July 1, 1969 G. DITRICH 3,452,691

APPARATUS FOR CLOSING STOCKING TOES

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Fig. 2

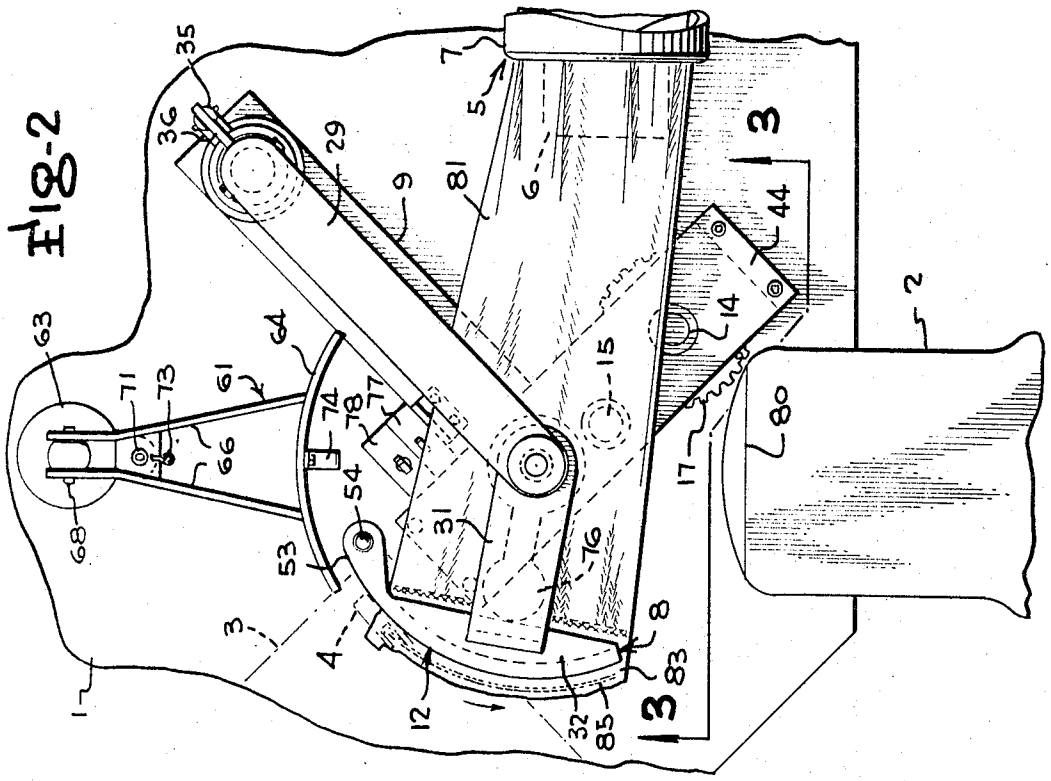
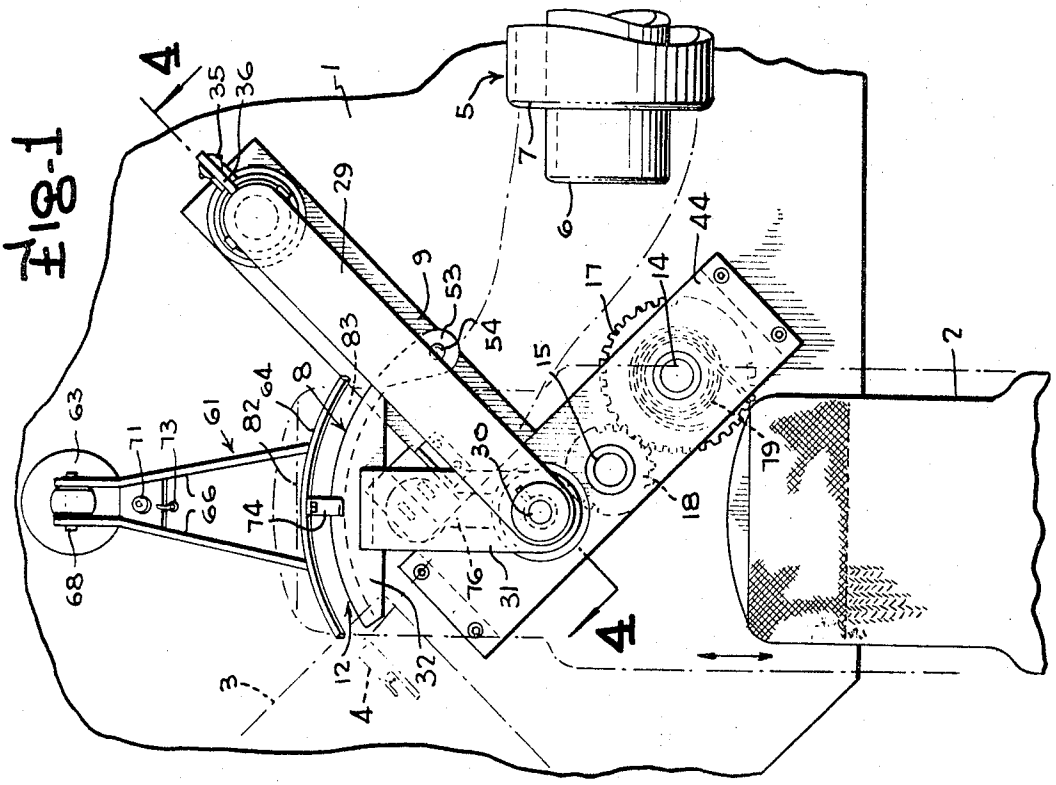


Fig. 1



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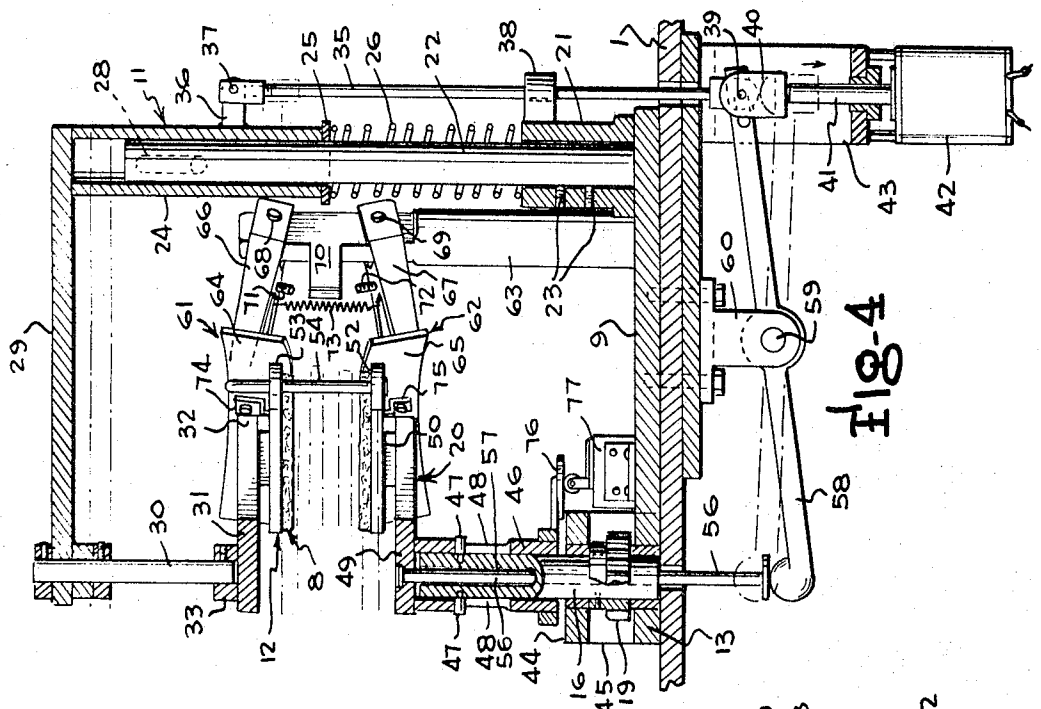


FIG-4

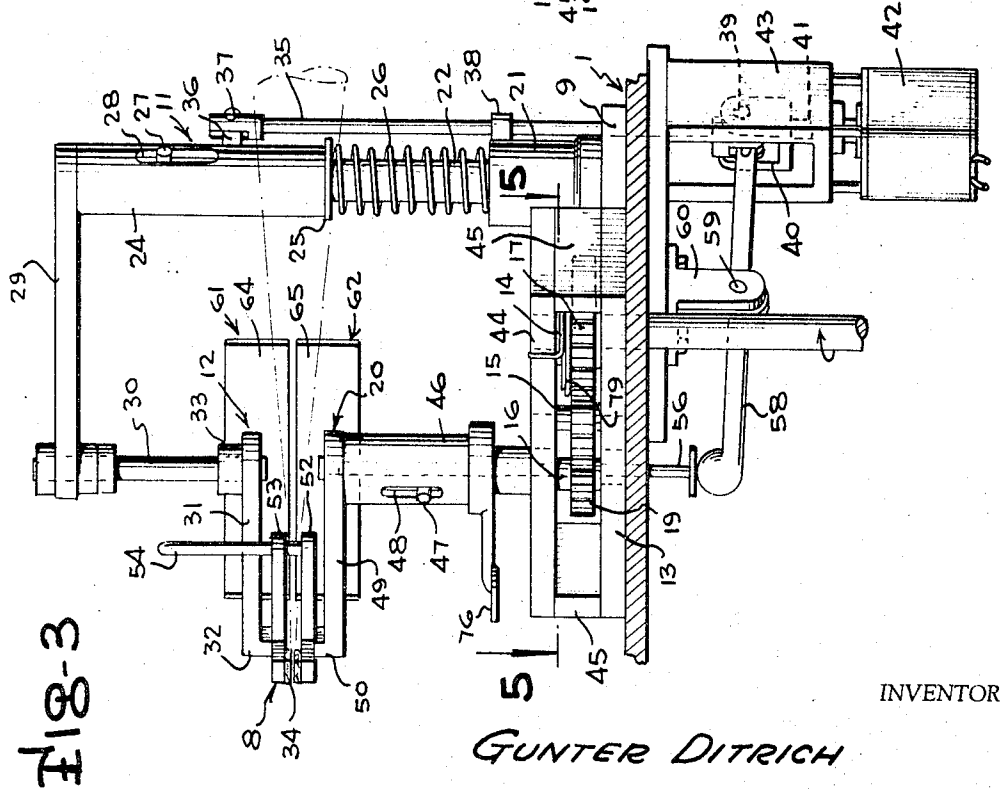


FIG-3

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Fig-5

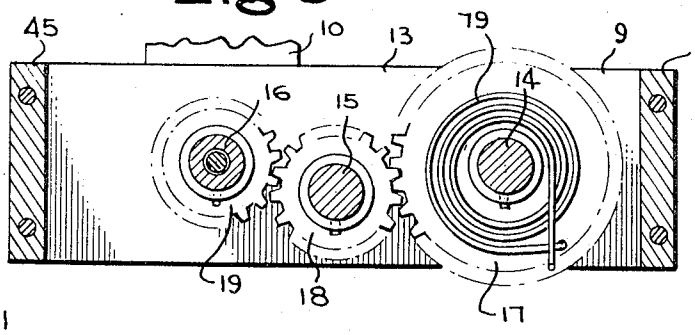


Fig-7-A

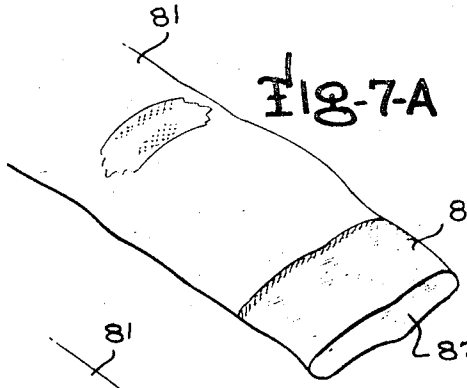


Fig-7-B

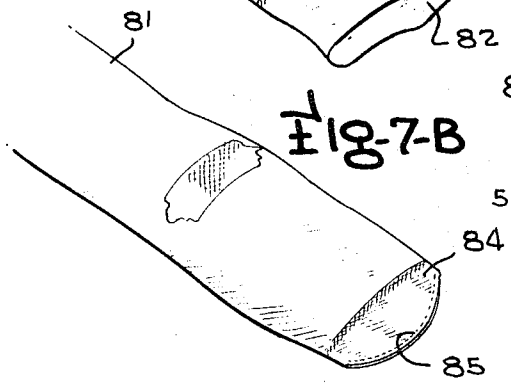


Fig-7-C

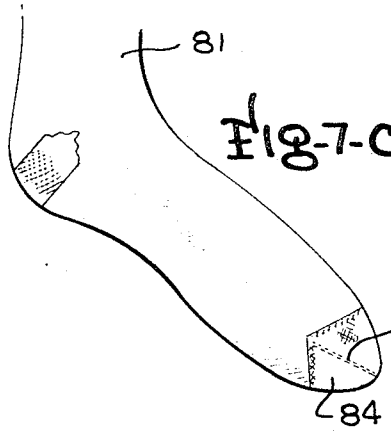
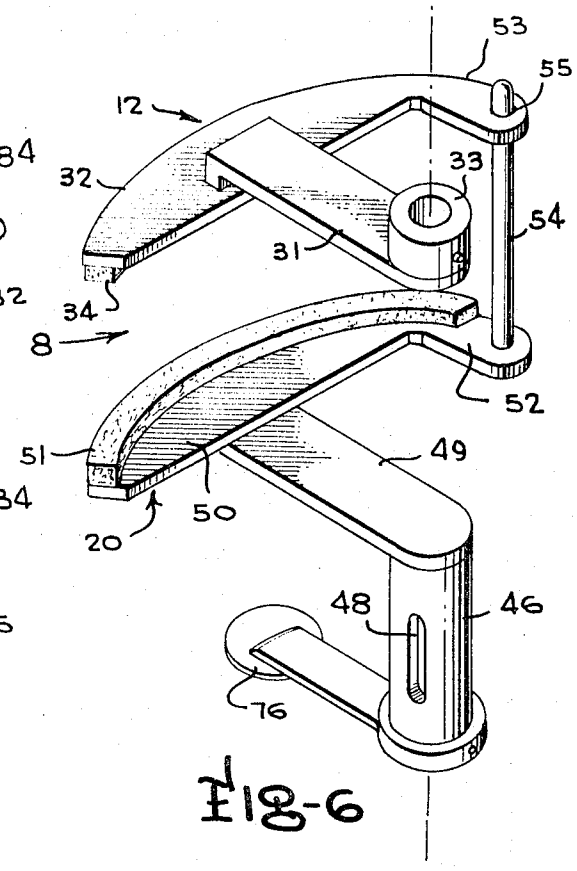


Fig-6



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APPARATUS FOR CLOSING STOCKING TOES

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Int. Cl. D05b 23/00, 27/00, 7/00
U.S. Cl. 112—2 8 Claims

This invention relates to apparatus for holding and feeding stockings to a sewing machine to close the toe with a so-called French seam.

There is presently in use a machine which, among other things, provides an inspection form upon which an everted, open toe stocking is placed. The form moves the stocking to a clamp which grips the stocking and feeds it to a toe-closing sewing machine. During seaming, the leg of the stocking is within the outer tube and over the inner tube of a two concentric tube everting and ejecting member in which vacuum in the outer tube tensions the stocking during seaming. After the seam is completed, the clamp releases the stocking and vacuum suction changes from the outer to the inner tube, to evert the stocking and eject it to a collection bin. This machine, however, will produce only what is known as an under the toe seam, and is incapable of closing the toe by a round, or French seam.

The object of the present invention is to provide an assembly which can be installed on the above-described machine to convert the machine to close stocking toes by means of a French seam.

Another object is the provision of such an assembly wherein the several parts are completely adjustable to allow for precision mounting for coaction with the elements of the machine on which the assembly is mounted.

A further object of the invention is to provide an assembly for closing stocking toes which will operate with the electric control system of the existing machine.

Other objects of the invention will become apparent from the following description of one practical embodiment thereof, when taken in conjunction with the drawings which accompany, and form part of, this specification.

In the drawings:

FIGURE 1 is a top plan view of a toe-closing assembly constructed in accordance with the present invention, shown mounted on the existing machine and in inoperative position, adjacent parts only of the existing machine being shown;

FIGURE 2 is a similar view with the assembly being shown at the completion of a toe-closing operation;

FIGURE 3 is a vertical section taken in the line 3—3 of FIGURE 2, the stocking clamp being in closed position;

FIGURE 4 is a vertical section taken on the line 4—4 of FIGURE 1, the clamp being shown in full lines in open position and in dotted lines in closed position;

FIGURE 5 is a horizontal section taken on the line 5—5 of FIGURE 3, illustrating the drive gearing;

FIGURE 6 is a perspective view of the clamp arms; and,

FIGURES 7A, 7B and 7C show, respectively a stocking before toe-closing, after closing, and after preboarding.

The above mentioned machine, with which the present invention is to be used, includes a table, or platform, 1 above which is mounted an inspection form 2. There is also a sewing machine 3, having a presser foot 4, and everting and discharging tube system 5, which consists of inner and outer vacuum tubes, 6 and 7 respectively, with the inner tube 6 projecting forwardly beyond the end of the outer tube 7. The improved clamp 8, which forms the present invention, is mounted on the table and operates

intermediate the form, sewing machine and everting and discharging system.

As the general machine does not form part of the present invention, parts only have been shown somewhat schematically. To understand the present invention, it is only necessary to know that in the general machine, the form 2 moves forward to place the open end of a stocking between the jaws of the clamp and then moves back to receive another everted stocking. The top of the stocking held by the jaws is then placed over the inner tube of an everting and discharging system which has a vacuum source connected alternately to the outer tube, to hold a stocking taut during the toe-closing operation, and to the inner tube, to evert the stocking after closure and released from the jaws and discharge it from the machine.

The clamp is carried on a T-shaped base 9 mounted on the table 1. The leg 10 of the base supports a vertical post 11 which carries the clamp upper jaw 12. The top bar 13 of the base provides journals for a driving shaft 14 connected to the machine motor (not shown), an idler shaft 15 and a driven shaft 16. Shaft 14 carries a driving gear 17; shaft 15 carries an idler gear 18 in mesh with gear 17; and, shaft 16 carries driven gear 19 which is in mesh with gear 18. Thus, rotation of shaft 14 by the motor will cause rotation of driven gear 19 and shaft 16 upon which it is mounted. Shaft 16 supports the lower jaw 20 of the clamp.

Post 11 is in three parts, and includes a base socket 21, fixed to the leg 10 of the clamp base 9, a rod 22, seated in socket 21 and held immovable by set screws 23, and a cylindrical cap 24 telescopically mounted on the rod 22. A bearing plate 25, beneath the cap, rests upon the top of a coil spring 26 which has its lower end seated on the top of the base socket 21. Vertical movement of cap 24 is limited by means of a pin 27 through rod 22 which projects into vertical slots 28 in the cap. When the clamp is open, spring 26 holds the cap elevated with pin 27 in contact with the bottoms of slots 28 as shown in full lines in FIGURE 4. Pin 27 and slots 28 also serve to hold the cap against rotative movement relative to the rod.

Cap 24 has an arm 29 extending horizontally from its top to overlie shaft 16. The arm has journalled in it a vertical, depending shaft 30 which is in axial alignment with shaft 16. The clamp upper jaw 12 is fixed to the lower end of shaft 30, and, as shaft 30 is rotatably mounted in arm 29, the jaw and shaft can rotate together.

The jaw 12 consists of mounting arm 31 and a jaw proper 32. The jaw proper is arcuate, with its curve being struck from the center of shaft 30. The mounting arm has a hub 33 for securing the jaw to shaft 30. A resilient stocking engaging member 34 of the same curvature as the jaw proper is attached to the underside of the jaw proper.

Jaw 12 is moved to its operative, or stocking clamping, position by means of a control rod 35. This rod has its upper end bifurcated to embrace a lug 36 attached to the side wall of cap 24. A pin 37 connects the rod and lug. Socket member 21 of post 11 carries a guide 38 through which control rod 35 is slidable. The lower end of the control rod is connected by a pin 39 to a clevis 40 carried at the upper end of a solenoid plunger 41. The solenoid 42 is mounted in a bracket 43 beneath the platform 1. Consequently, when solenoid 42 is energized rod 35 will be drawn down, pulling cap 24 with it and compressing spring 26. This will move jaw 12 downwardly. When the solenoid is deenergized, spring 26 will expand and move cap 24 and jaw 12 upwardly until pin 27 strikes the bottom of slots 28.

Shaft 16 carries gear 19, as described, and is journalled in the base 9. Shaft 16 is also journalled in a cover plate 44, as are shafts 14 and 15, which plate is held in spaced relation above the base by spacers 45 located at the

ends of the top bar 13 of base 9. A cylindrical cap 46 is telescopically fitted over the upper end of shaft 16, and cap 46 carries lower jaw 20 of the clamp. The cap and shaft are held against relative rotation by pins 47 in the shaft extending through vertical slots 48 in the cap.

Clamp jaw 20 is an inverted duplicate of jaw 12. It has a mounting arm 49 and a jaw proper 50. A stocking-engaging strip 51 lies around the upper arcuate edge of the jaw proper. Jaw 20 has an extension 52 at one side of the jaw proper, and jaw 12 has a similar extension 53 which overlies the extension 52. A tie pin 54 is fixed to the end of the extension 52 and projects vertically and slides freely through an opening 55 in extension 53. By this means, rotary motion imparted to shaft 16 will cause rotary movement of lower jaw 20, and, through tie pin 54, the same motion will be given to upper jaw 12. Thus, the two jaws will move to the same degree and in unison, and this is true whether the jaws are in stocking-engaging position or in open position.

Jaw 12 is caused to move to stocking-engaging position by means of a rod 56 which is connected at its upper end to the top of cap 46 and extends downward through a central opening 57 in shaft 16. The lower end of rod 56 rests upon a lever 58, which is pivoted intermediate its length by pivot pin 59 to a bracket 60, secured to the underside of platform 1. The opposite end of lever 58 is secured to the pin 39, which connects control rod 35 to the clevis 40 on solenoid plunger 41. This arrangement will cause the two jaws to move in opposite directions to be brought into clamping relation when the solenoid is energized. When the solenoid is released, spring 26 will lift jaw 12 and jaw 20 will drop by gravity.

As will be explained more fully later, after the form 2 has moved a stocking to clamp-gripping position and the form has withdrawn leaving the stocking gripped by the clamp, there will be a short length of the open toe overhanging the clamp. This is the area where the closure seam is to be made. In order to hold this extended portion in the plane of the remainder of the stocking and in position for feeding to the sewing machine, a pair of movable guides are provided. These include an upper guide 61 and a lower guide 62 pivotally mounted on a pedestal 63 fixed to the platform 1. The guides consist of arcuate guide elements 64 and 65, which are secured to the pedestal by pairs of arms 66 and 67. The arms are connected to the pedestal at vertically spaced points by pivot pins 68 and 69, with the pivots being equidistant above and below the inspection form. Pedestal 63 has a horizontally projecting arm 70, intermediate the pivots 68 and 69, which serves as an abutment for stop screws 71 and 72 carried by the respective guides. By using screws as the stop members, the relation of the arms when in guiding position can be adjusted and the gap between the guides can be varied.

A spring 73, connected to the guide arms, yieldably holds the guides in operative position. In order to separate the guides during insertion of the stocking into the clamp and between the guide member, the guide elements have tabs 74 and 75 which overlie the edges of the clamp jaws so that when the clamp opens the guides will be separated. Of course, when the guides close the spring 73 will draw the guides together until the stop screws strike the abutment arm 70. They will then be in the proper position to hold, and guide, the stocking toe without gripping it.

It is important that the clamp have its jaws centered on the extended longitudinal centerline of the inspection form, and that the common axis of the shafts 16 and 30 be on this centerline. It is also important that the sewing machine stitch point be located at a distance from the common axis of the shafts 16 and 30 just slightly greater than the distance from the common axis to the ends of the clamp jaws. With this arrangement, the toe closure seam will be made on an arc which is symmetrical on opposite sides of the center of the stocking foot, and located adjacent the arcuate inter edges of the clamp jaws. This will provide a true French seam.

Cap 46 is shown as carrying a switch-operating arm 76, and switches 77 and 78 are shown mounted on platform 1. Arm 76 contacts, and depresses these switches when the clamp is in inoperative and open position. When the clamp closes the switches are released. These switches are in the automatic control circuits and these need not be described for an understanding of the present invention.

One other feature of the illustrated structure is the return spring 79, which surrounds shaft 14 and connects to gear 17 and the cover plate 44 over the gears. When gear 17 turns to advance a stocking to the sewing machine the spring 79 is wound, and when the driving power is cut off the spring will unwind and return the clamp to inoperative position.

In using the device, the operator will draw an everted stocking 81 onto the inspection form until the open toe 82 reaches a datum mark 80 on the inspection form. The operator will then press a button, not shown. The form then advances, carrying the stocking between the open jaws of the clamp. As the form reaches its most forward position, a switch will energize solenoid 42 and move clamp jaws 12 and 20 toward one another to engage the stocking. At the same time, the guides 61 and 62 will move toward one another by the contraction of spring 73. When the clamp jaws grip the stocking, the inspection form will move back, leaving the stocking between the jaws and the projecting end 83 between the guide elements 64 and 65. Of course, as the inspection form moves out the jaws will close tighter, as will the guide elements. As the form draws out of the stocking, the operator will slip the stocking welt end over the inner vacuum tube 6 and within the outer vacuum tube 7, and vacuum is placed on the outer tube to hold the stocking taut during the toe-closing operation.

At this point in the operation, the drive means begins to move and the shaft 16 is rotated in a counterclockwise direction to move the clamp (and stocking) from the position shown in FIGURE 2. Shaft 16 rotates lower jaw 20, and jaw 20, through pin 54, rotates upper jaw 12. As the jaws move horizontally the stocking toe 84 is carried to the sewing machine, being advanced on an arc concentric to the curvature of the clamp jaws. As the stocking is centered on the clamping jaw, the seam 85 formed by the sewing machine will be symmetrical on opposite sides of the jaw center. When the clamp moves toward the sewing machine, the extended portion of the stocking will gradually slip out of the guides 61 and 62. However, before the trailing edge of the open toe leaves the guide, the leading edge will be upon the sewing machine and supported by the machine. After the clamp completes its advancing movement, the drive means is shut off and spring 79 returns the gears, and the clamp to inoperative position. When the clamp jaws are between the tabs 74 and 75 of the guide, the solenoid 42 is de-energized and the jaws open as previously described. When the jaws open, they spread the guide elements 61 and 62 so that the inspection form with a stocking in place may enter easily between the clamp jaws and guide members.

When the stocking toe is released by the clamp, it is placed in the inner vacuum tube 6, and the vacuum shifts from the outer to the inner tube. This will cause the stocking to evert, and to discharge from the machine.

What is claimed is:

1. In a stocking toe-closing machine of the type having a sewing machine to close the stocking toe, an inspection form to receive a stocking and move it into a position for toe closing and to retract it therefrom, and vacuum means to hold a stocking taut during toe-closing and to evert a stocking after toe-closing, the improvement which includes, means to hold a stocking open-toe and advance it into the sewing machine to form a French seam comprising, a clamp having upper and lower jaws positioned

on opposite sides of the plane of horizontal movement of the inspection form, means mounting the upper and lower jaws for movement toward and from one another and the plane of horizontal movement of the inspection form and for horizontal arcuate movement from a position overlying the inspection form when at the toe-closing position to and through the sewing machine, the jaw mounting means having a vertical pivot axis located in a vertical plane passing through the longitudinal centerline of the inspection form.

2. In a stocking toe-closing machine as claimed in claim 1 wherein, there are means to move the jaws toward and from one another, and means to swing the jaws arcuately about the pivot axis.

3. In a stocking toe-closing machine as claimed in claim 2 wherein, there are means separated from the jaws to support a length of the stocking open-toe protruding beyond said jaws in the plane of the closed jaws prior to stitching.

4. In a stocking toe-closing machine as claimed in claim 3 wherein, there are cooperating means on the jaws and supporting means to separate the supporting means when the jaws are moved away from one another.

5. In a stocking toe-closing machine as claimed in claim 1 wherein, the means mounting the lower jaw includes a rotatable shaft mounted on the machine below the horizontal plane of the inspection form, and a jaw arm carrying the lower jaw and slidably mounted on the shaft, and the means mounting the upper jaw includes a post mounted on the machine to one side of the inspection form, an overhanging arm slidably mounted on the post, depending shaft rotatably mounted in the overhanging arm having an axis of rotation coincident with the

axis of rotation of the shaft carrying the lower jaw, and a jaw arm carrying the upper jaw, means outside the area of travel of a stocking in the machine interconnecting the upper and lower jaws for simultaneous rotative movement, means to rotate the shaft carrying the lower jaw, and means for moving the jaws toward and from one another.

6. In a stocking toe-closing machine as claimed in claim 5 wherein, the means for moving the jaws toward and from one another include a lever pivotally mounted intermediate its length for swinging in a vertical plane, means operably associated with the ends of the lever and the respective jaw arms, whereby movement of the lever will cause opposite and simultaneous movement of the jaws.

7. In a stocking toe-closing machine as claimed in claim 6 wherein, there are means to swing the lever.

8. In a stocking toe-closing machine as claimed in claim 7 wherein, there are means to yieldably urge the upper jaw to upper release position.

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G. V. LARKIN, *Assistant Examiner.*

U.S. Cl. X.R.

112—27; 223—93, 112; 269—86