

July 8, 1941.

K. SCHEIBEL

2,248,439

BLIND STITCHING AND PIQUE MACHINE

Filed July 26, 1937

2 Sheets-Sheet 1

Fig. 1

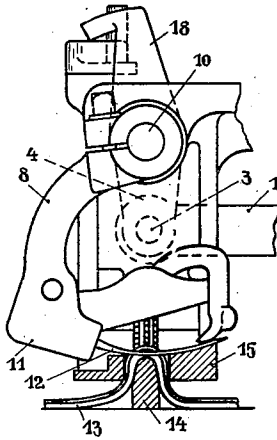


Fig. 2

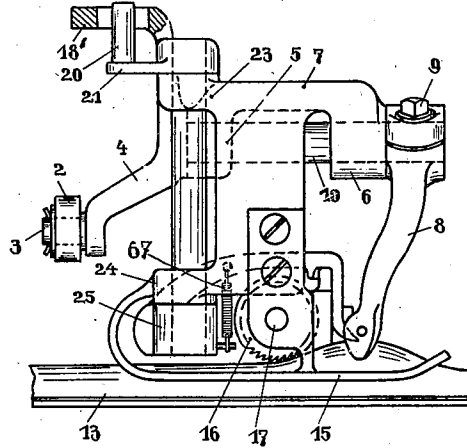


Fig. 3

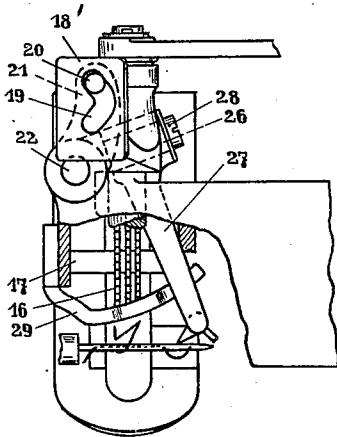
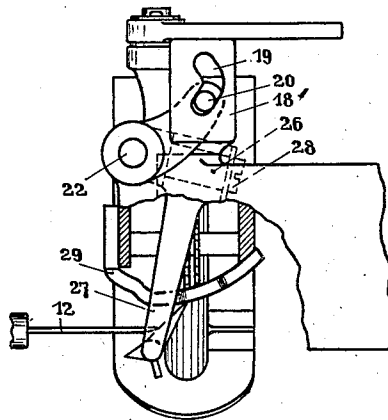


Fig. 4



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2 Sheets-Sheet 2

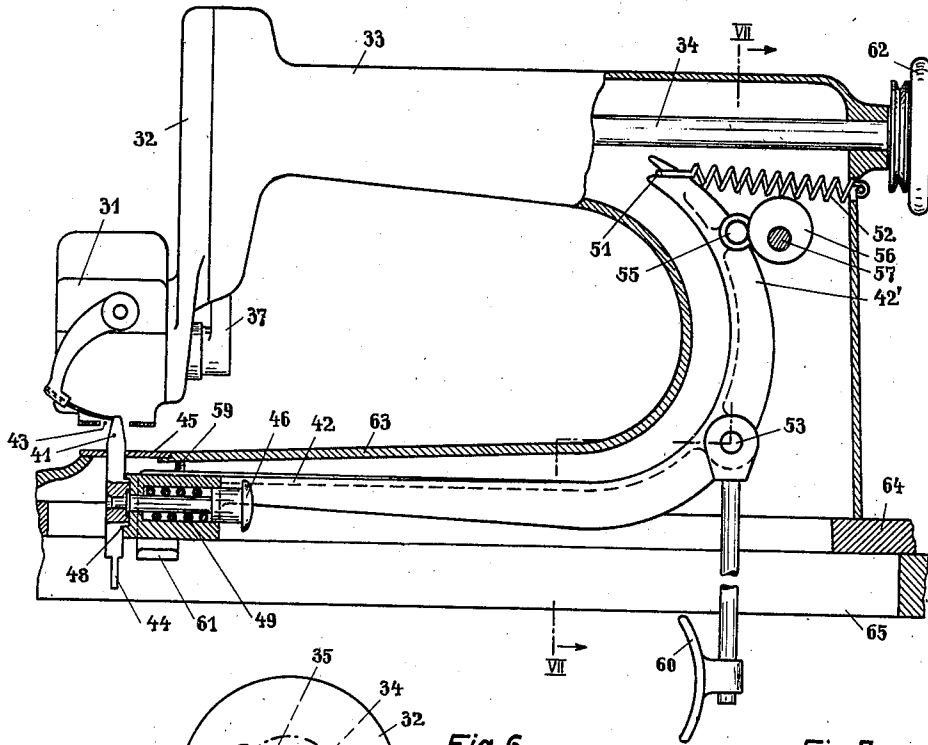


Fig. 6

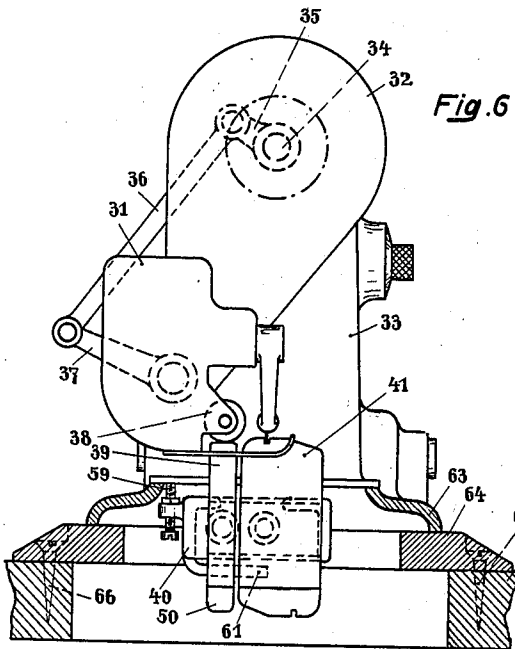
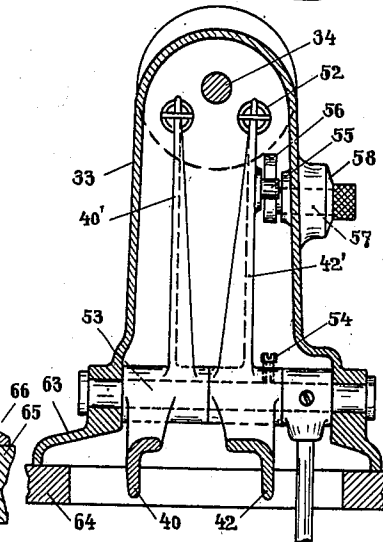


Fig. 7



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# UNITED STATES PATENT OFFICE

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## BLIND STITCHING AND PIQUÉ MACHINE

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In Germany February 2, 1934

14 Claims. (Cl. 112—176)

There are existing blind stitching and piqué machines which operate by means of an oscillating looper to pick up the thread loop presented by a curved needle for the purpose of forming a chain or blind stitch seam. In the machine shown in German Patent 565,933, for example, the back and forth motion of the looper takes place along the same path. In these machines the looper moves through an arc of 180° so that the path traveled by the looper is consequently a half circle which intersects the path of the needle at a right angle. There are also machines in which the looper does not travel back over the same path but describes an approximately rectangular movement during the stitching process. To obtain this movement of the looper a complicated mechanism is required. Even machines in which the looper moves through an arc of 180° have a looper actuating mechanism which is relatively complicated. Also, to provide a looper adapted to move through an arc amounting to half a rotation requires a complicated arrangement of parts which cannot be used in small machines owing to the difficulties of construction.

One of the objects of the present invention is to improve and modify this type of machine. To this end the looper according to the present invention is tilted to the line of feed at an angle of about 30° so that the path of motion of the looper is almost a straight line and intersects the path of the needle at an acute angle. The thread loop is consequently positively engaged and positively presented to the penetrating needle. This affords a much simpler drive than that employed in hitherto known machines in which a separate driving mechanism is used for the motions of the needle and the looper, while in the present instance a single mechanism is sufficient to perform the stitching operation. Owing to the short paths of travel of the looper, it is possible to drive it directly by means of a cam mounted on the oscillatory needle lever. By means of the cam it is possible to impart to the looper the desired motions required in forming the stitch and in picking up the loop. While other machines have a rotary drive, a plunger or rocker driving member can be used in the present device for driving the looper. The device is therefore much simplified, while the seam is equally as good as that made on special blind stitching machines.

The quality of the seam to be made does not depend solely on the construction of the stitching elements, but also on their proper cooperation with the fabric folder. In existing types of blind stitching devices that are adapted to be installed on the fabric presser foot of an existing sewing machine, the device is adapted to be raised by lifting the presser foot so as to per-

mit the fabric to be moved over the stationary outer support for the counter bearing as well as over the stationary fabric folder. This arrangement however presents the disadvantage that the blind stitching of various thicknesses of fabric is rendered difficult because the rigid outer support for the counter bearing cannot give or yield in a downward direction to adapt itself to the thickness of the fabric. Therefore, a further object of the present invention is the provision of a novel supporting means for the fabric bender and the counter bearing. The fabric bender and the counter bearing extend through openings in the hollow cloth supporting plate and are disposed so as to be tiltable downwardly. The hollow cloth table is preferably constructed as an integral part of the machine frame within which the supports for the cloth bender and the counter bearing are pivotally mounted. By constructing the machine with the cloth plate as an integral part of the frame to which the blind stitching device is attached a sturdy and rigid unit is obtained. Since only the relatively small outer supports for the counter bearing and the fabric bender are tilted downwardly when the fabric is inserted this only necessitates the moving of parts of slight weight so that the construction is accordingly simplified yet completely fulfills all requirements.

Owing to the fact that the outer support for the counter bearing can be moved upward independently of the fabric bender, a great variety of different thicknesses of fabric can be provided with blind stitch seams with great accuracy. The arrangement of a common pivotal support for the counter bearing and fabric bending supporting levers also provides a very simple construction because the shaft serves at the same time as a support for the knee operated lever for moving the counter bearing and fabric bending levers. This construction dispenses with the necessity of providing shiftable guides or the like in which the awkward changing over to a narrow or thin fabric bender also affects the outer support for the counter bearing. Both the counter bearing and the fabric bender when tilted downward away from the presser foot are adapted to be rotated and locked in the desired position.

One embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a view in front elevation of the blind stitching mechanism.

Fig. 2 is a side view thereof.

Fig. 3 is a top plan view showing the looper in front of the point where the loop is seized.

Fig. 4 is a top plan view showing the position of the looper at the point where the loop is delivered.

Fig. 5 is a front elevation, partly in section, of a modification showing the fabric bending device.

Fig. 6 is a side view of the modification shown in Fig. 5.

Fig. 7 shows a section taken on the line VII—VII of the modification of Fig. 5.

The stitching mechanism is operated by a reciprocating link connection 1 reciprocated by any desired means having the end 2 thereof pivotally mounted on the pin 3 carried by the lever 4. The lever is provided with an integral shaft 10 extending through and journaled in the bearings 5 and 6 forming part of the supporting frame 7 and carries the needle lever 8 which is firmly secured to the shaft 10 by means of the screw 9. Owing to the reciprocating motion of the operating link 1 an oscillating motion is imparted to the arm 8. The arm has formed on the free end thereof a head 11 to which is secured the curved needle 12 which stitches through the fabric 13 that is fed over the fabric bender 14. The fabric is held on the sides and in contact with the stationary bender by the presser foot 15 of the device. A feed wheel 16 secured to a shaft 17 is disposed to the rear of the fabric bender and is set in intermittent rotation by means of a driving mechanism (not shown) to move the fabric 13 in the direction of sewing. The operating arm 4 has an integral extension forming an arm 18 provided with an integral laterally extending portion 18' having a cam slot opening 19 therein. The sides of the cam slot engage a pin 20 secured to the outer end of an arm 21 carried by the shaft 22. The shaft is journaled in the laterally extending portions of the frame forming bearings 23 and 24 and carries at its lower end an arm 25 formed as a laterally extending trunnion 26. The looper arm 27 is pivotally mounted on the trunnion and retained thereon by the screw 28. The outer end of the looper arm engages an arcuate cam plate 29 which has a cam edge having a raised portion formed thereon to impart an upward motion to the looper. In order to maintain the looper arm in engagement with the cam a spiral spring connected to the arm is preferably provided to urge the arm downwardly in order to prevent any possibility of the looper leaping off the cam edge during speedy operation. The location of the shaft 22 at one side of the line of feed permits the motion of the looper to be in approximately a straight line intersecting the path of the needle at an acute angle so that the loop will be delivered by the looper in advance of the needle.

After the curved needle 12 has reached the position shown in Fig. 1, a thread loop is formed in the well known manner when needle lever 8 retreats. This thread loop is engaged (Fig. 3) by the point of the looper and is lifted by the looper 27 to the left over the ridge of fabric formed by the bender 14, whereupon the needle is projected through the thread loop presented to it, and which, through the advance of the feed wheel 16, assumes a slanting position as shown in Fig. 4. On penetration of the thread loop by the needle, there is produced the well known chain stitch seam, also known as a blind stitch seam when the needle only half penetrates the fabric so that no formation of a seam is to be seen on the bottom of the fabric. According to the present invention this is accomplished in a very simple manner by the looper 27 with a single motion lifting the thread loop over the ridge of fabric to the left, due to the simultaneous swinging motion of the looper arm and the upward motion imparted by the raised portion of the cam. This arrangement produces a particu-

larly simple looper motion which forms the basis for a simple and inexpensive device. Because the looper 27 and the needle 12 return together on lifting of the thread loop, it is essential that the thread loop be completely lifted by the looper before the needle has reached its extreme left position. If this were not the case, the thread loop would offer a relatively great resistance to the motion of the looper. According to the present invention, a minimum resistance to the motion of the looper is obtained by giving the looper 27 a corresponding acceleration when it enters the thread loop and during its motion which is determined by the shape of the cam slot formed in the upwardly extending arm 18.

The purpose of the cam shaped guide member 29 is to impart an upward motion to the point of the looper so that the latter is raised over the ridge of fabric. However the looper shaft 22 can be arranged in such a slanting position that the looper is raised over the ridge of fabric through its natural slanting position.

In the construction illustrated in Figures 5, 6 and 7 the stitch forming mechanism 31 is essentially the same as that disclosed in Figures 1 to 4 inclusive with the single exception that the drive mechanism therefore is slightly differently constructed.

The stitch forming mechanism 31 is secured to a supporting plate 32 on the outer end of arm 33 of the machine frame and is driven by the main shaft 34 having secured thereto an arm 35 pivotally connected to link 36 for oscillating the arm 37 of the stitch forming mechanism. The housing 31 supports the stitch forming means and the feed wheel 38 for moving the fabric forward in the direction of sewing. A counter bearing 39 is pivotally secured to the lever 40 and cooperates with the feed wheel 38 to yieldably press the fabric against the feed roller. The fabric bender 41 is not arranged to swing into the fabric as is customary in blind stitching machines, but is secured to a second lever 42. With customary blind stitching devices having a uniform size passage 43 for the ridged fabric, the fabric bender has to be exchangeable according to whether the fabric being worked on is thick or thin. To provide for different thickness of material, the fabric bender shown in Fig. 5 is provided with a relatively thick upper end for medium and thin fabrics and a relatively thin lower end 44 for very thick overcoat materials and the like. For this purpose it has hitherto been necessary to change the entire fabric bender with its fabric bender plate and the corresponding outer support for the counter bearing, whereas in the present instance the fabric bender is merely required to be turned to present either end of the fabric bender. This is effected by moving the fabric bender 41 downwardly under the plate 45 by tilting the supporting lever 42. The supporting lever is provided at its outer end with a spring actuated plunger having a knob 46 for selectively turning the fabric bender to present the desired end of the latter to the stitch forming device. The knob 46 is pressed inwardly against the pressure of the spring 49 to move the fabric bender 41 out of the retaining groove 48 so that it may be given a half turn and retained in locked position by the spring 49.

A similar construction, not shown, is provided for the counter bearing's outer support, so that the lower end 50 of the counter bearing 39 may be brought into working position. While it had formerly been necessary to change whole sets

of plates in an awkward manner, the present invention provides a novel and improved means to adapt the device to operate on fabrics of different thickness.

The lever 42 is designed as a double arm lever on the short arm 42' of which the eye 51 of a strong tension spring 52 engages, the other end of the spring being secured to the frame 33. The tension spring draws the outer end of the lever 42 upwardly on the fabric bender side, the lever being secured to the shaft 53 by means of a screw 54, whereupon the fabric bender 41 is in position within the passage 43 to ridge the fabric for the formation of the stitch in the well known manner.

However the fabric bender is adjustable in height depending on the thickness of the fabric and the depth of the stitch, and accordingly the short arm 42' has secured thereto a pin 55 in contact with the edge of the cam or eccentric disc 56 secured to the shaft 57. The eccentric disc 56 is rotatably adjustable and is provided with a scale or graduated dial 58 so that the fabric bender may be adjusted vertically by turning the dial. With this arrangement a simple but very accurate adjustment of the fabric bender may be obtained.

The lever 40 which carries the outer support of the counter bearing 39 is likewise provided with a shorter lever arm 40' to which a tension spring is attached in the same manner as with lever 42'. The corresponding tension spring retains the end of the lever 40 and the counter bearing's outer support in vertical position, the stop pin 59 secured to the lever arm being in contact with the fabric support in its normal position. This stop may be made adjustable if desired, so that the vertical position of the counter bearing may be varied. The lever 40 is loosely mounted on the same shaft 53 and when the fabric bender is moved downwardly the counter bearing is taken along with it by the downward movement of the lever 42 by the operator moving the knee lever 60. This is effected by the movement of the knee lever 60 and the lever 42 both of which are rigidly secured to the shaft 53, and the movement of the lever downwardly against the stop 61 of the lever 40 simultaneously tilts the latter downward. This results in the lever 40 which is loosely positioned on the axle 53 being taken along together with the counter bearing 39, when the knee lever is moved.

The space between the plate 45 and the blind stitching appliance 31 is free for the reception of the fabric so that the latter can be fed under the stitch forming mechanism. This new blind stitching machine can be very easily substituted for the stitching mechanism of another sewing machine, the drive wheel 62 being adapted to be rotated by the existing treadle. As before mentioned, the rotary motion of the drive wheel is converted by the linkage connection 35, 36, 37 into an oscillatory motion of the drive shaft of the blind stitching mechanism 31. In substituting this blind stitching mechanism for another, it is necessary in some instances to cover the different size openings in the table plate and to arrange the blind stitching machine in proper relation with the drive belts passing through the table plate. In this case the blind stitching machine must be shifted on the table plate and at the same time be adapted to cover the different size openings in the table plate. This is however effected in a very simple manner by

having the fabric supporting base 63 of the frame 33 attached to an intermediate plate 64 which in turn is adapted to be secured by screws or other fastenings 66 to the table plate 65 of the sewing machine. In this case the intermediate plate should be of sufficient size to cover the maximum opening in the table plate of a sewing machine. This form of construction makes it possible for a tailor or other user to obtain an inexpensive and efficient machine which is within his means.

It is obvious that once the broad features of my invention are disclosed, numerous modifications and adaptations will readily occur to those skilled in the art, all falling within the ambit of my disclosure. Accordingly I intend that my invention be limited only by the scope of the appended claims, wherein I claim:

1. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, the combination of an arm pivotally supported above the presser foot, an oscillating needle mounted on said arm, the path of oscillation of said needle being transverse to the line of feed, a fabric bender extending through an opening in the presser foot, an oscillating looper operating above the presser foot and cooperating with said needle, means for oscillating said looper in a plane intersecting the path of the needle at an acute angle, a cam guide for imparting an upward movement to said looper to raise the latter over the fabric bender, and operating connections between said needle supporting arm and said looper to vibrate the latter in timed relation to the movements of the needle supporting arm.

2. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, the combination of an arm pivotally supported above the presser foot, an oscillating needle mounted on said arm, the path of oscillation of said needle being transverse to the line of feed, a fabric bender extending through an opening in the presser foot, an oscillating looper operating above the presser foot and cooperating with said needle, a universal joint support for said looper, a cam guide for imparting an upward movement to said looper to raise the latter over the fabric bender, and oscillating cam and follower connections between said needle supporting arm and said looper to vibrate the latter in timed relation to the movements of the needle supporting arm.

3. In a blind stitch sewing machine having a frame, a work support, a presser foot and work feeding means, the combination of a horizontally disposed shaft journaled in the frame above the presser foot, an oscillating arm secured to said shaft, a needle mounted on said arm, the path of oscillation of said needle being transverse to the line of feed, a fabric bender extending through an opening in the presser foot, an oscillating looper arm operating above the presser foot and cooperating with said needle, a vertically disposed shaft journaled in the frame, a horizontally disposed trunnion secured to said vertical shaft for pivotally supporting said looper arm, a stationary cam guide secured to the frame for imparting an upward movement to said looper to raise the latter over the fabric bender, an arm supported on said horizontal shaft and having a cam slot formed in the end thereof, an oppositely disposed arm carried by the shaft, a reciprocating drive link connected to said oppositely disposed arm, an arm secured to the vertical

shaft and having a follower pin secured to the end of said arm and in engagement with the edges of said cam, said cam and follower pin forming an operating connection between said needle and looper to vibrate the latter in timed relation to the movements of the needle.

4. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, a counter bearing for said work feeding means and a fabric bender projecting through an opening in said presser foot, and independently adjustable means to vary the height of said counter bearing and fabric bender in relation to said presser foot.

5. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, a pivotally mounted counter bearing for said work feeding means and a pivotally mounted fabric bender projecting through an opening in said presser foot, independently adjustable supports for each of said pivotally mounted members, each of said supports comprising a pivotally mounted arm and independent adjusting means for said arms to vary the height of said counter bearing and fabric bender in relation to said presser foot.

6. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, a counter bearing for said work feeding means and a fabric bender projecting through an opening in said presser foot, independent supports for said counter bearing and fabric bender, springs yieldably urging said supports upwardly toward the presser foot, and adjustable stops for limiting the upward movement of each of said supports.

7. In a blind stitch sewing machine having a work support, a presser foot and work feeding means, a counter bearing for said work feeding means and a fabric bender projecting through an opening in said presser foot, independent pivotally mounted supports for said counter bearing and fabric bender, springs connected to said supports for yieldably urging said supports upward independently toward the presser foot, adjustable stops for limiting the upward movement of each of said supports, and a stop on one of said supports engageable by the other support on the downward movement of the latter to simultaneously withdraw said supports away from said presser foot.

8. In a blind stitch sewing machine having a frame, a work support, a presser foot and work feeding means, a counter bearing for said work feeding means and a fabric bender projecting through an opening in said presser foot, a shaft journaled in said frame, independent supports for said counter bearing and fabric bender pivotally mounted on said shaft, springs connected to said supports for yieldably urging said supports upwardly toward the presser foot, means for securing one of said supports on the shaft, a stop on the other support engageable by the former support on the downward movement of the latter to yieldingly withdraw said supports away from said presser foot, a manually operated lever secured to said shaft and adjustable stops for limiting the upward movement of each of said supports.

9. In a blind stitch sewing machine having a frame, a presser foot and work feeding means, a pair of spaced parallel shafts journaled in independently adjustable supporting arms, a counter bearing for said work feeding means secured to one of said shafts and a fabric bender secured

to the other of said shafts, and projecting through an opening in said presser foot, a shaft journaled in said frame and carrying said supporting arms, springs connected to the latter for yieldably urging said arms upward independently toward the presser foot, a stop for limiting the upward movement of the counter bearing supporting arm, and a cam shaped member rotatably mounted on the frame for adjusting the height of the fabric bender supporting arm.

10. In a sewing machine attachment the combination of a needle, an arm to which said needle is attached, a shaft to which said arm is attached, a lever fixed to said shaft, means for oscillating said lever and thereby oscillating said shaft and needle, a looper cooperating with said needle, a second shaft oscillated by said first mentioned shaft, a trunnion on said second shaft and said looper being pivotally mounted on said trunnion.

11. In a blind stitch sewing machine having a work support, a presser foot, work feeding means, a counter bearing for said work feeding means, a fabric bender, said presser foot having an opening therein through which said counter bearing and said fabric bender may project, independently adjustable supports for said counter bearing and said fabric bender, independent pivotally mounted levers on which said counter bearing and fabric bender are mounted and locking means cooperating with each of said supports to adjust the position of said counter bearing or fabric bender with respect to the opening in said presser foot.

12. In a blind stitch sewing machine having a work support, a presser foot, work feeding means, a counter bearing for said work feeding means, a fabric bender, said presser foot having an opening therein through which said counter bearing and said fabric bender may project, a pair of spaced parallel shafts upon which said counter bearing and fabric bender are mounted, supports for said shafts, independent means for rotating each of said shafts and latching means on said supports for locking said shafts in the position to which they have been rotated.

13. In a blind stitch sewing machine having a work support, a presser foot, work feeding means, a counter bearing for said work feeding means, a fabric bender, said presser foot having an opening therein through which said counter bearing and said fabric bender may project, said fabric bender and counter bearing having portions of different width, means for adjusting said fabric bender and counter bearing so as to bring the portions thereof having the desired width opposite the opening in said presser foot and means for locking said fabric bender and counter bearing in such adjusted position.

14. In a blind stitch sewing machine having a work support, a presser foot, work feeding means, a counter bearing for said work feeding means, a fabric bender, said presser foot having an opening therein through which said counter bearing and said fabric bender may project, said fabric bender and counter bearing having portions of different width to accommodate cloths of different thicknesses, parallel rotatable shafts carrying said fabric bender and counter bearing, supports for said shafts and latching means cooperating with said supports and shafts for locking said shafts in desired position so as to bring the desired width of said fabric bender and counter bearing opposite the opening in said presser foot.

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