

April 14, 1959

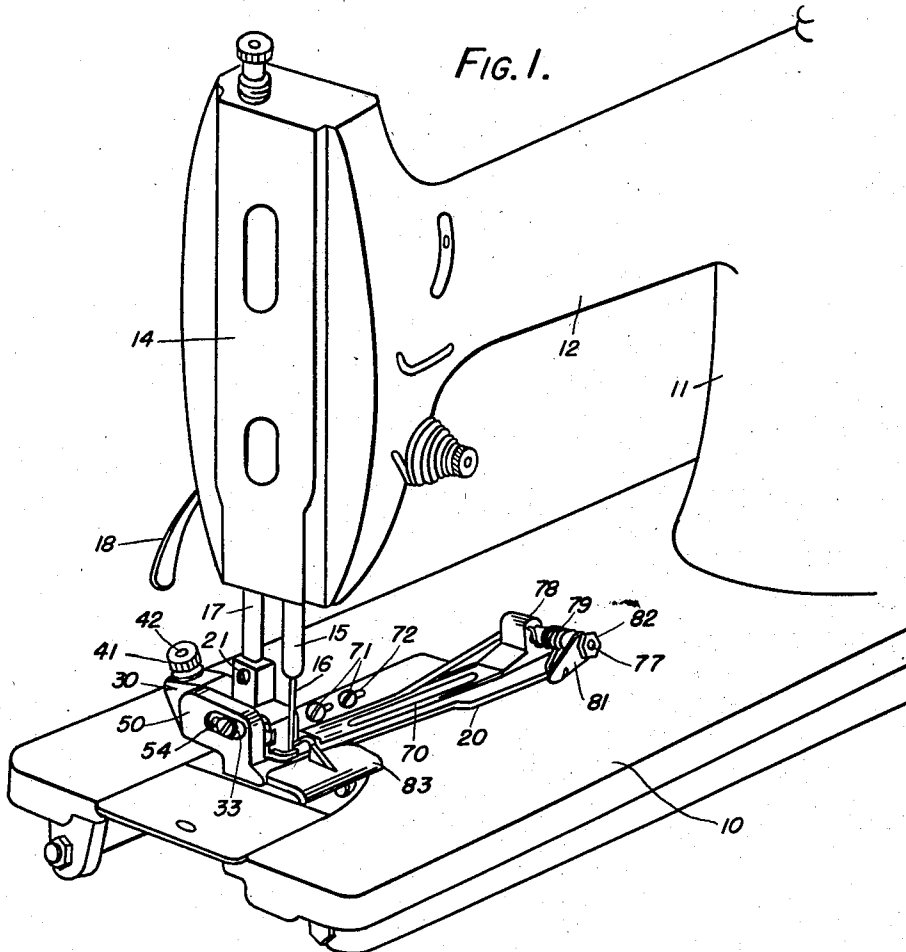
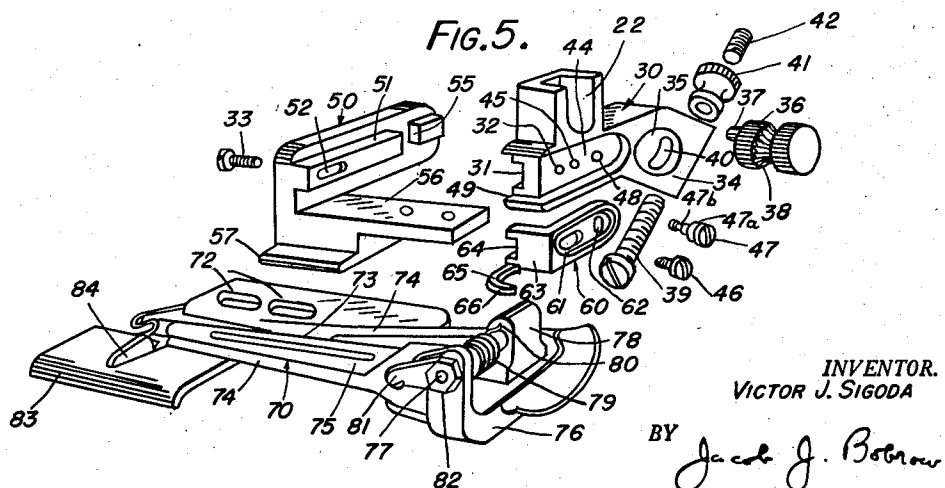
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2,881,725

SEWING MACHINE ATTACHMENT

Original Filed June 15, 1950

3 Sheets-Sheet 1



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SEWING MACHINE ATTACHMENT

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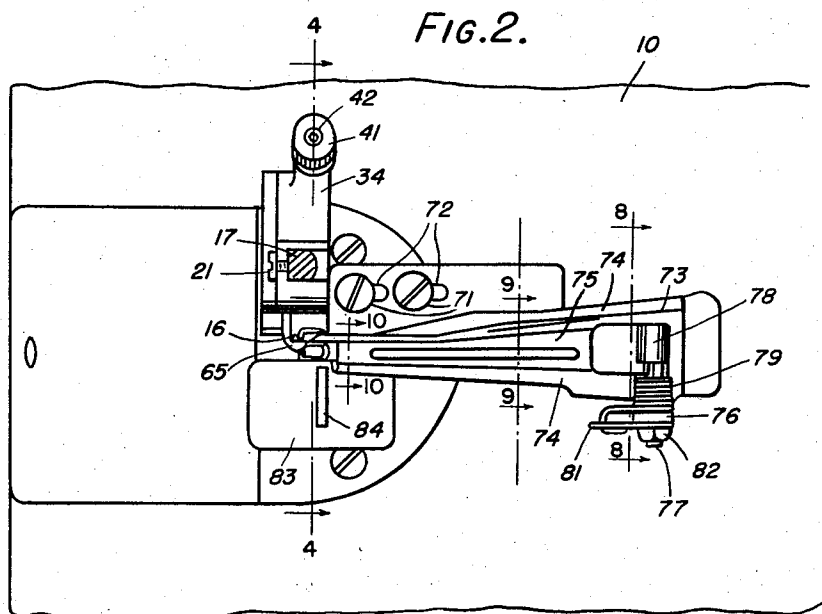


FIG. 6.



FIG. 3.

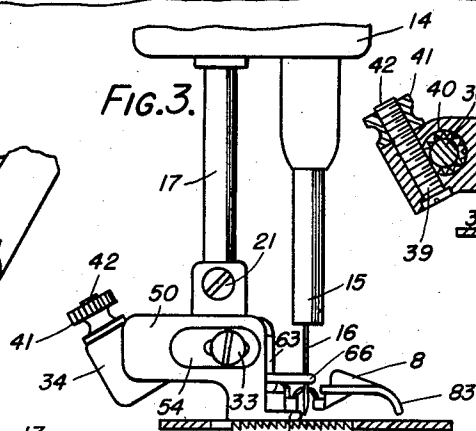


FIG. 4.

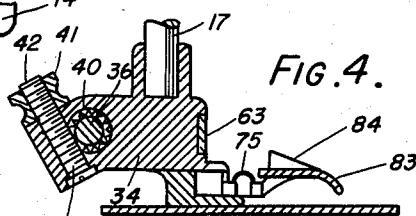
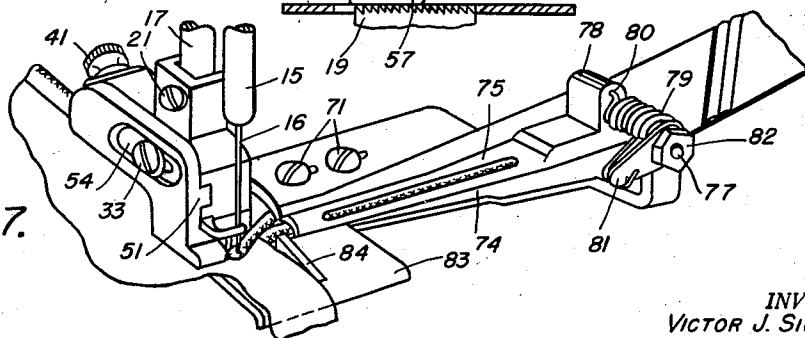


FIG. 7.



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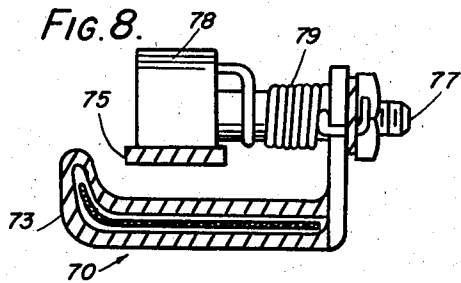
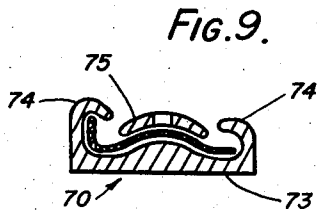
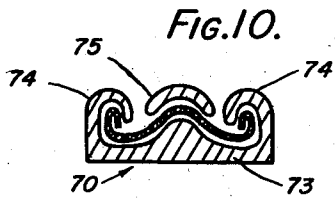
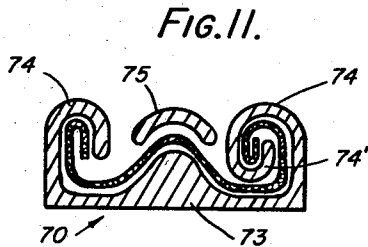
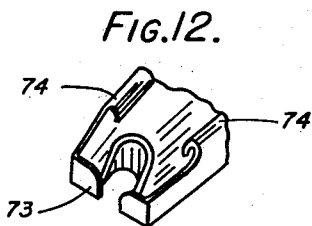
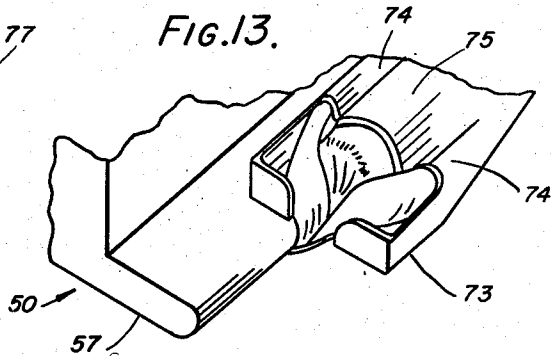
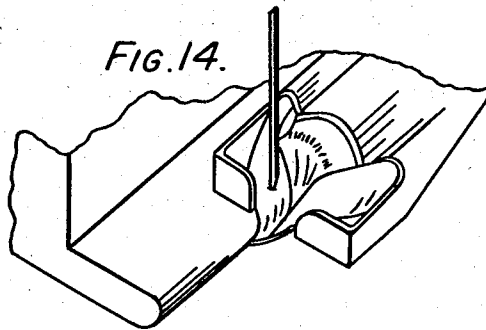
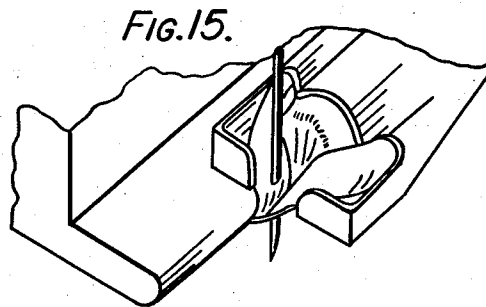
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SEWING MACHINE ATTACHMENT

Original Filed June 15, 1950

3 Sheets-Sheet 3



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SEWING MACHINE ATTACHMENT

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Continuation of application Serial No. 168,355, June 15, 1950. This application August 12, 1953, Serial No. 373,850

5 Claims. (Cl. 112—140)

This invention relates to attachments for sewing machines for applying a folded strip of material, commonly known as piping, either to the raw edge of dress materials to form a piped binding or upon the surface of such materials for ornamental purposes. More particularly, it relates to that class of such attachments where the stitching is concealed within the folds of the piping so that it is not visible on the normally viewed outer surface.

This manufacture is done in one operation by utilizing a folder which bends the respective edges of the strip into reverse folds and then into U form. If desired, while in this U form, an additional layer of material such as the raw edge of the bottom of a skirt may be inserted between the folded over edges, and then stitched together. By feeding the folded over strip to the needle so that it may only nip the underlayer of the top fold without penetrating it completely, and then directing the needle through the remaining plies, it is possible to obtain an effect whereby the stitching does not show through on the outer surface. Apparatus whereby this may be accomplished has been shown in the patent to Seaman and Braf, 1,756,036 of April 29, 1930. In that form, the needle comes into contact with a rounded shoe over which the folded plies are bent. There has been disclosed in Patent No. 2,527,582, issued October 31, 1950, of Sigoda, means whereby this may be accomplished without causing the needle to come into contact with the shoe.

This is effected by mounting the needle in a supplementary holder whereby by means of a cam the path described by the needle is such that the needle inclines slightly rearwardly during a portion of its downward reciprocation until it pierces the back of the surface layer and thereafter, the needle is returned to its normal vertical position for the balance of its travel to the needle hole, thus avoiding the shoe.

It can therefore be seen that the position of the point of the needle is of great importance in such manufacture, particularly when it is realized that the materials used commonly are between .005 and .010 of an inch in thickness, and that it is necessary for the purpose above described to split this very small thickness with the point of the needle so that the needle thread is secured within the fibres of the material sufficiently to hold the top ply to the lower plies, but without appearing on the top surface.

When attachments as described above are used with machines running at comparatively slow speeds, satisfactory results are obtained. However, when the speed of operation is increased, as has become increasingly necessary in these days of high speed production, considerable difficulties are encountered. Stitches are missed and the top ply is therefore loose from the lower plies, or the stitching shows through the top surface and the blind-stitch effect is marred. Vibration set up in the needle as a result of the high speed causes the needle point to move in an erratic pattern so that sometimes the needle does not penetrate the top ply and sometimes the needle passes through it so far that it may hit the point of the shoe and be broken.

It is therefore a primary object of the invention to provide means in such an attachment whereby the troubles encountered may be eliminated, so that reliable operation at increased speeds of production is possible without needle and thread breakage and without defectively produced finished work.

There has therefore been provided a means whereby the positioning of the nose of the foot with respect to the needle may be accurately set with considerable precision which is necessary when the adjustment is highly critical.

In conjunction with this, a novel means has been provided to minimize the erratic action of the needle. This is occasioned by a variety of causes, which either singly or in combination, cause the needle to depart from the desired, fixed path during its vertical reciprocation. One factor is that some clearance must be provided in the bushings in which the needle bar reciprocates, and this clearance combined with the normal manufacturing tolerances results in some play. More play is occasioned by wear of the bushings and the needle bar. This play permits the needle bar itself to vibrate laterally in an erratic pattern during reciprocation, which is dependent upon the speed of operation, the presence or absence of lubricant or lint, etc.

Another factor stems from the fact that the needle is actually a wire of a relatively small cross section but of relatively long length. It is accordingly quite limber, and can be easily deflected. Long study reveals that in piercing the material the needle suffers some deflection and that this varies with weave, finish and thickness, particularly where fillers such as starch or metallic binders are added to give the material "body" or weight.

Still another contributing cause is the fact that the needle is actually a vibrating reed, being held at one end, with the other end, the point, being free to oscillate under the proper stimulus. Under the conditions existing during reciprocation, the needle may be set into vibration, particularly when the resonant frequency is reached. The amplitude of the oscillation will vary depending upon how close to the resonant point the needle is brought. Accordingly, it has been an important object of this invention to provide a means of counteracting the deflection of the needle from its ideal path during reciprocation, and to thus afford sure operation.

This is a continuation of pending application Serial No. 168,355, filed June 15, 1950, now abandoned.

Other objects will appear from the following detailed description of the attachment taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a view in perspective showing the attachment as it would be applied to a standard sewing machine;

Fig. 2 is a plan view corresponding thereto;

Fig. 3 is a view taken in elevation from one end of the machine;

Fig. 4 is a view taken in cross-section on line 4—4 of Fig. 2.

Fig. 5 is an exploded view taken in perspective, the parts being disassembled in their relative positions;

Fig. 6 is a detail view taken partly in cross-section showing the piping as it would be folded over and attached to a separate layer of material such as the bottom edge of a skirt and how the piped edge is held together by the blind-stitching produced by the device;

Fig. 7 is a view in perspective showing the strip as it emerges from the folder to be stitched to a separate inserted ply of material similar to Fig. 6;

Figs. 8, 9 and 10 are cross-sectional, detail views taken respectively on lines 8—8, 9—9 and 10—10 of Fig. 2, to show how the strip is folded longitudinally as it proceeds through channelled guide 73 on its way to the blind stitching operation;

Fig. 11 is a cross-sectional detail corresponding to Fig.

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10, but showing a variation of channeled guide 73, having an additional fold bend 74' whereby the five-ply member shown in Fig. 6 may be folded;

Fig. 12 is an enlarged, fragmentary, perspective view of the throat end of channeled guide 73;

Fig. 13 is an enlarged, fragmentary, perspective view showing how the folded strip emerges from the throat end of channeled guide 73 and is disposed substantially vertically as it passes around the edge 57 and under the adjustable nosepiece 50;

Fig. 14 is a detail view showing the manner in which blindstitching is produced by the device, the needle being shown as it is about to penetrate the inner fabric ply, and

Fig. 15 is a similar view showing the needle after penetration of the fabric plies.

The parts of the standard sewing machine shown are the bed 10, the upright 11, the arm 12, the head 14 carrying the usual needle bar 15 and needle 16, the presser foot bar 17, and the usual hand lifter 18, and the feed dog 19.

The complete attachment 20 is attached to the presser foot bar 17 by the usual screw 21, a recessed portion 22, similar to that of the usual foot being provided for this purpose.

The attachment consists of a main body portion 30 on which the other parts of the attachment are mounted in operating relationship, these main parts being the shoe portion 50, the counterdeflector portion 60, and the folder and guide 70.

Body portion 30 is provided on one side with slot 31 extending longitudinally along the line of stitching, in which a mating projection 51 of shoe portion 50 may be received, so that the latter may be supported in fixed vertical position, but may be moved horizontally as required to or from the needle 16. A threaded hole 32 in body member 30 retains a locking screw 33, the head of which is received within counterbored recess 54 of shoe portion 50, passing through slot 52.

A portion 34 of body member 30 is provided with a bore 35 to receive an eccentric member 36, carrying an off center stud 37, which, when the attachment is assembled, fits into slot 55 of shoe member 50. Member 36 is provided with a peripheral groove having lengthwise serrations which mate with the thread of a screw 39. Bore 40 is provided in portion 34 to receive screw 39, the lower portion being counterbored so that the head of the screw 39 may be mounted therewithin. A knurled nut 41 is assembled with screw 39 and held in fixed position thereon by means of set screw 42 which when threaded into the top of nut 41, comes into locking contact with the end of screw 39.

It can be seen that when assembled, screw 39 may be turned (by manipulation of nut 41) to act as a worm to rotate eccentric member 36 in bore 35, causing eccentric stud 37 to describe a path in slot 55 of shoe member 50 which will cause the latter to move toward and from the needle 16, as desired.

On the side opposite slot 31, member 30 is provided with slotted recess 44 to receive counter-deflector 60, a threaded hole 45 being provided to receive a locking screw 46, the head of which is received within counter-bored recess 61 in counter-deflector 60. The position of counter-deflector 60 in slot 44 is varied by rotation of an eccentric screw 47 which has an eccentric shoulder 47a which fits within elongated bore 62. Screw 47 is retained in opening 48 in member 30 by any suitable means, as by a locking screw (not shown) threaded into 30 which engages peripheral groove 47b on the shank of screw 47.

The front face of member 30 is relieved at 49 so that arm 63 of counter-deflector 60 may be received therein for flush mounting. Arm 63 is slotted at 64 to permit projection 51 to pass therethrough without interference, and is also provided with an offset hook 65, 66. Portion 66 is maintained in contact with the surface of the needle

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by manipulation of screw 47 as required, the adjusted position of counter-deflector 60 then being locked by means of screw 46.

Folder 70 is mounted on projecting arm 56 of shoe portion 50 by screws 71 which fit in the usual slots 72 which permit optimum positioning of the folder with respect to the needle action.

Referring to Figs. 8 to 13, channelled guide portion 73 is provided with suitable fold bends 74 to cause the strip edges to fold over longitudinally as the strip is drawn through the bends toward needle 16 for the subsequent blind stitching operation. As shown in Figs. 8 to 10, bends 74 produce a folded strip having four fabric plies. As shown in Fig. 11 where one of the bends has an additional fold 74', a folded over strip having five plies, as illustrated in Fig. 6, will be produced. The additional ply increases the bulk of the finished tubing or piping and gives it a filled appearance without the use of an additional filler cord. Folders to produce such folded over strips are well known in the art, and are no part of the invention described herein.

Normally the channelled guide portion 73 is provided with a top wall spaced from the lower wall just sufficiently to allow a single ply of material of average thickness to pass through. In this improvement this now consists of a tongue 75 which is pivotally and resiliently mounted at one end and arranged so that it normally tends to close down on the strip as it passes through the channel. The pivotal mounting however, permits tongue 75 to be raised just enough to allow multiple plies to pass through whenever a seam appears.

An L-shaped bracket 76 attached to the bottom of the channel 73 supports a shaft 77 on which an L-shaped bracket 78 is freely mounted. Tongue 75 is attached to bracket 78. A torsion spring 79 surrounding shaft 77, connects with bracket 78, one end being received in a hole 80 thereof, and the other end being held by a lug 81 which is mounted on shaft 77, and held in any desired adjusted position thereon by means of a locknut 82. This permits adjustment of the tension exerted by tongue 75 on the strip as it passes.

A platform 83 is attached to channel 73 in position so that it can act as a support over which a piece of material to the edge of which the folded strip is to be applied as a binding, may be fed. An upright guide 84 is provided to line up the edge of the piece of material for this purpose.

In operation, handnut 41 is manipulated so that for the particular material being employed, shoe member 50 is positioned so that needle 16 just clears the rounded edge 57 thereof. The fine micrometric adjustment provided permits this to be done with precision, which is necessary in high speed operation. Eccentric 47 is rotated until the hook 66 of deflector 60 just comes into contact with the surface of the needle during its reciprocation. The machine and attachment after the usual sewing adjustments, are then ready for high speed operation.

The method of producing blind stitching with this attachment is substantially similar to that utilized in the device shown in the Seaman et al. patent previously referred to. The throat end of channelled portion 73 is shown in Fig. 12, and in Fig. 13, the folded over strip is shown just as it leaves the throat end of the folder. This end of the folder is mounted so that it is somewhat higher than the edge 57 of adjustable nosepiece 50 so that as the folded strip leaves the end of the folder to pass around edge 57, it is in an obliquely vertical position in a plane substantially parallel to that of the needle path. By proper positioning of the throat end of channelled guide 73, these plies will lie in the path of travel of needle 16. As the position of nosepiece 50 is adjusted horizontally with respect to the path of travel of needle 16, the position of this upright section of the folded strip will be changed so that the needle may intercept various of the plies of the strip. Where it is desired to produce

a so-called blind stitch, nosepiece 50 is adjusted so that the needle will pass through the innermost ply of the top fold. Hence the stitching will not show through this top fold. After passing through these plies, the needle continues to pass downwardly through the remaining plies to form the usual stitch locking the folded over strip into a tube or piping. The stitched piping continues around the edge 57 and under the bottom surface of adjustable nosepiece 50 which acts as the usual presser shoe. In conjunction with the conventional feed dog 19, the sewn tube is drawn rearwardly from the machine.

The effect of the counter-deflector may be explained as follows. It will be noted that hook 66 is positioned only a short distance above the point where the needle enters the folded over strip. This shifts the point of support of the needle and therefore makes it independent of any play in the bushings and the needle bar. This change in point of support also in effect shortens the needle length, thereby stiffening the needle as the ratio between its cross section and effective length is changed. Under the same operating conditions, the deflection of the needle point is considerably less as it begins to pierce the material. The effective shortening of the needle length also raises its natural resonant frequency beyond the range which may be produced at the higher operating speeds now in use. All of this contributes to more positive and more reliable needle action, and hence higher production speed and efficiency.

While the present preferred embodiment has been described in detail for the purpose of illustration, it is to be understood that the invention is not to be limited to the details of construction shown and described, but is to be construed broadly within the spirit and scope of the appended claims.

What is claimed is:

1. In a blindstitch attachment for sewing machines having a vertically reciprocating needle which randomly deviates from a desired, fixed vertical path in high speed operation, said attachment including a presser shoe having an edge over which a folded strip is presented for needle penetration, said edge being disposed in close proximity to the path of needle travel: means for preventing such undesired needle deviations comprising a member supported on the machine adjacent the needle path and above the edge of the presser shoe, said member having a portion arranged to come into contact with the needle intermediate of its point of support and the point where it begins its penetration of the folded strip whenever said needle departs from the desired vertical path, and means to adjust the relative horizontal position of said member with respect to the needle in the line of feed, said means comprising a manually adjustable eccentric mounted in the support for said member, said eccentric having a portion in contact with said member for shifting the horizontal position thereof when said eccentric is manipulated.

2. The device defined in claim 1 in which additional means are provided to lock said member in adjusted horizontal position after manipulation of said eccentric.

3. In a blindstitch foot attachment for sewing machines having a vertically reciprocating needle which randomly deviates from a desired, fixed vertical path in high speed operation, said foot including a presser shoe having an edge over which a folded strip is presented for needle penetration, said edge being disposed in close proximity to the path of needle travel: means for preventing such

undesired needle deviations comprising a member adjustably mounted on said foot for horizontal positioning with respect to said needle, said member having an arm arranged to come into contact with said needle above the edge of the presser shoe whenever said needle departs from said fixed, vertical path, and means for adjusting the horizontal position of said member comprising a manipulatable eccentric mounted in said foot arranged to engage and shift said member on manipulation of said eccentric and additional means to lock said member in fixed position after horizontal positioning by manipulation of said eccentric.

4. In a blindstitch foot attachment for sewing machines having a vertically reciprocating needle which randomly deviates from a desired, fixed vertical path in high speed operation, said foot including a presser shoe having an edge over which a folded strip is presented for needle penetration, said edge being disposed in close proximity to the path of needle travel; said presser shoe being slidably mounted on said foot for positioning horizontally with respect to the needle in the line of feed, means for horizontally positioning said shoe comprising a peripherally serrated, cylindrical member rotatably mounted in said foot, an eccentric stud carried by the cylindrical member, means on the shoe engaging the stud to be shifted horizontally thereby on rotation of the cylindrical member, a mating screw rotatably mounted in the foot having its threads in engagement with the serrations and means for manipulating the screw member to rotate the cylindrical member, together with means for preventing undesired needle deviations comprising a member mounted on said foot for horizontal positioning with respect to said needle, said member having an arm arranged to come into contact with the needle above the edge of the presser shoe whenever said needle departs from said fixed, vertical path, and means in said foot for adjusting the horizontal position of said member.

5. In a blindstitch foot attachment for sewing machines having a vertically reciprocating needle which randomly deviates from a desired, fixed vertical path in high speed operation, said foot including a presser shoe having an edge over which a folded strip is presented for needle penetration, said edge being disposed in close proximity to the path of needle travel; said presser shoe being slidably mounted on said foot for positioning horizontally with respect to the needle in the line of feed, means for horizontally positioning said shoe comprising a worm gear rotatably mounted in said foot, eccentric means carried by the gear arranged to engage the slidable shoe portion to shift the latter, and an externally manipulatable worm rotatably mounted in the foot in engagement with said gear, together with means for preventing undesired needle deviations comprising a member mounted on said foot for horizontal positioning with respect to said needle, said member having an arm arranged to come into contact with the needle above the edge of the presser shoe whenever said needle departs from said fixed, vertical path, and means in said foot for adjusting the horizontal position of said member.

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