Dec. 15, 1953 C. SEAMAN ET AL 2,662,494

SHIRRING ATTACHMENT FOR SEWING MACHINES

Filed Nov. 22, 1949

3 Sheets-Sheet 1

Fig. 1.

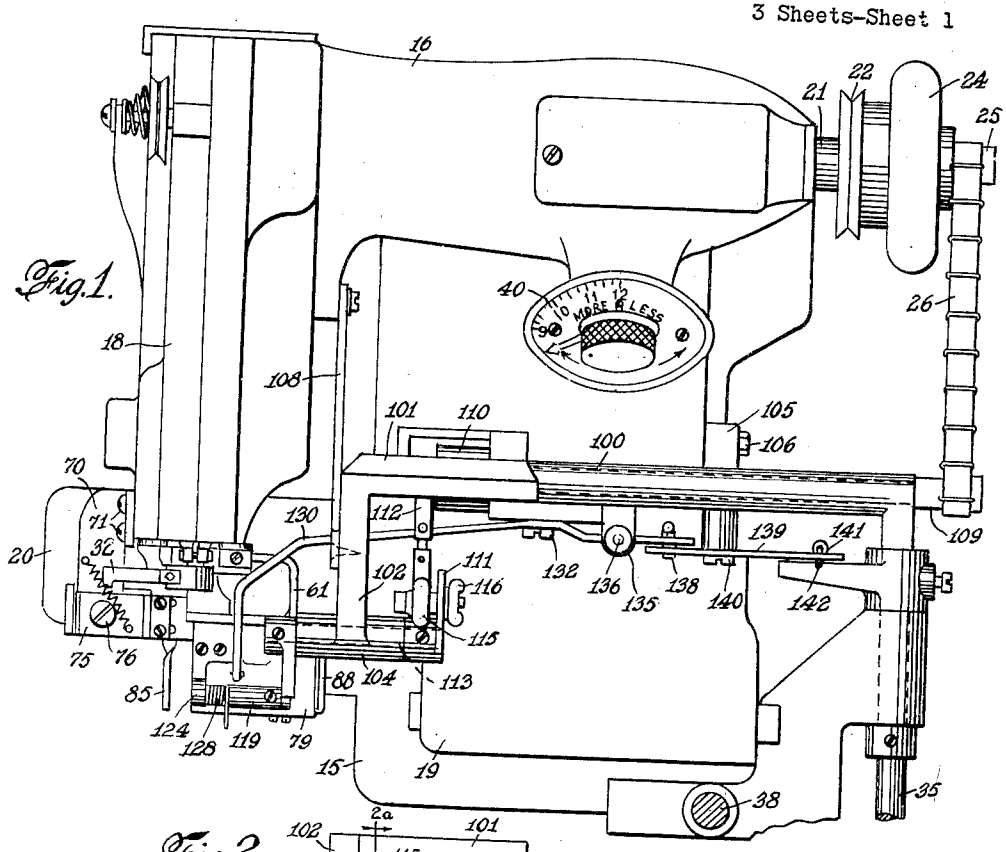


Fig. 2.

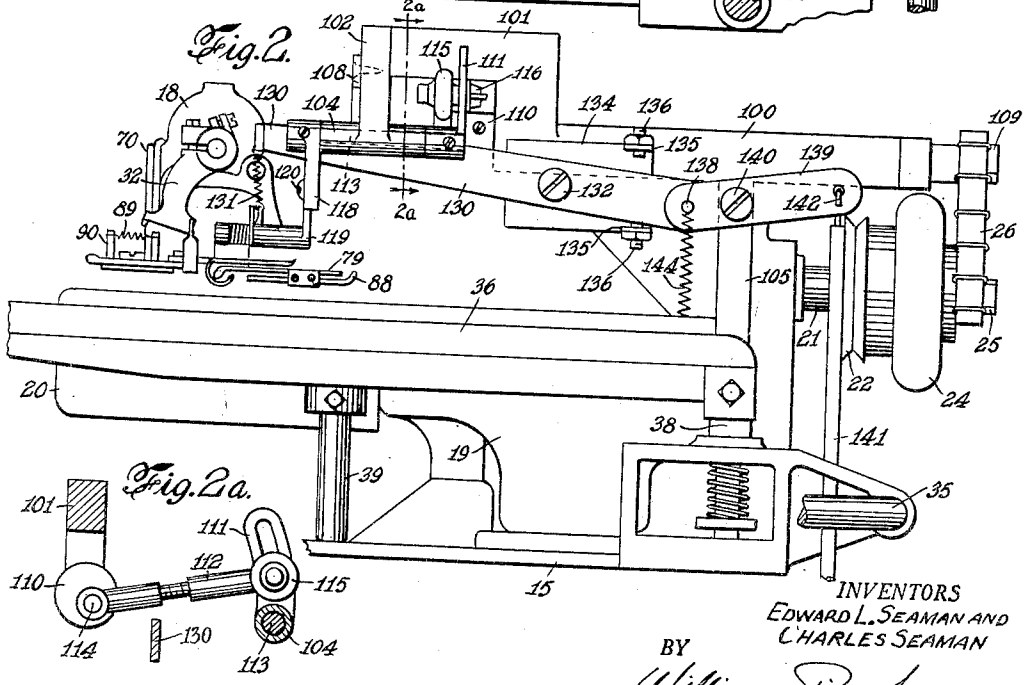


Fig. 2a.

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Fig. 3.

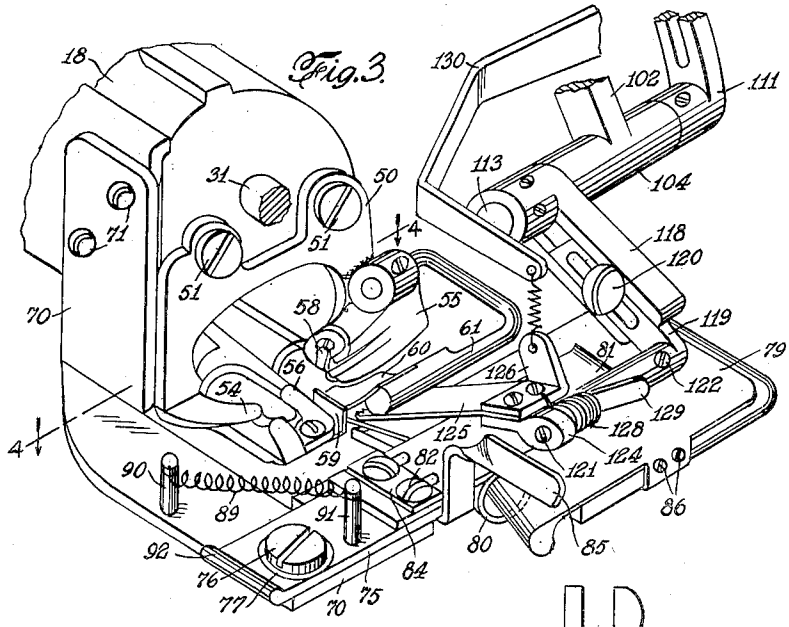


Fig. 4.

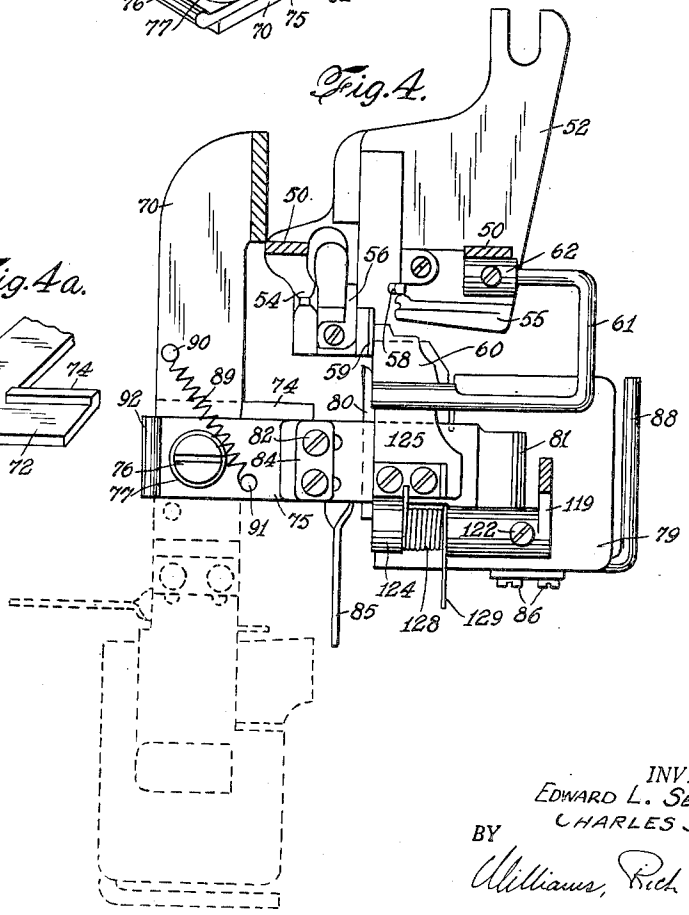
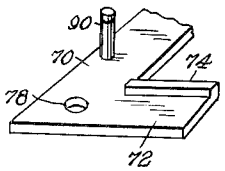


Fig. 4a.



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Fig. 5.

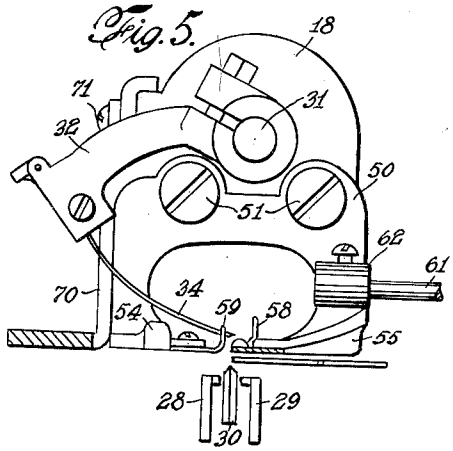


Fig. 6.

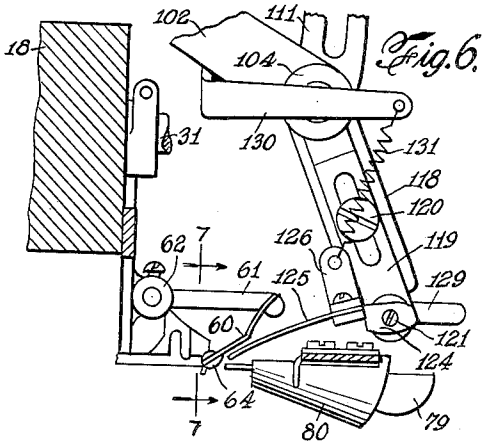


Fig. 7.

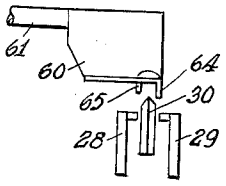


Fig. 8.

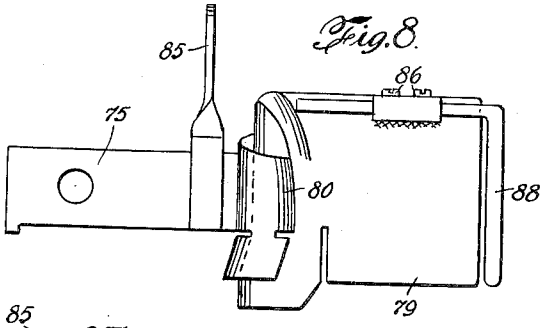


Fig. 9.

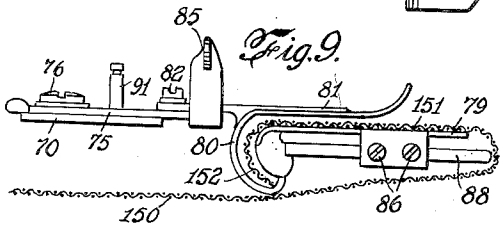
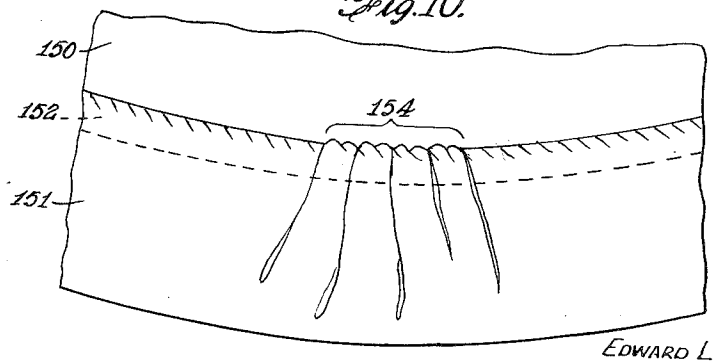


Fig. 10.



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Patented Dec. 15, 1953

2,662,494

UNITED STATES PATENT OFFICE

2,662,494

SHIRRING ATTACHMENT FOR SEWING MACHINES

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Application November 22, 1949, Serial No. 128,806

12 Claims. (Cl. 112—132)

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This invention relates to sewing machines, more particularly to hem-forming attachments for use therewith especially adapted for making hems on curved skirt bottoms.

Circular and other wide bottoms on skirts, coats and the like present a difficult problem when the hem is formed and stitched on a machine because the marginal portion which is turned up to form the hem is not straight but follows a substantial curve. Consequently, if more than a very narrow hem is turned, the edge of the inner face of the hem is much longer than the line of stitching. This requires gathering or shirring of the upper inside margin of the hem, either continuously or at intervals, to take care of the excess material. Continuous shirring would require a nice adjustment of the extent of the shirring relative to the dimensions of the adjacent garment parts which would be impracticable in working on a variety of garments. It is preferable, therefore, to provide for intermittent shirring or gathering of the inner face of the hem under the control of the operator as the work progresses through the machine.

The objects of the invention, therefore, are

(*a*) to provide apparatus for forming a hem on the margin of a garment as it is fed into a sewing machine;

(*b*) to provide apparatus by which the depth of the hem may be varied;

(*c*) to provide a hem folder which may be readily swung out of its position within the folds of the hem before the hem is finally closed, permitting completion of the sewing without removing the garment from the machine;

(*d*) to provide apparatus by which the inner face of the hem may be gathered or shirred to the extent and at the places desired by the operator to equalize the effective lengths of the layers of material being sewed together;

(*e*) to provide hemming apparatus readily applicable to standard sewing machines in the form of an attachment thereto and powered therefrom without material alteration of the machine proper; and

(*f*) particularly to provide such an attachment applicable to blind-stitch machines.

The invention is herein illustrated and exemplified by means of a detailed description of the present preferred embodiment thereof as adapted for use in conjunction with a blind-stitch machine of well known construction and generally of the type shown and described in U. S. Patent 1,926,644 to Buono et al. It is to be understood, however, that the invention is not limited to use with such machines or to use with blind-stitch machines since, by obvious modifications, it may be used with equal effect on machines of other types. The following description is to be read in conjunction with the drawings, in which:

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Fig. 1 is a plan of a blind-stitch machine having the invention incorporated therein as an attachment, certain parts being omitted;

Fig. 2 is a front elevation of the same machine also showing the pivoted work holder in place;

Fig. 2*a* is a detail of driving mechanism on the line 2*a*—2*a* of Fig. 2;

Fig. 3 is a perspective view of the principal parts of the attachment which are adjacent the sewing head;

Fig. 4 is a plan of the hem-forming and shirring attachment, sectioned on the horizontal plane indicated by the line 4—4 of Fig. 3;

Fig. 4*a* is a perspective detail of the front end of the hem-folder supporting bracket;

Fig. 5 is an elevation, partly in section of the sewing head and associated parts;

Fig. 6 is a side elevation as seen from the left of Fig. 5, showing the adjacent parts of the attachment, the needle arm being omitted;

Fig. 7 is a detailed elevation on the line 7—7 of Fig. 6;

Fig. 8 is a bottom view of the hem-folder;

Fig. 9 is a front elevation of the hem-folder with a layer of fabric therein; and

Fig. 10 is a section of the hem of a garment such as may be produced by the apparatus which will now be described.

Referring to Figs. 1 and 2, they show the principal parts of a blind-stitch machine, not in itself part of the invention, which has a base 15, a frame arm 16, a needle head 18 and pivoted work holder 19, the head 20 of which extends underneath the needle. The machine has the usual main shaft 21 equipped at its outer end with a belt-pulley 22 and a hand wheel 24. The outer end of the shaft is equipped with a drive pulley 25 adapted to receive the auxiliary cleated belt 26 which serves to drive the attachment to be later described.

The work holder head 20 carries the usual pivoted work-supporting fingers 28, 29 (Figs. 5 and 7) and an oscillating rib 30 which support the material being sewn, the rib forming a bight therein through which the needle passes, as is well known in the art. Protruding from the end of the needle head 18 is the needle shaft 31 carrying the needle bar 32 in which is fastened the curved needle 34. The machine has the usual

feed dog which overlies and coacts with the feed fingers 28 and 29 and a looper which forms the stitches, these parts being omitted for the sake of clarity. The pivoted work holder 19 is actuated by the shaft 35 which extends to a position adjacent the knee of the operator. Overlying the front portion of the machine is a work-supporting table 36 mounted on a rotatable shaft 38 mounted in the frame of a machine, the table being supported by a leg 39 which rests on the base 15. The table 36 may be swung into or out of position adjacent the head 20, depending on the kind of work being done. The pivoted work holder is depressed by means of the shaft 35 to enable the work to be inserted in the machine. The depth of penetration of the needle 34 is regulated by means of the dial 40, all in a known manner.

The attachment of the invention consists of a replacement for the foot assembly with which machines of this type are equipped, a pivotally mounted hem folder, shirring mechanism associated therewith and driven by the belt 26, and control means for the shirring mechanism. These parts will now be described in the order named.

Referring particularly to Figs. 3, 4, 4*a* and 5, the foot assembly replacement is essentially a cut-down version of the foot assembly which is standard equipment. It consists of a bracket 50 attached to the front end of the needle head 18 by screws 51. This bracket, together with the notched attaching plate 52 which extends beneath and is fastened to the head 18, carries needle guides 54 and 55, a needle wear plate 56 and an upstanding tongue 58 which cooperates with the looper. For directing the material to the needle there is a vertical guide 59 and a hold-down finger 60 made of spring steel and attached to a bar 61 which is fastened in a collar 62 attached to the bracket 50 as by brazing. Finger 60 is provided on its underside (Fig. 7) with downwardly extending ears 64, 65 which cooperate with the rib 30 in holding the material while the stitch is forming.

The hem folder assembly (Figs. 3, 4, 4*a* and 8) is supported on a forwardly extending angular bracket 70, attached to the side of the machine head 18 by screws 71. As shown in Fig. 4*a*, the front of this bracket is provided with a lateral extension 72, the rear edge of which extends upwardly to provide a stop 74. An arm 75 is pivotally mounted on bracket 70 by means of a shouldered screw 76 which passes through a spring washer 77 and enters the hole 78. Adjustably mounted on arm 75 is an adjustable hem folder comprising a plate 79, the rolled edge of which cooperates with a folding guide 80 which is continuous with an upper guide bar 81. (See Fig. 9.) This folder is adjustably attached to the bar 75 by screws 82 passing through a bar washer 84 and slots in bar 81. The forwardly extending handle 85 is attached to this assembly by means of which it may conveniently be swung about its pivot. Slidably secured by screws 86 in a bracket formed on the underside of plate 79 is an extensible angular rod 88, the position of which determines the depth of the hem. The hem folder is shown in full lines in the drawings in its operating position in which it is held against the stop 74 by a coil spring 89 attached to posts 90 and 91, attached respectively to the bracket 70 and the arm 75. In Fig. 4, the folder assembly is shown in its inoperative position in dotted lines, in which position the end 92 of bar 75 engages the stop 74, and the spring 89 acts to hold it in this position since it passes to the opposite side of the pivot screw 76.

The shirring mechanism, referring to Figs. 1, 2, 2*a*, 3, 4 and 6, is supported by a bracket, preferably a casting, which extends across the central part of the sewing machine and consists of a tubular portion 100, an arch 101, and a forwardly and downwardly extending arm 102 at the end of which is a boss 104. The bracket is also provided with a downwardly extending leg 105 which is bolted to the base of the machine at 106. It may also be further supported from the machine arm 16 by a brace 108. Extending through the tubular portion 100 of the bracket is a shaft carrying at its outer end a pulley 109 driven by the belt 26, and at its other end a drive member 110. Passing through the boss 104 is a rock shaft 113 carrying at one end a slotted arcuate crank 111, which is adjustably coupled with the drive member 110 by a connecting rod 112. The latter is attached eccentrically to the drive member at 114 and is adjustably attached to the crank 111 by a ball and socket joint 115 which is fastened in its selected position by a wing nut 116. Rotation of member 110, therefore, imparts oscillation to the rock shaft 113. At the opposite end of shaft 113 is a slotted arm 118 carrying a slidable angular arm 119 adjustably secured to arm 118 by a screw 120.

The horizontal portion of arm 119 contains a bore in which is a pin 121 held in position by set screw 122. Rotatably mounted on the end of pin 121 is a yoke 124 carrying the shirring blade 125. The blade is attached to the yoke by screws which extend through the perforated angular lug 126. Between yoke 124 and arm 119 and surrounding the pin 121 is a coil spring 128 which has one end anchored to the pin and the other end hooked over the lug 126, the tension of the spring acting to press the shirring blade 125 downwardly toward the plate 79. To enable the tension of the spring to be adjusted, a short lever 129 is attached to the pin 121 by which the pin can be rotated. Normally the shirring blade 125 is held out of operating position by means about to be described and is permitted to drop into operating position under the influence of spring 128 at such times as it is desired to shirr or gather portions of the inner face of the hem being formed.

The shirring blade control means, which acts in opposition to the spring 128 to lift the blade 125, comprises the following parts, which are best shown in Figs. 1, 2 and 3, adapted to be operated by a foot pedal (not shown) positioned underneath the right hand side of the machine within easy reach of the operator: Extending over the lug 126 is an arm 130, the end of which is attached to the lug by a short spring 131. Arm 130 is pivoted at 132 to the tubular portion 100 of the bracket. Interposed between the bracket and the arm is a small stationary plate 134 having ears 135 carrying adjustable stops 136. The end of arm 130 is attached by a pin 138 to a link 139 mounted on the pivot 140. The opposite end of link 139 is attached to a strap or similar tension member 141 by means of a hook 142. It will be understood that the member 141 extends downwardly to the foot pedal previously mentioned. Attached to the pin 138, at the junction of link 139 and arm 130, is a tension spring 144, the other end of which is attached to the base of the machine or other convenient stationary part so as normally to maintain the end of arm 130,

which is adjacent the shirring blade, in raised position. This end of the arm will be lowered upon depression of the foot pedal attached to member 141. As is apparent, the strength of springs 131 and 144 is sufficient to overcome the tension of spring 128 which tends to depress the shirring blade 125, and obviously when this tension is removed by operation of the pedal the shirring blade will drop into engagement with the plate 79 or the fabric resting thereon.

Foot control of the shirring blade leaves the operator's hands free to guide the material being stitched and the lever system comprising arm 130 and link 139 places the foot pedal in a convenient location. However, the link might be omitted and tension member 141 connected directly to arm 130 between its pivot and the end which is connected to the shirring blade. Likewise spring 144 might be located in any position in the system to give the desired movement to arm 130.

The operation of the machine is as follows: The material to be hemmed is fed into the folder as shown in Fig. 9 where the material is designated 150. The inner face 151 of the hem overlies plate 79 and the inwardly turned edge 152 is directed around underneath the plate. Initially the folder is in the position shown in the drawings in full lines and the shirring blade 125 is held up out of operating position. As the formation of the hem progresses it is possible for the operator to observe from time to time that an excess of material is accumulating in the inner face 151, at which time the foot pedal is depressed, pulling down on member 141 which causes the shirring blade to drop into contact with the fabric and gather it as shown at 154 in Fig. 10. The shirring blade forms gathers in the material overlying plate 79 and pushes them under the hold-down finger 60. This gathering will continue until the pressure on the foot pedal is released, drawing the shirring blade up and permitting stitching to progress without any gathering. In forming the hem on a garment such as a skirt it is obvious that the hem folder must be removed from the hem before it is entirely closed, and so while there are still a few inches of unstitched hem, the operator swings the holder out of the hem to the position shown in dotted lines in Fig. 4 and operates the machine to complete the stitching of the hem.

The amount of the gathering or shirring which takes place while the shirring blade is in operation may be varied by adjusting the location of the connecting rod 112 on the slotted arm 111, and also by varying the position of the shirring blade by movement of the arm 119 in the slotted arm 113. The latter adjustment is more or less permanent and minor variations are preferably made by adjustment of the connecting rod 112 which is locked in position by the wing nut 116.

While the invention has been exemplified by reference to a detailed description of one embodiment thereof, it is to be understood that this is merely illustrative and that the invention is to be constructed broadly within the purview of the claims.

What is claimed is:

1. In combination with a sewing machine having feed means and stitch-forming means including a needle, intermittent shirring means comprising a plate positioned in advance of said needle, a shirring blade pivotally supported in a fixed location above said plate, means continuously urging said blade toward said plate, means

for continuously reciprocating said blade regardless of its position, lifting means normally holding said blade away from said plate against the action of said urging means to permit feed of the material being sewn across said plate without shirring, and means under the control of the operator for rendering said lifting means ineffective.

2. In combination with a sewing machine having feed means and stitch-forming means including a needle, intermittent shirring means comprising a flat plate positioned in advance of said needle, a shirring blade pivotally supported in a fixed position above said plate, resilient means continuously urging said blade toward said plate, means for continuously reciprocating said blade across the surface of said plate regardless of the position of said blade, lifting means normally holding said blade away from said plate against the action of said urging means to permit feed of the material being sewn across said plate without shirring, and means under the control of the operator for rendering said lifting means ineffective.

3. In combination with a sewing machine having feed means and stitch-forming means including a needle, said feed means including a resilient hold-down finger, intermittent shirring means comprising a plate positioned in advance of said needle and underlying said finger, a shirring blade pivotally supported in a fixed location above said plate, means continuously urging said blade toward said plate, means for continuously reciprocating said blade along the line of feed and under said finger regardless of the position of said blade, lifting means normally holding said blade away from said plate against the action of said urging means to permit feed of the material being sewn across said plate without shirring, and means under the control of the operator for rendering said lifting means ineffective whereby said blade forms gathers in the material on said plate and pushes them under said hold-down finger.

4. In a sewing machine having fabric feeding and stitching means, in combination, hem-folding means in advance of said feeding means having a plate over which the inside face of the hem passes, a continuously reciprocating blade pivotally supported in a fixed location to engage the inside layer of the hem as it passes over said plate to shirr said layer, continuously operating drive means for reciprocating said blade regardless of its position, means continuously urging said blade toward said plate, lifting means normally acting in opposition to to said last mentioned means to lift said blade away from the plate, and means under the control of the operator to release said lifting means to cause shirring of the inside face of the hem.

5. In a sewing machine having a drive shaft and fabric feeding and stitching means, in combination, hem-folding means in advance of said feeding and stitching means having a plate over which the inside face of the hem passes, a continuously reciprocating blade pivotally supported in a fixed location to engage the inside layer of the hem as it passes over said plate to shirr said layer, drive means for said blade continuously driven from said drive shaft to reciprocate said blade regardless of its position, means continuously urging said blade toward said plate, holding means including a pivoted arm acting in opposition to said urging means to lift said blade away from the plate, and tension means attached to said arm and extending to a position adjacent

the foot of the operator for releasing said holding means to cause shirring of the inside face of the hem.

6. In a sewing machine, in combination, stitching means, a plate over which passes the material to be stitched, a shirring blade pivotally supported over said plate, resilient means urging said blade toward said plate, an arm pivotally supported with an end overlying said blade and connected thereto, a spring acting on said arm in opposition to said resilient means and of sufficient strength to lift said blade upwardly away from said plate, and a tension member under the control of the operator adapted to move said arm in a direction to release said blade.

7. The combination defined in claim 6 in which stop means are associated with said arm for limiting its movement.

8. The combination of claim 7 in which said stop means are adjustable.

9. In a sewing machine, in combination, stitching means, a plate over which passes the material to be stitched, a shirring blade pivotally supported over said plate, resilient means urging said blade toward said plate, an arm pivotally supported intermediate its ends with an end overlying said blade and connected thereto, a link pivotally supported intermediate its ends and coupled at one end to the other end of said arm, a spring acting on said arm in opposition to said resilient means and of sufficient strength to lift said blade upwardly away from said plate, and a tension member under the control of the operator connected to the other end of said link and adapted to move said arm in a direction to release said blade.

10. In a sewing machine, in combination, stitching means, a plate over which passes the material to be stitched, a shirring blade pivotally supported at one end over said plate, resilient means urging said blade toward said plate, an arm pivotally supported with an end overlying said blade and connected thereto intermediate the ends of said blade, a spring acting on said arm in opposition to said resilient means and of sufficient strength to lift said blade upwardly away from said plate, and a tension member under the control of the operator adapted to move said arm in a direction to release said blade.

11. A hemming attachment for a blind-stitch machine having a needle head, an oscillating needle and a cooperating oscillating rib which forms a bight in the material to be sewn, said attachment comprising a first bracket attachable to said head carrying guides for said needle and a spring hold-down finger cooperating with said rib, a second bracket attachable to said head and extending forwardly and to one side of said needle, stop means on said second bracket, an arm pivotally mounted on the forward end of said second bracket and swingable between two positions in which it engages said stop means, a spring attached respectively to said arm and to said second bracket and adapted to pass over said pivot as said arm moves between its extreme positions, a hem-folder carried by said arm and including a plate extending beneath said hold-down finger, a shirring blade, means for reciprocating said blade across said plate along the line of feed to the needle, a spring adapted to press said blade toward said plate, a pivoted lever having one end attached to said blade, a spring acting on said lever to raise the blade away from the plate, and means under the control of the operator to move said lever in opposition to the force exerted by said last-mentioned spring to release the blade to effect shirring of material extending across said plate.

12. A hemming attachment for sewing machines adapted to form continuous hems on curved skirt bottoms and the like, said attachment comprising a bracket attachable to the machine so as to extend forwardly of the needle and to one side thereof, such side being that toward which the unstitched folded hem opens, a hem-folder pivotally supported on said bracket and adapted to swing into and out of the operative position in which said folder lies between the folds of the hem, a stop on said bracket adapted to position said folder in its operative position, resilient means associated with said bracket and said folder to movably hold said folder against the stop, a shirring blade pivotally supported in a fixed location overlying said folder when the latter is in operative position, means for continuously urging said blade toward said folder, lifting means normally holding said blade away from said folder in opposition to said urging means, means under the control of the operator for rendering the lifting means ineffective to cause the shirring blade to contact the fold of the hem overlying said folder, and means for continuously reciprocating said blade regardless of its position, whereby a continuous hem may be stitched with intermittent shirring and the folder swung out of the hem before it is completely closed.

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