MACHINE FOR MAKING COMBINED SHIRRING AND FRENCH PIPING

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Fig. 5

Fig. 6

Fig. 7

Fig. 8

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[Image of patent drawings]
This invention relates to a sewing machine, or an attachment, for shirring a base material and attaching thereto a blind stitched piping of the type commonly known as a French piping.

An object of the invention is to provide a mechanism of the above type which may be readily applied to a standard sewing machine.

Another object is to provide a device of the type above indicated which may be manually controlled to produce various shirred effects.

Another object is to provide a device of the above type in which the operation of the shirring mechanism may be interrupted without removing the shirring attachment from the machine.

Another object is to provide a convenient, dependable and commercially practical device of the type above indicated.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Although the novel features which are believed to be characteristic of this invention are pointed out more particularly in the claims appended hereto, the invention itself will be better understood by referring to the following description, taken in connection with the accompanying drawings, in which a specific embodiment thereof has been set forth for purpose of illustration.

In the drawings,

Figure 1 is a top plan view of a sewing machine head embodying the present invention, partly broken away to show the details of construction;

Figure 2 is an end elevation showing the stitching and feed mechanism;

Figure 3 is a section taken on the line 3—3 of Figure 2;

Figure 4 is a section taken on the line 4—4 of Figure 1;

Figure 5 is an enlarged detail view showing the action of the shirring mechanism;

Figure 6 is a bottom plan view of the shirring guide plate;

Figure 7 is a partial plan view showing one type of product which may be made on the present machine;

Figure 8 is a section taken on the line 8—8 of Figure 7;

Figure 9 is a section taken on the line 9—9 of Figure 2, with the needle, needle bar and presser foot omitted for sake of clarity;

Figure 10 is a detail view of the shirring mechanism in the non-shirring position;

Figure 11 is an end elevation of the machine showing the drive mechanism; and

Figure 12 is an exploded perspective view showing the construction of the presser foot.

Referring to the drawings more in detail, Figure 1 shows a standard sewing machine head having a base plate 1 carrying an overhanging arm 2, to which is secured a needle head 3 (Figure 2) carrying a needle bar 4 and a presser foot bar 5. A lever 6 is provided for elevating the presser foot bar 5 when desired, as, for example, to provide clearance for inserting or removing the material. The needle bar 4 is driven by the usual drive shaft 7 actuated by a belt pulley 8. It is to be understood that the sewing machine head is of standard construction and embodies the usual stitching and feed mechanism. Only so much thereof has been shown herein as is necessary to an understanding of the present invention.

The present invention provides a guide plate to guide a base material to the needle path for stitching, a folder to fold and position a piping material for attachment to the edge of said base material, and a shirring mechanism adapted to shirr the base material as it is fed to the piping.

The folder may be of any suitable form and may, for example, be similar to the piping mechanism shown in my Patent No. 2,133,652, dated August 2, 1938. For purpose of illustration, a specific type of guide and folder is disclosed herein which comprises a guide plate 10 (Figures 3 and 5) over which a base material 11 is passed to the needle for stitching and which carries a folder 12 adapted to fold a piping material 13 into a U-shaped cross-section with the edges of the material interlaced between the sides of the U. It is to be understood, of course, that the folder 12 may be moved in accordance with the type of piping with which it is desired to attach. For example, the raw edge may be folded in on only one side of the U, which may be located at the top of the finished product, in which event the piping will extend in a single layer on the inner side of the material. By a suitable change in the folder, the piping material may be folded into any desired thickness, as is well known in the art.

The folder 12 is provided with a throat 14, through which the folded piping material is discharged downwardly around a guide or toe 15 of a presser foot 16, as shown in Figure 5, in a position such that the needle, in its penetrating stroke, enters and leaves from the concealed side of the material so as to produce a blind stitch.

The guide plate 10 may be attached to the base of the sewing machine head by suitable means,
shown as screws 11 (Figure 3). The plate is shown as carrying a block 16 in which an arm 19 is pivoted as by a screw 20. An eccentric pin 21 provides means for effecting a slight adjustmen of the arm 19. The pin 21 is actuated by a lever 22 having a pointer 23 cooperating with a scale 24 on the plate 10. The lever 22 may be retained in adjusted position by a set screw 25.

The arm 19 carries at its free end a spring 26 (Figures 2, 3, 12) which is secured thereto by screws 27 extending through elongated slots 28 therein. The slots permit the spring 26 to be adjusted with respect to the arm 19 so as to properly position the presser foot to be described. The spring 26 carries at its end the presser foot 16, above mentioned, and also carries a bracket 28a (Figures 2 and 12) having an opening 29 therein. A pin or screw 30 (Figure 2) secured in the presser foot bar 5 extends through this opening 29 and is adapted to engage the bracket 28a so as to elevate the presser foot 16 when the presser foot bar 5 is raised by means of the lever 6. The resilience of the spring 26 permits the presser foot to be raised in the manner above described and also causes the same to exert the necessary pressure for engaging the base material as the needle point passes over the presser foot bar 5.

The guide or toe 15 is mounted on a spring arm 31 (Figures 3 and 12) which is attached by screws 32 to a block 33 carried by the plate 10. It will be noted that the forward surface 16a of the presser foot 16 provides a stop and guide for the toe 15, and that the toe 15 may be adjusted with respect to the needle path by making a suitable adjustment of the presser foot 16. The resilience of the spring arm 31 permits the toe 15 to be moved to provide clearance for the passage of materials of increased thickness, such as seams or the like. A guide wire 34 is attached to the toe 15 to form a guide and stop for the shirring blade 44 to be described.

A pre-folder 35 (Figure 3) may be provided with a pin 36, which is secured by means of a screw 37, in an arm 38 in the same manner as above mentioned, by means of a screw 39. The pre-folder 35 may be provided with a gate 40, if desired, for guiding the piping material 13 thereto for folding.

The plate 10 is provided with a downwardly extending lip 4 (Figure 5) over which the base material 11 is fed to the path of the needle. A guide member 42 (Figures 3 and 5) may be secured to the top of the plate 10 by means of screws 43 in a position to engage the edge of the base material 11 and guide the same into position for stitching.

The shirring mechanism comprises a shirring blade 44, to be described, and a spring guide plate 45 associated with the plate 10. The guide plate 45 (Figures 3 and 5) is secured to the under side of the plate 10 by a screw 46, extends through an aperture 47 in said plate, and is bent downwardly in a curve corresponding in general to that of the lip 41 of the plate 10. The end of the guide plate 45 is provided with a plurality of serrations 48, which are adapted to engage the folded base material produced by the shirring blade 44 and to prevent the same from being pulled back when the shirring blade is retracted. The guide plate 45 is also provided with a recess 49 to provide clearance for the needle.

In order to retract the spring plate 45 while desired, so as to prevent the same from cooperating with the shirring blade 44, and thereby interrupting the shirring operation, a wire 50 is provided which extends through an aperture 51 in the lip 41 of the plate 10 and is attached to the inner side of the guide plate 45. The wire 50 is secured in said plate 10 by means of a set screw 52. The pin 51a is attached to a rock cam 53, which is pivotally mounted in a bracket 54 attached to the under side of the plate 10 and carries a control lever 55. The rock cam 53 engages a spring 56 which is secured by screws 57 to the under side of the plate 10 and cooperates with the rock cam 53 to produce a toggle effect, so as to hold the cam in either upper position, as shown in Figure 5, or lower position, as shown in Figure 10. The upper position of the rock cam 53 is such that when the lever 55 is shifted to operate it will be noted that the spring plate 45 is extended so as to hold the material 11 in a position to be engaged by the shirring blade 44. In the position of Figure 10, the movement of the pin 51a has caused the wire 50 to be extended and operated the spring plate 45 so as to release the material 11 from the blade 44 and to thereby interrupt the shirring operation.

The shirring blade 44 is provided at its ends with serrations 60 adapted to engage the material 11, the needle 12 engaging the base material 11 from the underside as the needle 12 is in its lowest position. The blade 44 is provided with a downwardly extending lip 4 (Figure 5) over which the base material 11 is fed to the path of the needle 12. The blade 44 is normally held in a position in engagement with the base material 11.

The blade 44 carries a pin 67 having a roller 68 journaled therein. The roller 68 is adapted to engage a portion 69a of a pin 69, which is carried by the lever 55, the arrangement being such that when the lever 55 is shifted to operate in its normal position, as shown in Figure 10, the portion 69a of the pin 69 engages the roller 68 to lift the blade 44 from operative relationship with the spring guide plate 45. At the same time, the spring guide plate 45 is retracted by the wire 50, so as to be held in the block 33, and the guide plate 45 and the shirring blade 44 without being engaged thereby. The pin 69 may be adjustably secured in the lever 55 by a set screw 70.

The oscillating arm 65 is attached to a shaft 71 journaled in a boss 72 formed on a bracket 73. The shaft 71 also carries an arm 74 (Figure 4) to which a link 75 is adjustably connected by means of a set screw 76 extending through a slot 77 in said arm 74. The link 75 is journaled about an eccentric 76 carried by a sleeve 78, which is adapted to be secured to a rotating shaft 80 (Figure 1). The shaft 80 is journaled in bearings 81 and 82 so as to retract the bracket 73, the sleeve 79 providing a thrust bearing to prevent axial movement of said shaft 80. The bracket 73 is formed with a lip 82 which is secured to the needle head 3 by means of a screw 83.

The shaft 80 extends through a boss 85 on a bracket 86 (Figures 1 and 11) which is attached to the sewing machine head by bolts 87. The shaft 80 carries a pulley 88 engaging a belt 89, which is driven by a pulley 90 attached to the drive shaft 7. The belt 89 may comprise a standard type of drive belt, such as for example an elevator belt, having a plurality of cross wires 91 engaging slots 92 in the pulley 88 to provide a positive drive. The bracket 86 also carries a frame 93 which forms a housing for the
belt 89 and may be closed by a pair of cover plates 84 and 95. In the operation of the above-described mechanism, the binding or piping material 13 is fed through the prefolder 38 and the folder 12, which are in such a position that the edge of the base material is positioned between the two sides of the folded binding or piping as it advances to the needle. In this way, the piping is attached by a blind stitch to the edge of the base material. The piping or binding material may, of course, be folded so as to form any desired number of plies at either the top or bottom of the base material, by making suitable changes in the folders 12 and 35. It is to be understood, of course, that the pre-folder 35 may be omitted if the desired folding operation is obtained by means of the folder 12. The position of the toe 16 is adjusted by means of the lever 15 in accordance with the thickness of the material and the number of folded plies thereof, so as to cause the needle to enter the same in a proper position for producing the above-mentioned blind stitch.

The drive mechanism, above described, including the clamps 88, the shaft 80, eccentric 16, link 15 and arms 14 and 55, causes the shirring blade 44 to reciprocate. The base material 11 is held in the path of the shirring blade 44 by means of the spring plate 45 so that, as the blade reciprocates, the serrated edge 48 engages the base material beyond the piping and causes the same to advance to the needle in folds, thereby producing a shirred effect as illustrated in Figure 7, with the blind-stitched piping attached along the edge of the shirred material. The shirring blade 44 is preferably timed so that it holds the folded material until the needle has penetrated the same, thereby preventing the material from being pulled back when the blade is retracted. The serrated edge 48 of the spring plate 45 is also adapted to engage the folded material to prevent the same from being pulled back with the shirring blade in the event that the blade is retracted before the needle has fully penetrated the material.

In the above-described mechanism, the width of the folds may be adjusted by loosening the set screw 16 and shifting the link 16 with respect to the arm 14, thereby changing the throw of the arm. The adjustment may be varied to produce any shirred, tuck-ed, gathered or pleated effect desired, herein for convenience termed "shirring."

The shirring operation may be interrupted by shifting the lever 55 to the position shown in Figure 10, thereby retracting the spring plate 48 and at the same time lifting the shirring blade 44 from the material so that the blade is free to reciprocate without engaging the material to form folds therein. With the mechanism in this position, the piping or binding is stitched to the edge of the material, while the base material is fed in a straight position, as indicated at 101 in Figure 7. The wire 34 forms a stop and guide for the blade 44 as it reciprocates out of contact with the material 11.

Obviously, intermittent shirring can be obtained by manual manipulation of the lever 55 so as to cause the base material to be shirred at spaced points, indicated at 101 in Figure 7, which are separated by unshirred portions 100. Any desired combination of shirred and unshirred portions may thus be obtained in accordance with the effect desired.

While the invention has been shown for purposes of illustration as embodied in a specific mechanism, it is to be understood that various changes and modifications may be made therein as will readily appear to a person skilled in the art. The invention is not to be restricted to the specific embodiment shown but is only to be limited in accordance with the scope of the following claims.

I claim:

1. In a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, a guide plate positioned to guide material to the needle for stitching, a reciprocating blade adapted to engage the material as the material passes over said guide plate for advancing the material to the needle in successive folds for forming pleats or shirring therein, drive means driven by said drive shaft to impart reciprocating movement to said blade, and means for retracting said guide plate and shifting said blade into non-cooperative position, whereby the blade is rendered ineffective for the above purpose.

2. In a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, a reciprocating blade, drive means driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, and means for retracting said guide plate and shifting said blade into non-cooperative position, whereby the blade is rendered ineffective for the above purpose.

3. In a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, a reciprocating blade, drive means driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, a pivoted member connected to retract said spring guide member from cooperating position with respect to said blade, said pivoted member having means engaging said blade to shift the same into inoperative position, and spring means holding said pivoted member in operative or inoperative positions, whereby said pivoted member provides a manual control for interrupting the shirring or pleating operation.

4. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, said attachment comprising a guide plate to be positioned to guide material to the needle for stitching, a reciprocating blade adapted to engage the material as the material passes over said guide plate for advancing the material to the needle in successive folds for forming pleats or shirring therein, drive means to be driven
by said drive shaft to impart reciprocating movement to said blade, and means for retracting said guide plate and shifting said blade into non-operative position, whereby the blade is rendered ineffective for the above purpose.

5. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, said attachment comprising a reciprocating blade adapted to position material for stitching, drive means to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, and means for retracting said spring guide member and shifting said blade into non-operative position, whereby the blade is rendered ineffective for the above purpose.

6. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, said attachment comprising a reciprocating blade adapted to position material for stitching, drive means to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, a pivoted member connected to retract said spring guide member from cooperating position with respect to said blade, said pivoted member having means engaging said blade to shift the same into inoperative position, and spring means holding said pivoted member in operative or inoperative positions, whereby said pivoted member provides manual control for interrupting the stitching or pleating operation.

7. In a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, a guide plate adapted to guide material to the needle for stitching, a reciprocating blade adapted to engage the material as the material passes over said guide plate for advancing the material to the needle in successive folds for forming pleats or shirring therein, drive means driven by said drive shaft to impart reciprocating movement to said blade, cam means associated with said guide plate and adapted to retract said guide plate from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, and means operatively connected to said cam means and adapted to actuate said cam means to retract said guide plate.

8. In a sewing machine having a head carrying a reciprocating needle and drive means therefor including a rotating drive shaft, a guide plate adapted to guide material to the needle for stitching, a reciprocating blade adapted to engage the material as the material passes over said guide plate for advancing the material to the needle in successive folds for forming pleats or shirring therein, drive means driven by said drive shaft to impart reciprocating movement to said blade, cam means associated with said guide plate and adapted to retract said guide plate from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, means operatively connected to said cam means and adapted to actuate said cam means to retract said guide plate.
shift said blade into inoperative position when said spring guide member is retracted.

12. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a drive shaft, said attachment comprising a reciprocating blade, drive means adapted to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, cam means associated with said spring guide member and adapted upon actuation thereof to retract said spring guide member from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, means operatively connected to said cam means and adapted to actuate said cam means to retrace said spring guide member.

13. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a drive shaft, said attachment comprising a reciprocating blade, drive means adapted to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, cam means associated with said spring guide member and adapted upon actuation thereof to retract said spring guide member from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, means operatively connected to said cam means and adapted to actuate said cam means to retrace said spring guide member, and means for holding said cam in position while said blade is in the operative or inoperative position.

14. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a drive shaft, said attachment comprising a reciprocating blade, drive means adapted to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, cam means associated with said spring guide member and adapted upon actuation thereof to retract said spring guide member from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, means operatively connected to said cam means and adapted to actuate said cam means to retrace said spring guide member, and means associated with said cam-actuating means to shift said blade into inoperative position when said guide member is retracted.

15. An attachment for a sewing machine having a head carrying a reciprocating needle and drive means therefor including a drive shaft, said attachment comprising a reciprocating blade, drive means adapted to be driven by said drive shaft to impart reciprocating movement to said blade, a guide plate adapted to guide a material to the needle for stitching, a spring guide member associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby to the needle in successive folds, cam means associated with said spring guide member and adapted upon actuation thereof to retract said spring guide member from cooperative relationship with said blade, whereby said blade is rendered ineffective for the above purpose, means operatively connected to said cam means and adapted to actuate said cam means to retract said spring guide member, and means for holding said cam in position while said blade is in the operative or inoperative position.
ber adapted to be positioned in advance of said throat and associated with said plate to hold the material in position to be engaged by said reciprocating blade and advanced thereby between the plies of the folded binding in successive folds, cam means associated with said spring guide member and adapted upon actuation thereof to retract said spring guide member from co-operative position with respect to said blade, whereby said blade is rendered ineffective for the above purpose, means to actuate said cam means, and means associated with said cam-actuating means to shift said blade into inoperative position when said guide member is retracted.

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