

Aug. 17, 1965

R. J. BOSER ET AL

3,200,779

BINDER FOLDER ATTACHMENT FOR SEWING MACHINES

Filed Dec. 18, 1963

6 Sheets-Sheet 1

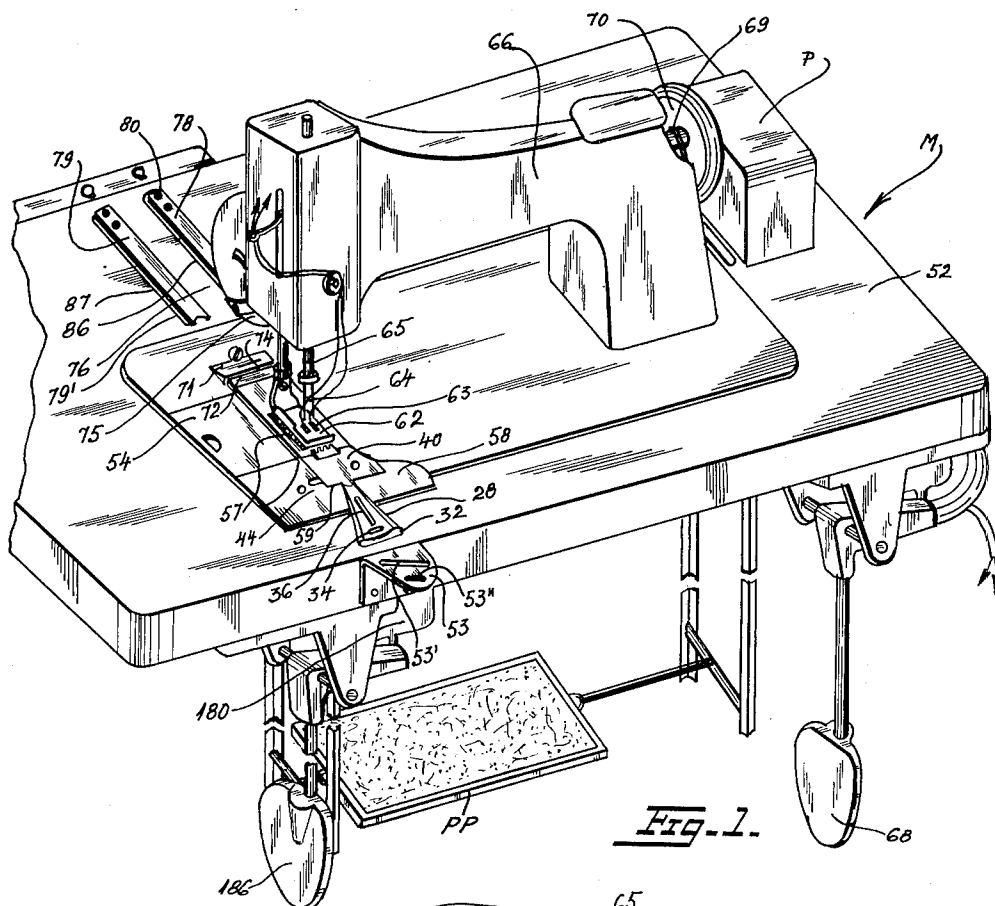


Fig. 1.

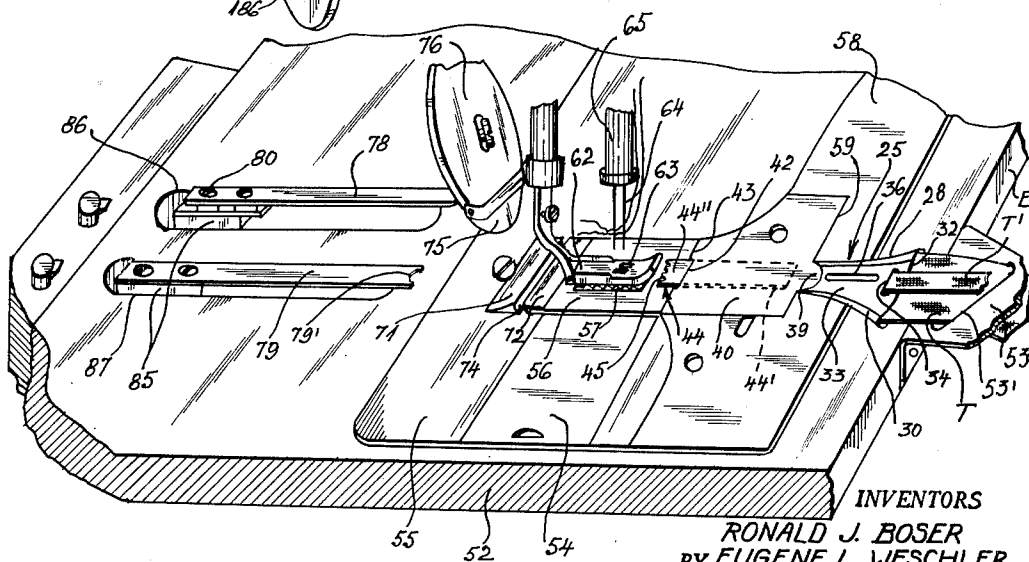
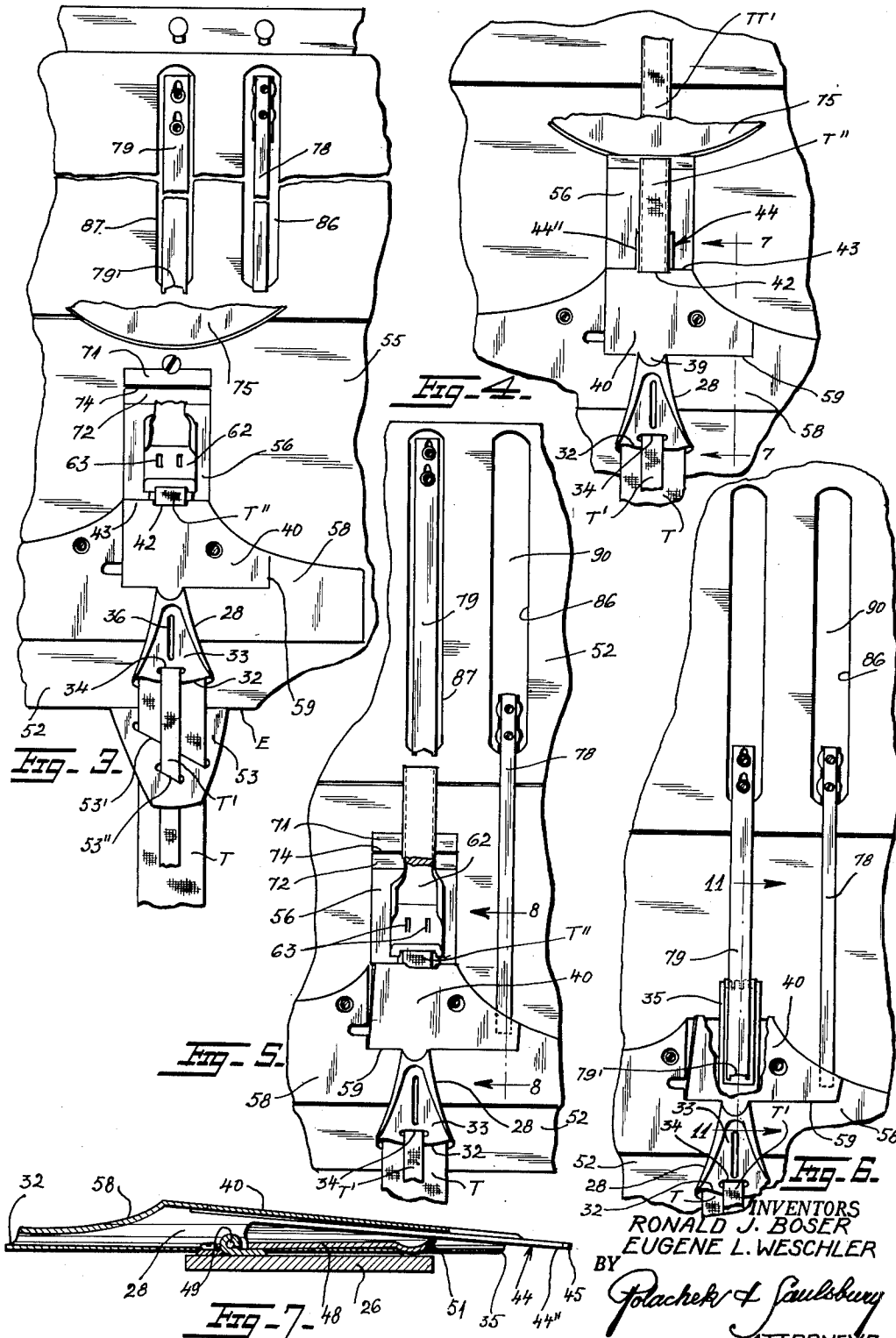


Fig. 2.

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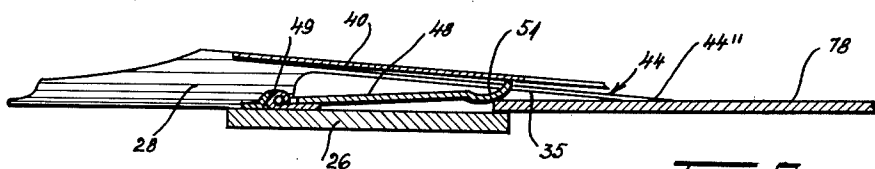


Fig. 8.

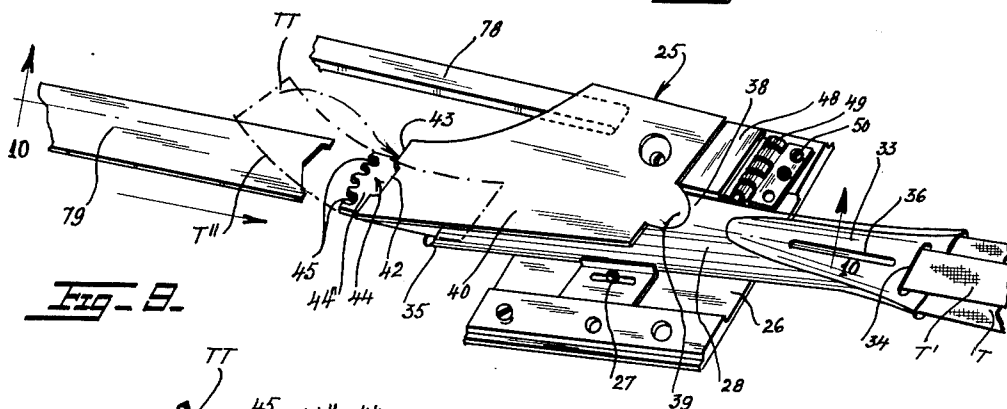


Fig. 9.

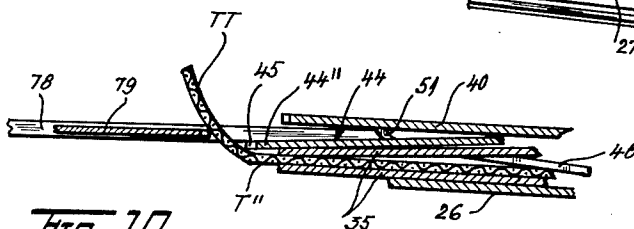


Fig. 10.

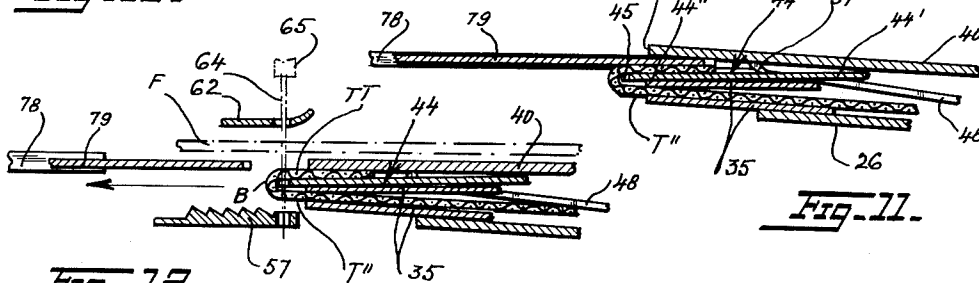


Fig. 11.

Fig. 12.

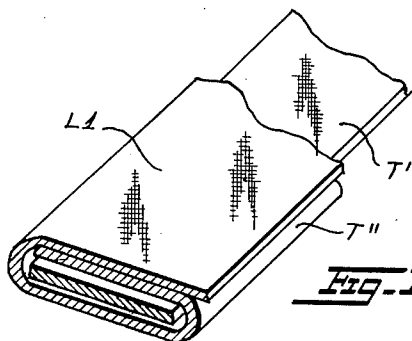


Fig. 19.

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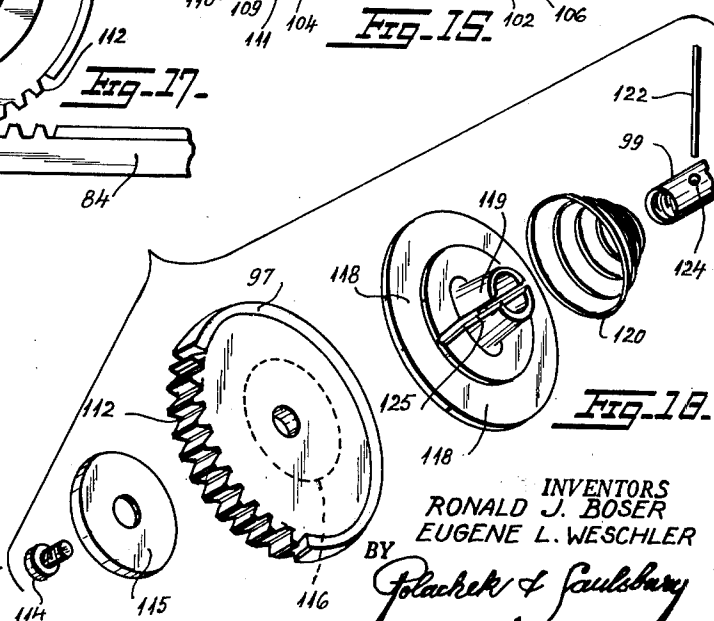
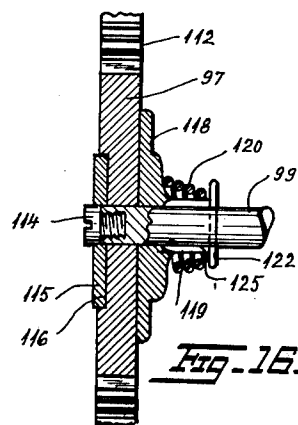
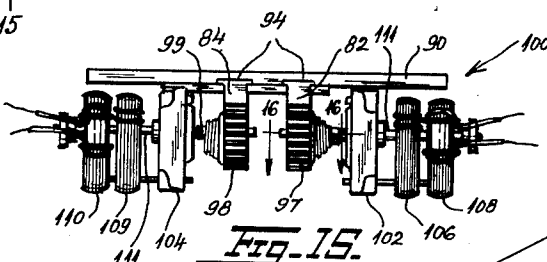
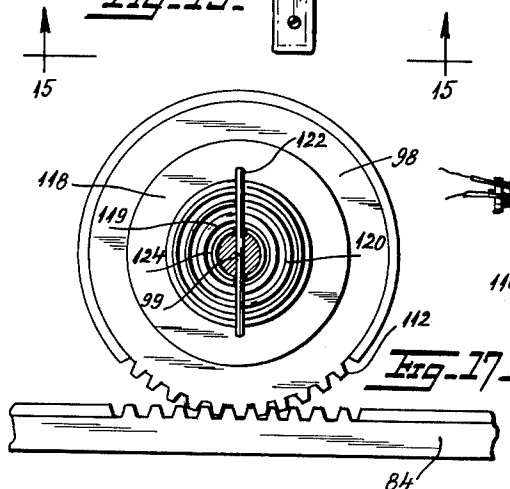
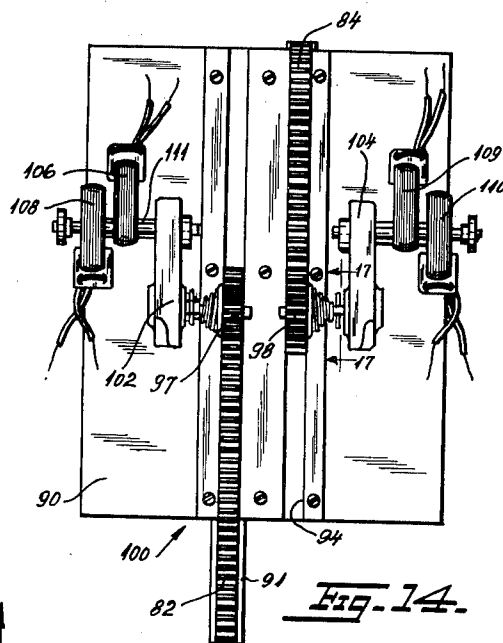
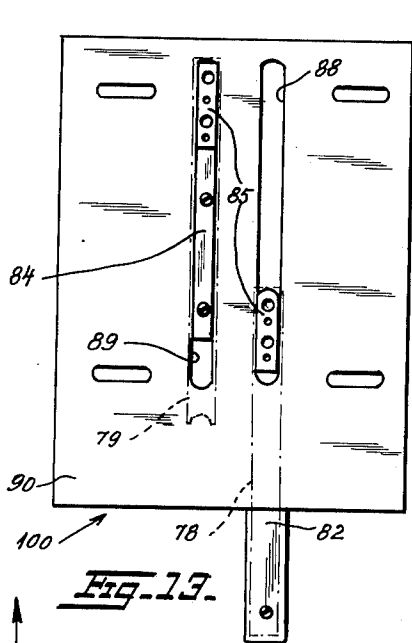
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BINDER FOLDER ATTACHMENT FOR SEWING MACHINES

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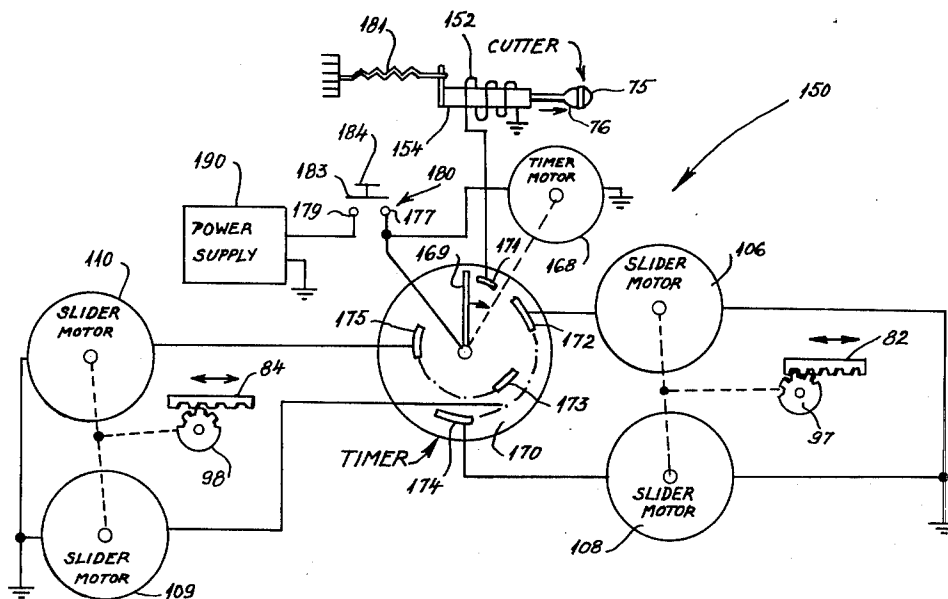
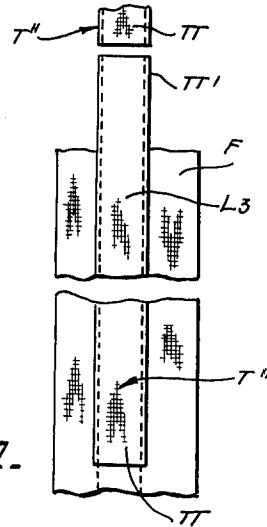
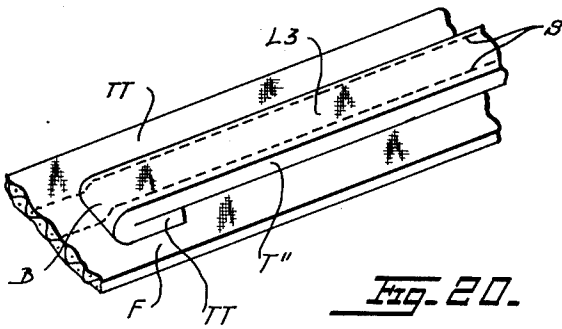
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BINDER FOLDER ATTACHMENT FOR SEWING MACHINES

Filed Dec. 18, 1963

6 Sheets-Sheet 5



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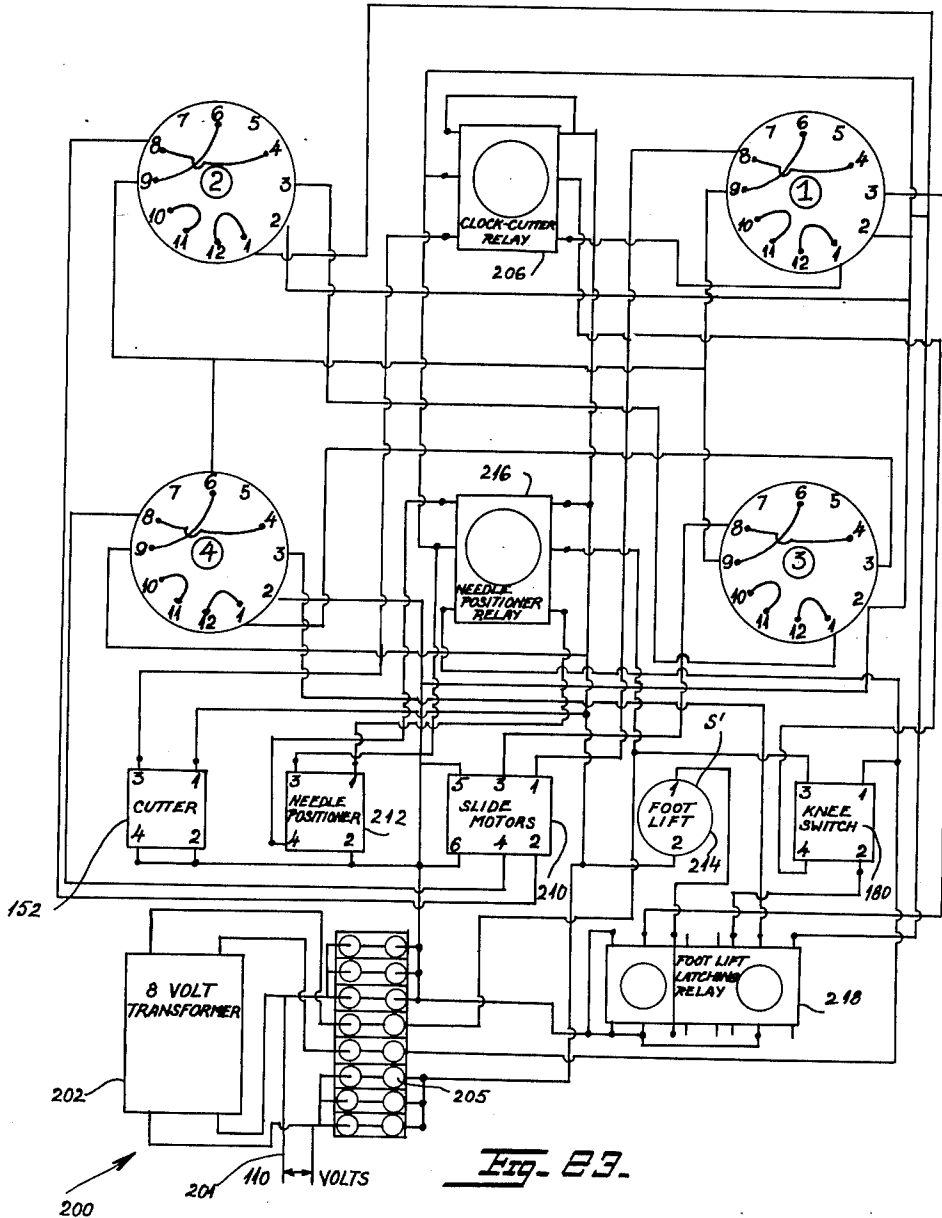
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BINDER FOLDER ATTACHMENT FOR SEWING MACHINES

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BINDER FOLDER ATTACHMENT FOR SEWING MACHINES

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Filed Dec. 18, 1963, Ser. No. 331,570
10 Claims. (Cl. 112—152)

This invention relates to sewing machine attachments, and more particularly concerns an attachment assembly for automatically forming flat tape to form tubing, for guiding the tubing as it is sewn to fabric, and for cutting the tubing after a length of tubing has been sewn to the fabric.

In use of the invention, a flat tape is fed to the attachment assembly which has a scroll portion to turn and fold the tape to form tubing. At the same time, another flat tape may be fed to the attachment assembly for enclosure in the tubing as a stiffener, thickener or reinforcement. The tubing is cut by an associated cutter to leave a free end. In the attachment assembly, the free end of the tubing is folded transversely. The attachment has a guide portion located under the needles of the sewing machine so that the folded end of the tubing can be sewn to an underlying fabric which is drawn through the machine. As the tubing is sewn to the underlying fabric and advances with the fabric, the flat tape or tapes are continuously passed through the scroll portion of the attachment and folded to tubular form. When sewing of a length of tubing to the fabric is completed the tubing is cut to leave the free end for starting another cycle of operation.

It is therefore one object of the invention to provide an attachment assembly for a sewing machine for continuously receiving and passing flat tape therethrough, the assembly including a scroll portion for turning and folding the flat tape to form tubing, and means for folding transversely and turning rearwardly a free end of the tubing.

Another object is to provide an attachment assembly as described wherein the transverse folding means includes an electrically operated plunger.

A further object is to provide an attachment assembly as described with an associated electrically operated cutter for severing the tubing.

Still another object is to provide an assembly as described with an automatic, cyclically operated electrical circuit for actuating the transverse folding means and cutter, the circuit being controllable by an operator of the sewing machine.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a perspective view of an attachment assembly embodying the invention mounted on a sewing machine.

FIG. 2 is an enlarged perspective view of parts of the attachment assembly and table of the sewing machine.

FIG. 3 is a top plan view of parts of the attachment assembly, other parts being broken away.

FIGS. 4-6 are plan views similar to a part of FIG. 3

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showing the assembly at different stages of operation thereof.

FIG. 7 is an enlarged, fragmentary sectional view taken on line 7—7 of FIG. 4.

FIG. 8 is an enlarged, fragmentary sectional view taken on line 8—8 of FIG. 5.

FIG. 9 is an enlarged perspective view of parts of the attachment assembly showing a stage of operation thereof.

FIG. 10 is a sectional view taken on line 10—10 of FIG. 9.

FIG. 11 is an enlarged sectional view taken on line 11—11 of FIG. 6.

FIG. 12 is a view similar to FIG. 11 showing a subsequent stage of operation of the assembly.

FIG. 13 is a top plan view of a slider mechanism forming part of the assembly.

FIG. 14 is a bottom plan view of the slider mechanism of FIG. 13.

FIG. 15 is an end view of the slider mechanism taken on line 15—15 of FIG. 13.

FIG. 16 is an enlarged fragmentary sectional view taken on line 16—16 of FIG. 15.

FIG. 17 is an enlarged fragmentary sectional view taken on line 17—17 of FIG. 14.

FIG. 18 is an exploded perspective view of parts of a gear assembly used in the slider mechanism of FIGS. 13-17.

FIG. 19 is a fragmentary enlarged perspective view of cloth tubing as formed in the attachment assembly.

FIG. 20 is a fragmentary perspective view in an inverted position of tubing as attached to a piece of fabric by an attachment assembly embodying the invention.

FIG. 21 is a bottom plan view of tubing attached to a piece of fabric, parts being broken away.

FIG. 22 is a schematic diagram of parts of an electric circuit and some associated mechanical parts employed in the invention.

FIG. 23 is a wiring diagram including the electric circuit of FIG. 22, for use with the attachment assembly.

Referring to the drawings, there is shown in FIGS. 1-12 a scroll and guide mechanism 25 forming part of the assembly. This mechanism includes a rectangular base plate 26 to which is secured by screws 27 an elongated tubular double scroll 28 of a known type; see FIG. 9. At its entrance end, the scroll has a tapered end portion 30 with a wide open end 32 into which a flat tape T is passed. The upper wall 33 of the end portion 30 has a transverse slot 34 into which can be passed a narrow tape T' which may serve as a filler or core for the tubing T'' which passes out of the narrow other end 35 of the scroll. A longitudinal slot 36 in upper wall 33 just beyond slot 34 permits tapes T and T' to be engaged by a tool for manually advancing the tapes into the scroll.

Secured to the upper central portion 38 of the scroll is end 39 of a thin pressure plate 40. The plate is formed with a notch 42 at its free end 43 to receive a folded free end TT of tubing T''. Plate 40 is flexible and overlays a flat finger 44 formed of a thin strip of metal. Finger 44 has one end 44' secured by welding or the like to scroll portion 38 just inwardly of end 39 of plate 40 and spaced slightly therefrom. The outer free end 43 of plate 40 normally overlays and presses down on finger 44. The outer free end 44'' of finger 44 extends beyond end 43 of plate 40 and is formed with notches 45. The folded end TT of tubing T'' overlays end 44'' of finger 44 and

underlays the end 43 of plate 40 during operation of the assembly as will be described.

A plate lifter 48 in the form of a narrow metal plate is secured at one end by a hinge 49 and screws 50 to base plate 26. The plate lifter 48 has a curved end 51 turned upwardly toward tapered end portion 40' of plate 40.

The mechanism 25 is mounted for use on table 52 of the sewing machine M at the forward end or edge E of the table. Tape guide plate 63 with diagonal slots 53', 53" may be mounted on edge E. Slide plate 54, bed plate 55, and dog plate 56 with feed dog 57 form conventional parts of the sewing machine. A plate 58 with cutout 59 to receive plate 40 is secured to the bed plate 55. The foot 62 of the sewing machine has two holes 63 through which reciprocate two vertical needles 64 carried by reciprocating shaft 65 on the head 66 of the machine. End 32 of scroll 28 located just inside of table edge E.

The machine M is provided with a needle positioner assembly P operated by a knee switch lever 68 under control of the operator of the machine for positioning the needles in an elevated position to clear the presser foot 62. The needle positioner forms no part of the present invention but is used during operation thereof. A suitable needle positioner may be provided as described in our co-pending application 315,822, filed October 14, 1963, and entitled Automatic Needle Positioner for Sewing Machine. The needle positioner elevates shaft 65 in response to actuation of lever 68, by turning shaft 69 on which the belt-driven pulley 70 is mounted. Shaft 69 is operatively connected to shaft 65 carrying needles 64.

Just inwardly of dog plate 56 are two stationary cutter plates or blades 71, 72 spaced apart to define a slot 74. A movable cutter blade 75 carried by a support 76 is disposed to enter slot 74 for cutting tubing T" which extends over the slot and blades 71, 72 during operation of the attachment assembly. The cutter support 76 is movably carried on head 66 at the rear thereof and is actuated by a solenoid which lowers support 76 and blade 75 during operation of the assembly to cut tubing T".

The assembly includes a slider mechanism 100 having horizontal, parallel bars 78, 79 located rearwardly of the cutter blade 71. At their rear ends, the bars 78, 79 are secured at their rear ends by screws 80 to movable rack gears 82, 84, respectively. The bars 78, 79 are removed from the rack gears 82, 84 (FIGS. 13-15) but are indicated by dotted lines therein. The rack gears have steps 85 extending through slots 86, 87 in the table 62; see FIGS. 1 and 2. The steps 85 also extend through slots 88, 89 formed in a base plate 90 for the slider mechanism 100. The rack gears 82, 84 have laterally extending flanges 91 engaged in grooves 94 formed in the underside of plate 90. The teeth 96 of the rack gears are engaged with spur gears 97, 98 carried on stub shafts 99 journaled in speed reducing bearing assemblies 102, 104. Pairs of motors 106, 108 and 109, 110 have shafts 111 associated with the respective bearing assemblies to drive the respective gears 97, 98.

FIGS. 14-18 show details of the gear mechanism. It will be noted that gears 97, 98 have teeth 112 extending only part way around the periphery of each gear. Each of gears 97, 98 is secured on stub shaft 99 by a screw 114 screwed into the end of the shaft and bearing on a spacer plate or washer 115 fitted in recess 116 in the outer side of the gear. A clutch and pressure plate 118 is provided on shaft 99. This plate has a conical, diametrically slotted sleeve 119 which receives shaft 99. Conical coil spring 120 fits on sleeve 119, and a locking pin 122 extends diametrically through a hole 124 in shaft 99 and through slots 125 in sleeve 119. By this arrangement, a slip clutch coupling is provided between shaft 99 and its associated gear 97 or 98.

The bar 78 is aligned with the upturned end 51 of plate lifter 48 and raises this end of lifter 48 when the bar 78 is advanced forwardly under the lifter. The bar 79 is aligned with finger 44 and is slightly elevated above the finger to

turn end TT of tubing T" over the end 44" of the finger when the bar 79 is advanced forwardly.

In FIGS. 19, 20 and 21 are shown tubing T" as formed in scroll 28 of the assembly. The tubing T" encloses tape core T' which extends longitudinally in tubing T". It will be noted that the tubing has two layers L1 and L2 overlapping tape T' while a single layer L3 of the tubing underlays the tape T'. The end TT of the tubing and core is folded over outer layer L1 and is sewn in place on fabric F by two lines of stitching S. In FIG. 9, the tubing is shown prior to stitching. In FIGS. 10, 11 and 12, the tubing T" is shown as having a single layered construction in order to simplify the drawings.

In FIG. 22 is shown schematically a circuit 150 which may be employed in the electrical system forming part of the attachment assembly. This circuit includes a solenoid 152 having a plunger 154 to which the support 76 for blade 75 is attached. When the solenoid is energized the plunger advances so that blade 75 can enter slot 74 between fixed blades 71, 72 to cut tubing T".

Rack gear 82 is shown engaged with gear 97 driven in one direction by motor 106 and in an opposite direction by motor 108. Rack gear 84 is engaged with gear 98 which is driven in one direction by motor 109 and in opposite direction by motor 110. A timing device is provided including a motor 168 driving an electrically conductive arm 169 around an insulation plate 170. On this plate are circumferentially spaced arcuate fixed contacts 171-175 contacted in turn by arm 169.

Contact 171 is connected to solenoid 168. Contact 172 is connected to motor 106. Contact 173 is connected to motor 109. Contact 174 is connected to motor 108. Contact 175 is connected to motor 110. Arm 169 is connected to contact 177 and switch 180. This contact is also connected to motor 168. Contact 179 of switch 180 is connected to a power supply 190. Plunger 154 is retracted by a spring 181 when the solenoid is deenergized. One terminal of each motor, the solenoid 152 and power supply 190 are connected in common to ground. The switch 180 has a shorting bar 183 which closes contacts 177, 179 when the button 184 is pressed. The switch 180 is closed by moving the knee lever 186 shown in FIG. 1, to the right.

In operating the apparatus described above, the operator inserts tape T through slot 53' of guide member 53 and inserts tape T' through slot 53". Then the tapes are threaded through open end 32 of scroll 28 and slot 34 in the upper side 33 of scroll 28. The curved side walls effect an overlapping of the lateral edges of the tape T' as the tapes are pushed through the scroll. The tubing T" formed in the scroll extends outwardly of the narrow end 35 of the scroll past end 44' of finger 44.

By moving lever 68 to the right, the switch 192 in circuit with needle position P is closed and the needles 64 are elevated above the presser foot 62. Suppose now that the operator moves knee lever 186 to the right to close switch 180. The motor 168 will be energized and solenoid 152 will first be energized as arm 169 rotates around to first contact 171. The blade 75 will be advanced downwardly to cut the free end of tubing T" at the slot 74 a predetermined distance from finger 44. Then the blade 75 will retract as arm 169 leaves contact 171 leaving tubing end TT projecting beyond finger 44. When arm 169 reaches contact 172, motor 106 will be energized and the gear 97 will be rotated to drive rack gear 82 and bar 78 forwardly. The forward end of bar 78 will contact the underside of end 51 of plate lifter 48 as shown in FIG. 8 and will pivot the lifter upwardly to elevate the end 43 of plate 40 from the end 44" of finger 44. As arm 169 leaves contact 172 motor 106 stops and the bar 78 remains in its forwardly extended position. Then arm 169 reaches contact 173 and motor 109 is energized to turn gear 98 and move gear 84 forwardly with bar 79. The forward end 79' of this bar is notched to engage the free end TT of tubing T" as indicated in FIG. 9 and FIG. 10.

As the bar 79 moves forward it turns the end TT over the notched end 44" of finger 44 and pushes this end of the tubing underneath the forward end 43 of plate 49 as shown in FIG. 11. Then arm 169 leaves contact 173 to stop motor 109 and reaches contact 174. This energizes motor 108 and gear 82 with bar 78 are retracted to release lifter 48 and lower plate 40. Then arm 169 leaves contact 174 to stop motor 108 and reaches contact 175. Motor 110 is energized to retract arm 79 leaving the free end TT of tubing T" engaged between the end of plate 43 and the end 44" of finger 44 as shown in FIG. 12. A hem with an edge or looped bight B of the tubing end TT is located at the notched end of finger 44. This completes the operating cycle of the attachment assembly.

A piece of fabric F may now be placed down on the table of the machine and moved under presser foot 62 where it will overlay the edge B of hem end TT of the tubing as shown in FIG. 12. The operator can now pivot the motor control pedal PP shown in FIG. 1 which operates the motor drive of the sewing machine M to reciprocate needles 64. The needles will pass through hole 57" in feed dog 57 and through notches 45 of finger 44 to sew two lines of stitching S shown in FIG. 21. The end TT of the tubing will be engaged between the body of the tubing and the underside of the fabric which is shown in an inverted position in FIGS. 20 and 21. The fabric will be drawn forwardly along with the tubing by operation of the feed dog 57 in conventional manner.

When sewing is completed, the operator will operate lever 63 to position the needles 64 in elevated position clear of presser foot 62. The rear end TT" of the tubing will extend beyond the fabric F as shown in FIG. 21. By actuation of lever 186 a new cycle of operation of the attachment assembly is initiated with blade 75 advancing to cut the end TT' of the tubing, releasing the sewn fabric and attached length of tubing, and leaving a free end TT to be folded under plate 40 in the manner described above.

FIG. 23 shows a wiring diagram of an electrical system 200 which includes circuit components described in connection with FIG. 22. Parts corresponding to those of circuit 150 of FIG. 22 are identically numbered. The power supply line 201 is connected to a transformer 202 which has an 8 volts output. All components are in circuit with a terminal board 204 having terminals 205. The cutter solenoid 152 is connected to the timer assembly 206 in circuit with the knee-operated switch 180 and motor assembly 210. The needle positioner motor 212, foot lift switch 214, needle positioner relay 216, and foot lift latch-relay 218 are all in circuit with the power supply.

The apparatus described makes possible forming of tubing from flat tape and attachment of the tubing to garments and fabrics at very high speed. Once the knee-operated switch 180 is actuated the cutting of the tubing and folding of the tubing end in a loop proceeds automatically. The attachment is readily installed in association with a conventional sewing machine. It is rugged in construction and capable of long, trouble-free service.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

1. A sewing machine attachment assembly for feeding tape to a sewing position and folding an end of the tape at said sewing position, comprising:

- a support mountable near said sewing position on the machine;
- a tubular member open at both ends for passing tape therethrough, said member being secured to said support;
- a flat finger secured at one end thereof to said tubular

member and extending at its other end beyond one end of the tubular member for engaging a folded free end of the tape;

a pressure plate secured at one end thereof to the tubular member and over said finger, and having a movable free other end overlaying said finger and spaced inwardly of said other end of the finger to engage the free end of the tape when folded over said other end of the finger;

a lifter member secured at one end to said support and having a movable other end disposed under said pressure plate for lifting said other end of the pressure plate off of the finger to enable insertion of the free end of the tape between said pressure plate and finger; another support mountable near said sewing position of the machine;

a pair of parallel bars slidably carried by said other support, one of said bars being alignable with said lifter member to lift the lifter member when said one bar is advanced, the other of said bars being alignable with said finger to enter between the finger and pressure plate for inserting the free end of the tape therebetween when said other bar is advanced;

and means for cyclically advancing said one bar to lift said lifter member and in turn lift said pressure plate, advancing the other bar to insert the free end of the tape between the finger and lifted pressure plate, retract the one bar from the lifter member, and retract the other bar from the finger and pressure plate, whereby the free end of the tape is held engaged between the finger and pressure plate, said free end of the tape being looped around the other end of the finger to form a hem so that an edge of the hem is exposed for sewing at said sewing position.

2. A sewing machine attachment assembly for feeding tape to a sewing position, cutting said tape transversely to leave a free end thereof, and folding said free end of the tape transversely to form a hem for sewing at said sewing position, comprising:

a support mountable near said sewing position on the machine;

a tubular member open at both ends for passing the tape therethrough, said member being secured to said support;

cutter means movably disposed near said tubular member for cutting the tape transversely to leave a predetermined length of tape extending beyond said tubular member to define said free end of the tape;

a flat finger secured at one end thereof to said tubular member and extending at its other end beyond one end of the tubular member for supporting the free end of the tape when folded over the said other end of the finger;

a pressure plate secured at one end thereof to the tubular member and over said finger, and having a movable free other end overlaying said finger and spaced inwardly of said other end of the finger to engage the free end of the tape when folded over said other end of the finger;

and a lifter member secured at one end to said support and having a movable other end disposed under said pressure plate for lifting said other end of the pressure plate off of the finger to enable insertion of the free end of the tape between said pressure plate and finger.

3. A sewing machine attachment assembly for feeding tape to a sewing position, cutting said tape transversely to leave a free end thereof, and folding said free end of the tape transversely to form a hem for sewing at said sewing position, comprising:

a support mountable near said sewing position on the machine;

a tubular member open at both ends for passing the tape therethrough, said member being secured to said support;

cutter means movably disposed near said tubular member for cutting the tape transversely to leave a predetermined length of tape extending beyond said tubular member to define said free end of the tape;

a flat finger secured at one end thereof to said tubular member and extending at its other end beyond one end of the tubular member for supporting the free end of the tape when folded over the said other end of the finger;

a lifter member secured at one end to said support and having a movable other end disposed under said pressure plate for lifting said other end of the pressure plate off of the finger to enable insertion of the free end of the tape between said pressure plate and finger;

another support mountable near said sewing position of the machine;

a pair of parallel bars slidably carried by said other support, one of said bars being alignable with said lifter member to lift the lifter member when said one bar is advanced, the other of said bars being alignable with said finger to enter between the finger and pressure plate for inserting the free end of the tape therebetween when said other bar is advanced;

and means for cyclically advancing said one bar to lift said lifter member and in turn lift said pressure plate, advancing the other bar to insert the free end of the tape between the finger and lifted pressure plate, retract the one bar from the lifter member, and retract the other bar from the finger and pressure plate, whereby the free end of the tape is held engaged between the finger and pressure plate, said free end of the tape being looped around the other end of the finger to form a hem so that an edge of the hem is exposed for sewing at said sewing position.

4. A sewing machine attachment assembly for feeding tape to a sewing position, cutting said tape transversely to leave a free end thereof, and folding said free end of the tape transversely to form a hem for sewing at said sewing position, comprising:

a support mountable near said sewing position on the machine;

a tubular member open at both ends for passing the tape therethrough, said member being secured to said support;

cutter means movably disposed near said tubular member for cutting the tape transversely to leave a predetermined length of tape extending beyond said tubular member to define said free end of the tape;

a flat finger secured at one end thereof to said tubular member and extending at its other end beyond one end of the tubular member for supporting the free end of the tape when folded over the said other end of the finger;

a lifter member secured at one end to said support and having a movable other end disposed under said pressure plate for lifting said other end of the pressure plate off of the finger to enable insertion of the free end of the tape between said pressure plate and finger;

another support mountable near said sewing position of the machine;

a pair of parallel bars slidably carried by said other support, one of said bars being alignable with said lifter member to lift the lifter member when said one bar is advanced, the other of said bars being alignable with said finger to enter between the finger and pressure plate for inserting the free end of the tape therebetween when said other bar is advanced;

and means for cyclically and in turn: advancing said cutter means to cut the tape and leave said free end, retracting said cutter means, advancing said one bar to lift said lifter member and in turn lift said pressure plate, advancing said other bar to insert the free end of the tape between the finger and lifted

pressure plate, retract the one bar from the lifter member, and retract the other bar from the finger and pressure plate, whereby the free end of the tape is held engaged between the finger and pressure plate, said free end of the tape being then looped around the other end of the finger to form a hem so that an edge of the hem is exposed for sewing at sewing position.

5. A sewing machine attachment assembly according to claim 4, wherein said tubular member includes a scroll for forming said tape into a tubing while passing through said tubular member.

6. A sewing machine attachment assembly according to claim 4, wherein said tubular member includes a scroll for forming said tape into a tubing while passing through said tubular member, and further includes a central passage for passing another tape therethrough for enclosure by said tubing while the two tapes pass through said tubular member.

7. A sewing machine attachment assembly for feeding tape to a sewing position and folding an end of the tape at said sewing position, comprising:

a support mountable near said sewing position on the machine;

a tubular member open at both ends for passing tape therethrough, said member being secured to said support;

a flat finger secured at one end thereof to said tubular member and extending at its other end beyond one end of the tubular member for engaging a folded free end of the tape;

a pressure plate secured at one end thereof to the tubular member and over said finger, and having a movable free other end overlaying said finger and spaced inwardly of said other end of the finger to engage the free end of the tape when folded over said other end of the finger;

and a lifter member secured at one end to said support and having a movable other end disposed under said pressure plate for lifting said other end of the pressure plate off of the finger to enable insertion of the free end of the tape between said pressure plate and finger;

said tubular member including a scroll for forming said tape into a tubing while passing through said tubular member, and further including a central passage for passing another tape therethrough for enclosure by said tubing while the two tapes pass through said tubular member.

8. A sewing machine attachment assembly according to claim 1, wherein the last-named means comprises:

motor means;

gear means operatively connecting said motor means and parallel bars;

timer means in circuit with said motor means for cyclically activating said motor means;

and switch means in circuit with said timer means for initiating and terminating energization of said timer means.

9. A sewing machine attachment assembly according to claim 2, wherein the last-named means comprises:

motor means;

gear means operatively connecting said motor means and parallel bars;

timer means in circuit with said motor means for cyclically activating said motor means;

and switch means in circuit with said timer means for initiating and terminating energization of said timer means.

10. A sewing machine attachment assembly according to claim 4, wherein the last-named means comprises:

solenoid means for advancing and retracting the cutter means;

motor means;

gear means operatively connecting said motor means and parallel bars;

timer means in circuit with said solenoid means and
motor means for cyclically activating said solenoid
means and motor means when said timer means is
energized;
and switch means in circuit with said timer means for
initiating and terminating energization of said timer
means.

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