

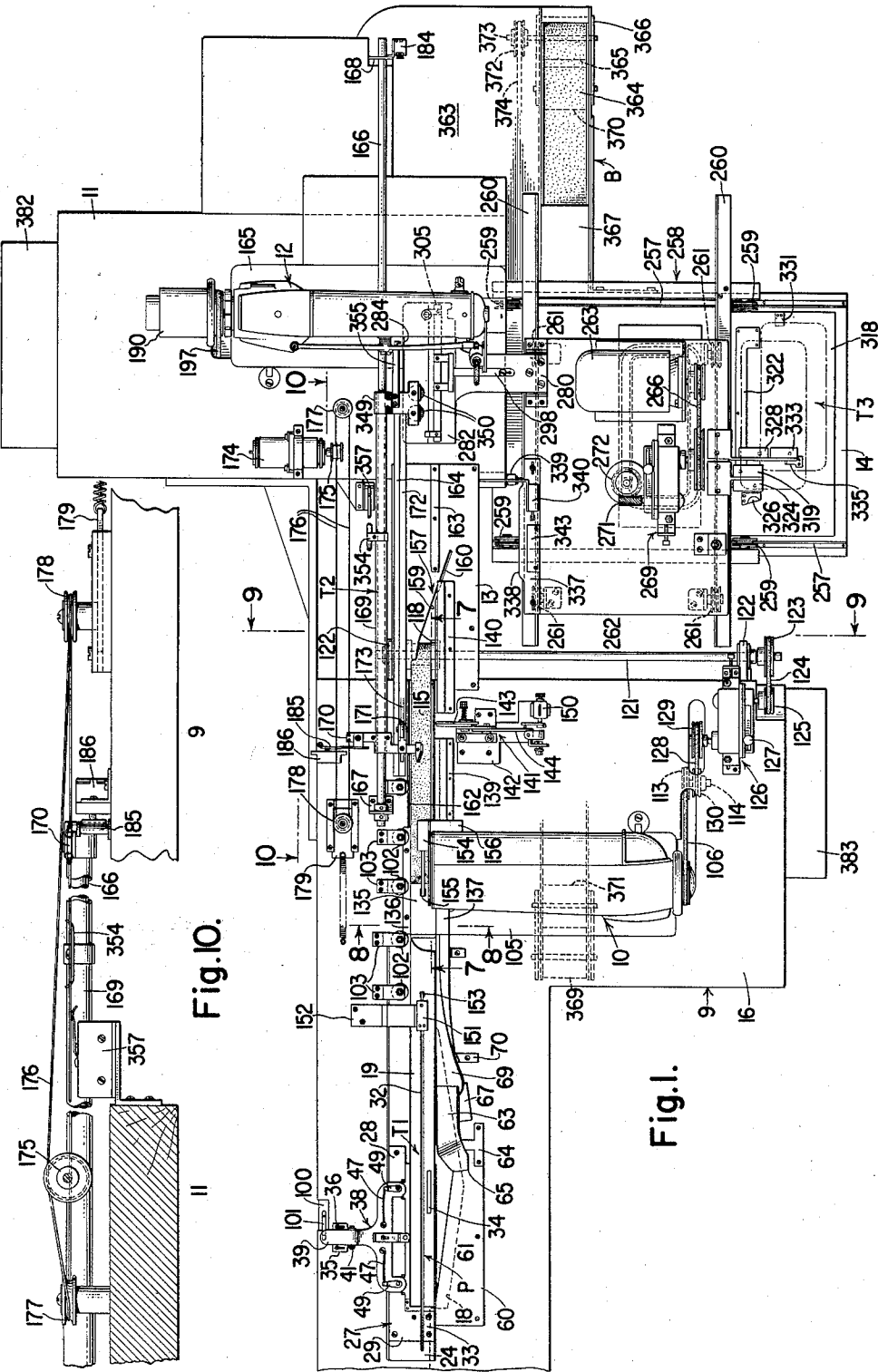
July 16, 1963

O. B. REID ETAL
AUTOMATIC SEWING UNITS

3,097,617

Filed May 26, 1958

12 Sheets-Sheet 1



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12 Sheets-Sheet 2

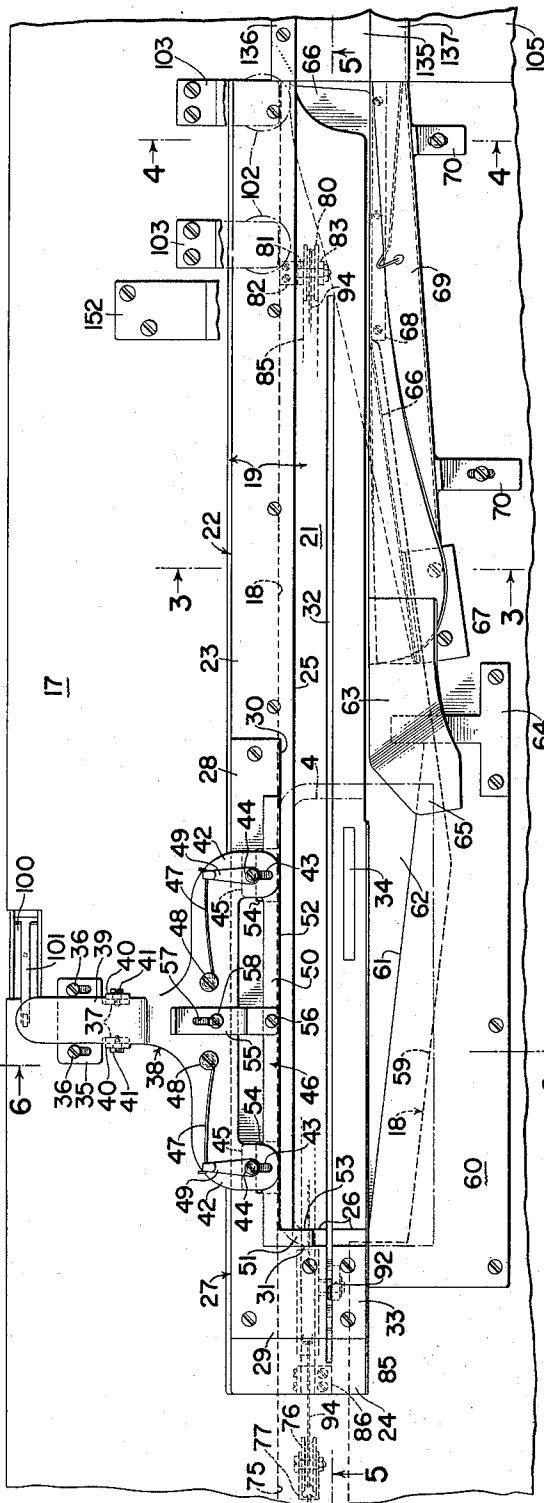


Fig. 2.

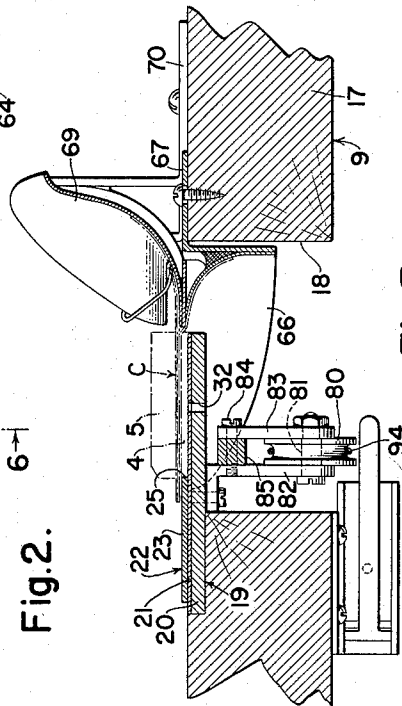


Fig. 3.

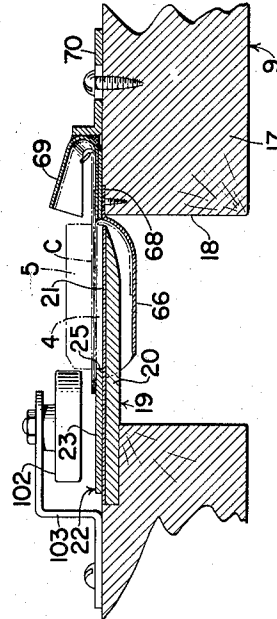


Fig. 4.

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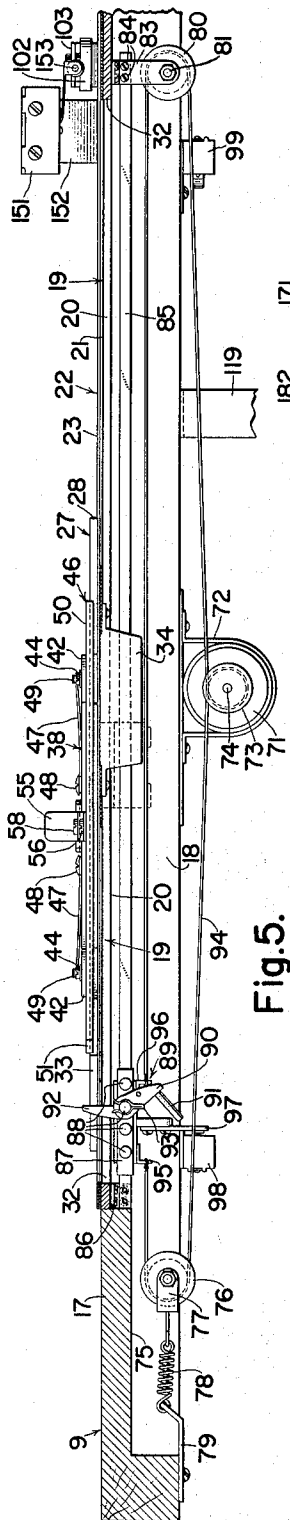


Fig. 5.

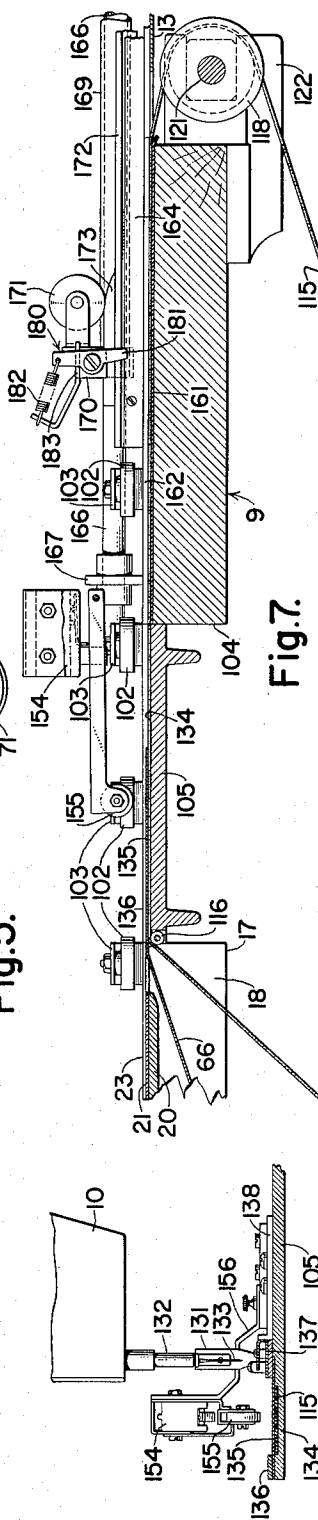


Fig. 7.

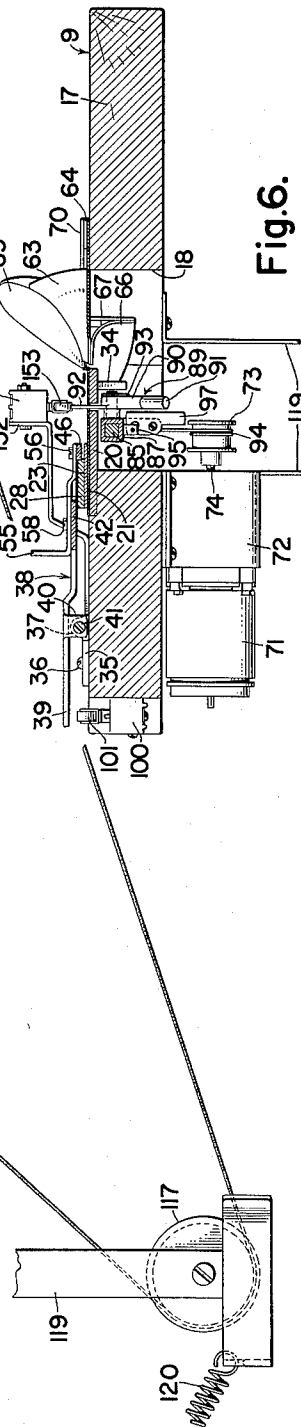


Fig. 6.

Fig. 8.

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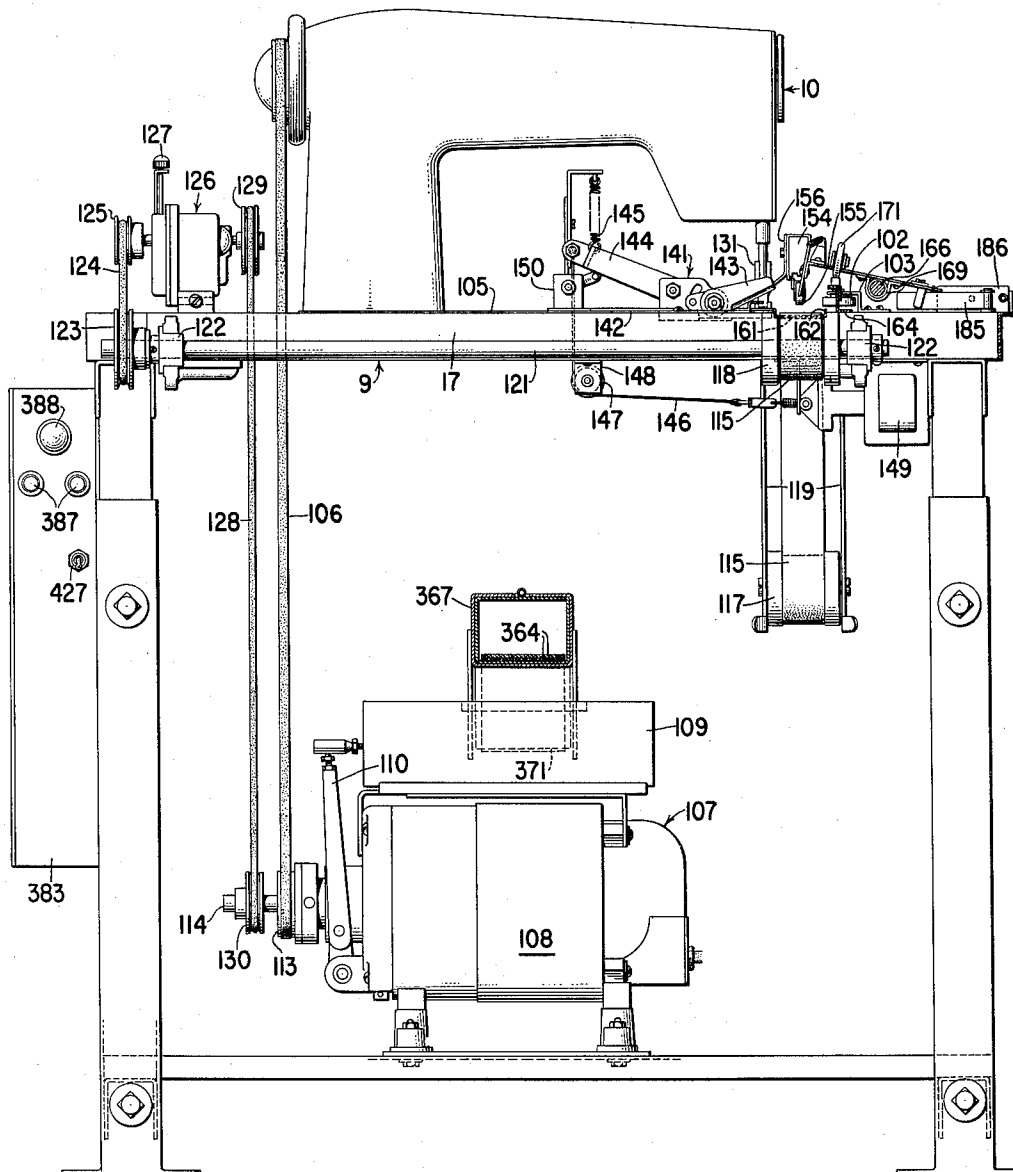
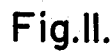


Fig. 9.

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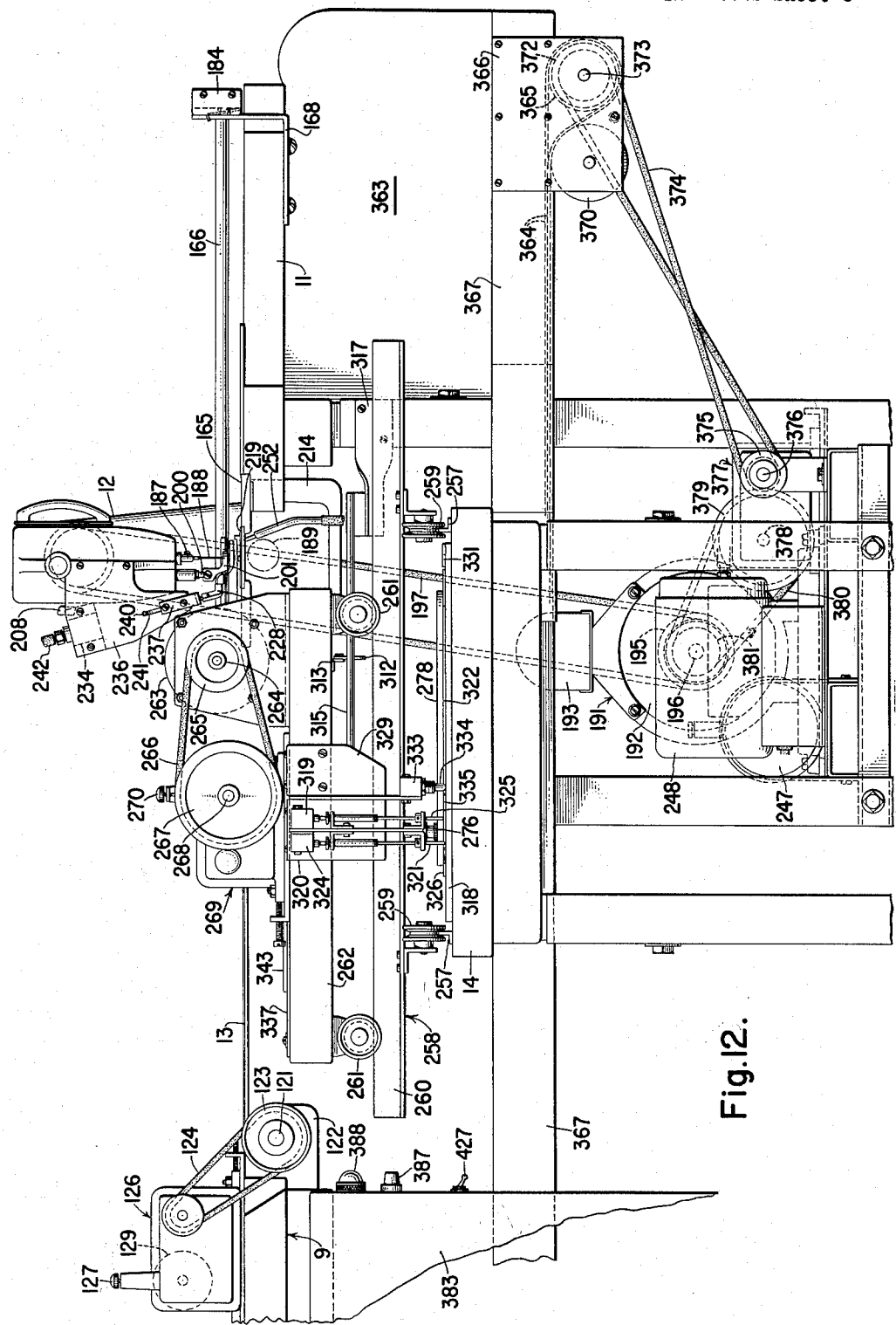


Fig. 12.

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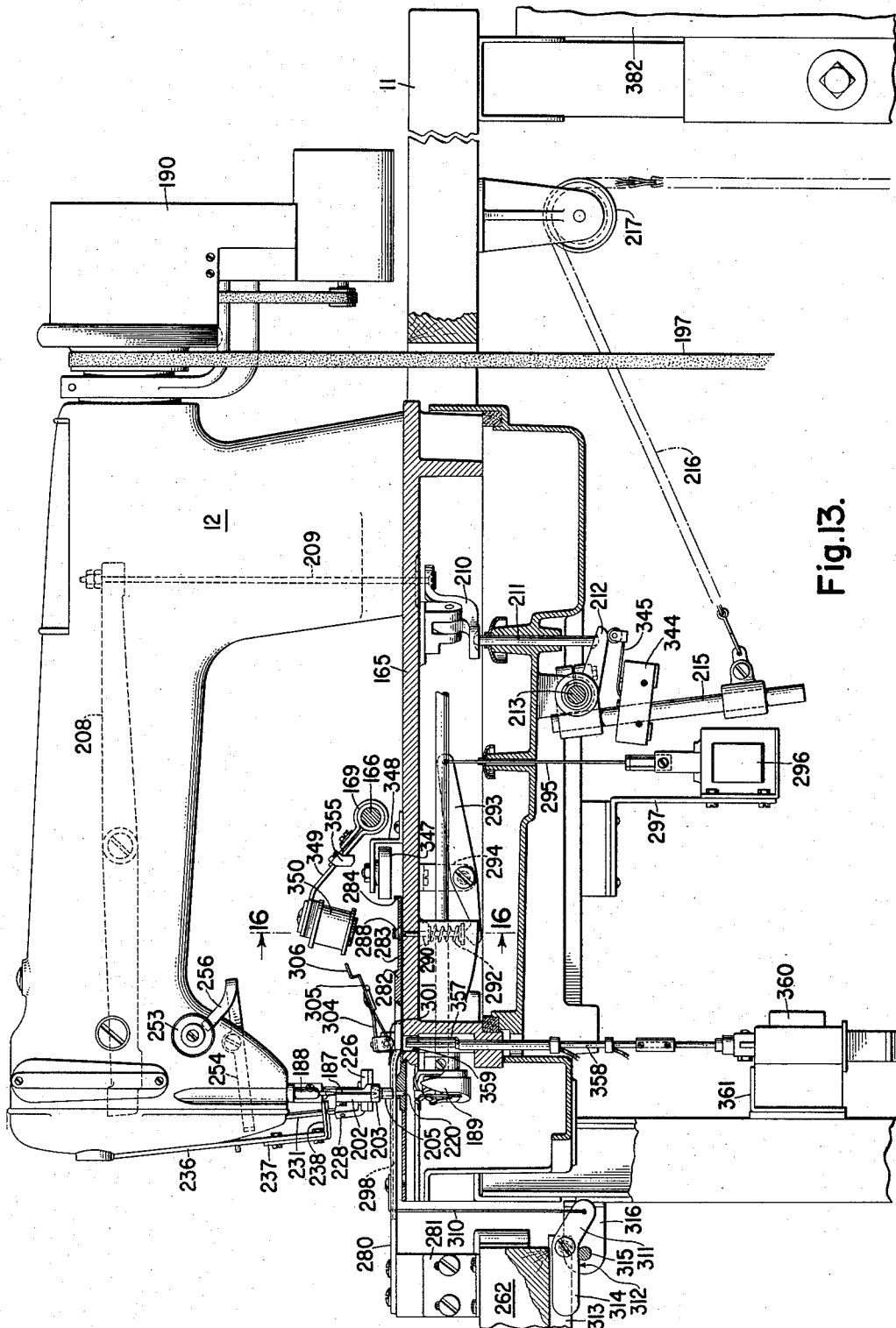


Fig. 13.

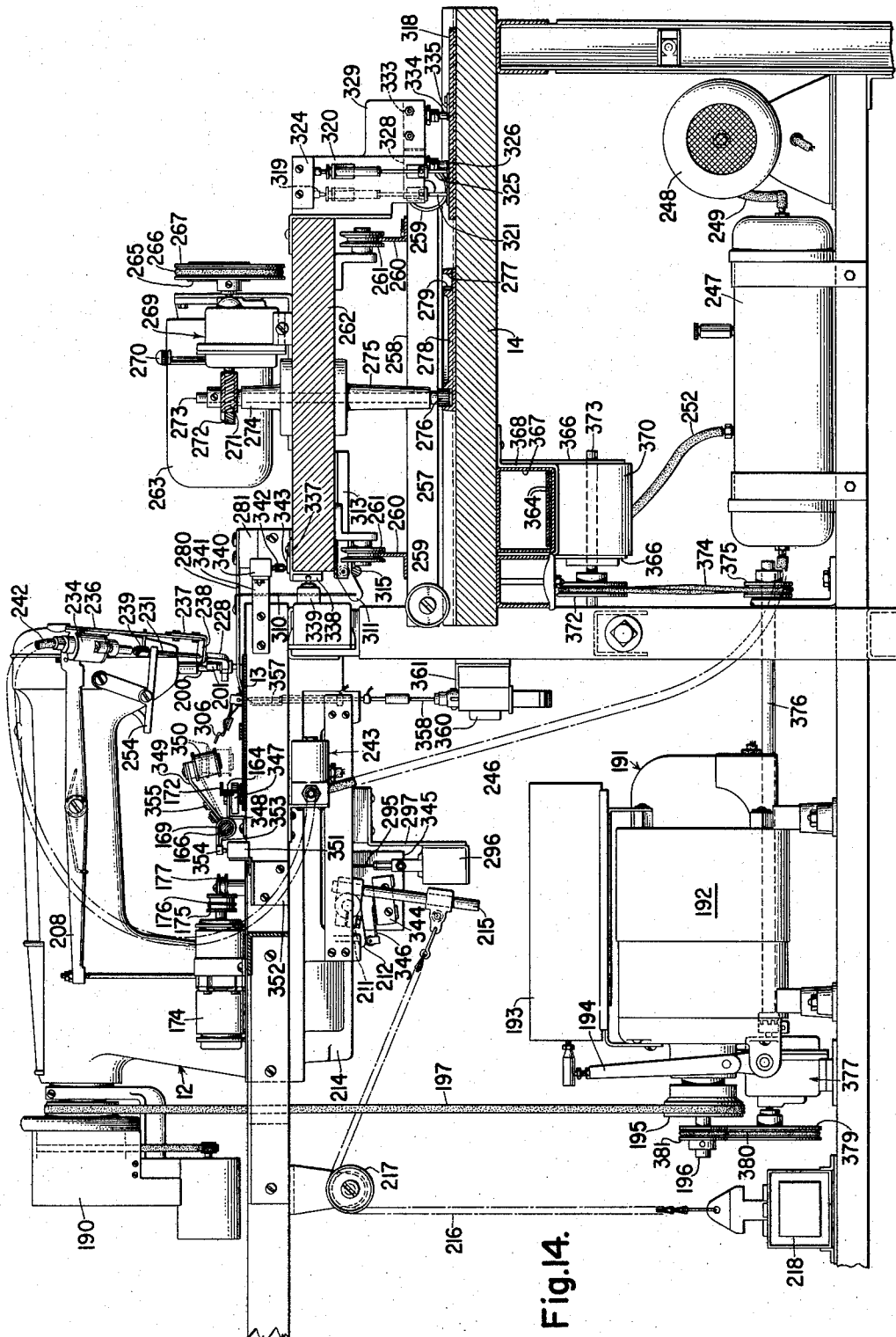
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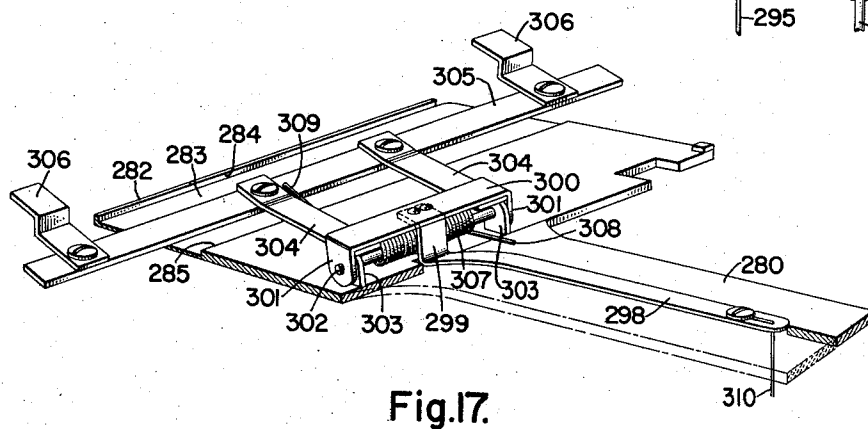
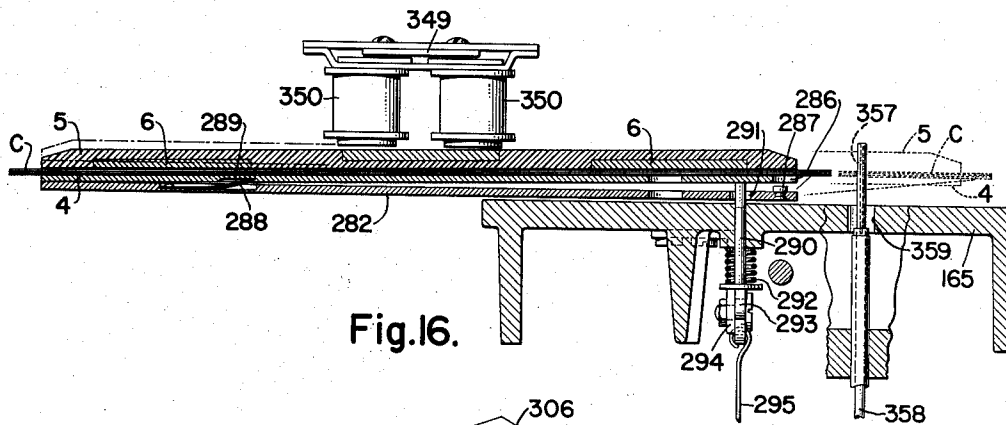
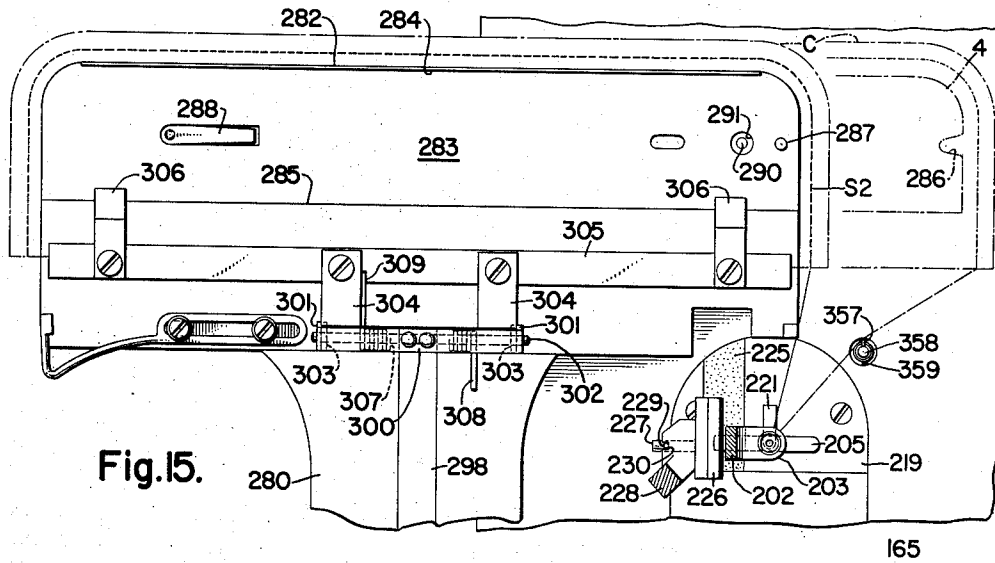
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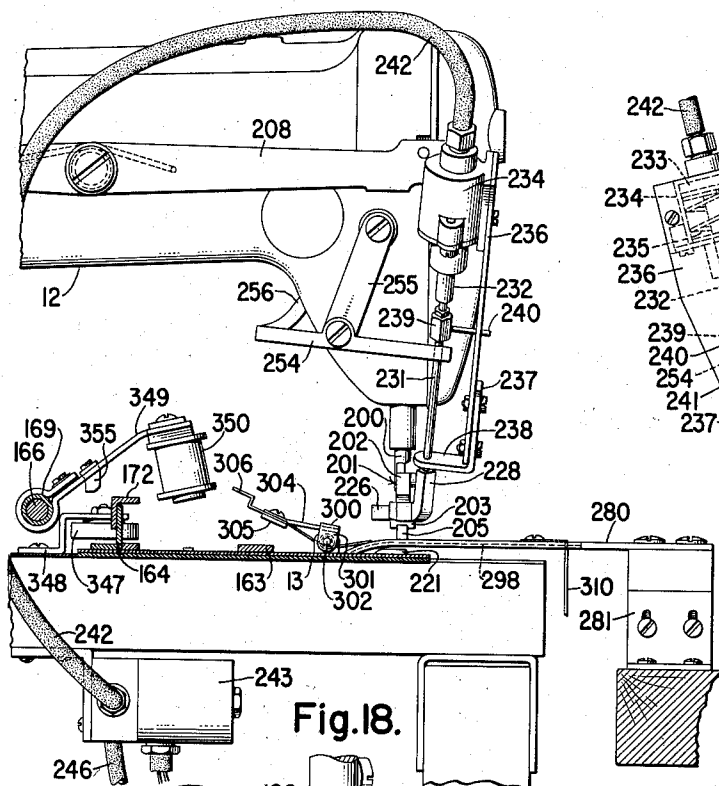


Fig. 18.

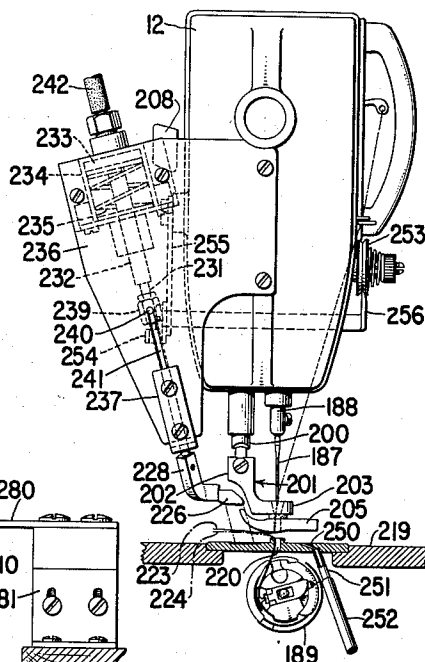


Fig. 19.

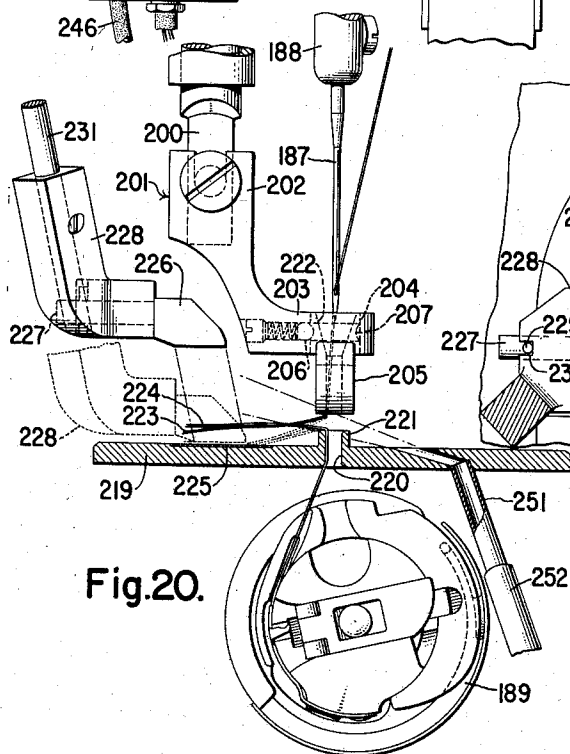


Fig. 20.

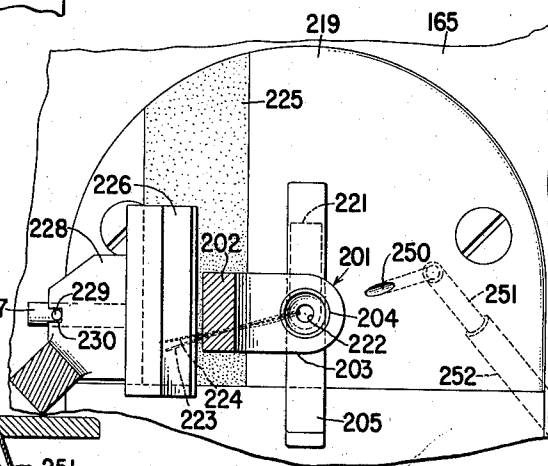


Fig. 21.

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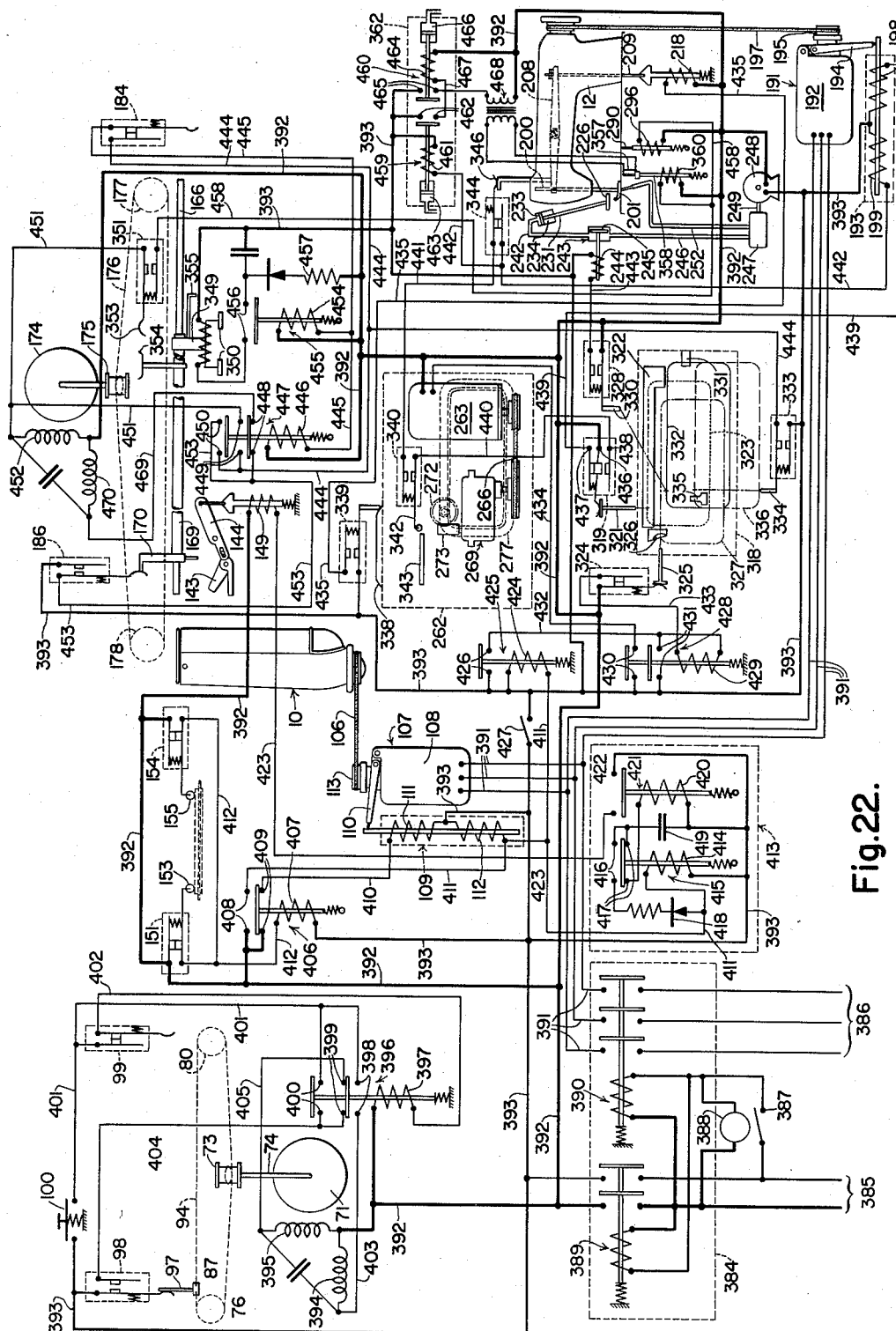


Fig.22:

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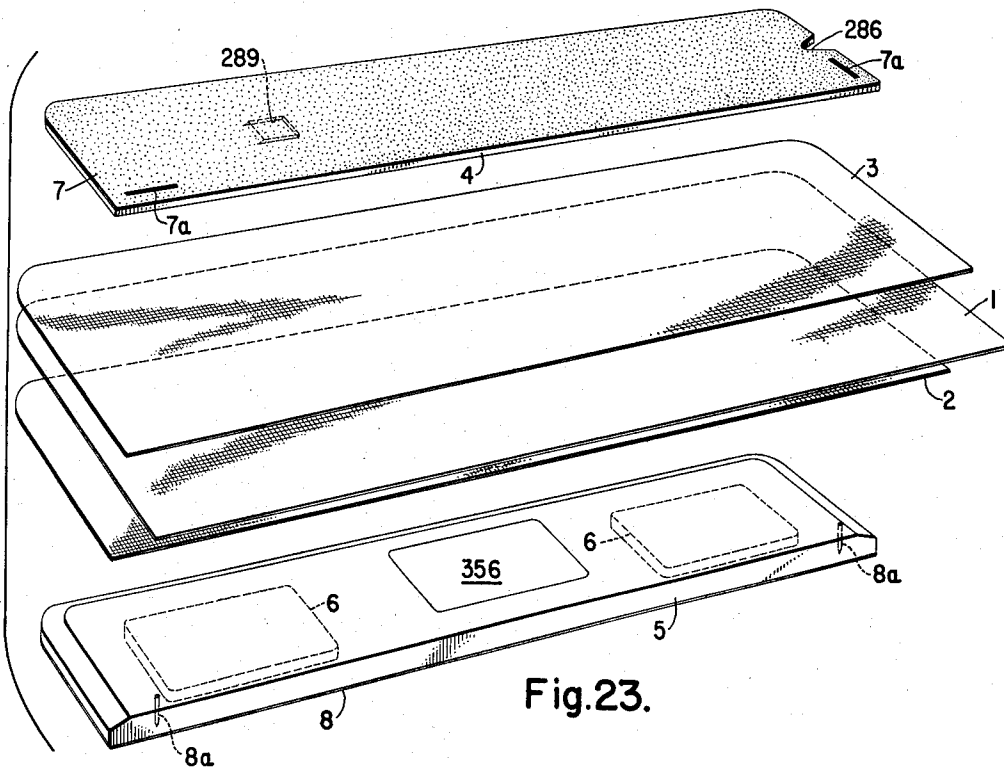


Fig.23.

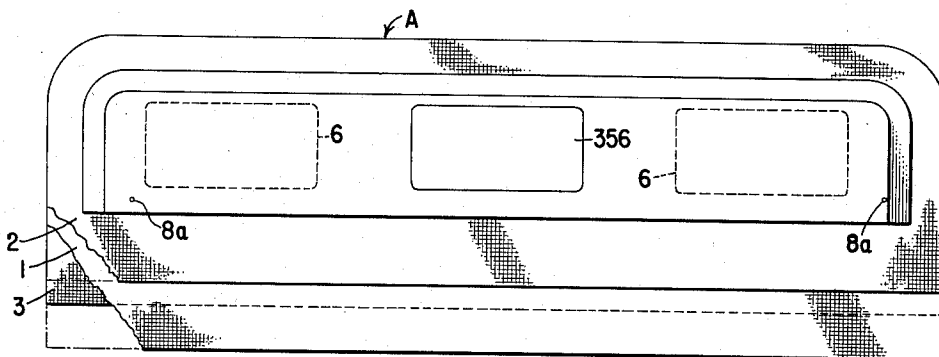


Fig.24.

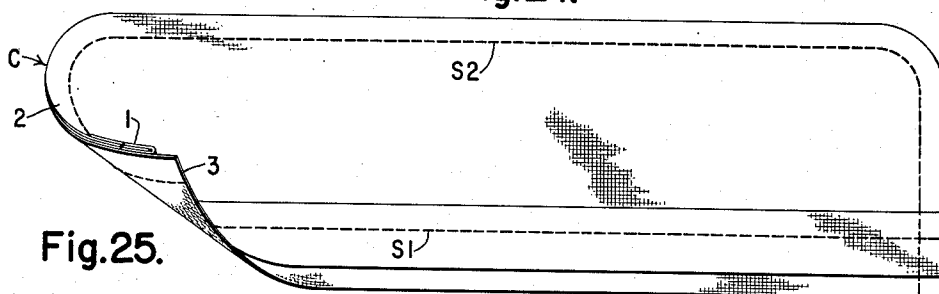


Fig.25.

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3,097,617

AUTOMATIC SEWING UNITS

Orland B. Reid, Kenilworth, John A. Herr, Garwood, and Edgar P. Turner and George J. Abel, Watchung, N.J., assignors to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey
Filed May 26, 1958, Ser. No. 737,775
18 Claims. (Cl. 112—2)

The present invention relates to sewing machines and particularly to an automatic sewing unit.

The quantity and the quality of the output that can be obtained with present-day sewing machines is heavily dependent upon the skill of the operator. For work having long straight runs, high quality work can be produced by a skilled operator running the machine at maximum speed. However, for work requiring a great deal of manipulation by the operator, for example, a shirt cuff which has short straight runs and requires turning the work between these runs, even a highly skilled operator cannot operate the machines at maximum speed and even then, has some difficulty producing uniformly high quality work. The primary object of this invention is to provide a machine which will decrease the manufacturing cost of a garment. To accomplish this end, there is provided in accordance with the present invention an automatically operating machine in which the sewing operation can be performed at higher sewing speeds, thus increasing the output of the operator without sacrificing quality. The machine in accordance with this invention is also designed to perform a succession of sewing operations, thus reducing the number of operators required. At the same time, since skilled operators are relatively highly paid, reducing the skill required of the operator will effect a further savings in the cost of the labor in the manufacture of the garment.

Generally, it is an object of this invention to provide a machine which, when loaded, will automatically perform a sewing operation on a work piece and also to provide such a machine which can be readily loaded by an inexperienced operator.

It is a further object of this invention to provide a machine adapted to accommodate a relatively large work piece such as a shirt cuff, which, when loaded and the operation thereof initiated, will automatically perform a sewing operation on the work piece to produce a seam of a predetermined configuration, and more particularly, to provide a traversing mechanism for feeding work relatively to the stitching mechanism of a sewing machine to produce a seam pattern and, further, which controlwise is interconnected with the sewing machine to provide an automatically operated unit.

It is a further object of this invention to provide an improved machine that will automatically perform a succession of sewing operations on a work piece.

Another object of this invention is to provide an improved work holding means for controlling a work piece as it is operated upon by a sewing machine.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

In the drawings:

FIG. 1 is a top plan view of a machine embodying the present invention.

FIG. 2 is a fragmentary plan view, on an enlarged scale,

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of that portion of the machine of FIG. 1 on which the work is loaded.

FIG. 3 is a fragmentary transverse vertical sectional view taken substantially on the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary transverse vertical sectional view taken substantially on the line 4—4 of FIG. 2.

FIG. 5 is a fragmentary longitudinal vertical sectional view taken substantially on the line 5—5 of FIG. 2.

FIG. 6 is a transverse vertical sectional view taken substantially on the line 6—6 of FIG. 2.

FIG. 7 is a fragmentary longitudinal vertical sectional view taken substantially on the line 7—7 of FIG. 1.

FIG. 8 is a fragmentary transverse vertical sectional view taken substantially on the line 8—8 of FIG. 1.

FIG. 9 is a transverse vertical sectional view taken substantially on the line 9—9 of FIG. 1.

FIG. 10 is a fragmentary longitudinal vertical sectional view taken substantially on the line 10—10 of FIG. 1.

FIG. 11 is a fragmentary plan view, on an enlarged scale, of that portion of the machine of FIG. 1 for performing the final sewing operation.

FIG. 12 is a front elevational view, on an enlarged scale, of that portion of the machine as illustrated in FIG. 11.

FIG. 13 is a fragmentary transverse vertical sectional view, on an enlarged scale, taken substantially on the line 13—13 of FIG. 11.

FIG. 14 is a transverse vertical sectional view taken substantially on the line 14—14 of FIG. 11.

FIG. 15 is a fragmentary detail sectional view illustrating the work holding means of the mechanism of the machine of FIG. 1 for performing the final sewing operation.

FIG. 16 is a fragmentary detail sectional view taken substantially on the line 16—16 of FIG. 13.

FIG. 17 is a fragmentary perspective view of the work holding means illustrated in FIG. 15.

FIG. 18 is a fragmentary transverse vertical sectional view taken substantially on the line 18—18 of FIG. 11.

FIG. 19 is a detail sectional view showing the head of the sewing machine as illustrated in FIG. 18.

FIG. 20 is a vertical detail sectional view at the point of stitch formation of the sewing machine illustrated in FIG. 18.

FIG. 21 is a horizontal detail section view at the point of stitch formation of the sewing machine illustrated in FIG. 18.

FIG. 22 is a circuit diagram of the machine illustrated in FIG. 1 with various mechanical components of the machine illustrated schematically.

FIG. 23 is an exploded perspective view of a work assembly as it is passed through the machine of FIG. 1.

FIG. 24 is a top plan view of the work assembly of FIG. 23.

FIG. 25 is a plan view illustrating the completed work piece sewed on the machine illustrated in FIG. 1.

The present invention is herein illustrated as embodied in a machine that is designed to perform two successive sewing operations on a three ply cuff for men's shirts. With reference to FIGS. 23, 24 and 25, the cuff comprises a facing 1, an interliner 2, and a backing 3. The precut pieces 1, 2 and 3 are delivered to the operator who assembles them and presents them to the machine for sewing. The pieces 1, 2 and 3 have substantially the same contour except that they are of different widths, the interliner 2 being the narrowest, the backing 3 being somewhat wider, and the facing 1 being the widest.

In assembling the cuff pieces 1, 2 and 3 for sewing, the backing 3 is placed on the bottom, the facing 1 is laid on top of it, and the interliner 2 is laid on top of the facing. In the initial sewing operation, the edge

of the facing 1 is folded over the edge of the interliner 2 and stitched to it by a line of stitches S1, FIG. 25. In the second sewing operation the pieces 1, 2 and 3 are stitched together along three sides by a line of stitches S2 which follows the contour of the edges of the pieces and is spaced inwardly thereof a short distance. At the completion of the operation of the illustrated embodiment of the machine, the cuff, designated C, appears as illustrated in FIG. 25. In subsequent operations, the cuff is inverted to place the interliner 2 between the facing and backing 3, a finish contour stitching similar to the line of stitches S2 is placed about three edges of the cuff, and the cuff is finally attached to the shirt. Since the cuff is subsequently inverted, when the pieces of the cuff are assembled, the finished faces of the facing 1 and backing 3 are juxtaposed so that upon being inverted, these faces will be on the outside.

During the sewing operation, the three pieces of the cuff are sandwiched between a bottom plate 4 and a top plate 5. The bottom plate 4 is of steel and the top plate 5 is of a composition material and has two permanent magnets 6 embedded in the ends thereof. To reduce the possibility of any relative motion between the plates and the cuff piece, the cloth engaging faces of the plates 4 and 5 are provided with a frictioning material 7 and 8 such as emery cloth and there are also provided pins 8a on the top plate 5 and apertures 7a in the plate 4 for receiving the pins 8a. The plates 4 and 5, which are substantially identical in outline, conform substantially to the outline of the cuff pieces but are somewhat smaller so that the edges thereof corresponding to the three edges of the cuff pieces sewed with the stitching S2 will lie inside of the edges of the cuff pieces to provide clearance for the stitching mechanism, and are considerably narrower than the cuff pieces to provide for manipulation of the edges of the cuff pieces in sewing the seam S1.

The cuff assembly, which is illustrated in FIG. 24 and is designated A, comprises the bottom plate 4, the backing 3 laid on the bottom plate 4 with the finished face up, the facing 1 which is laid on the backing 3 with the finished face down, the interliner 2, and the top plate 5. The cuff assembly A is firmly held together magnetically by the action between the magnets 6 and plate 4 and is held against slipping by the frictioning material 7 and 8 and pins 8a.

With reference to FIG. 1, the disclosed embodiment of the invention comprises an L-shaped table 9 upon which is mounted a first sewing machine 10, a table 11 upon which is mounted a second sewing machine 12, a bridge piece 13 between the tables 9 and 11, and a table 14 for supporting a traverse mechanism for the sewing machine 12. The tables 9, 11 and 14 are mounted upon legs extending upwardly from a common base, all of which is only incidentally disclosed in the drawings since the details of the supporting structure form no part of the present invention. It is sufficient to note that the tables 9 and 11 are of the same height to define a continuous horizontal and planar work surface and that all of the tables are rigidly connected together by the supporting structure.

To describe the overall machine briefly, the L-shaped table 9 includes a first leg 16 upon which the sewing machine 10 is mounted and a second leg 17 upon which is mounted a first traversing mechanism T1. The operator is stationed facing the leg 17 of the table 9 with the sewing machine 10 at her right. The operator assembles the cuff on the traverse mechanism T1 at a loading position P and then initiates operation of the machine. While the machine is operating through its cycle, the operator assembles another cuff at the loading position P, and upon completion of the one cycle, initiates the next cycle. The traversing mechanism T1 is designed to move the cuff assembly from the loading position P to the sewing machine 10, and includes guides for folding under the edge of the backing 3 to position it out of the

way for sewing the seam S1 and guides for folding the edge of the facing 1 over the edge of the interliner 2. Upon presentation of the cuff assembly A to the sewing machine 10, that machine is automatically started and runs through its sewing cycle, upon the termination of which it stops and actuates a cutter to sever the thread chain, to a previously sewed cuff assembly. There is a second traverse mechanism T2 extending from the discharge side of the sewing machine 10, across the bridge piece 13, and across the table 11. The traverse mechanism T2, when actuated, moves a previously sewed and severed cuff assembly from the sewing machine 10 to the sewing machine 12 and in so doing, passes it over a guide on the bridge piece 13 to straighten the under folded edge of the backing 3. At the same time, the traverse mechanism T2 removes a finally completed cuff from the sewing machine 12 and drops it onto a belt mechanism B for returning it to the operator. Associated with the sewing machine 12 is a third traversing mechanism T3 mounted on the table 14 which moves the work relative to the sewing machine 12 for sewing the seam S2 and which controls the operation of the machine 12, the presser lifter mechanism, and the thread chain cutter.

First Traverse Mechanism

With reference to FIGS. 2-6, in the top of the leg 17 of the table 9 there is provided an elongated slot 18. As best seen in FIGS. 3, 4 and 6, a composite first plate 19, which consists of a support plate 20 having a coincident steel wear plate 21 fastened to the upper surface thereof, is set into the top of the table 9 along the rear edge of the slot 18 and overhangs the slot 18 with the front edge of the plate 19 being spaced from the front edge of the slot 18. As seen in FIG. 2, a second plate 22 is secured on top of the plate 19. The plate 22 is L-shaped, having an elongated leg 23 that is narrower than the plate 19 and arranged along the rear edge thereof and a short leg 24 at the left end that is substantially equal to the width of the plate 20. The plate 22 has an appreciable thickness so that it will extend above the top surface of the plate 19 and the inside edge 25 of the leg 23 and inside edge 26 of the leg 24 will define guide edges. A third plate 27 is secured to the top of the plate 19. The plate 27 is also L-shaped, having an elongated leg 28 that is narrower than the leg 23 of the plate 22 and arranged along the rear edge thereof and a short leg 29 at the left end. The plate 27 also has appreciable thickness so that the inside edge 30 of the leg 28 and the inside edge 31 of the leg 29 define guide edges. There is provided a narrow elongated slot 32 running longitudinally of the first plate 19 and arranged longitudinally of the slot 18 in the table 9. The slot 32 runs for almost the entire length of the plate 19 and into the leg 24 of the plate 22. The short leg 29 of the plate 27 terminates at the slot 32 and there is provided a piece 33 on the opposite side of the slot 32 which forms a continuation of the leg 29 to extend it and the guide edge 31 to substantially the width of the plate 19 and the leg 24 of the plate 22.

When the cuff assembly A is loaded, the bottom plate 4 is laid on the plate 19 against the guide edges 25 and 26 of the plate 22 and is held in position by a magnet 34 secured to the underside of the plate 19. The difference in the width of the plate 19 and the leg 23 of the plate 22 is made to be substantially equal to the width of the plate 4. The plate 4 and the plate 22 are of substantially the same thickness so that they will define a continuous planar surface. The cuff pieces are then loaded on top of the plate 4 against the guide edges 30 and 31 of the plate 27, the backing 3 being loaded first, then the facing 1, and finally the interliner 2. The top plate 5 of the cuff assembly, the outline of which substantially coincides with that of the bottom plate 4, is finally loaded in superposed relation to the bottom plate 4, thus magnetically locking the cuff assembly together. The magnet 34 holds the plate 4 and

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thus counteracts the effect of the magnets 6 in the plate 5 to facilitate loading.

To provide a guide to facilitate locating the top plate 5 of the cuff assembly A in exact alignment with the bottom plate 4, there is provided a bracket 35 secured to the top of the table 9 by screws 36. The bracket 35 has a pair of upstanding ears 37 to which is pivotally mounted a yoke or lever 38 having a rearwardly extending arm 39 including downturned ears 40 that are secured to the ears 37 by pivot screws 41. The lever 38 includes a pair of spaced forwardly extending arms 42 having elongated slots 43 that slidably receive studs 44 in the form of shouldered screws having heads overlying the arms 42 and threaded into rearwardly extending lugs 45 on an L-shaped bar 46. The bar 46 is biased rearwardly relatively to the lever 38 by wire springs 47 secured at one end to the lever 38 and having a free end that engages against a hook shaped end of a sheet metal element 49 cooperating with the studs 44. The bar 46 has an elongated leg 50 and a short leg 51. The inside edge 52 of the elongated leg 50 and the inside edge 53 of the short leg 51 comprise guide edges. The width of the legs 50 and 51 is made equal to the spacing between the guide edges 25 and 26 of the plate 22 and the guide edges 30 and 31 of the plate 27 so that when the bar 46 is pulled forwardly relative to the lever 38 and lowered onto the plate 22, the guide edges 52 and 53 will be aligned with the guide edges 25 and 26. The plate 27 is provided with cutouts 54 to accommodate the lugs 45 of the bar 46 to permit it to be lowered into engagement with the plate 27. To provide for sliding the bar 46 relative to the lever 38, there is provided a handle 55 secured to the bar 46 by a screw 56 and having an elongated slot 57 that slidably receives a headed stud 58 mounted upon the lever 38.

When the bottom plate 4 of the cuff assembly A and the cuff pieces 1, 2 and 3 are laid in position, the bar 46 by means of the handle 55 is moved forwardly relative to the lever 38 and lowered by pivoting the lever 38 to sandwich the edges of the cuff pieces between the bar 46 and the plate 22. When the handle 55 is released, the springs 47 will retract the bar 46 into engagement with the guide edge 30 of the plate 28, thus aligning the guide edge 52 of the bar 46 and the guide edge 25 of the plate 28. The top plate 5 of the cuff assembly A is then loaded against the guide edges 52 and 53 of the bar 46.

Opposite the lever 38, the slot 18 is enlarged laterally, as at 59. A plate 60 is secured to the top of the table 9 overlying a portion of the slot enlargement 59 and having a rear edge 61 that is tapered away from the plate 19 to expose the front edge of the plate 19 and to provide an opening 62. At the right end of the plate 60 there is provided a separator plate 63 having a bracket 64 for securing it to the top of the table 9. The receiving end 65 of the separator plate 63 overlaps with the corner of the cuff assembly A in the loading position, as indicated in phantom lines in FIG. 2, and is bent downwardly. When the cuff assembly A is loaded, the corner of the bottom ply, which is the backing 3, is pushed down through the opening 62 underneath the end 65 of the plate 63 and the corners of the top two plies, which are the interliner 2 and facing 1, are laid on top of the end 65 of the plate 63. To the right of the plate 63 a folding guide 66 having brackets 67 and 68 for mounting it on the table 9 is disposed in the slot 18 beneath the plate 19. A second folding guide 69 having a pair of brackets 70 for mounting it on the table 9 is disposed on top of the table in front of the plate 19. The bottom folding guide 66 is designed to receive the bottom ply of the cuff from the separator plate 63 and to fold it downwardly and back sharply about the edge of the bottom plate 4 of the cuff assembly and beneath the plate 19 as seen in FIGS. 3 and 4. The top folding guide 69 is designed to receive the top two plies of the cuff from the separator plate 63 and to fold the edge of the center ply, which is the facing 1, about the edges of the top ply, which is the interliner 2. The bottom

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ply is folded back sufficiently by the guide 66 so that the fold edge thereof will be clear of the folded edge of the facing 1 and the edge of the interliner 2 in the area of the line of stitches 51, so that in the first sewing operation only the top two plies will be sewed.

To move the cuff assembly A from the loading position P to the first sewing machine, there is a reversible induction type electric motor 71, FIGS. 5 and 6, secured to the underside of the table 9 by a strap 72 and having a pulley 73 mounted upon the drive shaft 74 thereof. At the left end of the slot 18 there is provided a cut out 75 in the underside of the table 9 that communicates with the slot 18. Mounted in the cut out 75 is a pulley 76 journaled on a yoke 77 that is connected by a spring 78 to a bracket 79 secured on the underside of the table 9. At the right end of the slot 18 there is provided a pulley 80, FIGS. 3 and 5, journaled on a shaft 81 which is carried by a bracket 82 secured to the underside of the table 9 and an arm 83 that is secured to the bracket 82 by a screw 84, the arm 83 being held in spaced relation relatively to the bracket 82 by and at the same time supporting one end of a guide rod 85 that is square in cross section, FIG. 6. The guide rod 85 is disposed parallel to the slot 32 in the plate 19 and at the other end is supported by the plate 19 by means of a bracket 86 secured to the underside of the plate. Mounted on the rod 85 is a slide 87 having a bore corresponding in shape to the cross section of the rod 85 to prevent turning of the slide 87 on the rod 85 while permitting of the same longitudinally of the rod 85. The slide 87 has a plurality of lateral studs 88 upon a selected one of which is pivotally mounted a lever 89 having a depending lever arm 90 carrying a weight 91 and an upstanding finger 92 that extends upwardly through the slot 32 in the plate 19. The lever 89 is held on the stud 88 by a snap pin 93 and is free to pivot clockwise as seen in FIG. 5 but is limited to a stop position in counterclockwise pivoting by the fact that the lever arm 90 engages the adjacent one of the studs 88. The particular stud on which the lever 89 is mounted is determined in accordance with the length of the cuff being sewed. A string belt 94 is wound around the pulley 73 of the motor 71, and is entrained about the pulleys 76 and 80 with the ends of the belt being secured to brackets 95 and 96 which are secured to the slide 87.

Depending from the slide 87 is an arm 97 that is adapted to actuate a switch 98, FIGS. 5 and 6, at the left end of the stroke of the slide 87 and a switch 99 at the opposite end of the stroke. A starting switch 100 having an actuating arm 101 is mounted on the table 9 with the arm 101 directly beneath the arm 39 of the lever 38.

When the operator has finished loading a cuff, the arm 39 of the lever 38 is depressed which raises the bar 46 to permit the springs 47 to retract the same into a position on top of the plate 27, thus clearing the loading position for loading the next cuff. At the same time, the starting switch 100 is actuated to start the motor 71 forward which, through the belt 94, moves the slide 87 to the right in FIG. 5. With the finger 92 extending upwardly through the slot 32, it will engage the cuff assembly A and move it toward the first sewing machine 10. The cuff assembly A is controlled by the guide edge 25 of the plate 22 as it is moved along and by a series of guide rollers 102 journaled in bracket 103 mounted upon the top of the table 9. As is more fully explained with relation to the circuit diagram, FIG. 22, the arm 97 engages the switch 99 at the end of the stroke which reverses the motor 71 to return the slide 87 to the loading position. Upon arriving at the loading position, the arm 97 engages the switch 98 to stop the motor 71.

First Sewing Machine

The first sewing machine 10 is mounted in a cut out 104 in the table 9, FIG. 7, and includes a bed plate 105. This machine is a Singer No. 402W101, which is a needle feed, high speed, industrial lock stitch machine similar

to the machine disclosed in the United States patent of Parry, No. 2,410,790, but having a single needle and a single horizontal axis rotary hook. Since the details of the sewing machine 10 form no part of the present invention, it is not herein further described. The sewing machine 10 is driven by a belt 106, FIG. 9, from a double solenoid controlled electric power transmitter 107, such as disclosed in the United States patent application of Turner et al., Serial No. 536,414, filed September 26, 1955, now Patent No. 2,860,748, granted November 18, 1958. The transmitter 107 is mounted upon the supporting structure of the table 9 and includes an electric motor 108 having a double acting solenoid 109 mounted upon the casing thereof. The solenoid 109 is connected to a lever 110 that controls the clutch and brake mechanisms of the transmitter 107. With reference to FIG. 22, the solenoid 109 includes a brake solenoid 111 and a clutch solenoid 112. When the clutch solenoid 112 is energized, the lever 110 is pivoted to clutch the driving pulley 113 on the shaft 114 of the transmitter 107 to the fly wheel of the transmitter thus driving the sewing machine, and when the brake solenoid 111 is energized, the lever 110 is pivoted to bring the belt pulley against a stationary braking surface to bring the machine to a stop.

A feeding belt 115 is arranged to feed the cuff assembly A past and beyond the sewing machine 10. The belt 115 is arranged about an idler pulley 116, FIG. 7, a tensioning pulley 117 and a drive pulley 118. The idler pulley 116 is journaled in a cut out in the bed 105 of the machine 10. The tensioning pulley 117 is carried by a pair of spaced brackets 119 mounted on the underside of the table 9 and biased to tension the belt 115 by a coil spring 120 secured at one end to the brackets 118 and at the other end (not shown) to the table 9. The drive pulley 118 is mounted upon a shaft 121, FIGS. 1 and 9, journaled in bearing lugs 122 secured to the edge of the table 9. On the forward end of the shaft 121 there is mounted a pulley 123 about which is entrained a belt 124 that is also entrained about a pulley 125 of a conventional adjustable speed ratio control mechanism 126 having an adjusting lever 127. The mechanism 126 is driven by a belt 128 entrained about a pulley 129 on the drive shaft thereof and about a pulley 130 on the driven shaft 114 of the transmitter 107. The feeding belt 115, being driven by the same source of power as the sewing machine 10, i.e., the transmitter 107, will operate only when the sewing machine 10 is operated.

As seen in FIG. 8, the sewing machine 10 includes a presser mechanism including a presser foot 131 and an endwise moving needle bar 132 carrying a needle 133 that defines a point of stitch formation.

The bed 105 of the machine 10 has a milled groove 134, FIG. 8, for accommodating the belt 115 with the upper surface of the belt substantially in the plane of the upper or work supporting surface of the bed 105. The portion of the belt adjacent to the delivery ends of the guides 66 and 69 and in front of the point of stitch formation of the sewing machine 10 is rendered inoperative by being covered by a plate 135. A guide bar 136 is mounted on the rear edge of the bed 105 of the sewing machine with the forward edge thereof aligned with and comprising an extension of the guide edge 25 of the plate 22. A U-shaped guide 137 is secured by a bracket 138 to the bed 105 of the machine 10. The guide 137 is designed to receive the folded edge of the facing 1 from the guide 69 and to conduct it to the stitching mechanism of the machine 10. Beyond the point of stitch formation, there is provided along the front edge of the belt 115 a guide bar 139 secured to the top of the table 9. Spaced from the end of and in alignment with the guide bar 139 is a further guide bar 140 secured to the top of the table 9 and the bridge piece 13. In the space between the guide bars 139 and 140, FIG. 1, there is arranged a conventional scissors-type thread-chain cutter 141 mounted upon a plate 142 secured to the top of the table 9. The

cutter 141 includes a movable blade 143, FIG. 9, that is actuated by a lever 144. The lever 144 is biased by a spring 145 in the direction to raise the blade 143 and is moved to lower the blade 143, and thus sever the thread chain, by a cord 146 connected at one end to the lever, run over an idler pulley 147 journaled in a bracket 148 mounted on the underside of the table 9, and connected at its other end to a solenoid 149 secured to the underside of the table 9. A counter 150 is arranged to be actuated by the lever 144 to indicate the number of cuffs passed through the machine.

As the cuff assembly A is advanced by the finger 92, it is moved onto the plate 135 and presented to the stitching and feeding mechanisms of the sewing machine 10. In advancing, the cuff assembly passes under and actuates a switch 151 carried by a bracket 152 mounted on the table 9 and having an actuating arm carrying a contact roller 153. The switch 152, as is more fully explained in relation to the discussion of the circuit diagram, FIG. 22, initiates actuation of the sewing machine 10. A second switch 154 having an actuating arm carrying a contact roller 155 is carried by a bracket 156 mounted on the bed 105 of the machine 10 and overhangs the path of travel of the cuff assembly behind the point of stitch formation. The switch 154 is adapted to be actuated by passage of the cuff assembly and is connected in parallel with the switch 151 to hold the sewing machine 10 in operation. Thus, so long as any part of the cuff assembly is under either of the switches 151 and 154 the sewing machine 10 is operative. The switch 154 is located immediately behind the point of stitch formation of the machine 10 so that the sewing machine will be stopped as soon as the cuff assembly A has passed through. The solenoid 149 is connected in the circuit of the switch 154, as is hereafter more fully explained, to be momentarily energized as soon as the machine 10 stops, thus actuating the thread chain cutter 141. The cutter 141 is spaced from the point of stitch formation a distance such that it is just in front of the leading edge of the cuff assembly A just sewed to sever the thread chain between this cuff assembly and the one previously sewed. The just-sewed cuff assembly, upon the next actuation of the sewing machine 10, is advanced by the belt 115 onto the bridge piece 13 and upon termination of that sewing cycle, is severed from the cuff assembly A that has just been sewed. The belt 115 tends to feed the cuff assembly at a speed faster than the speed of the sewing machine 10. Since the cuff assembly A is still connected by the thread chain, it is held back and therefore slips relatively to the belt 115, thus tensioning the thread chain and controlling it relative to the chain cutter 141. When the succeeding sewing cycle stops, the belt 115 stops and the severed cuff assembly A comes to rest.

Second Traverse Mechanism

The bridge piece 13, FIGS. 1 and 11, is a sheet metal element secured at its opposite ends to the top of the tables 9 and 11. At the end adjacent to the table 9, the bridge piece 13 is cut away at 157 to provide an edge 158 that is substantially in alignment with the edge of the guide bar 140 and an edge 159 that is inclined from a point adjacent to the rear edge of the belt 115 toward the edge 158 and leads into a slot 160. As the cuff assembly A passes onto the bridge piece 13, the under folded edge of the bottom ply, which has been folded back to avoid the stitching mechanism of the sewing machine 10 during the first sewing operation, passes under the edge 159 of the bridge piece 13. As the cuff assembly A is moved along on the bridge piece, the edge 159 and the slot 160 act to unfold this under folded edge so that it will lie flat.

Between the belt 115 and the portion of the table 9 over which it runs, there is provided a wear plate 161, FIGS. 7 and 9, the rear edge 162 of which is turned up to provide a guide for the belt and the cuff assembly A.

On the bridge piece 13 beyond the slot 160 there is a guide bar 163, FIGS. 1 and 11. A guide bar 164 in the form of an angle bar, FIGS. 9 and 11, is disposed along the path of travel of the rear edge of the cuff assembly A and extends from the table 9, across the bridge piece 13, and onto the table 11 and the bed plate 165 of the sewing machine 12.

The traversing mechanism T2 is actuated upon the next cycle of the machine and acts to advance a cuff assembly A from its rest position after having the thread-chain severed by the cutter 141 to the sewing machine 12 for the second sewing operation. This traversing mechanism comprises a rod 166 mounted at one end on the top of the table 9 by a bracket 167 and at the other end supported by a bracket 168, FIG. 12, secured to the underside of the table 11. A sleeve 169 is slidably mounted upon the rod 166. An arm 170, FIGS. 1, 7 and 9, is mounted upon the sleeve 169 and carries a wheel 171 that rides on a track 172 in the form of an angle bar that is secured to the guide bar 164. A cam 173 is mounted upon the track 172 and cooperates with the wheel 171 to effect turning of the sleeve 169 as the wheel 171 rides off the cam upon its initial forward motion to lower the arm 170 and rides up on the cam in the final portion of its rearward motion. The sleeve 169 is moved along the rod 166 by a reversible induction type electric motor 174 mounted upon the top of the table 11 and having a pulley 175 mounted upon the drive shaft thereof. A string belt 176 is wrapped around the pulley 175 and has its opposite ends connected to the arm 170, the belt 176 being entrained about an idler pulley 177 mounted upon the table 11 and a tensioning pulley 178 mounted on a spring biased slide 179 mounted on the table 9.

Upon the end of the arm 170 there is provided a lever 180, FIG. 7, pivotally mounted intermediate its ends on the arm 170 and having a depending finger 181 adapted to engage against the rear edge of the cuff assembly A and thereby push the cuff assembly along as the arm 170 is moved. The lever 180 is pivotally mounted on the arm 170 to permit it to deflect as a subsequent cuff assembly A is moved past the finger 181, the lever being biased by a spring 182 into a stop position determined by a stop shoulder 183.

As is more fully described hereinafter, operation of the second traversing mechanism T2 is initiated by the third traversing mechanism T3. Initial rotation of the motor 174 drives the sleeve 169 forward, which, with the finger 181 engaged against the end of the cuff assembly A, pushes it into sewing position relative to the sewing machine 12. A reversing switch 184, FIG. 12, is mounted on the bracket 168 in position to be engaged and actuated by the sleeve 169 at the end of its forward stroke. The motor 174 is then reversed to return the sleeve to its rest position. At the end of its return stroke, the arm 170 engages a lever arm 185 that is operatively associated with a stop switch 186, FIGS. 1 and 9.

Second Sewing Machine

The sewing machine 12 is a Singer Class 251 machine which is a single needle, high speed, lock stitch industrial sewing machine substantially as disclosed in the United States patent of Graesser, No. 2,680,417. As best illustrated in FIG. 13, the stitching mechanism of the machine includes an endwise moving needle 187 on the lower end of a needle bar 188 mounted in the head of the machine and a cooperating rotary hook 189 mounted in the bed of the machine. The machine 12 is fitted with a needle positioner 190 that, upon termination of the sewing cycle, stops the machine with the needle 187 in the raised position. For driving the machine 12, there is provided a transmitter 191, FIG. 14, mounted upon the supporting structure of the table 11. The transmitter 191 is identical to the transmitter 107 and includes an electric motor 192 having a double acting solenoid 193 mounted upon the casing thereof. The

solenoid 193 is connected to a lever 194 that controls the clutch and brake mechanisms of the transmitter 191. The transmitter 191 has a drive pulley 195 on the drive shaft 196 thereof that is connected by a belt 197 with the sewing machine 12. With reference to FIG. 22, like the solenoid 109, the solenoid 193 includes a brake solenoid 198 and a clutch solenoid 199.

The presser mechanism of the machine 12 includes a presser bar 200, FIGS. 17-20, mounted in the head thereof. A presser foot 201 includes a shank 202 secured to the lower end of the presser bar 200 and an arm 203 having a vertical axis bore in which is journaled a cylindrical shank 204, FIG. 20, integral with a work engaging foot 205. The shank 204 is held in the bore in the arm 203 by a spring pressed ball 206 mounted in the arm 203 and engaging an annular groove 207 in the shank 204. The foot 205 is thus mounted on the presser bar 200 for turning freely about a vertical axis so that it will follow about the edge of the top plate 5 of the cuff assembly A during the sewing cycle of the machine 12. To raise the presser foot 201 from engagement with the work, there is provided a presser lifting lever 208 pivotally mounted intermediate its ends on the bracket arm of the sewing machine 12. One end of the lever 208 is connected to the presser bar 200 in the usual manner (not shown) and the other end is connected, FIGS. 13 and 14, by a rod 209 with one end of a rock lever 210 pivotally mounted in the bed of the machine 12. A push rod 211 engages the other end of the rock lever 210 and is in turn actuated by a crank arm 212 mounted on a shaft 213 journaled in a bed pan 214 of the machine. The shaft 213 has a second crank arm 215 that is connected by a chain 216 running over an idler pulley 217 to a solenoid 218, FIG. 14, mounted on the supporting structure of the table 11. When the solenoid 218 is energized, the presser foot 201 will be lifted from the work.

About the point of stitch formation, there is provided a throat plate 219 having a needle aperture 220 formed in a laterally elongated raised boss 221. The boss 221 is raised to a height substantially equal to the thickness of the bottom plate 4 of the cuff assembly and is elongated laterally to provide a guide edge for the plate 4. The work engaging foot 205 and the shank 204 thereof are provided with a needle hole 222 in alignment with the needle aperture 220 in the throat plate 219 and through which the needle passes during stitch formation. The hole 222 is concentric of the shank 204 so that the axis about which the work engaging foot is free to turn coincides with the axis of the needle 187.

To secure the loose ends of the needle thread and the bobbin thread of the sewing machine 12 until the initial stitches are made, thus preventing unthreading of the needle and improper positioning the bobbin thread, there is provided a thread end holder which forms the subject matter of copending United States patent application Serial No. 737,606, filed May 26, 1958, now Patent No. 2,988,031, granted June 13, 1961. As illustrated in FIGS. 17-20, the thread ends, designated 223 and 224 are adapted to be clamped against a roughened surface 225 of the throat plate 219 by a foot 226. The foot 226 has a stud 227 mounted in a bracket 228 for turning about a horizontal axis to permit automatic leveling of the foot 226 relative to the surface 225. Turning of the foot 226 is limited by a pin 229 on the stud 227 that is received in a groove 230 in the bracket 228. The bracket 228 is mounted upon the lower end of a rod 231. The rod 231 has an enlarged upper portion 232 that is connected to a piston 233 mounted in a cylinder 234 and biased upwardly by a spring 235. The cylinder 234 is mounted on a plate 236 secured to the head of the sewing machine 12. For guiding the lower end of the rod 231, there is provided a bracket 237 mounted on the lower end of the plate 236 and having an apertured ear 238 through which the rod 231 ex-

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tends. A collar 239 mounted on the rod 231 carries a stud 240 extending through a slot 241 in the plate 236 to prevent turning of the rod 231. The upper end of the cylinder 234 above the piston 233 is connected by a tube 242 to a solenoid actuated valve unit 243 mounted on the under side of the table 11. With reference to FIG. 21, the valve unit 243 includes a solenoid 244 and an air valve 245. The valve unit 243 is connected by a tube 246 with a source of compressed air comprising a pressure tank 247 and an electric motor driven air compressor 248 mounted upon the supporting structure of the table 14 and interconnected by a tube 249.

To position the thread ends 223 and 224 under the foot 226 there is provided a blower comprising a bore 250 drilled in the throat plate 219 at an angle such that air emerging therefrom will carry the thread ends under the foot 226. The bore 250 communicates with a nipple 251 mounted on the underside of the throat plate 219 and connected by a tube 252 with the air tank 247. Thus, there is a continuous blast of air emerging from the bore 250 for forcing the thread ends 233 and 234 under the foot 226.

The sewing machine 12 is provided with a conventional needle thread tension device 253. The collar 239 engages the one end of a lever 254 pivotally mounted on an anchor arm 255 mounted on the head of the machine and between the discs of the tension device 253 to release the tension on the needle thread when the rod 231 is forced downwardly to grasp the thread ends.

Third Traverse Mechanism

The sewing machine 12 is designed to sew the line of stitches S2 which runs about three sides of the cuff material. To move the cuff assembly in the desired pattern relatively to the stitching mechanism of the sewing machine 12, the feeding mechanism of the machine 12 is completely removed and there is provided a traversing mechanism mounted on the table 14. For mounting the traversing mechanism there is provided a set of parallel tracks 257, FIG. 12, on the top of the table 14 upon which is mounted a frame 258 having a pair of wheels 259 mounted upon each of the tracks 257. The frame 258 includes a pair of parallel tracks 260 upon each of which ride a pair of wheels 261 mounted on the underside of a traversing table 262.

Mounted upon the traversing table 262 is an electric motor 263 having a drive shaft 264 carrying a pulley 265 that is connected by a belt 266 with a pulley 267 on the driven shaft 268 of an adjustable speed ratio control mechanism 269 having an adjusting lever 270. On the drive shaft of the mechanism 269 is a worm 271 that meshes with a worm wheel 272 on the upper end of a vertical axis shaft 273 extending through the traversing table 262 and supported above and below the table 258 respectively by bearing lugs 274 and 275. The shaft 273 extends to just above the table 14 and at its lower end is formed with a pinion 276 disposed in a guide track 277 in a plate 278 on the table 14. The inner edge of the track 277 is formed with teeth 279 to define a rack that cooperates with the pinion 276 so that upon actuation of the motor 263, the table 262 will traverse a path defined by the track 277. The track 277 is designed to impart to the table 262 a path of movement conforming to the outline of the stitching S2.

An arm 280 is mounted on the traversing table by a bracket 281. The arm 280 is T-shaped, FIGS. 11 and 15, and includes a traverse end portion or plate 282 on the free end thereof, which plate 282 conforms substantially to the outline of the line of stitching S2 but being slightly inside thereof to provide clearance for the needle 188. As the cuff assembly A is advanced by the sleeve 169, it is moved onto the plate 282. To position the cuff assembly A on the plate 282, the plate 282 is provided, FIGS. 13 and 17, with a groove 283 in the upper face thereof to define a guide edge 284 along the rear edge

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thereof and a guide edge 285 along the front edge thereof. The groove 283 is just wide enough to accommodate the bottom plate 4 of the cuff assembly which slides onto the plate 282 between the guide edges 284 and 285. As seen in FIGS. 15 and 16, to position the cuff assembly A longitudinally of the plate 282, the leading edge of the bottom plate 4 is provided with a notch 286 that cooperates with a stud 287 extending upwardly from the plate 282. Retrograde movement of the cuff assembly is prevented by a light leaf spring 288 seated in a recess in the top of the plate 282 and having the forward end thereof extending upwardly to engage in a notch 289 in the bottom of the plate 4. After the sewing operation, the bottom plate 4 of the cuff assembly is released from the stud 287 by a plunger 290 mounted for endwise sliding in the bed plate 165 of the sewing machine 12 and adapted to be thrown upwards through a hole 291 in the plate 282 against the bottom of the plate 4. The plunger 290 is biased downwardly, FIGS. 13 and 15, by a spring 292 and is moved upwardly by a lever 293 pivotally mounted intermediate its ends on the underside of the bed 165 by a bracket 294. At its opposite end, the lever 293 is connected by a tension rod 295 to a solenoid 296 mounted by a bracket 297 on the bottom of the bed pan 214 of the sewing machine 12.

To hold the cuff assembly on the plate 282, a lever arm 298 is seated in a groove longitudinally of the arm 280 and has an upturned end 299 to which is secured a cross bar 300 having downturned apertured ears 301 at each end. A pivot pin 302 passing through the ears 301 pivotally secures the cross bar 300 to a bracket 303 on plate 282. A pair of arms 304 extend forwardly from the cross bar 300 and support a bar 305 carrying a pair of arms 306 the free ends of which overlie the top plate 5 of the cuff assembly. The arms 306 are biased downwardly against the top plate 5 by a spring 307 coiled about the pivot pin 302 and having one end 308 engaging the arm 280 and the other end 309 engaging the bar 305. To lift the arms 306 from the top plate 5, the free end of the lever 298 is connected by a cord 310, FIG. 13, to one end 311 of a lever 312 pivotally mounted intermediate its ends by means of a bracket 313 to the underside of the table 262. The other end 314 of the lever 312 extends at an angle relative to the end 311. A rod 315 mounted at the opposite ends thereof by brackets 316 and 317 upon the supporting structure of the table 11, is arranged to be engaged by the arms 311 and 314 of the lever 312. Thus, when the table 262 is adjacent to the table 11, the rod 315 engages the arm 314 of the lever 312, FIG. 13, to exert a pull on the cord 310 and thus lift the bar 305, and as the table 262 moves away from the table 11, the rod 315 engages the arm 311 of the lever 312 to permit the spring 307 to lower the bar 305 and through the arm 306 clamp the cuff assembly on the plate 282.

Mounted on the top of the table 14 is a cam plate 318 having four face cam surfaces cooperating individually with a corresponding number of switches on the table 262. As seen in FIG. 11, there is a first switch 319 carried by a bracket 320 mounted on the traversing table 262 and having a vertically movable feeler rod 321 cooperating with a cam surface 322 on the plate 318. The path of motion of this switch as the table 262 travels through its cycle as defined by the cam track 277 is indicated at 323. This is a double acting switch that controls the operation of the sewing machine through the clutch and brake solenoids 198 and 199, FIG. 22, the switch 319 being arranged that when the feeler rod 321 is riding on the cam surface 322, the brake solenoid 198 is energized and when riding off the cam surface 322, the clutch solenoid 199 will be energized and the sewing machine 12 is in operation.

A second switch 324 is carried by the bracket 320 and has a vertically movable feeler rod 325 that cooperates with a cam surface 326 on the cam plate 318. The path of motion of the feeler rod 325 on the cam plate 318 is

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indicated at 327. This is the stop switch that terminates operation of the traverse motor 263 when the feeler rod 325 rides up on the cam surface 326, the mechanism doing a certain amount of coasting which will carry the feeler rod 325 over the cam surface 326, thus resetting it for the next sewing operation.

A third switch 328 is carried by a bracket 329 secured to the traversing table 262 and has a vertically movable feeler rod 330 that cooperates with a cam surface 331 on the cam plate 318. The path of motion of the feeler rod 330 on the cam plate 318 is indicated at 332. The switch 328 controls the solenoid actuated valve 244 of the thread end holding foot 226.

A fourth switch 333 is carried by the bracket 329 and includes a vertically movable feeler rod 334 that cooperates with a cam surface 335 on the cam plate 318. The path of motion of the feeler rod 334 on the cam plate 318 is indicated at 336. This switch initiates operation of the final motion of the machine as hereinafter described.

The traversing table 262 also carries a cam plate 337, FIGS. 11 and 14, secured to the upper surface thereof and including an elongated cam surface 338 extending over the rear edge. This cam surface 338 cooperates with a switch 339 mounted on the supporting structure of the table 11 to close the switch when the traversing table 262 is moved laterally relatively thereto. The switch 339 controls the operation of the solenoid 218 which when energized, actuates the presser lifter mechanism of the sewing machine 12. The cam surface 338 is elongated to hold the solenoid 218 in operation while the arm 280 is passing under the head of the sewing machine 12.

For preventing operation of the sewing machine 12 while the arm 280 is under the needle 188, there is provided a safety switch 340 which is in series with the one side of the switch 319 that controls the operation of the clutch solenoid 199 of the transmitter 191. The switch 340, FIGS. 11 and 14, is carried by a bracket 341 mounted on the supporting structure of the table 11 and includes a roller-carrying actuating arm 342 that cooperates with a cam surface 343 mounted on the cam plate 337.

A further safety switch 344 is provided in the series with the one side of the switch 319 that controls the operation of the clutch solenoid 199 of the transmitter 191 when the presser foot 201 is raised. The switch 344, FIGS. 13 and 14, is mounted on a bracket 345 depending from the pan 214 of the sewing machine 12 and includes an arm 346 that cooperates with the crank arm 212 of the presser lifter mechanism. The switch 344 is normally closed and is opened when the presser lifter mechanism is actuated to lift the presser foot 201.

The switch 333, as noted above, initiates operation of the final motion of the machine, which is transporting a cuff assembly from its rest position after the completion of the sewing operation of the sewing machine 10 to the sewing position relatively to the sewing machine 12, and simultaneously removing the previously completed cuff from the sewing machine 12. As is hereinafter more fully explained in connection with the circuit diagram, FIG. 22, the switch 333 initiates forward operation of the motor 174 which will move the sleeve 169 forward until the limit switch 184 is actuated and will then reverse and return to its original position where actuation of the limit switch 186 stops the motor 174. As the sleeve 169 moves forward, the finger 181 mounted thereon engages a cuff assembly and moves it into sewing position relatively to the sewing machine 12. A guide roller 347 carried by a bracket 348 mounted on the bed plate 165 of the machine 12 cooperates with the rear edge of the top plate 5 of the cuff assembly to assist in guiding it onto the arm 282. At the same time, there is an arm 349 on the opposite end of the sleeve 169 from the arm 170. The arm 349 carries an electromagnet 350. The electromagnet 350 is energized simultaneously with energization of the motor 174 during its forward rotation.

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As the sleeve 169 is moved forwardly, it is turned by cooperation of the roller 171 with the cam 173 on the track 172 to lower the electromagnet 300 upon the top plate 5 of the cuff assembly that is on the traversing arm 282 and upon which the sewing operation has been completed. The top plate 5 is provided with a metal insert 356 for attraction by the magnet 350. A switch 351 is carried by a bracket 352 mounted on the edge of the table 11 and includes an actuating arm 353 that is adapted to cooperate with a tripping arm 354 carried by the sleeve 169. The arm 349 carries a tripping arm 355 that is adapted to actuate the limit switch 184. Simultaneously with lowering of the magnet 350 upon the cuff assembly, the switch 351 is momentarily actuated to energize the solenoid 296 to actuate the plunger 290 for releasing the bottom plate 4 of the cuff assembly from the stud 287, FIG. 16. The cuff assembly is thus freed from the plate 282 and magnetically locked to the sleeve 169 so that it will be carried by the sleeve.

For severing the thread chain, there is provided a cutter which forms the subject matter of copending United States patent application Serial No. 737,607, filed May 26, 1958, now Patent No. 3,008,437, granted November 14, 1961. This cutter comprises a wire 357, FIG. 13, that is heated to incandescence for burning the thread chain. The wire 357 is mounted upon the upper end of a rod 358 mounted for vertical sliding movement in the bed of the sewing machine 12. The rod 358 is normally disposed below the bed plate 165 and is adapted to be projected upwardly through an opening 359 in the bed plate 165 by a solenoid 360 that is carried by a bracket 361 mounted on the supporting structure of the table 11. The solenoid 360 is controlled by the switch 351 and is operated simultaneously with the solenoid 296. With reference to FIG. 15, the wire 357 is located such that the thread chain will be wiped over it as the cuff assembly is moved away from sewing position. The heating of the wire 357 is controlled by a unit 362, FIG. 22, so that it is heated only shortly before termination of the sewing cycle of the sewing machine 12.

From the sewing position relatively to the sewing machine 12, the cuff assembly is carried by the sleeve 169 across and beyond the bed of the machine 12 and the table 11. At the end of the forward motion of the sleeve 169, the electromagnet 350 is deenergized simultaneously with reversal of the motor 174, and the cuff assembly is released. Beneath the point where the cuff assembly is released, there is a chute 363, FIGS. 1, 12 and 14, that directs it onto a belt 364. The belt 364 is entrained at the end adjacent to the chute 363 about a pulley 365 that is journaled in brackets 366 supported by a chute 367 which encloses the belt 364 for the major portion of its length and is in turn supported by brackets 368, FIG. 14, secured to the underside of the table 14. The belt 364 is arranged beneath the tables 11 and 14 and the leg 16 of the table 9 for carrying the completed cuff assembly back to the operator stationed at the loading position, who dismantles the cuff assembly, disposes of the completed cuff, and re-uses the plates 4 and 5. At the end adjacent to the loading position and beneath the table 9, the belt 364 is entrained about a pulley 369, FIG. 1, that is also journaled in brackets carried by the chute 367. To maintain both runs of the belt 364 close together for running in the chute 367, an idler pulley 370, FIG. 12, is journaled in the brackets 366 and a similar idler pulley 371, FIG. 1, is arranged relative to the pulley 369. The belt 364 is driven by a pulley 372, mounted upon the shaft 373 which carries the pulley 365. A belt 374 is entrained about the pulley 372 and about a pulley 375 on the end of a shaft 376 journaled on the supporting structure of the table 11. At its other end, the shaft 376 is coupled to a speed reducing mechanism 377 that has a driven shaft 378 having a pulley 379 connected by a belt 380 with a pulley 381 on the end of the shaft 196 of the transmitter 192.

The machine includes numerous electrical control com-

ponents as will hereinafter appear, which components are housed in a box 382, FIG. 1, mounted on the supporting structure of the table 11 and a box 383 mounted on the supporting structure of the table 9.

Electrical Connections and Operation

The operation of the machine can best be understood with reference to the description of FIG. 22 which is an electrical diagram having the basic mechanical components illustrated schematically.

Power is supplied to a relay unit 384 from a 110 volt source by leads 385 and from a three-phase 220 volt source by leads 386. An on-off switch 387 for the relay unit 384 controls the power supply to the machine and a pilot light 388 indicates that the power is on. The unit 384 includes a pair of relays 389 and 390 energized from the 110 volt source 385 and controlled by the switch 387. From the relay 390 which controls the 220 volt source, there are three leads 391 that deliver power to the electric motors 108 and 192 of the transmitters 107 and 191 which begin to operate immediately when the switch 387 is closed. The 220 volt power energizes only the motors 108 and 192, the remainder of the electrical components of the machine being energized by 110 volt power.

From the relay 389 which is in the line of the 110 volt source, there is a first common 392 which, in FIG. 22, is the heaviest of the lines and a second common 393 which is the medium heavy line. The motor of the air compressor 248, which is connected directly across the commons 392 and 393 begins to operate immediately when the switch 387 is closed.

The motor 71 which drives the first traversing mechanism includes a forward drive field coil 394 and a reverse drive field coil 395. A relay 396 includes a solenoid 397, a pair of normally open contacts 398, a pair of normally closed contacts 399 and a pair of normally open contacts 400. The starting switch 100 is connected at one side to the common 393 and at the other side is connected by a lead 401 to one side of the limit switch 99 and one side of the relay contacts 399 and 400. The other side of the limit switch 99 is connected by a lead 402 with one side of the solenoid 397, the other side of which is connected to the common 392. Thus, when the starting switch 100 is closed, the solenoid 397 is energized through the normally closed limit switch 99 and the leads 401 and 402.

Upon energization of the solenoid 397, the relay contacts 398 and 400 are closed and the contacts 399 are opened. The side of relay contacts 398 opposite from the lead 401 are connected by a lead 403 to one side of the forward field coil 394 of the motor 71, the other side of which is connected to the common 392. Thus, when the relay contacts 398 are closed, the motor 71 begins forward rotation to drive the belt 94 and thus advance the cuff assembly from the loading position to the first sewing machine 10. The limit switch 98 is normally closed and is held open by the arm 97 on the slide 87. Upon the initial movement of the belt 94, the arm 97 moves away from the limit switch 98, permitting it to close. The limit switch 98 is connected at one side to the common 393 and at the other side by a lead 404 to the side of the relay contacts 400 opposite from the side connected to the lead 401. When the limit switch 98 closes, the relay solenoid 397 is energized from the common 393, through the limit switch 98, relay contacts 400, lead 401, limit switch 99 and lead 402. The starting switch 100 can now be released and the cycle of actuation of the motor 71 will continue, the forward field coil 394 of the motor 71 being energized from the common 393, through the now closed limit switch 98, lead 404, relay contacts 400, lead 401, relay contacts 398, and lead 403.

At the end of its forward movement, the arm 97 opens the limit switch 99 which deenergizes the solenoid 397, and it in turn, opens the relay contacts 398 and 400 and closes the relay contacts 399. Opening the contacts 398 deenergizes the forward field coil 394 and stops forward

rotation of the motor 71. One side of the relay contacts 399 is connected to the lead 404 and the other side is connected by a lead 405 to one side of the reverse field coil 395 of the motor 71, the other side of which is connected to the common 392. Thus, closing of the relay contact 399 energizes the coil 395 from the common 393, through the limit switch 98, lead 404, relay contacts 399 and lead 405, and the motor 71 will rotate in reverse to return the slide 87 to its original position. Since the relay contact 400 is now open, the solenoid 397 will not be reenergized when the limit switch 99 closes as the arm 97 moves away from it. At the end of the return stroke, the arm 97 opens the limit switch 98 thus deenergizing the reverse field coil 395 and stopping the motor 71. The arm 97 is engaged against the limit switch 98 when the motor 71 stops to hold the switch open until initiation of the next cycle.

As the cuff assembly is advanced by the slide 87, it passes under and thereby closes the normally open switch 151 to initiate operation of the sewing machine 10. To control the solenoid 109 of the transmitter 107, there is a relay 406 including a solenoid 407, a normally open pair of contacts 408 and a normally closed pair of contacts 409. The contacts 409 are connected at one side to the common 392 and at the other side are connected by a lead 410 with one side of the brake solenoid 111 of the transmitter 107, the other side of which is connected to the common 393. When the solenoid 397 is not energized and the relay contacts 409 are therefore closed, the one side of the brake solenoid 111 is connected to the common 392 through the lead 410 and relay switch 409, thus energizing the brake solenoid 111 to engage the brake mechanism of the transmitter 107. The normally open relay contacts 408 are connected at one side to the common 392 and at the other side by a lead 411 with one side of the clutch solenoid 112 of the transmitter 107, the other side of which is connected to the common 393. When the contacts 408 are closed, the clutch solenoid 112 will be energized to actuate the sewing machine 10. The relay solenoid 407 is connected at one side to the common 393 and at the other side by a lead 412 with one side of the switch 151, the other side of which is connected to the common 392. When the cuff assembly passes under and closes the switch 151, the solenoid 407 is energized to close the relay contacts 408 and thus initiate operation of the machine 10. The switch 154 is connected in parallel with the switch 151 and acts to maintain energization of the solenoid 407 after the cuff assembly has passed under the switch 151 and thus hold the sewing machine in operation. When the cuff assembly passes under the switch 154, the solenoid 407 is deenergized, the switch 408 is opened and the switch 409 is closed to stop the sewing machine 10. The switch 151 is located to start the sewing machine 10 as the cuff assembly is moved into sewing position and the switch 154 is located to hold the sewing machine 10 in operation for sewing a predetermined distance beyond the cuff assembly to provide a thread chain between successive cuffs.

To actuate the thread-chain cutter 141 there is provided a relay control unit 413. The lead 411 is connected to one side of a solenoid 414 of a relay 415 and having its other side connected to the common 393. The relay 415 includes a normally open pair of contacts 416 and a normally closed pair of contacts 417. The solenoid 414 is energized when the contacts 408 are closed to initiate operation of the sewing machine 10, and acts to close the contacts 416 and open the contacts 417. The contacts 416 are connected at one side to one side of a rectifier 418 that is connected at its other side to the lead 411. The other side of the contacts 416 is connected to one side of a condenser 419 which is connected at its other side to the common 393. Thus, when the contacts 416 are closed, the condenser 419 is charged from the lead 411 through the rectifier 418. The contacts 417 are connected at one side to the condenser 419 and at the other side to one side

of a solenoid 420 of a relay 421 that has a pair of normally open contacts 422. The contacts 422 are connected at one side to the common 393 and at the other side by a lead 423 to one side of the solenoid 149 of the cutter 141, the other side of which is connected to the common 392. When the contacts 408 are opened upon termination of the sewing cycle of the machine 10, the solenoid 414 is deenergized which closes the contacts 417 and discharges the condenser 419 through the solenoid 420. This action momentarily closes the contacts 422 to energize the solenoid 149 and actuate the cutter 141.

The lead 411 is also connected to one side of the solenoid 424 of a starting relay 425 having a pair of normally open contacts 426. The relay 425 acts to initiate operation of the final phases of the cycle simultaneously with initiation of the operation of the sewing machine 10. The side of the solenoid 424 opposite from the lead 411 is connected to the common 393 which between this point and the power source is adapted to be broken by a normally closed isolation switch 427. The switch 427 is designed to provide for independent operation of the initial phases of the machine for servicing and adjusting the same. Although they have been omitted from FIG. 22 for clarity, certain other isolation switches similar to the switch 427 are used to provide for independent operation of various components of the machine.

Since the sewing cycle of the sewing machine 10 is considerably shorter than that of the sewing machine 12, there is provided a holding relay 428 including a solenoid 429 and two pairs of normally open contacts 430 and 431. One side of each of the contacts 426 of the starting relay, and the contacts 430 and 431 of the holding relay is connected to the common 393. The other side of the contacts 426 is connected by a lead 432 with one side of the solenoid 429, the other side of which is connected by a lead 433 with one side of the normally closed stop switch 324 which, in turn, has its other side connected to the common 392. When the contacts 408 are closed, the solenoid 424 is energized to close the contacts 426 and thus to energize the solenoid 429 through the stop switch 324. The contacts 431 are connected in parallel with the contacts 426 across the common 393 and the lead 432 so that when the solenoid 429 is once actuated to close the contacts 431, it will be locked in by the contacts 431 through the stop switch 324 so that the contacts 426 can be opened without deenergizing the solenoid 429.

The contacts 430, which are closed by energization of the solenoid 429 are connected at the side opposite from the common 393 by a lead 434 to the motor 263 which is also connected to the common 392. Thus being energized the motor 263 drives the traversing table through its cycle of motion.

During the initial motion of the traversing table 262, it moves laterally of the sewing machine 12 to carry the arm 280 across the point of stitch formation. At this time the sewing machine 12 is at rest with the needle bar in its raised position as determined by the needle positioner 190. To lift the presser mechanism, the normally open switch 339 and the solenoid 218, which are connected respectively to the commons 393 and 392, are interconnected by a lead 435. As the table 262 moves, the switch 339 is closed to energize the solenoid 218 and lift the presser foot 201, and is held closed during the time that the arm 280 is under the presser foot 201.

During this initial motion of traversing table 262, the feeler rod 321 of the switch 319 is riding on the cam surface 322. The switch 319 which is double acting includes a middle terminal 436 connected to the common 392, and two opposed terminals 437 and 438. The terminal 437 is connected by a lead 439 to one side of the brake solenoid 198 of the transmitter 191 for the sewing machine 12. The terminal 438 is connected by a lead 440 to one side of the safety switch 340 the other side of which is connected by a lead 441 to one side of the safety switch 344, which in turn, is connected at the other side by a

lead 442 with the side of the clutch solenoid 199 of the transmitter 191, the other side of the solenoid 199 also being connected to the common 393. The safety switches 340 and 344, being in series with the terminal 438 and solenoid 199, prevent energization of the solenoid 199 when, respectively, the arm 280 is under the needle 187 of the sewing machine 12 and the presser foot 201 is raised. When the feeler rod 321 is riding on the cam 322, the terminal 437 of the switch 319 is closed, thus energizing the solenoid 198 and actuating the brake mechanism of the transmitter 191.

Upon completion of the idle lateral stroke of the traversing table 262, the direction of motion of the table 262 is changed and the sewing machine 12 is brought into operation to begin sewing in the stitches 52. Immediately before and at the time that the sewing operation begins, the switch 328 is closed momentarily by the cam 331 to actuate the thread end holder mechanism. For this purpose, the switch 328 is connected at one side to the common 392 and at the other side by a lead 443 to one side of the solenoid 244, the other side of which is connected to the common 393.

As the feeler rod 321 of the switch 319 rides off the cam 322, the terminal 437 is opened, thus releasing the brake mechanism of the transmitter 191, and the terminal 438 is closed to energize the clutch solenoid 199 and thereby actuate the clutch mechanism of the transmitter 191. The sewing machine is thus placed in operation and will continue to sew as the traverse mechanism moves the cuff assembly relative to the stitching mechanism of the machine 12 to sew around three sides of the cuff. At the completion of the sewing cycle, the feeler rod 321 rides up onto the cam 322, opening the terminal 438 and closing the terminal 437 to stop the operation of the sewing machine 12.

Substantially simultaneously with the stopping of the machine 12, the feeler rod 325 of the switch 324 engages the cam 326 and opens the switch 324. When the switch 324 is opened, the solenoid 429 of the holding relay 428 is deenergized, opening the contacts 430 and 431. Opening the contacts 430 deenergizes the traverse motor 263 and stops the traverse mechanism which will do a little coasting that is relied upon to carry the feeler rod 325 over the cam 326 and reset the switch 324 for the next cycle.

Also substantially simultaneously with the stopping of the sewing machine 12, the switch 333 rides over the cam 335 and is momentarily closed. The switch 333 is connected at one side to the common 393 and at the other side by a lead 444 to one side of the limit switch 184, the other side of which is connected by a lead 445 to one side of a solenoid 446 of a holding relay 447. The relay 447 includes a pair of normally closed contacts 448, and two pairs of normally open contacts 449 and 450. On the side opposite from the lead 445, the solenoid 446 is connected to the common 392 so that upon closing the switch 333, the solenoid 446 is energized through the limit switch 184 to close the contacts 449 and 450 and to open the contacts 448. The contacts 449 are connected at one side by a lead 451 with the forward field coil 452 of the motor 174, the other side of which is connected to the common 392. The side of the contacts 449 opposite from the lead 451 is connected by the lead 444 with one side of the contacts 450, the other side of which is connected by a lead 453 with one side of the limit switch 186, and it in turn is connected at the other side to the common 393. Thus, when the contacts 449 and 450 are closed by the solenoid 446, the forward field coil 452 of the motor 174 is initially energized from the common 393, through the switch 333, lead 444, contacts 449 and lead 451 and the motor 174 starts forward.

The limit switch 186 is normally closed and, in the rest position, is held open by the arm 170. As soon as the motor 174 begins forward, the arm 170 moves away from the limit switch 186, permitting it to close. The limit switch 186 is in parallel with the switch 333 and when it

is closed, the switch 333 can be opened. The limit switch 186 energizes the solenoid 446 from the common 393 through the lead 453, contacts 450, lead 444, limit switch 184, and lead 445. The forward field coil 452 is then energized from the common 393, through the limit switch 186, lead 453, contacts 450, lead 444, contacts 449, and lead 451. The motor 174 thus continues forward rotation to move the cuff assembly away from sewing position relatively to the sewing machine 12.

In parallel with the solenoid 446 of the holding relay 447 across the lead 445 and common 392 is a solenoid 454 of a relay 455 that includes a pair of normally open contacts 456. The contacts 456 are connected at one side through a rectifier 457 to the common 392 and at the other side to one side of the electromagnets 350, the other side of which is connected to the common 393. The electromagnets 350 are thus energized simultaneously with energization of the forward field coils 452 of the motor 174 to pick up the cuff assembly and carry it along as the motor 174 moves the sleeve 169 carrying the magnet forwardly.

The initial forward movement of the sleeve 169, as it is driven by the motor 174, causes the arm 354 momentarily to close the normally open switch 351. One side of the switch 351 is connected by a lead 458 to one side of the solenoid 296 of the cuff assembly release mechanism, the other side of which is connected to the common 392. The other side of the switch 351 is connected by the lead 451, contacts 449, lead 444, contacts 450, and lead 453 of limit switch 186 to the common 393. Closing the switch 351 during the forward movement of the sleeve 169 momentarily energizes the solenoid 296 to actuate the plunger 290 for freeing the cuff assembly from the plate 282.

Connected in parallel with the solenoid 296 between the lead 458 and common 392 is the solenoid 360 of the thread chain cutter. Upon energization of the solenoid 360 it projects the rod 358 upwardly to position the wire 357 in the path of the thread chain from the cuff assembly so that the thread chain will be wiped over the wire 357 and severed as the cuff assembly is moved away from sewing position relative to the sewing machine 12. Heating of the wire 357 is controlled by the unit 362 which includes a pair of opposed time-delay relays 459 and 460. The relay 459 comprises a solenoid 461, a pair of normally open contacts 462 and a dashpot 463 that imposes a time delay between energization of the solenoid 461 and closing of the contacts 462. The relay 460 comprises a solenoid 464, a pair of normally open contacts 465, and a dashpot 466 that imposes a time delay between deenergization of the solenoid 464 and opening of the contacts 465. The solenoid 461 is connected at one side to the common 393 and at the other side to the lead 441 so that the solenoid 461 is energized simultaneously with energization of the clutch solenoid 199 of the transmitter 191 which initiates operation of the sewing machine 12. The dashpot 463 is adjusted to provide a predetermined time lag between energization of the solenoid 461 and closing of the contacts 462. The contacts 462 and the solenoid 464 are connected respectively to the commons 393 and 392 and are interconnected by a lead 467. Thus, when the contacts 462 close, the solenoid 464 is energized and closes the contacts 465. One side of the contacts 465 is connected to the common 393 while the other side is connected to one side of the primary coil of a step-down transformer 468, the other side of which is connected to the common 392. The secondary coil of the transformer 468 is connected to the wire 357. When the contacts 465 close, power is supplied through the transformer 468 for heating the wire 357. The time delay of the dashpot 463 is adjusted such that the wire 357 will be heated to incandescence at the completion of the sewing cycle. The contacts 462 will remain closed so long as the solenoid 461 is energized, which is until completion of the sewing cycle. At that time, the switch

438 is opened to stop the sewing machine 12, and simultaneously therewith, the solenoid 461 is deenergized. The contacts 462 then open to deenergize the solenoid 464. The contacts 465 remain closed for a predetermined time after deenergization of the solenoid 460 as determined by the dashpot 466 to keep the cutting wire 357 heated to incandescence until after the thread-chain has been cut.

At the end of the forward motion of the sleeve 169, the arm 355 opens the limit switch 184, thus deenergizing the solenoid 454, which opens the contacts 456 and deenergizes the electromagnet 350. With the electromagnet 350 deenergized, the cuff assembly falls onto the chute 363 which directs it onto the belt 364 to be returned to the operator stationed at the loading position of the machine. Simultaneously with deenergizing the solenoid 454, opening of the limit switch 184 deenergizes the solenoid 446 which opens the contacts 449 and 450 and closes the contacts 448. With the contacts 449 and 450 open, the forward field coil 452 of the motor 174 is deenergized to stop forward rotation of the motor. The contacts 448 are connected at one side to the lead 453 and at the other side by a lead 469 to the reverse field coil 470 of the motor 174 so that upon closing of the contacts 448 the coil 470 is energized through the limit switch 186 and contacts 448 to effect reverse rotation of the motor 174. The switch 351, which actuates the cuff release solenoid 296 and the thread-chain cutter solenoid 357 is connected through the contacts 449 so that these solenoids will be energized only upon the forward stroke of the sleeve 169 and will not be energized when the switch 351 is closed upon the reverse stroke of the sleeve 169.

Thus, as the sleeve 169 is moved forward, the completed cuff assembly is removed from the plate 282 and is dropped onto the belt 364 to be returned to the operator. Simultaneously therewith, the arm 170 picks up the succeeding cuff assembly and moves it onto the plate 282 for the next cycle.

At the end of the return stroke of the sleeve 169, the arm 170 opens the limit switch 186, thus stopping the motor 174. The machine has now completed one cycle and will remain at rest until the starting switch 100 is again closed.

Having thus set forth the nature of the invention, what we claim herein is:

1. In combination, a supporting structure, a sewing machine mounted on said supporting structure, said sewing machine having a work supporting surface, stitch forming mechanism including an endwise movable needle defining a point of stitch formation on said work supporting surface, traversing mechanism for moving work relative to said point of stitch formation to produce a seam of a predetermined configuration, said traversing mechanism comprising a traversing element for carrying the work and mounted upon said supporting structure for driving said traversing element comprising a rack conforming to the predetermined configuration and a driven pinion cooperating with said rack, said rack and pinion being carried by said traversing element and said supporting structure, means for initiating operation of said traversing element, and control means responsive to the operation of said traversing mechanism for automatically controlling the operation of the sewing machine to initiate operation thereof and to stop the same at the completion of the sewing cycle and for automatically stopping said traversing mechanism upon completion of the traverse cycle.

2. In combination, a supporting structure, a sewing machine mounted on said supporting structure, said sewing machine having a work supporting surface, stitch forming mechanism including an endwise movable needle defining a point of stitch formation on said work supporting surface, traversing mechanism for moving work relative to said point of stitch formation to produce a seam of a predetermined configuration, said traversing

mechanism comprising a traversing element mounted upon said supporting structure, an arm on said traversing element for carrying the work, releasable clamping means for clamping the work on said arm, means for initiating operation of said traversing mechanism, means responsive to the operation of said traversing mechanism for actuating said clamping means to clamp the work during the traversing cycle, and control means responsive to the operation of said traversing mechanism for automatically controlling the operation of the sewing machine to initiate operation thereof and to stop the same at the completion of the sewing cycle and for automatically stopping said traversing mechanism upon completion of the traverse cycle.

3. In combination, a sewing machine having stitch forming mechanism defining a point of stitch formation, a first traversing mechanism for moving a work piece relative to the point of stitch formation to produce a seam of a predetermined configuration, a second traversing mechanism for moving a work piece from a receiving position to said first traversing mechanism and simultaneously therewith removing a previously completed work piece from said first traversing mechanism and depositing it at an unloading position, means for initiating operation of said first traversing mechanism, means responsive to the operation of said first traversing mechanism for starting said sewing machine and for stopping the same at the completion of the sewing cycle, for stopping the operation of said first traversing mechanism at the completion of the traversing cycle, and for initiating forward operation of the second traversing mechanism at the completion of the cycle of said first traversing mechanism, means for reversing said second traversing mechanism at the end of its forward stroke, and means responsive to the completion of the return stroke of the second traversing mechanism for stopping the same.

4. The combination in accordance with claim 3 in which said second traversing mechanism comprises a linearly moving element, a reversible motor for driving said element, means on said element for engaging a work piece at a receiving position and a second work piece on the first traversing mechanism for advancing the first work piece with said element to the first traversing mechanism during the forward stroke thereof and for removing the second work piece from said first traversing mechanism.

5. The combination in accordance with claim 3 and including a thread-chain cutter associated with said sewing machine, and means responsive to the initial forward movement of said second traverse mechanism for actuating said thread-chain cutter.

6. The combination in accordance with claim 3 and including a thread-chain cutter comprising an element actuating means for projecting said element into the path of the thread chain as the work is moved by said second traverse mechanism, an electrical heating circuit for said element, means responsive to the operation of said first traverse mechanism for energizing said heating circuit to heat said wire to incandescence, and means responsive to the initial forward movement of said second traverse mechanism for operating said actuating means for said element to project it into the path of the thread chain.

7. In combination, a sewing machine having stitch forming mechanism including an endwise movable needle defining a point of stitch formation, a needle positioner for positioning said needle in the raised position when the sewing machine is stopped, a presser mechanism, a presser lifting mechanism for raising said presser mechanism, a first traversing mechanism for moving work relative to the point of stitch formation to produce a seam of a predetermined configuration, and including an idle motion in which a portion of said traversing mechanism passes under the needle, a second traverse mechanism for moving a work piece from a receiving position to said first traversing mechanism and simultaneously therewith removing a previously completed work piece from said

first traversing mechanism, means for initiating operation of said first traverse mechanism, means responsive to the actuation of said first traverse mechanism for initiating operation of said sewing machine and for stopping the same upon the completion of the sewing cycle, for actuating said presser lifter mechanism while the sewing machine is idle and the traversing mechanism passes under the needle and presser mechanism, for stopping said first traversing mechanism, and for initiating operation of said second traversing mechanism, a thread chain cutter associated with said sewing machine, means responsive to the initial forward motion of said second traversing mechanism for actuating said cutter, means for reversing said second traversing mechanism at the end of its forward stroke, and means responsive to the completion of the return stroke of the second traversing mechanism for stopping the same.

8. The combination in accordance with claim 7 in which the work is held by a magnetic plate, and said second traversing mechanism includes an electromagnet, means for energizing said electromagnet simultaneously with initiation of the forward motion of the traversing mechanism for magnetically securing said magnetic plate to said traversing mechanism, and means for deenergizing said electromagnet at the end of the forward stroke of the traversing mechanism for releasing the work.

9. In a machine for sewing cuffs or the like, a first sewing machine, a first traversing mechanism for moving a work piece from a loading position and presenting it to said first sewing machine, a first thread-chain cutter for severing the thread chain connecting the work piece to said first sewing machine, a second sewing machine, a second traversing mechanism for moving the work piece relatively to said second sewing machine for sewing a seam of a predetermined configuration, a third traversing mechanism for moving the work piece from said first sewing machine and to said second traversing mechanism and simultaneously for removing a previously completed work piece from said second traversing mechanism, a second thread-chain cutter for severing the thread-chain connecting the work piece to said second sewing machine, means for initiating operation of said first traversing mechanism, means responsive to the completion of the traversing cycle for stopping said first traversing mechanism, means responsive to the presentation of a work piece to said first sewing machine for initiating operation thereof and simultaneously initiating operation of said second traversing mechanism, means responsive to the completion of the sewing cycle for stopping said first sewing machine and actuating said first thread chain cutter, means responsive to the operation of the second traversing mechanism for starting the second sewing machine and for stopping the same at the completion of the sewing cycle, for stopping the second traversing mechanism at the completion of its cycle, and for initiating operation of the third traversing mechanism, means responsive to the initial motion of said third traversing mechanism for actuating said second thread chain cutter, and means responsive to the completion of the traversing cycle for stopping said third traversing mechanism.

10. In a machine for sewing cuffs or the like consisting of a plurality of plies including a backing and a facing, a first sewing machine, a first traversing mechanism on which said plies are assembled and for presenting the plies to said first sewing machine, guide means associated with said first traversing mechanism for folding said backing clear and for edge folding said facing and presenting the cuff to said first sewing machine for stitching the folded edge of the facing, a first thread-chain cutter associated with said first sewing machine, a second sewing machine, a second traversing mechanism for moving the cuff relatively to said second sewing machine for stitching the margin of the facing and backing together along the three sides opposite from the folded edge of the facing, a third traversing mechanism for moving the cuff from said

first sewing machine to said second traversing mechanism and simultaneously removing a previously completed cuff from said second traversing mechanism, a second thread-chain cutter for severing the thread chain connecting the cuff to said second sewing machine, means for initiating operation of said first traversing mechanism, means responsive to the completion of the traversing cycle for stopping said first traversing mechanism, means responsive to the presentation of the cuff to said first sewing machine for initiating operation thereof and simultaneously initiating operation of said second traversing mechanism, means responsive to the completion of the sewing cycle for stopping said first sewing machine and actuating said first thread chain cutter, means responsive to the operation of the second traversing mechanism for starting the second sewing machine and for stopping the same at the completion of the sewing cycle, for stopping the second traversing mechanism at the completion of its cycle, and for initiating operation of the third traversing mechanism, means responsive to the initial movement of said third traversing mechanism, means responsive to the initial movement of said third traversing mechanism for actuating said second thread-chain cutter, and means responsive to the completion of the traversing cycle for stopping said third traversing mechanism.

11. The combination in accordance with claim 10 having cuff holding means for controlling said cuff during the sewing operations, said cuff holding means being secured to said cuff as the plies thereof are assembled on the first traversing mechanism and being removed from said cuffs at the completion of the sewing operations, said work holder being shaped to provide clearance relative to the seams.

12. The combination in accordance with claim 10 having cuff holding means for controlling said cuff during the sewing operations comprising a pair of plates between which the cuff is sandwiched as the plies thereof are assembled on the first traversing mechanism, said plates including a first plate of magnetic material and a second plate carrying a permanent magnet, said plates substantially coinciding in outline and being shaped to provide clearance relative to the seams.

13. In combination, a sewing machine having stitch forming mechanism defining a point of stitch formation and feeding mechanism for moving work relatively to said point of stitch formation, sewing machine actuating means for operating said stitch forming mechanism and said feeding mechanism, loading mechanism including work transporting means adapted to be opened for receiving a work piece and to be closed for securing a work piece thereto for unitary movement and drive means for moving said work transporting means between a loading position and a work presenting position wherein the work is presented to said feeding mechanism, operator controlled means adapted to be actuated when said work transporting means is at said loading position to close said work transporting means and to initiate operation of said drive means to move said work transporting means away from said loading position, means for automatically opening said work transporting means and thereby release the work piece upon arrival of said work transporting means at said work presenting position, for initiating operation of said stitch forming mechanism and said feeding mechanism, and for actuating said drive means to return said work transporting means to said loading position, means for automatically terminating operation of said loading mechanism with said work transporting means at said loading position, and means for automatically terminating operation of said sewing machine upon completion of a sewing cycle.

14. In combination, a sewing machine having stitch forming mechanism defining a point of stitch formation and feeding mechanism for moving work relatively to said point of stitch formation, a loading mechanism having a work transporting element and means for moving

said element between a loading position and a work presenting position in which the work is presented to said feeding mechanism, operator actuated means for initiating operation of said loading mechanism to advance said element from said loading position to said work presenting position, means responsive to a movable portion of said loading mechanism after said element has moved to said work presenting position for automatically initiating operation of said stitch forming mechanism and said feeding mechanism, means for automatically initiating operation of said loading mechanism before termination of said stitch forming operation to return said element from said work presenting position to said loading position and for terminating operation of said loading mechanism with said element in said loading position, and means for automatically terminating operation of said stitch forming mechanism at the completion of the stitch forming operation.

15. A combination in accordance with claim 14 in which said loading mechanism is provided with guide means at said loading position for facilitating positioning and aligning of the work relatively to said work transporting means.

16. In combination, a sewing machine having stitch forming mechanism defining a point of stitch formation and feeding mechanism for moving work relatively to said point of stitch formation, drive means for said sewing machine, a loading mechanism having a work transporting element and reversible drive means for moving said element between a loading position and a sewing position in which the work is presented to said sewing machine operator actuated means for initiating forward operation of said drive means to move said element from said loading position to said sewing position, control means for said sewing machine drive means responsive to said element after said element has moved to said sewing position for initiating operation of said sewing machine, and means responsive to the movement of said element before termination of said sewing operation for reversing said drive means for said element to return said element from said sewing position to said loading position and for stopping said drive means with said element in said loading position, and means responsive to the completion of the sewing operation for stopping said sewing machine.

17. A sewing machine having an endwise reciprocating needle defining a point of stitch formation, a needle positioner on said sewing machine for positioning the needle in its raised position when the sewing machine is stopped, a cyclically-operated traverse mechanism for receiving work to be sewed and having an operating cycle for moving the work relative to the point of stitch formation through a closed path defining a desired line of stitch formation, said cycle comprising a stitch forming portion during which said sewing machine is operative and an idle portion during which said sewing machine is cooperative and during which a portion of said traverse mechanism passes under said needle, means for initiating operation of said traverse mechanism and for automatically stopping the same at the completion of its cycle, and in the same position in which it was when the cycle was begun, and control means actuated by said traverse mechanism during operation thereof for controlling the operation of the sewing machine for initiating operation thereof at the beginning of the stitch forming portion of the cycle, for stopping the sewing machine at the completion of the stitch forming portion of the cycle, and for maintaining the sewing machine at rest during the idle portion of the cycle.

18. In combination, a sewing machine having stitch forming mechanism defining a point of stitch formation and a cyclically-operated traverse mechanism for receiving work to be sewed and having an operating cycle for moving the work relative to the point of stitch formation through a closed path defining a stitch forming portion

during which said sewing machine is inoperative and an idle portion during which said sewing machine is inoperative, means for initiating operation of said traverse mechanism, means for automatically stopping the traverse mechanism at the completion of its cycle and in the same position in which it was when the cycle was begun, and control means activated by said traverse mechanism during operation thereof for controlling the operation of the sewing machine for initiating operation thereof at the beginning of the stitch forming portion of the cycle for stopping the sewing machine at the completion of the stitch forming portion of the cycle, and for maintaining the sewing machine at rest during the idle portion of the cycle.

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