arm 14 and against face 16, is a needle head 20, the needle head extending forwardly from the arm and towards and beyond the front edge 22 of the base. A shaft 24 extends through arm 14, and is mounted in bearings provided for that purpose in the arm. The shaft may be driven by a belt trained over a pulley 26 secured on the end of shaft 24 where it extends outside arm 14.

Shaft 24, by suitable mechanism not necessary for description here, but such as in common use in the Dearborn type machine and well

known to those skilled in the art, may transmit oscillating movement to a shaft 28 mounted in suitable bearings in head 20. An end of shaft 28 extends beyond head 20 to have a needle-carrying arm 30 secured thereto. By means of a suitable clamp, an arcuately shaped needle 32 may be removably fixed to the end of the arm, the arrangement being such that, as shaft 28 oscillates, point 34 of the needle and, therefore, thread 36 carried thereby, will move through an arcuate path. Shaft 24, where it extends beyond arm 14 and into needle head 20, also carries means for imparting both oscillating, rotary and lateral motion to a looper rod 38 at the end of which is affixed a looper 40, all of this mechanism being similar to that of the conventional Dearborn machine. Shaft 24 also has means for imparting motion to a feed dog bar 42 at the end of which is affixed a feed dog 44, so that the feed dog likewise may be oscillated in timed relationship to both needle and looper.

All of these parts operate immediately above or in slots provided in the usual stationary presser foot 46 of the Dearborn type machine. The presser foot is fixedly mounted upon the end of needle head 20. Dog 44 is lifted and lowered and slid lengthwise within a slot 48 in the presser foot, the slot forming a guide for the dog, and permitting the dog to be lowered into engagement with platens 50, which are carried by arm 52. These platens may be of usual construction, their top faces 54, when fabric is not positioned thereon and when dog 44 is lifted in slot 48 out of engagement with the platens, being engaged against bottom face 56 of the presser foot.

It is necessary to mention generally that, as shaft 24 rotates, feed dog 44, by reason of the manner in which bar 42 is pivoted and hung, all of which forms no part of the specific invention here, is lifted and lowered, and also is advanced and retracted, that is, follows the usual four motions of a feeding member, so that its teeth engage with fabric retained between foot 46 and platens 50. The dog pushes down against this fabric and against the action of the platens, to release the fabric from engagement with bottom face 56. Then, as the dog continues to move, now with lengthwise motion, it drags the fabric over top faces 54 of the platens, and thus feeds the fabric. At the end of its travel, the dog moves upwardly out of engagement with the fabric, permitting the fabric to come to rest as the platens again press the fabric into engagement with bottom face 56. Needle 32 now carries thread 36 through the fabric and through a bight formed therein by one of the bight-forming members 60 and 62, to provide a loop for engagement by looper 40, the looper functioning in the normal manner to draw the loop over into position for engagement by needle 32 on its next stroke.

Arm 52, associated with base 10, and supporting platens 50 and members 60 and 62, is, in the particular instance shown, narrow, its width being just sufficient to house and retain platens and bight-forming members in desired association. Positioned, in its normal position, immediately below presser foot 46, arm 52 includes a base or mounting section 64 from which a pair of parallel walls 66 and 68 extend forwardly and then upwardly. These walls, in the forwardly extending portions and in part of the upwardly extending portions, are connected by a transverse wall 70, which imparts the necessary rigidity to

walls 66 and 68. Small portions 72 of walls 66 and 68 extend beyond the upper edge 74 of wall 70. Toward the front of portions 72, a pin 76 extends between the portions, and serves as a mounting upon which to pivot platen-carrying arms 78. Arms 78 may take somewhat the form of bell cranks, being provided bearing sections 80 positioned upon pin 76, the extent of the bearing sections being such that they fit snugly between walls 66 and 68.

Arms 78 include fingers 82, extending in the direction of feed, and having pivots upon which platens 50 are mounted. Other fingers 84 extend downwardly from sections 80 to be engaged with suitable springs 86 which may be anchored upon suitable pins or like members on the inner faces of walls 66 and 68. These springs act to retain the platens normally raised into engagement with bottom face 56, or to press fabric, supported upon the platens and between the platens and the presser foot or the feed dog, against face 56 or against the feed dog. Each finger 84 may have an adjustable stop 88 for cooperation with a portion of arm 52 to limit upward movement of the platens, as, for instance, when arm 52 is moved downwardly sufficiently to release the platens from engagement with foot 46. Fingers 82 are spaced from each other to provide a passage of sufficient width to permit the extension between them and above the level of sections 80 of arms 90 and 92 of members 60 and 62.

At the end of arms 90 and 92, and, therefore, above sections 80, the fabric-engaging heads 94 and 96 of the bight-forming members are defined. The platens are cut away at 98 to provide a passage through which heads 94 and 96 may be projected when moved to engage fabric carried on the platens and extending beneath slot 48. Slot 48 extends substantially the entire length of the presser foot, except for small bridge sections 100 and 102 at each end. Thus fabric fed beneath the presser foot is unsupported at the slot except for such support as may be obtained from the platens and heads 94 and 96.

Arms 90 and 92 are mounted to pivot upon a bearing stud 104 which in turn extends through openings in, and is provided bearings in those openings in, walls 66 and 68. Arms 90 and 92 extend below stud 104, and, at their respective ends, are pivotally connected to links 106 and 108, which likewise are housed within arm 52, extending along within passage 110 provided by walls 66, 68 and 70, and into chamber 112 at mounting section 64.

Arm 52, by mounting section 64, is pivotally mounted on base 10 by means of a large pin 114 which has bearings in end walls 116 and 118 of base 10. A collar 120 secured on pin 114 abuts one end wall 116 and cooperates with a taper pin 122, extended through a wall of mounting section 64 to fix arm 52 with relation to the end of pin 114, to prevent the pin from having any longitudinal movement in its bearings.

Intermediately of pin 114 is secured a collar 124 having an upwardly extending finger 126. To the end of finger 126 is engaged a spring 128 extending through the wall of standard 12 to be received in an individual casing 130 there to be engaged by an anchor pin 132 in the end wall of the casing. Pin 132 is adjustable in order to vary the tension of spring 128. The tension of spring 128 serves to turn pin 114 so that arm 52 will move upwardly into position to bring the platens into engagement with the presser foot. Collar

124 also has an arm 134 which extends forwardly from the collar to a position immediately beneath a plunger 136 which is carried upon a screw-threaded pin 138. The pin may be secured to a knurled knob 142 positioned on the top face of base 10, the pin extending through an opening in the base, and the knob being retained against separation from the base and so that, on rotation, plunger 136 will move up or down, according to the rotation of the knob. The action of spring 128 is to drive arm 134 into engagement with plunger 136, to limit upward movement of arm 52, and in accordance with the setting of plunger 136. A safety stop 144 may also be mounted in association with knob 142, and may be adjusted through an opening in base 10 to limit the adjustment derived from knob 142 so that members 60 and 62 may not be projected dangerously into the path of the needle.

Also supported in bearings in base 10 is shaft 146, the bearings being formed in wall 116 of the base and in a boss 148 extending downwardly from the top wall of the base. A pair of collars 150 fixed to the shaft retain it against longitudinal movement. The shaft extends beyond wall 116 and into chamber 112, and, rearwardly of pin 114, through a large opening 152 provided for that purpose. Shaft 146 does not move with arm 52.

On end 154 of shaft 146 extending into chamber 112, a pair of cranks 156 and 158 are affixed, as, for instance, by means of clevises in addition to set-screws, for retaining the cranks in fixed relationship to end 154. The cranks are disposed substantially opposed to each other, but not exactly 180° apart. One crank 156 is connected to link 106, while the other crank 158 is connected to link 108, and thus provide for oscillation of the respective members 60 and 62 to bring their effective heads 94 and 96 into cooperation with fabric pressed against the presser foot.

At the other end of shaft 146, a crank 160 is fixed, as, for instance, by means of a clevis 162. Crank 160 has a bearing for a shouldered pin 164, the bearing being in an opening at the end of the crank. To the extending end 168 of pin 164 is fastened the clevised end portion 170 of an eccentric strap 172. The eccentric strap extends upwardly through passage 174 in standard 12, and has its bore 176 carried upon eccentric 178. Eccentric 178 is mounted upon a pin 180, the pin extending transversely between the walls of standard 12. Fixed with eccentric 178 is a gear 182, this gear being meshed with a gear 184 carried upon main shaft 24. In the particular instance shown, gears 182 and 184 are in two-to-one relationship, that is, for every two revolutions of shaft 24, eccentric strap 172 will complete one cycle, so that shaft 146 will complete an oscillation.

Gears 182 and 184 are so timed, and cranks 156 and 158 are so disposed with regard to the center of shaft 146, that one of the heads 94 and 96 will be brought into engagement with fabric carried on the platens while the other head is moving out of and away from engagement with the fabric, and at the time the needle is passing into the fabric projected by the bight-forming member. Thus fabric retained between the platens and the presser foot will be biased upwardly only by one of the bight-forming members at any single reciprocation of the needle.

Fabric fed through the machine is pressed upwardly, as previously described, by platens 50.

Pressing down against the fabric is a shoe 186, as shown in Figs. 8, 9, 10 and 11. This shoe is an integral part of a bearing sleeve 188 which is provided a bearing on a headed pin 190. This pin in turn is received in a bore 192 eccentrically formed in a split sleeve 194. Sleeve 194 in turn is received in a bore 196 formed in an upright lug 198 which may be formed substantially integrally with presser foot 46. Sleeve 194 has a slot 200 for engagement of a screw driver or similar tool to rotate sleeve 194.

However, sleeve 194 normally is anchored and compressed by means of a set-screw 202 in lug 198, the compressed sleeve serving to retain pin 190 against rotation. However, on release from the compressing action of screw 202, sleeve 194 may be rotated within bore 196, and, because of the eccentricity, thus serve to lift and lower pin 190 as well as to advance and retract the pin relatively to slot 48, and thus serve as one means for adjusting the position of shoe 186.

Shoe 186 includes a plate 204 having an opening 206, as shown in Fig. 14. Through opening 206 extends a screw-threaded pin 208 affixed in presser foot 46. A coiled spring 210, assembled on pin 208, is held between plate 204 and a knurled nut 212 which is threaded on pin 208. The pressure of shoe 186 against material carried between the platens and the presser foot is thus regulated.

The bottom face 214 of plate 204 is formed to provide a surface 216 to cooperate with head 94. Since this head and surface 216 will act upon that portion of the fabric which is of lesser thickness, surface 216 is higher than the other portions of bottom face 214. Then bottom face 214 includes a surface 218 at a lower level than surface 216, and from surface 218 there extends downwardly a wedge-shaped member 220 for cooperation with head 96.

Medially of plate 204 is a slot 224 formed in plate 204, and through which extends a rib 226. This rib is an integral part of an L-shaped member 228, the flat portion 230 being anchored on the top face of plate 204 by means of a screw 234. Rib 226, surface 218, and member 220 cooperate with head 96 in forming a bight in the thicker portion of the fabric, wedging it up into the desired V-formation.

Bearing stud 104 is provided with a head 236, the stud being received through aligned openings 238 in walls 66 and 68 so that head 236 abuts the outer face of wall 68. At outer wall 66, a handle 240 is affixed to the extending end 242 of the stud, as, for instance, by means of a clevis. Handle 240 has a boss 244 formed thereon; in a passage in the boss slides a pin 246. A spring 248 encircles pin 246 within the passage and acts on the pin; by this means, pin 246 is forced against a quadrant 250 fastened to wall 66 by any suitable means such as screws. The outer periphery of the quadrant may be formed with teeth 252 to cooperate with the toothed end of pin 246. Stop pins 254 and 256 may be mounted either on wall 66 or on the quadrant to provide limits for movement of handle 240.

Between walls 66 and 68, bearing stud 104 is formed to provide independent bearings for arms 90 and 92. Arm 90 is provided a bearing section 258 which has a bore concentric with the axis of the stud, and, therefore, on movement of the stud by means of handle 240, no change takes place in the effective pivoting of arm 90. An eccentric bushing 260, affixed to stud 104, provides a bearing for arm 92. Thus, as handle 240 is actuated to adjust the axial position of stud

104, the axis of oscillation of arm 92 will be changed. Thus, head 96 will be brought up towards and moved away from fabric supported on the platens, that is, since the center of oscillation of member 62 will be changed, it will be made possible for this member to have less or more effect upon the fabric, to push the fabric into the path of the needle, more or less, according to the adjustment of handle 240.

Heads 94 and 96, as seen in Figs. 12 and 13, in addition to being pushers, that is, elements which push the fabric vertically, are also seen to have a forward arcuate overhang 262. This overhang, as can be seen, has a cam surface 264 turned downwardly to cooperate with fabric as it is fed through the machine, that is, the fabric riding into the stitching position is brought up the curving surface 264 into position beneath shoe 186.

Fabric being fed to the machine will be considered as consisting of two pieces 266 and 268, as shown in Fig. 15, the top-most piece being folded back on itself to form a third layer 270, and also to define a fold edge 272. As shown in Fig. 16, the fabric is positioned on the platens by depressing arm 52 against the action of spring 128. Then the arm is permitted to rise, whereupon, as shown in Fig. 17, platens 50 will clamp the fabric against face 56, and fold edge 272 will then be positioned immediately in contact with the side face of rib 226. The fabric actually crowds into slot 48, and piece 266 will be positioned in contact with surface 216. The superimposed formation of pieces 266 and 268 and layer 270 will be pressed against surface 218 and member 220.

Now, as the fabric is fed through the machine, first head 94, as shown in Fig. 18, will engage with the fabric and push it against the action of shoe 186 into the line of movement of needle 32. The platens are active to keep the fabric in tension as head 94 rises, and thus, although shoe 186 does not clamp the fabric of pieces 266 and 268 and layer 270 tightly, they are prevented from rising into the path of the needle. At the moment of peak movement of head 94, needle 32 passes through the bight in piece 266, as shown in Fig. 18, and then looper 40 cooperates with the needle in the usual manner. The needle is retracted; head 94 is lowered; the needle leaves the fabric; and the fabric is fed forwardly by dog 44. Head 94 continues to move towards the operator, and down away from the fabric while, at the same time, head 96 is rising.

In the meantime, looper 40 has transferred its loop into position to be engaged over the needle on the next movement of the needle into the fabric. At the end of the feed motion, head 96, as shown in Fig. 19, will have moved up into engagement with the fabric to push pieces 266 and 268 and layer 270 up into position so that edge 272 will be engaged by the needle, the various layers then cooperating with rib 226 and member 228. Now head 96 is the operative element, functioning for stitch formation. It, of course, is laterally displaced from head 94 and the disposition is such that a zig-zag stitch, such as shown in Figs. 20 and 21, will be produced. In such case, thread is first caught at point 274 at which a complete stitch is produced. Then, when head 94 is effective, the thread is caught at point 276; the same cycle of stitch formation now ensues; the thread keeps alternating back and forth from a line of points 274 to a line of points 276, and thereby produces substantially a zig-zag stitch, and what in effect is a skip stitch, sometimes called a floating stitch. The specific type of stitch, formed with a single thread chain stitch machine, is shown in Figs. 21 and 22.

An additional guide for that portion of edge 272 not yet engaged by the platens and associated elements, and to guide the edge up to those elements, may be provided by a finger 278 having an arm 280 affixed to the bottom face of the presser foot by means of a screw 282 passing through an opening 284 in the presser foot. Arm 280 is retained against rotation by engagement against a shoulder 286 in the bottom face of the presser foot. The arm is laterally adjustable by reason of the extent of opening 284.

Many other changes could be effected in the particular apparatus designed, and in the method of operation set forth, and in specific details thereof, without substantially departing from the invention defined in the claims, the specific description being merely of an operative embodiment capable of illustrating certain principles of the invention.

What is claimed as new and useful is:

1. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, means for forming stitches, a plurality of means for effecting movement of the supported fabric and the stitch-forming means towards each other so that thread is engaged in and passed through the fabric by the stitch-forming means, and means to operate each of the movement-effecting means at a different operation of the stitch-forming means to produce relative movement towards each other of the supported fabric and the stitch-forming means by each of the movement-effecting means individually of the other, the relative movement effected by each of the movement-effecting means being of a different extent, and means for varying the difference in extent of the relative movements.

2. Means for stitching together a plurality of superposed fabric layers, wherein one of the fabric layers is of lesser extent than the layer upon which it is supported so as to define a layer end edge within the extent of the surface of the supporting layer, the stitching means including stitch-forming means, means for supporting the fabric layers to retain the layer end edge in position upon the supporting layer for the stitch-forming operation, and means for presenting individually and at different operations of the stitching means either the layer end edge or the supporting layer to the stitch-forming means.

3. Means for stitching together a plurality of superposed fabric layers, wherein one of the fabric layers is of lesser extent than the layer upon which it is supported so as to define a layer end edge within the extent of the surface of the supporting layer, the stitching means including stitch-forming means, means for supporting the fabric layers to retain the layer end edge in position upon the supporting layer for the stitch-forming operation, and means for effecting movement towards each other first of the stitch-forming means and the layer end edge and then of the stitch-forming means and the supporting layer.

4. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, means for feeding the fabric along a line in one general direction, means for forming stitches, and means for forming bights in the supported fabric in cooperation with the stitch-forming means on opposite sides of the line for different operations of the stitch-forming means.

5. A blind-stitch sewing machine having means for supporting fabric in position for stitching op-

erations, means for feeding the supported fabric constantly in the same direction, and means for forming stitches in the fabric so supported, the forming means including a needle oscillating in substantially a single path for forming blind-stitches in the fabric, and means for effecting movement of the fabric towards and away from the path of oscillation of the needle, the movement-effecting means comprising means for selectively effecting movement of the fabric into stitch-forming positions for formation of successive stitches substantially out of any continuous straight line of stitching.

6. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, and means for stitching the fabric along a predetermined straight line, the stitching means including a needle oscillating in a path for forming blind-stitches in the fabric, and means for effecting movement of the fabric towards and away from the path of oscillation of the needle, the movement-effecting means comprising means for effecting movement of the fabric into stitch-forming position on either side of the line but only on one side of the line for any one stitch.

7. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, means for stitching the fabric along a predetermined mean line, the stitching means including a needle oscillating transversely of the line, means for effecting movement towards the needle of the fabric at points spaced apart along the line and on both sides of the line for engagement by the needle in forming a stitch, and means for making the movement-effecting means operative for effecting movement of the fabric on one side only of the line for any single stitch-forming oscillation of the needle.

8. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, means for stitching the fabric along a predetermined mean line, the stitching means including a needle oscillating transversely of the line, means for effecting movement towards the needle of the fabric at points spaced apart along the line and on both sides of the line for engagement by the needle in forming a stitch, means for making the movement-effecting means operative for effecting movement of the fabric on one side only of the line for any single stitch-forming oscillation of the needle, and means for controlling the depth of penetration of the needle into the fabric in forming the stitch.

9. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, means for stitching the fabric along a predetermined mean line, the stitching means including a needle oscillating transversely of the line, means for effecting movement towards the needle of the fabric at points spaced apart along the line and on both sides of the line for engagement by the needle in forming a stitch, means for making the movement-effecting means operative for effecting movement of the fabric on one side only of the line for any single stitch-forming oscillation of the needle, and means for controlling the depth of penetration of the needle into the fabric in forming the stitch and for adjusting the relation between the depths of penetration of the needle in forming stitches on the two sides of the line.

10. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, an oscillating needle for stitching fabric so supported, a pair of bight-forming members for effecting displacement of fabric and needle towards each other for stitch-formation, means for moving the members so that one of them is supporting and moving the fabric into fabric-presenting position when the other is out of fabric-supporting and fabric-presenting position, and means for determining a differential between the extent of fabric-presenting movements of the members and for adjusting the members relatively to each other to vary the differential.

11. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, an oscillating needle for stitching fabric so supported, a pair of oscillatory bight-forming members for presenting the fabric to the needle, and a support for the members, the members and the support including eccentric means for adjusting the relation between the oscillations of the members for varying the relative penetration of the needle in fabric presented to the needle by the members.

12. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, an oscillating needle for stitching fabric so supported, a pair of oscillatory bight-forming members for presenting the fabric to the needle, and a support for the members, the members and the support including an eccentric bearing for one of the members, the bearing being adjustable to vary the relation between the oscillations of the members for varying the relative penetration of the needle in fabric presented to the needle by the members.

13. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, an oscillating needle for stitching fabric so supported, a pair of bight-forming members for presenting the fabric to the needle, a shaft, and means driven by the shaft for moving each of the members individually of the other into fabric-presenting position, the members-moving means comprising a single rock arm driven from the shaft, said members-moving means imparting movement to return the members from fabric-presenting position, the members being adjustable relatively to each other to vary their effective fabric-presenting positions.

14. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, an oscillating needle for stitching fabric so supported, a pair of bight-forming members for presenting the fabric to the needle, a support for the members, a shaft, and means driven by the shaft for rocking the members on the support to bring them individually into fabric-presenting position, the members-moving means including a single rock arm driven from the shaft, said members-moving means imparting movement to return the members from fabric-presenting position, the members and the support having means for adjusting the relative limits of movement of the rocked members for varying the effective penetration of the needle into fabric presented to the needle by the members.

15. A blind-stitch sewing machine having means for supporting a plurality of superimposed layers of fabric in position to be stitched together, the topmost layer being the shorter and presenting an edge along which a line of stitching is to be formed for securing the layers together, an oscillating needle for forming a line of stitching in the layers of fabric so retained, a guide for retaining the edge in position during stitching by the needle, and a pair of oscillatory bight-forming members for presenting the fabric to the nee-

dle on either side of the guide, the members being adjustable relatively to each other to vary the effective penetration of the needle into fabric presented to the needle by the members.

16. A blind-stitch sewing machine having means for supporting fabric in position for stitching operations, a needle for stitching fabric so supported, a pair of bight-forming members, means for moving the members relatively to each other to a limited extent to bring each member individually, and at one of its limits of movement, into engagement with the fabric for presenting the fabric for needle penetration, and means for differentially adjusting the fabric-engaging limits of movement of the members relatively to each other.

17. A blind-stitch sewing machine having means for holding fabric in position for stitching operations, a needle for stitching fabric so held, a support, a pair of bight-forming members pivotally mounted upon the support, means for oscillating the members on the support to a limited extent so that one member is moving, at one of its limits of movement, into engagement with the fabric for presenting the fabric for needle penetration while the other member is moving away from the fabric, and means for differentially adjusting the fabric-engaging limits of movement of the members relatively to each other.

18. A blind-stitch sewing machine having means for holding fabric in position for stitching operations, a needle for movement in a path to engage and form stitching in fabric so held, a support, a pair of bight-forming members pivotally mounted upon the support for movement towards and away from the stitching path of the needle, and means for moving the members relatively to each other on the support to a limited extent so that one member is moving, at one of its limits of movement, into engagement with the fabric for presenting the fabric for needle penetration while the other member is moving away from the fabric, each of the members having an individual fabric-engaging limit of movement, and means effective upon rotation of the support to vary differentially the fabric-engaging limits of movement of the members relatively to each other.

19. A blind-stitch sewing machine having means for holding fabric in position for stitching operations, a needle for movement in a path to engage and form stitching in fabric so held, a support, a pair of bight-forming members pivotally mounted upon the support for movement towards and away from the stitching path of the needle, and means for moving the members relatively to each other on the support to a limited extent so that one member is moving, at one of its limits of movement, into engagement with the fabric for presenting the fabric for needle penetration while the other member is moving away from the fabric, the moving means including a single rock shaft, and a pair of cranks extending oppositely from the shaft, each crank having operative relation to one of the members.

20. A blind-stitch sewing machine having means for holding fabric in position for stitching operations, a needle for movement in a path to engage and form stitching in fabric so held, a support, a pair of bight-forming members pivotally mounted upon the support for movement towards and away from the stitching path of the needle, means for moving the members relatively to each other on the support to a limited extent so that one member is moving, at one of its limits of movement, into engagement with the fabric for presenting the fabric for needle penetration while the other member is moving away from the fabric, the moving means including a single rock shaft, and a pair of cranks extending oppositely from the shaft, each crank having operative relation to one of the members, and means for rotating the support to vary differentially the fabric-engaging limits of movement of the members relatively to each other.

21. In a blind stitch machine having means for supporting fabric in position for stitching operations, and means for forming stitches, the combination with the fabric-supporting means and the stitch-forming means of means for presenting the supported fabric to the stitch-forming means including a plurality of elements positioned in side-by-side relationship, and means for presenting the elements one at a time to the fabric and the stitch-forming means so that each element wholly by itself and without assistance from the other of the elements is in fabric-presenting association with the fabric and the stitch-forming means.

22. In a blind stitch machine having means for supporting fabric in position for stitching operations, and means for forming stitches, the combination with the fabric-supporting means and the stitch-forming means of means for presenting the supported fabric to the stitch-forming means including a plurality of elements, means for presenting the elements to the fabric and the stitch-forming means so that but one of the elements and without assistance from the other of the elements is in fabric-presenting association with the fabric and the stitch-forming means at any operation stage, and means for adjusting the elements to vary the effective fabric-presenting association of the element with the fabric and the stitch-forming means.

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