United States Patent

Anderson et al.

[15] **3,699,907**

[45] **Oct. 24, 1972**

[54] **BELT LOOPER APPARATUS**

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[73] Assignee: **The Duplan Corporation,** Winston-Salem, N.C.

[22] Filed: **Oct. 30, 1970**

[21] Appl. No.: **85,581**

[52] **U.S. Cl.** .....**112/121.27,** 112/104, 112/130, 270/61 R

[51] **Int. Cl.** **D05b 23/00**

[58] **Field of Search**...112/121.27, 121.26, 2, 121.11, 112/121.12, 121.15, 104, 147, 130, 152, 141, 203, 262, 265; 270/61 R, 86, 78; 156/510, 517, 521, 538, 539, 556, 558, 384

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Primary Examiner—James R. Boler
Attorney—Brumbaugh, Graves, Donohue & Raymond

[57] **ABSTRACT**

Apparatus for taking an elongated piece of material and for cutting the same in predetermined lengths. The cut pieces are folded to have one or two bent ends to serve as a belt loop. The folded loops are sequentially delivered to a sewing machine where they are sewn by an operator.

30 Claims, 21 Drawing Figures

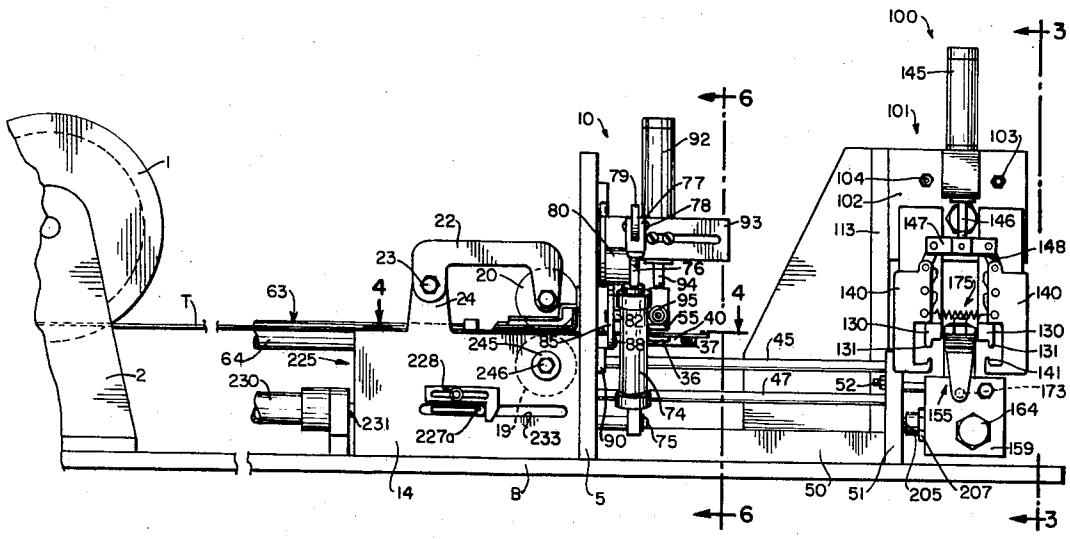

FIG. 1

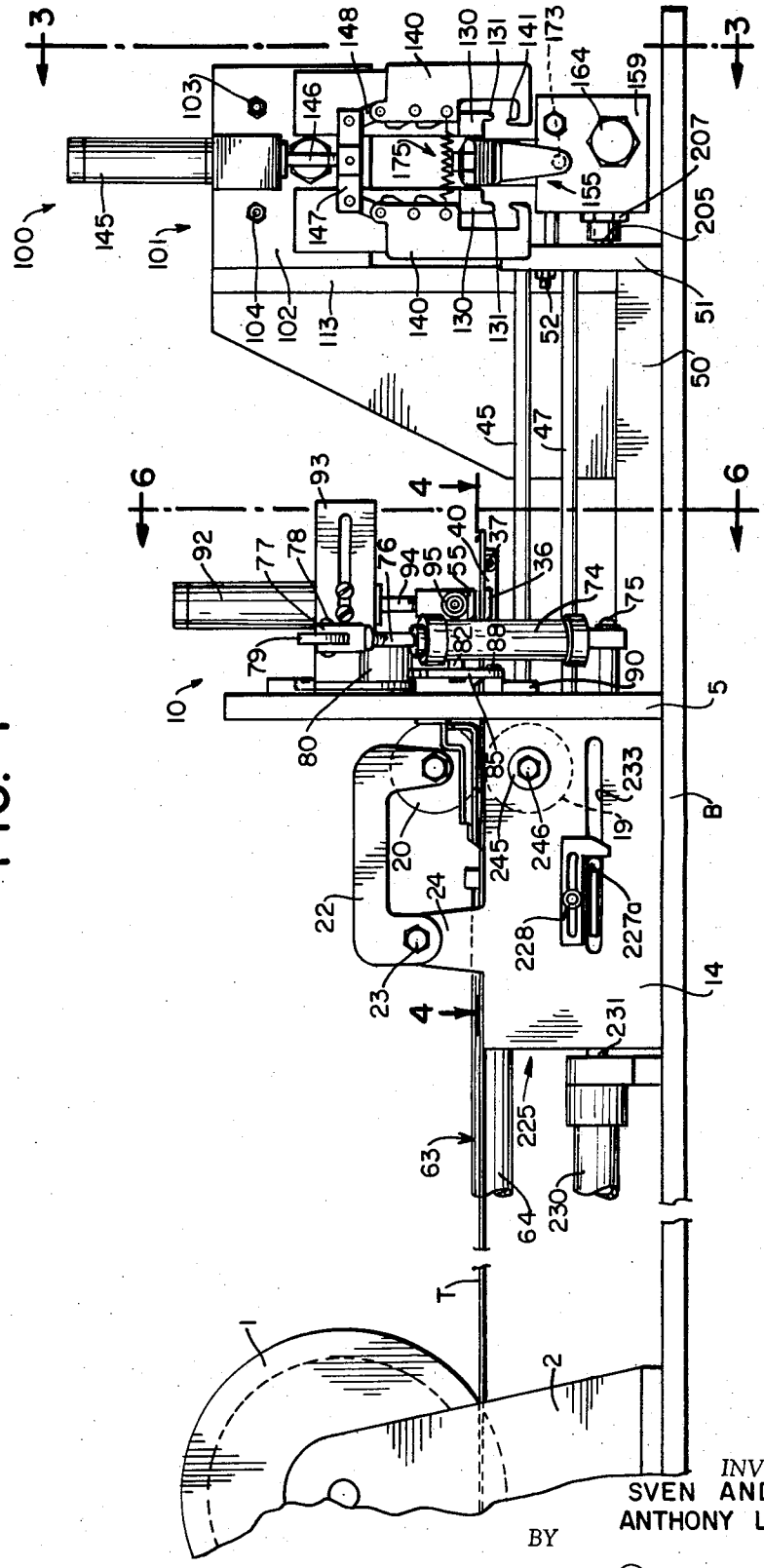

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FIG. 2

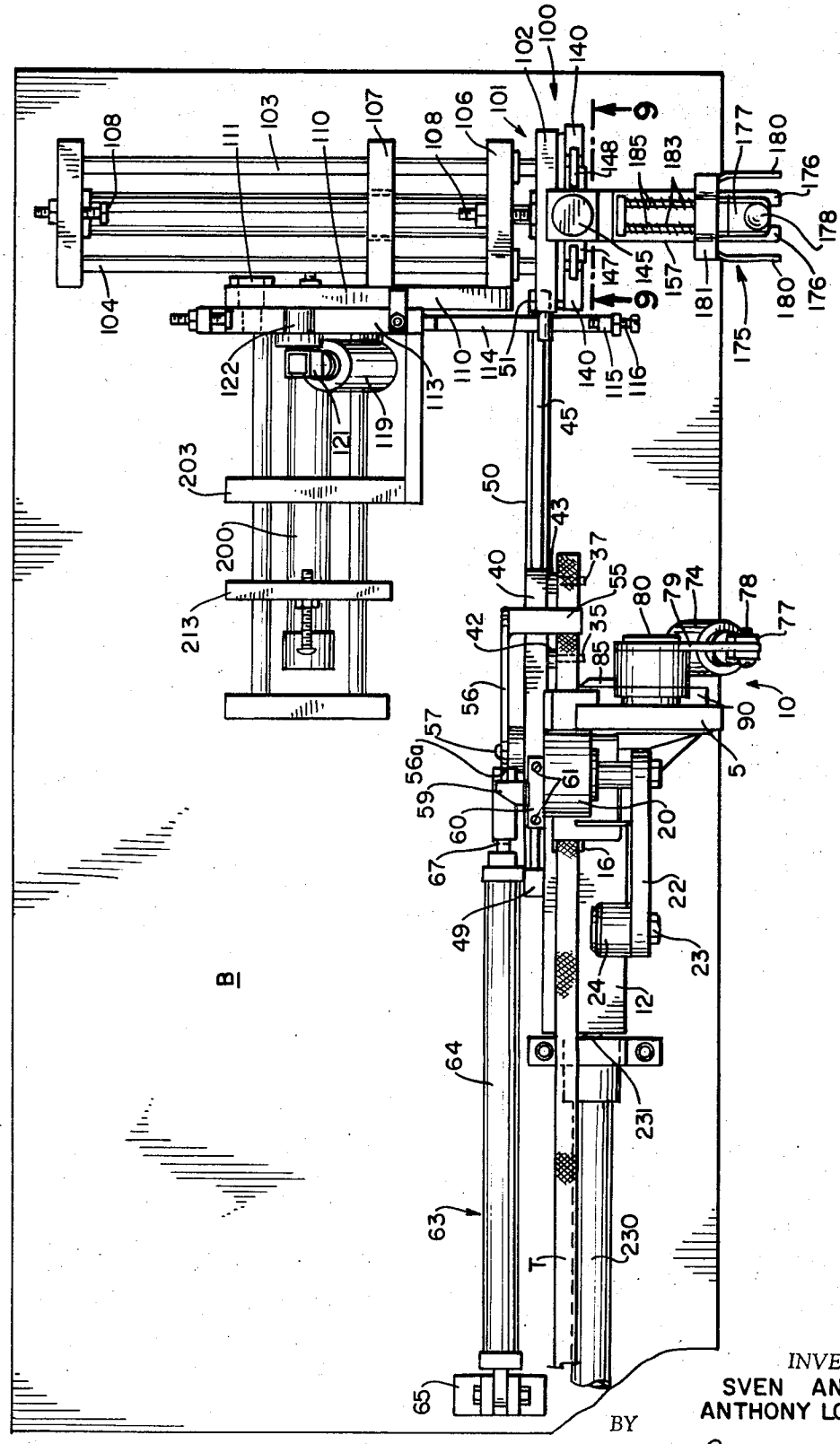

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FIG. 3

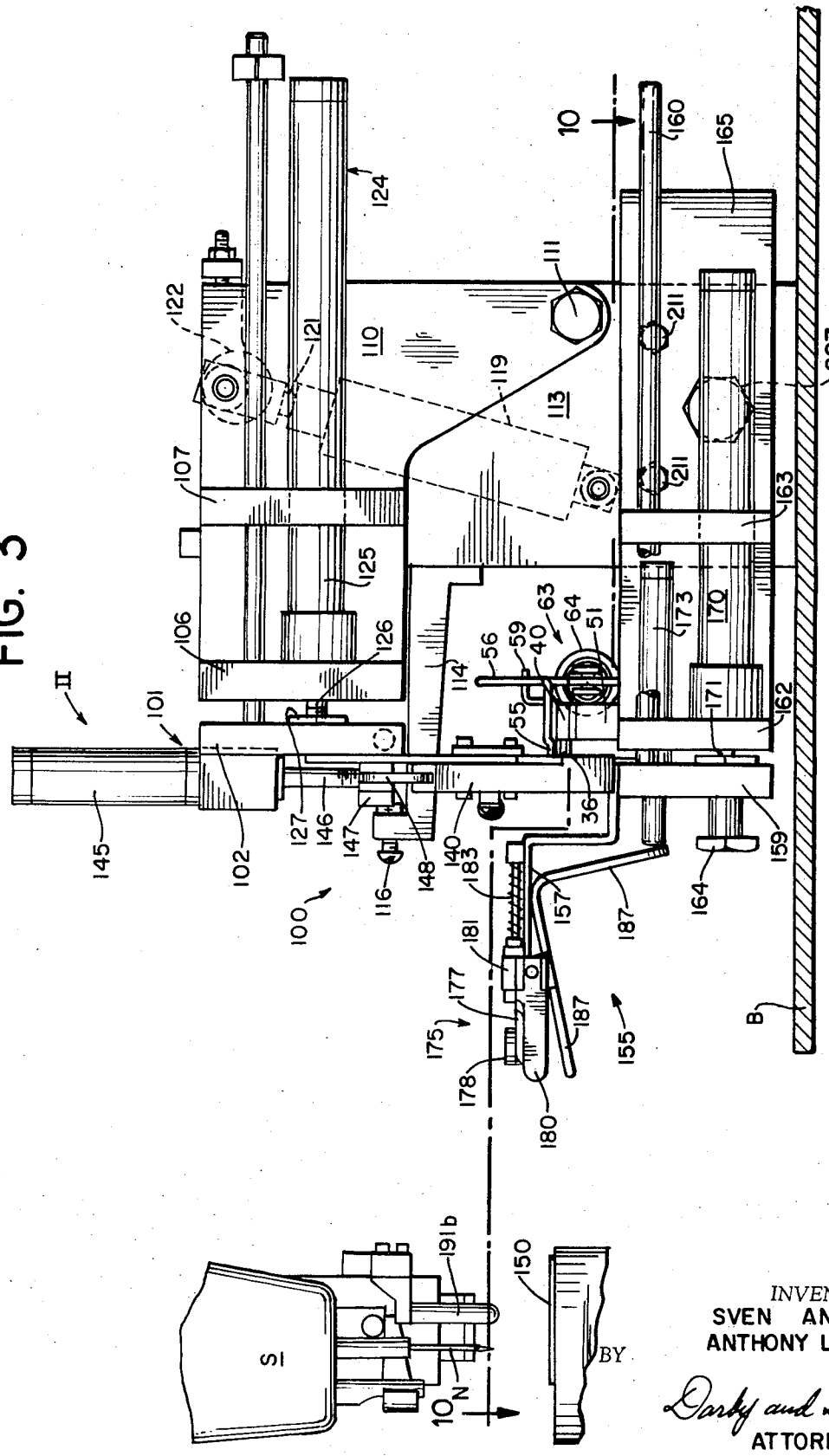

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FIG. 4

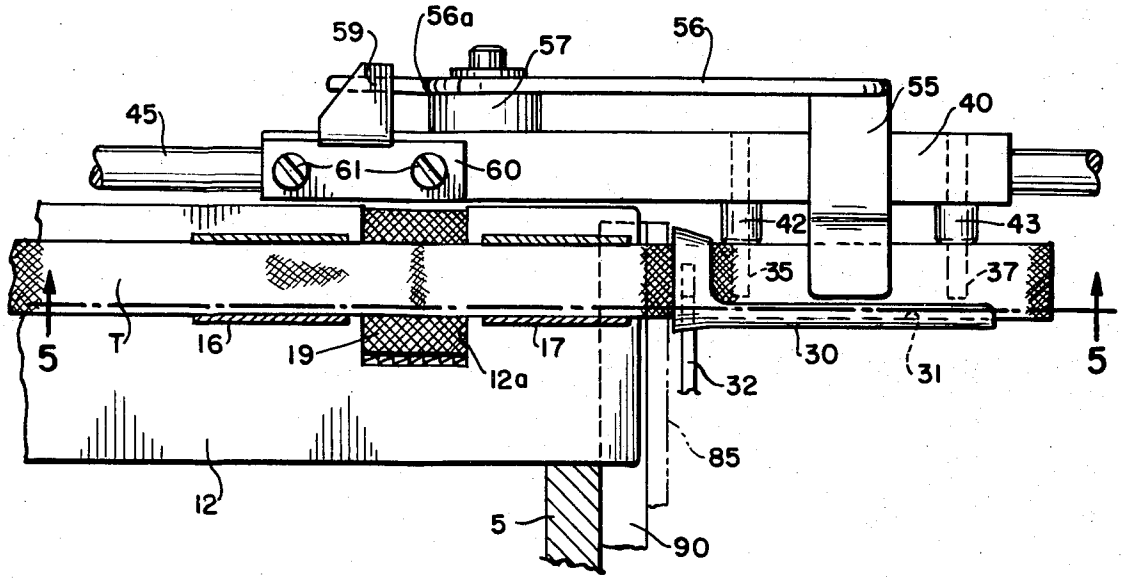

FIG. 5

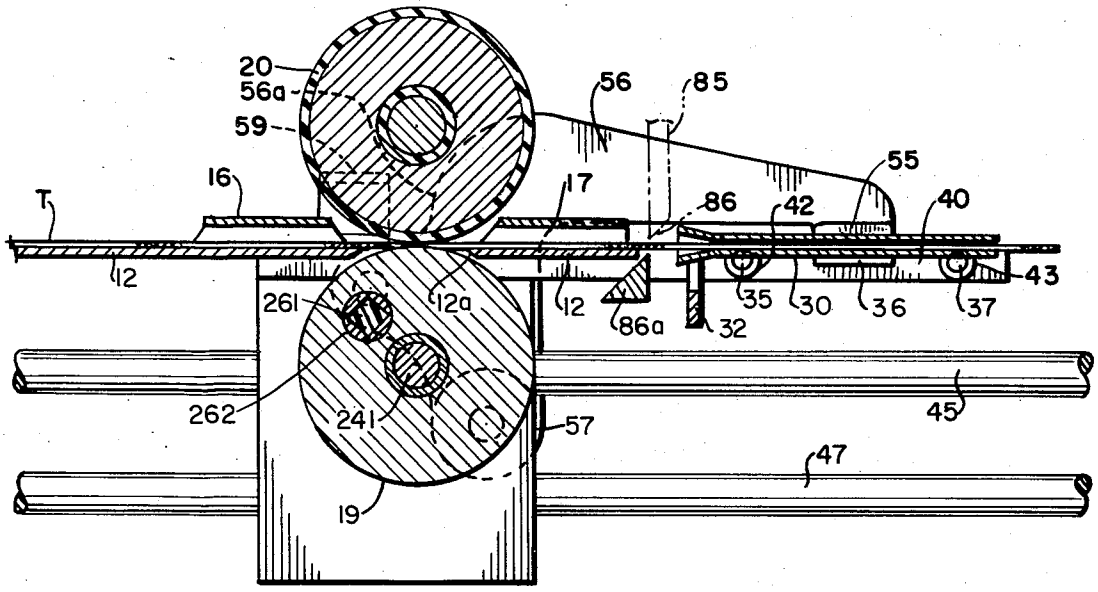

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FIG. 6

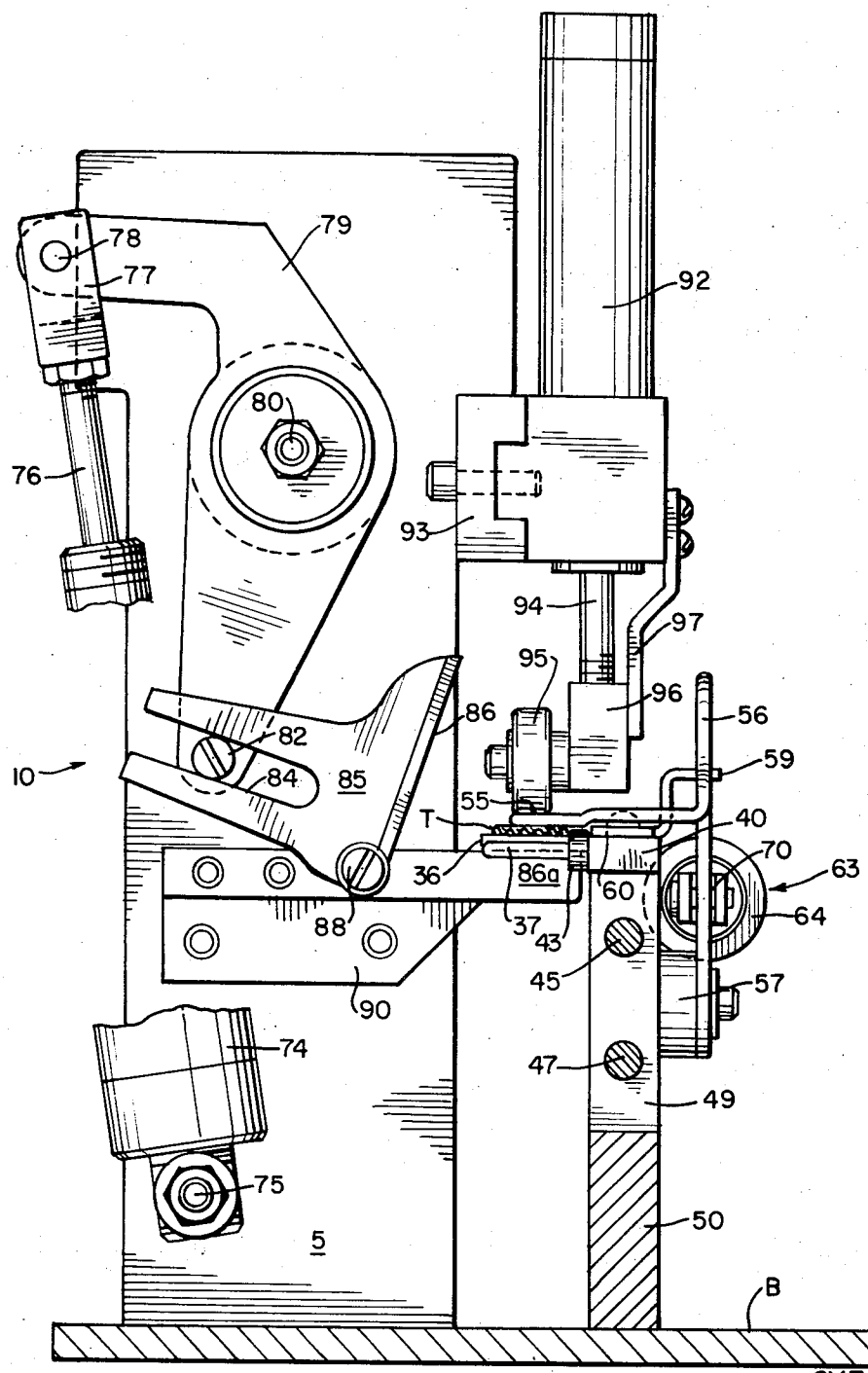

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FIG. 7

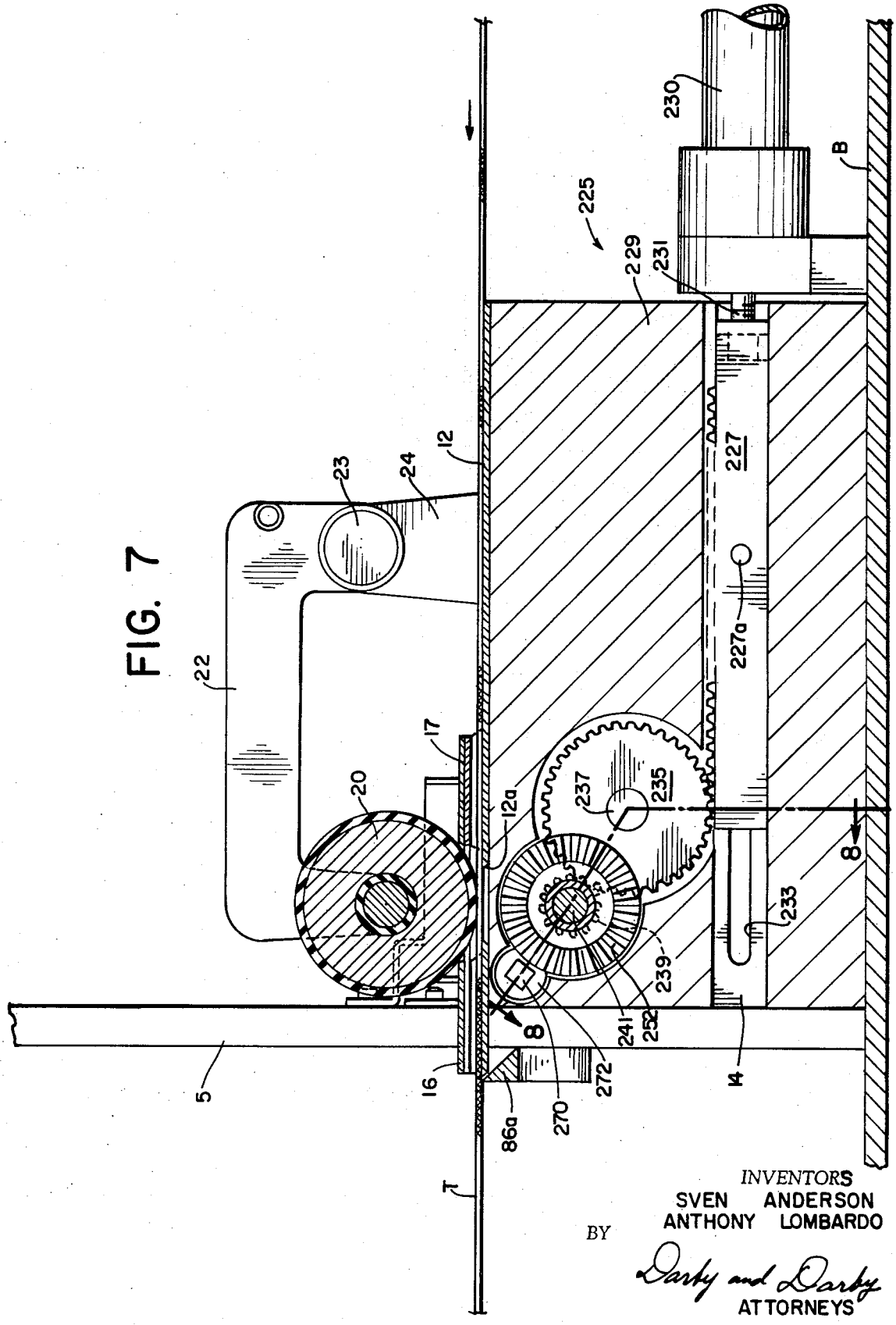

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FIG. 8

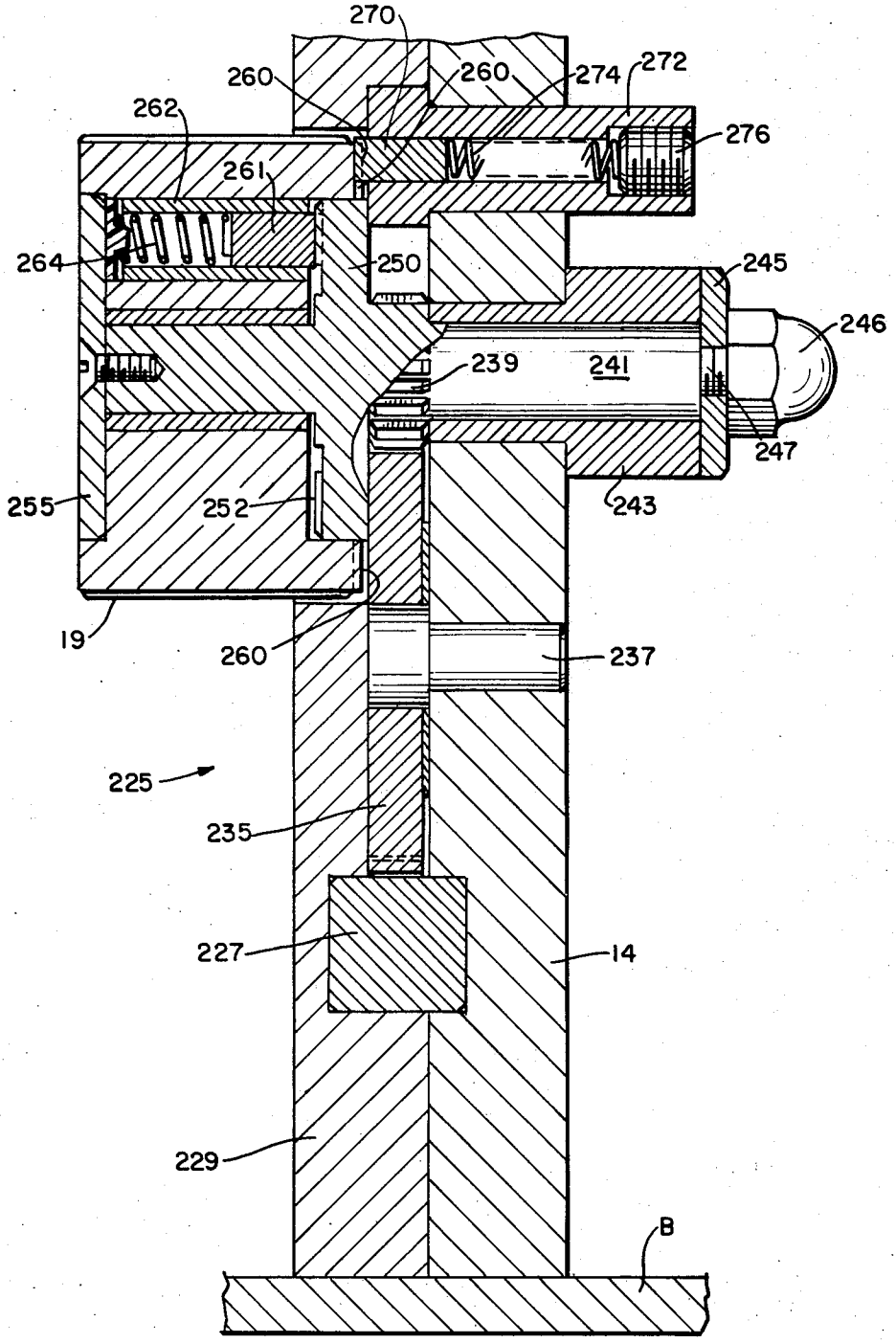

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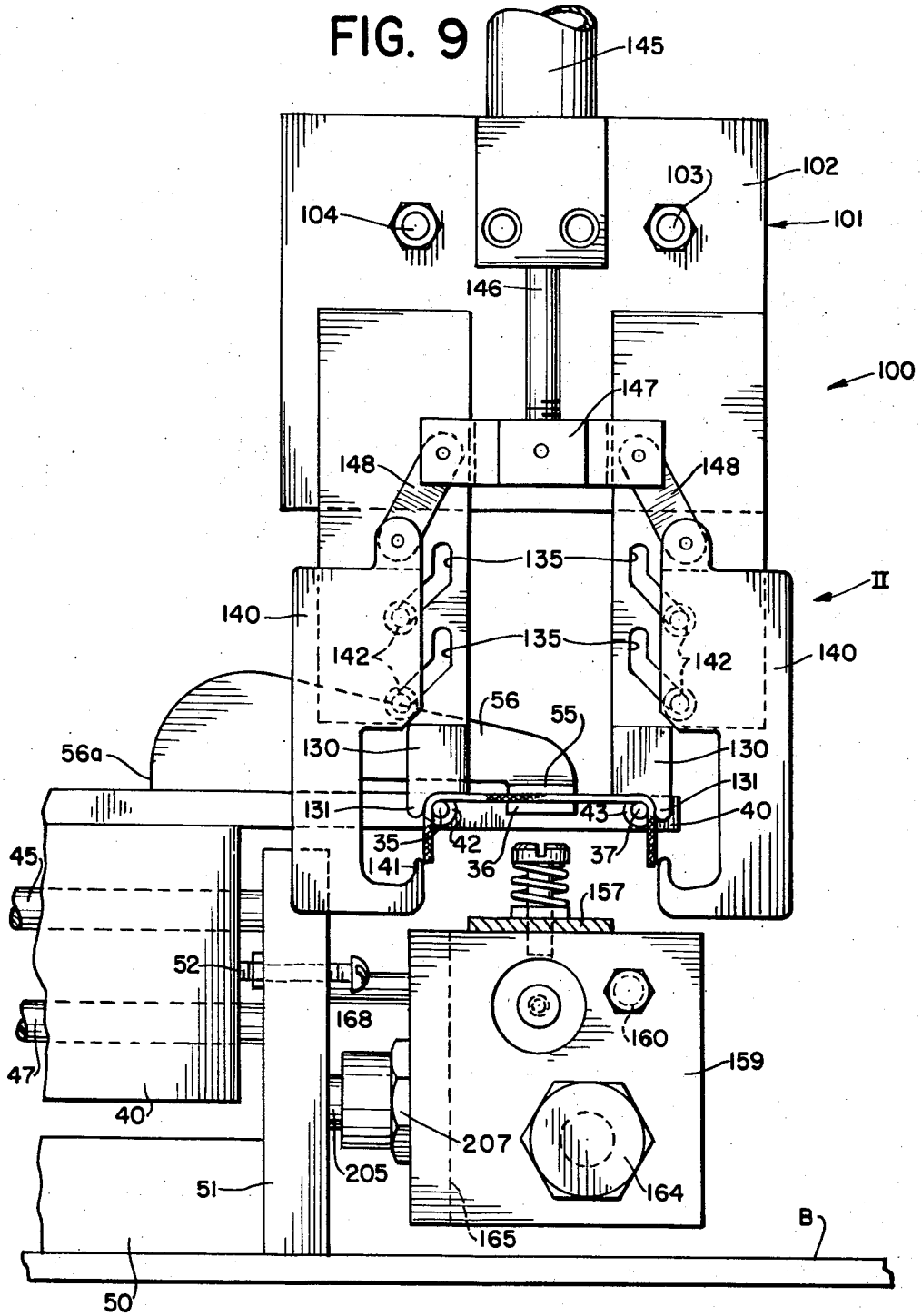
FIG. 9



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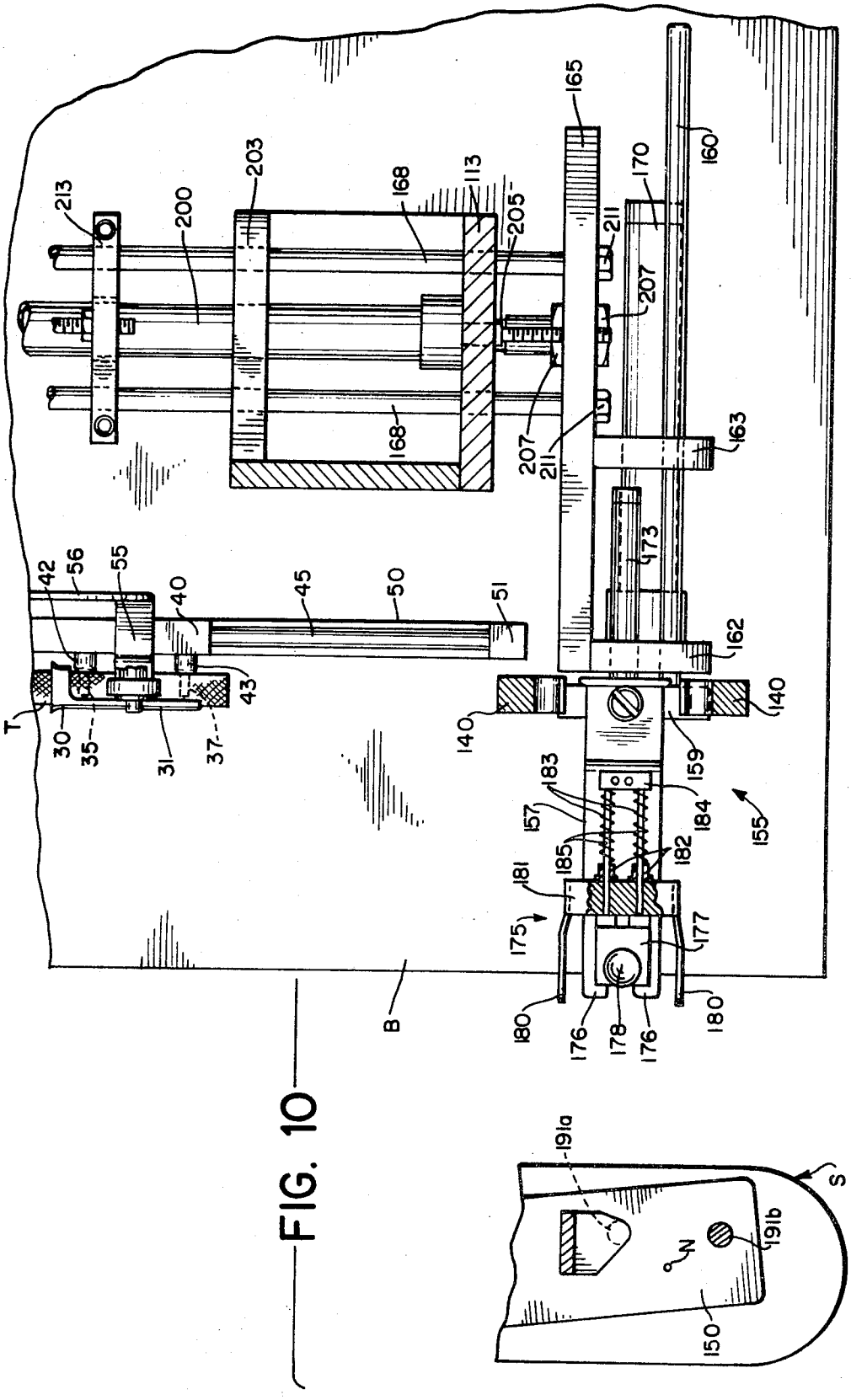
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FIG. 10

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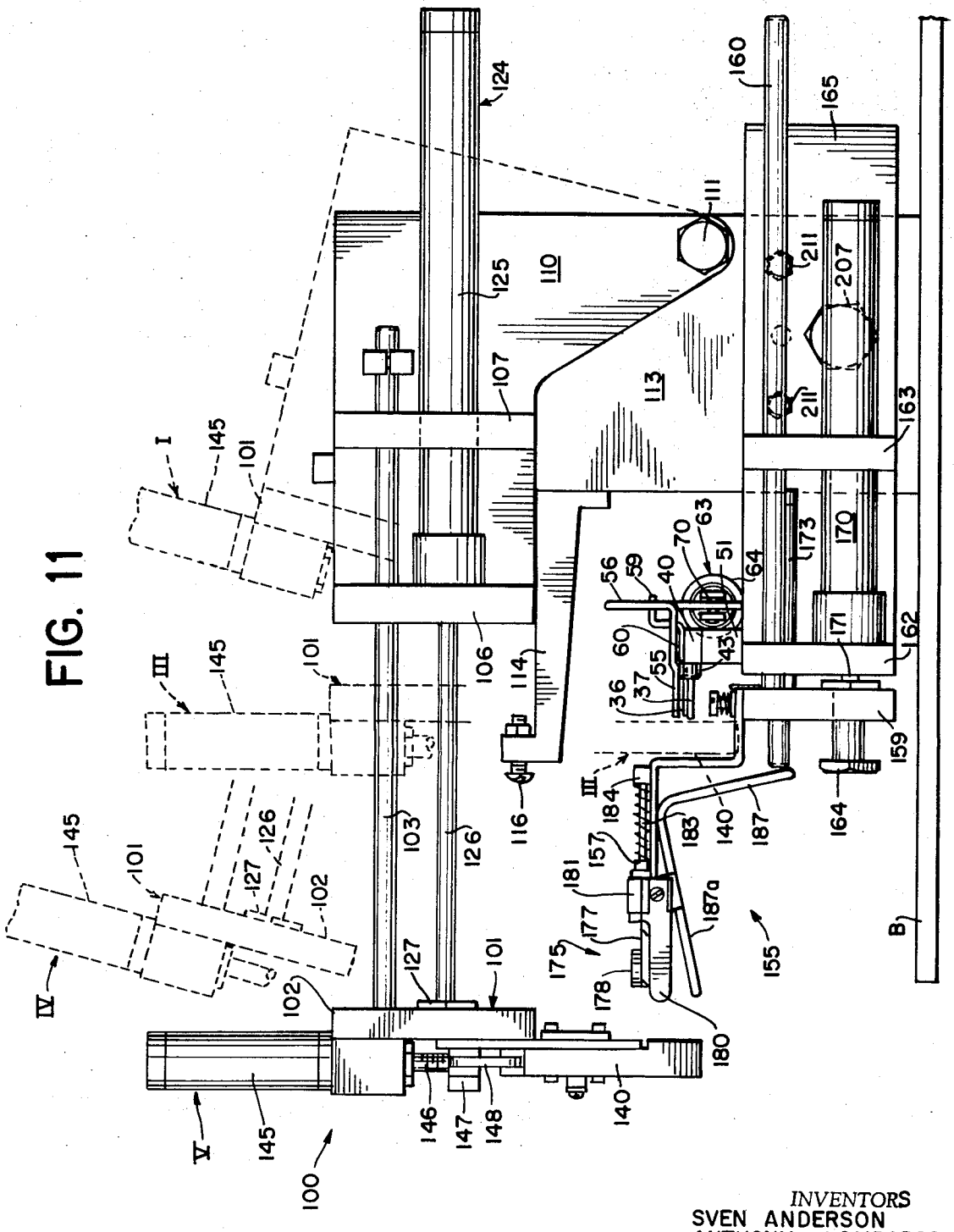

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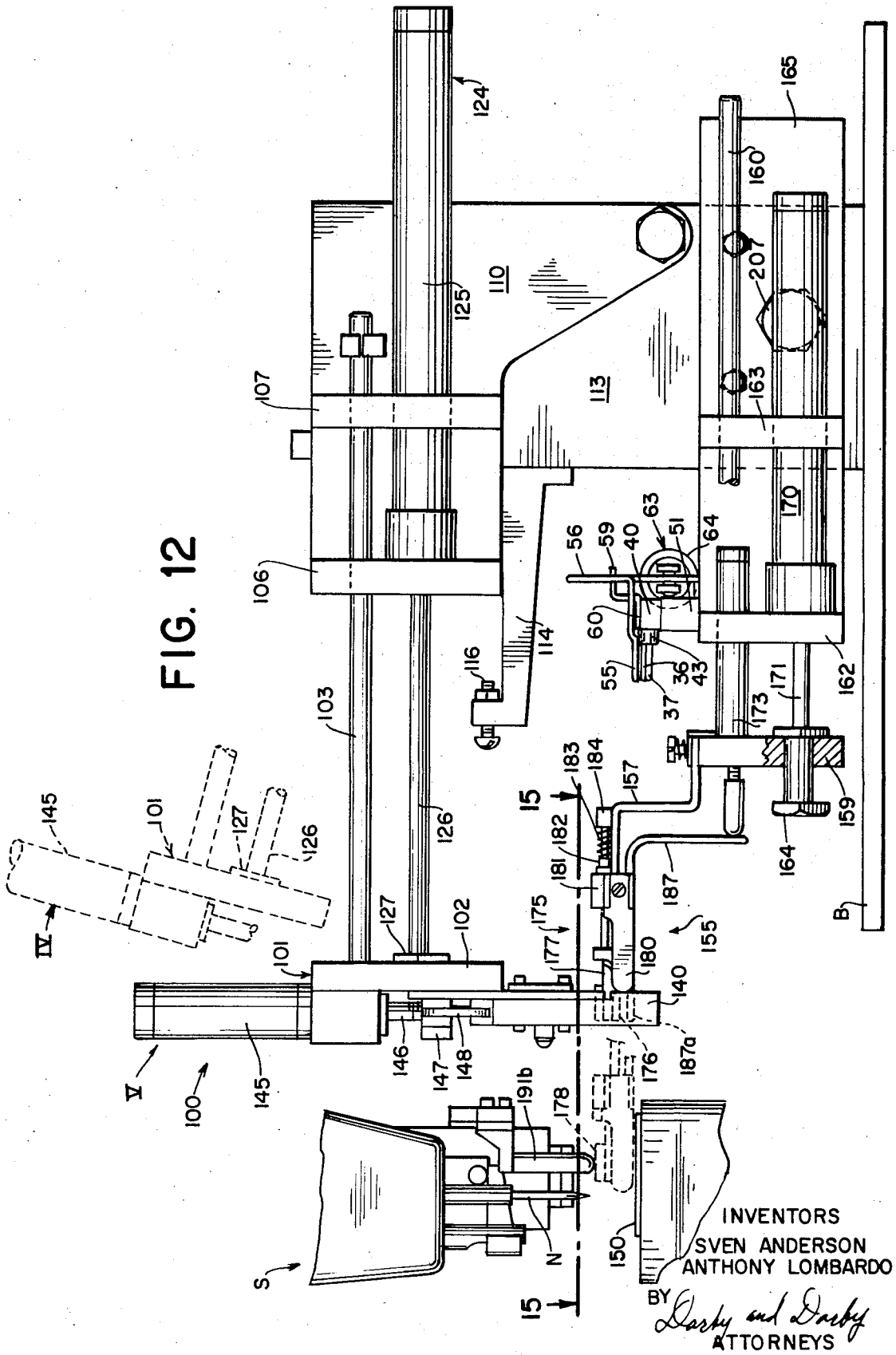
FIG. 12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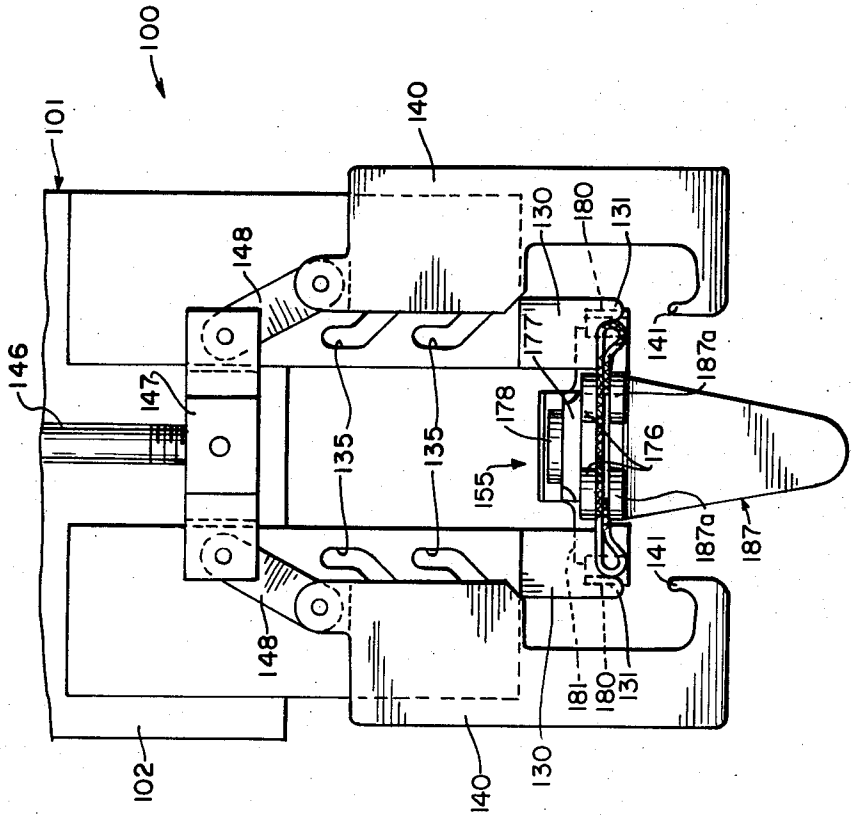

FIG. 14

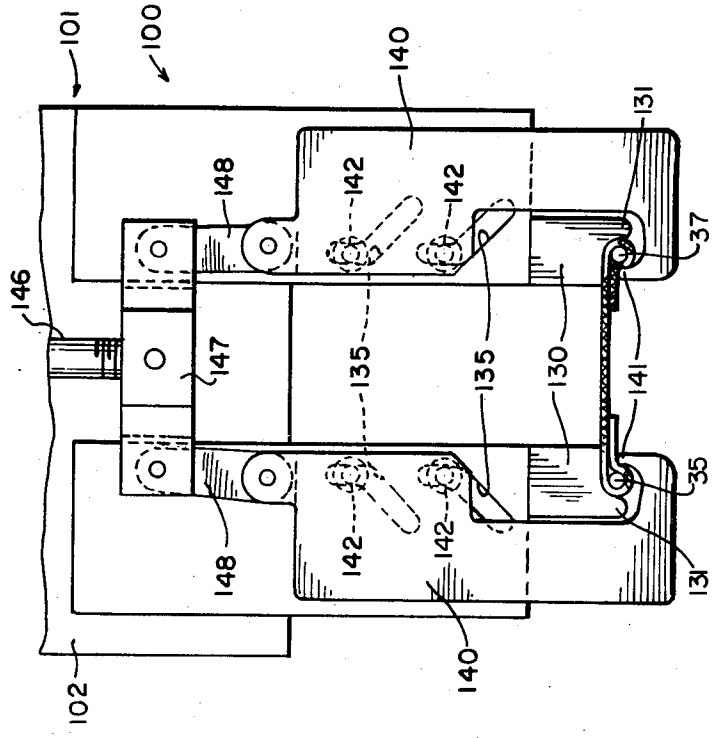

FIG. 13

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FIG. 15

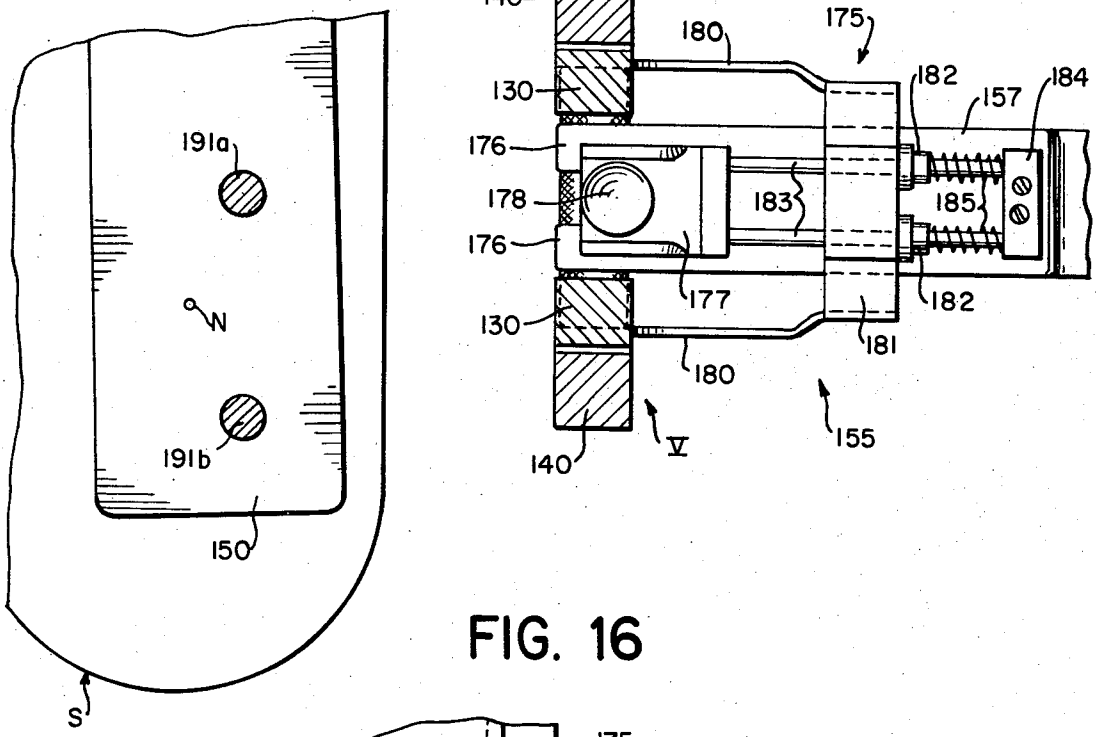

FIG. 16

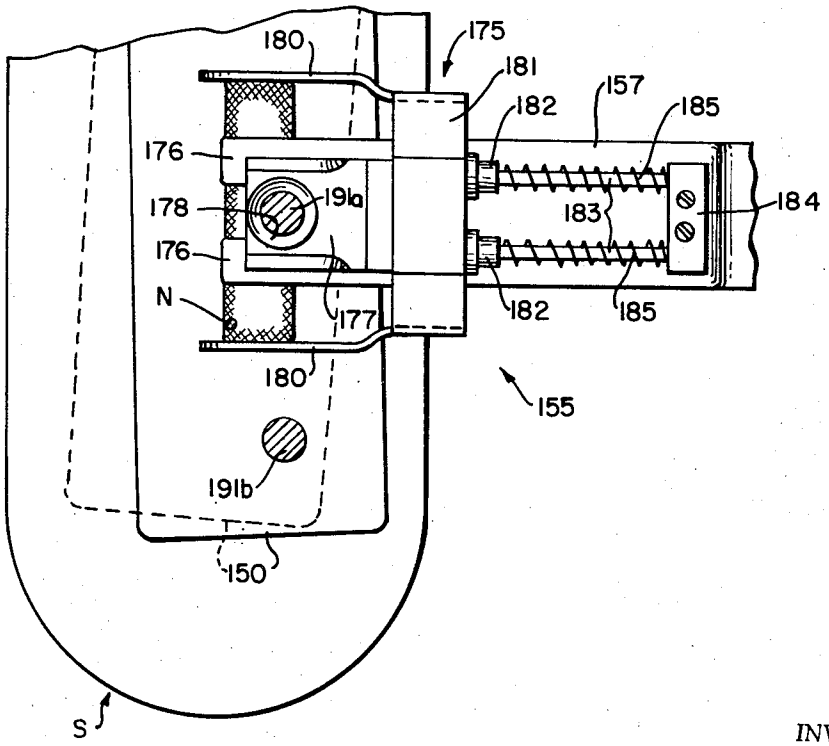

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FIG. 17

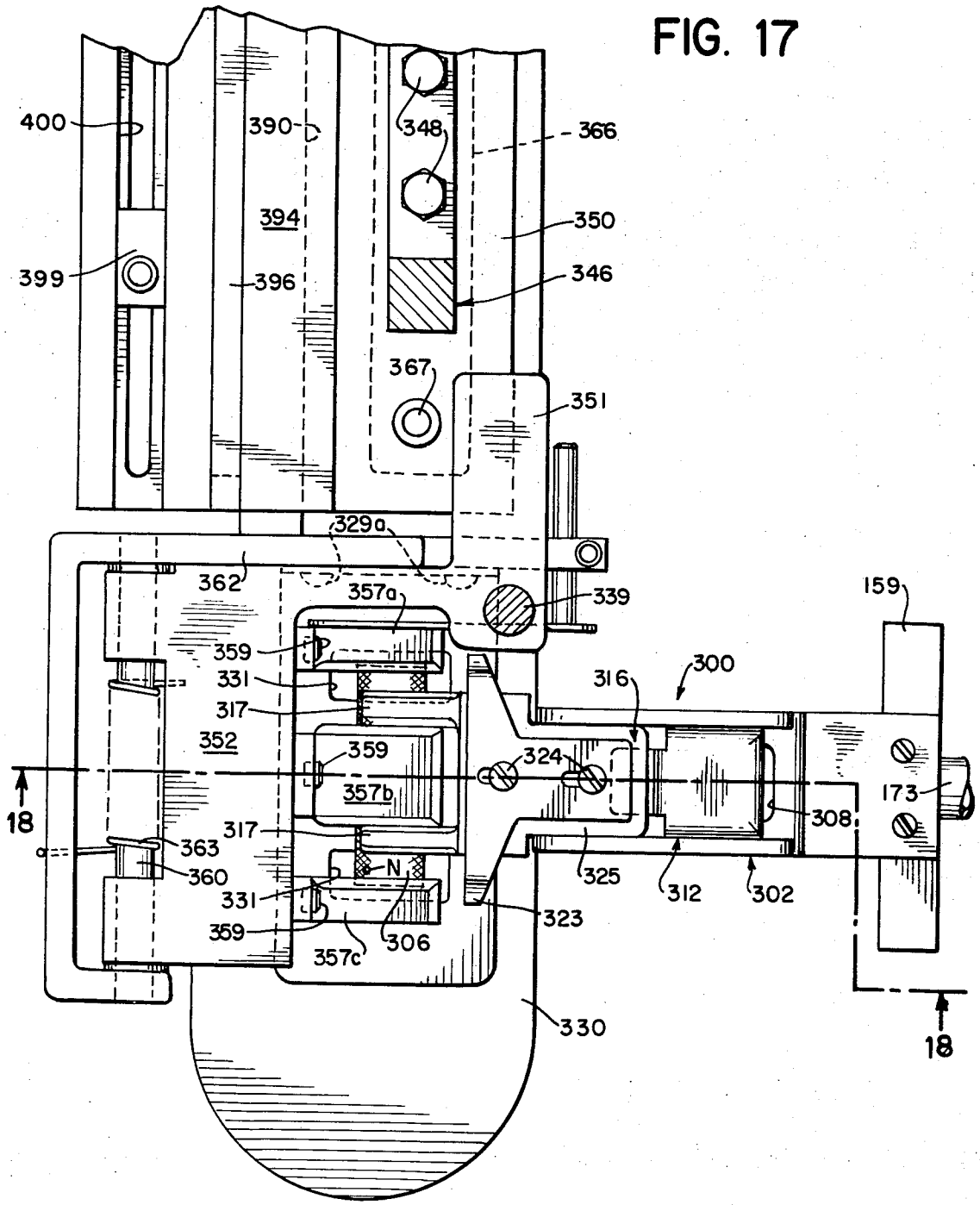

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FIG. 18

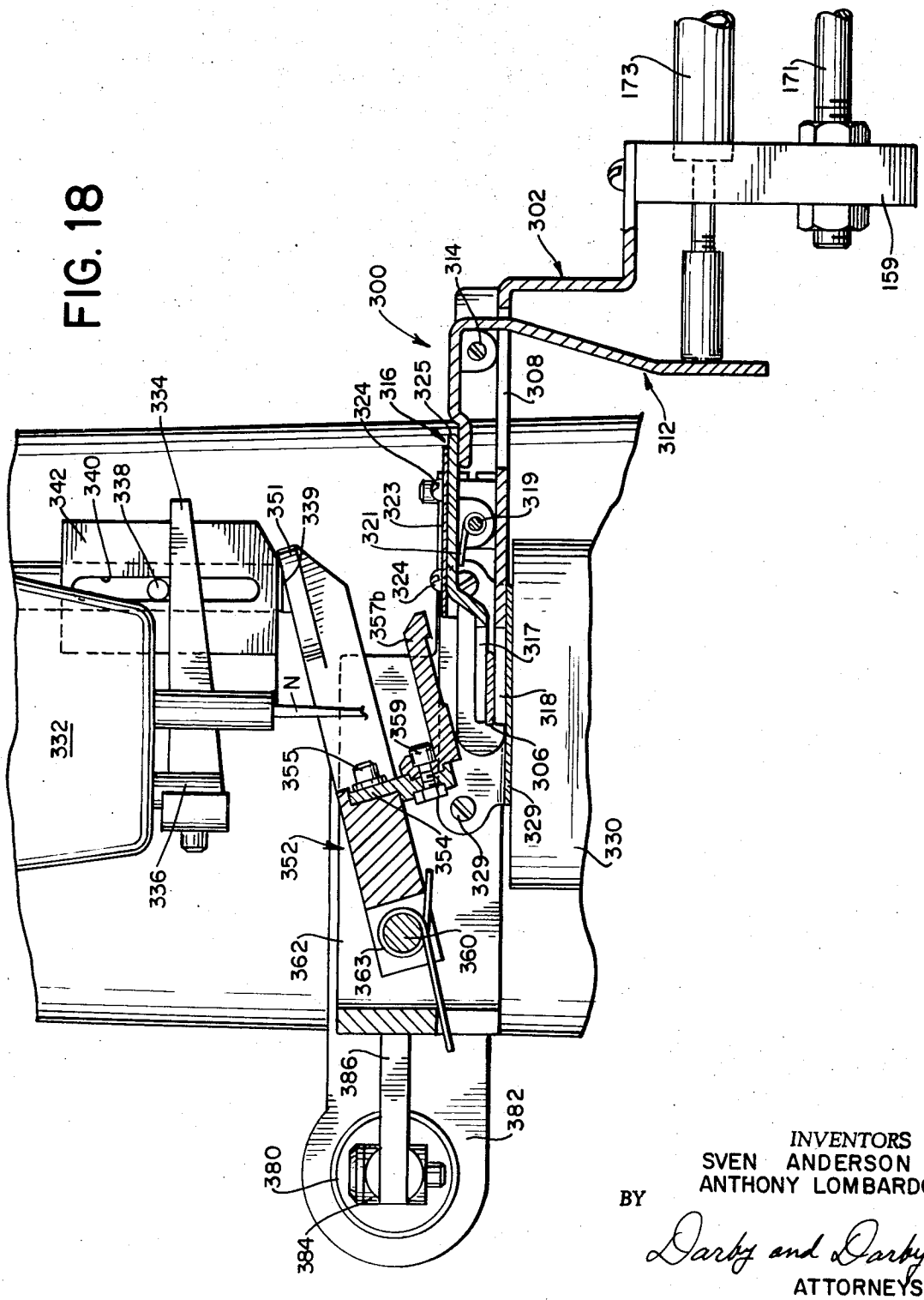

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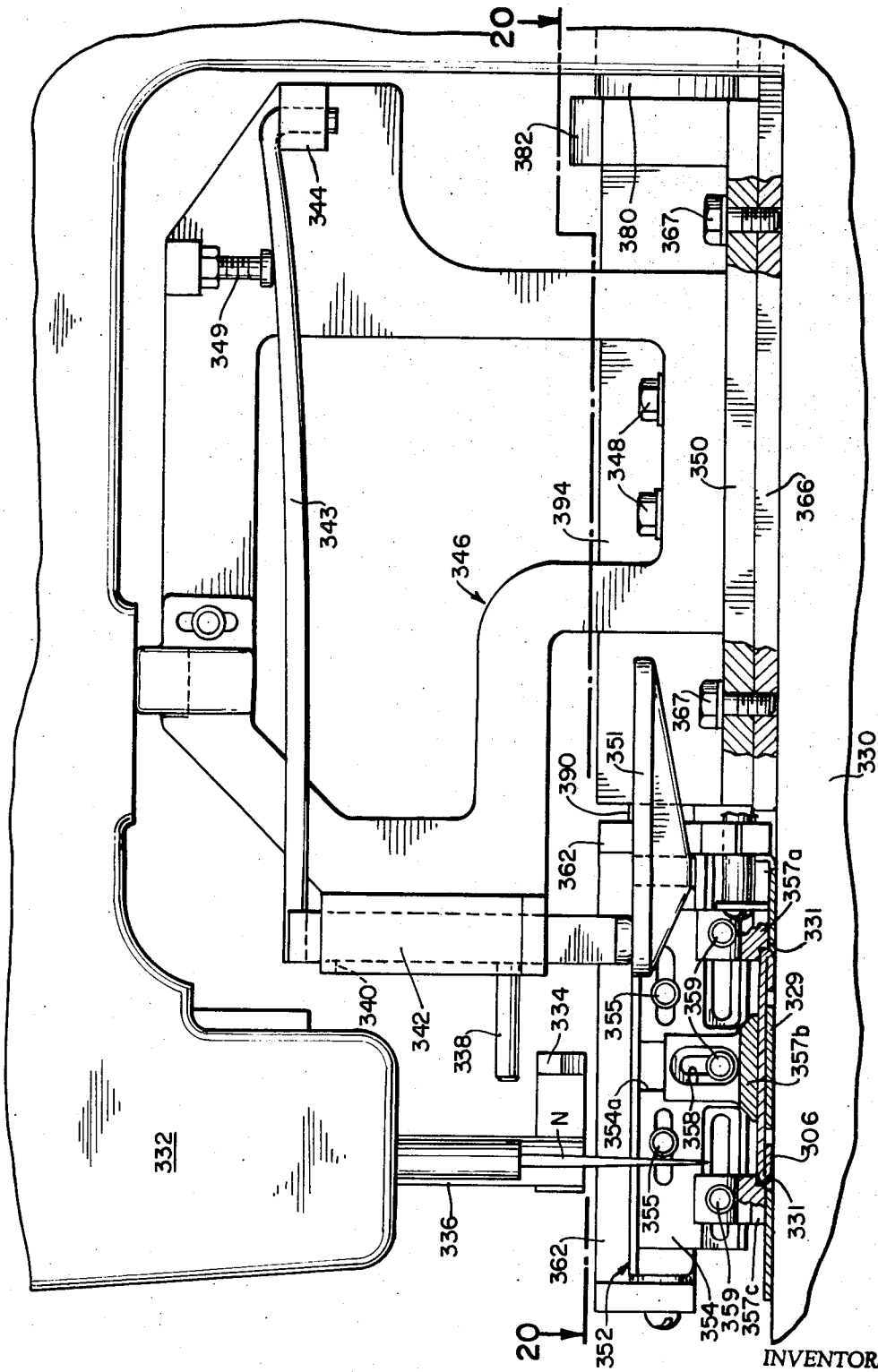
FIG. 19



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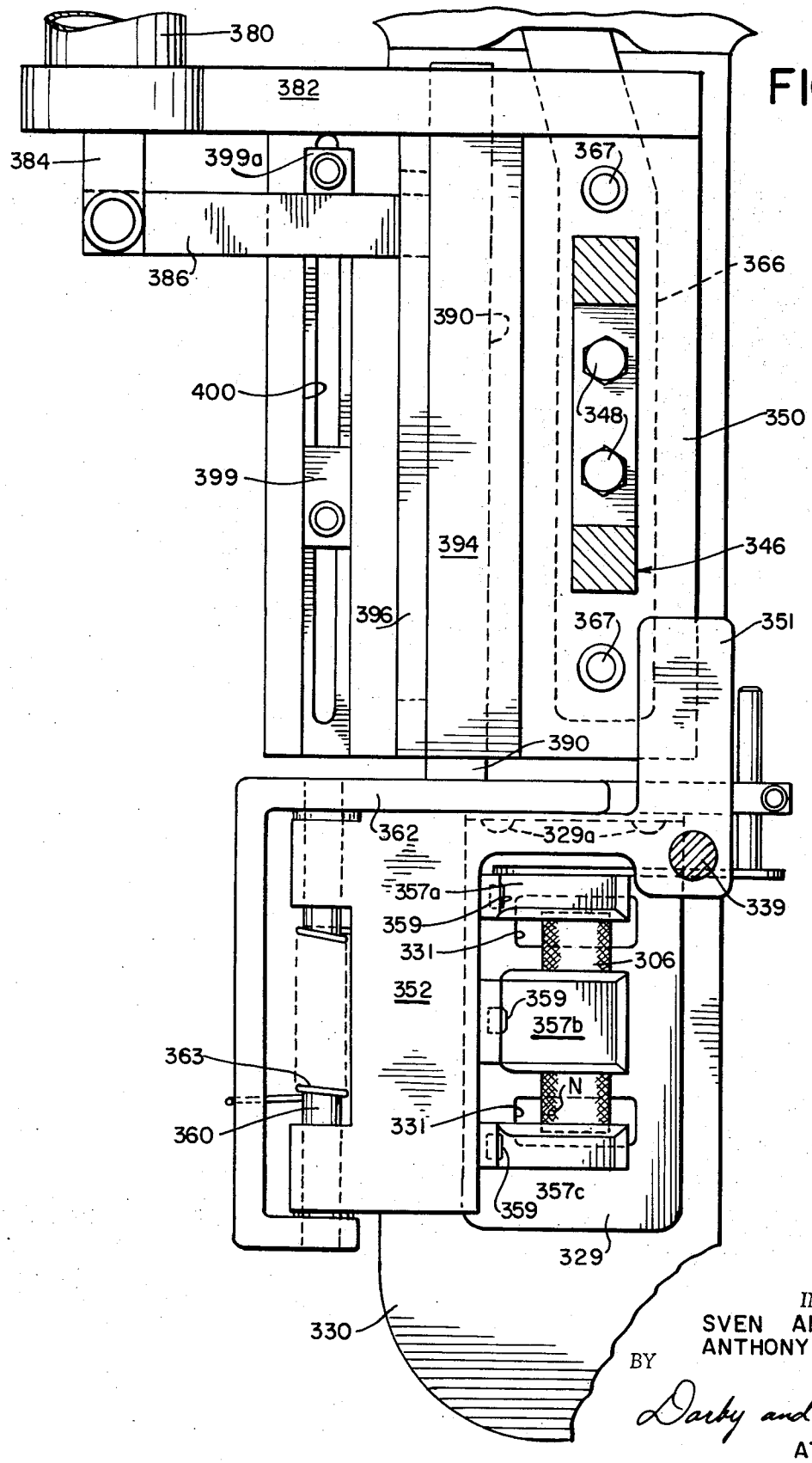

FIG. 20

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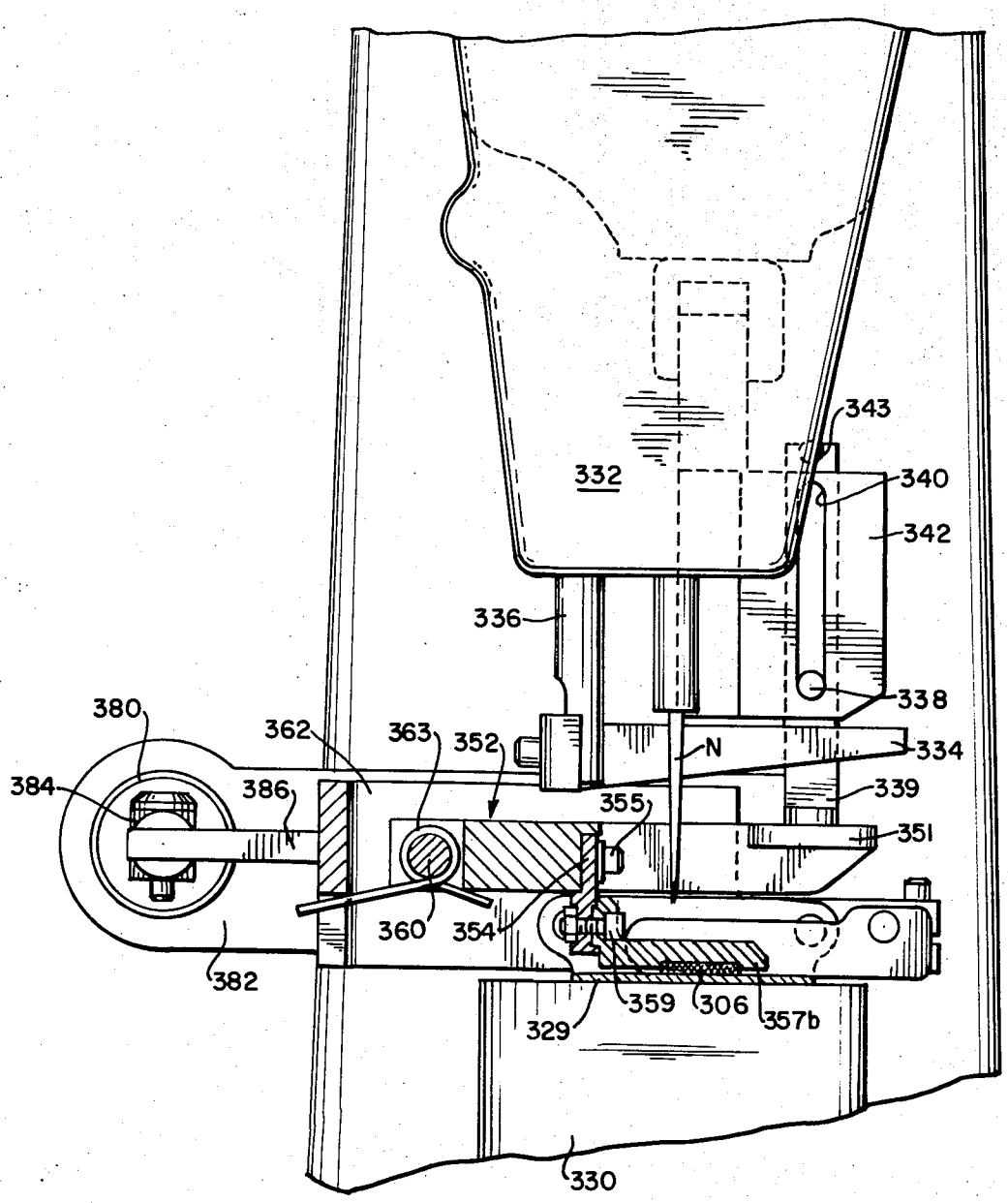
FIG. 21



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BELT LOOPER APPARATUS

In the manufacture of various articles of clothing, for example pants, dungarees and jeans, a number of belt loops must be sewn to the garment. The loops have one or two folded over ends. Where a loop has two folded ends, the stitch is made through the folded ends to the garment. Where a loop has only one folded end the stitch is made through the one folded end at one end of the loop. At the other end of the loop, the stitch is made only through the top part of the loop.

The forming of either one of the types of loops has been, in the prior art, a time consuming process. Usually, lengths of material to be used as the loops are cut at one station. The operator sewing the loops to the garment would take a cut piece, stitch it at one end to the garment and then manually fold over the remaining portion of the piece. The free end of the piece is then folded over and stitched to the garment. Since all of these operations are performed manually, the cost of the garment is raised materially.

The present invention relates to apparatus for automatically forming loops from a elongated piece of material and for delivering the loops sequentially to the sewing machine. In accordance with the the invention, the apparatus includes a station where the individual pieces of material are cut; a station where the cut pieces of material are formed into a loop having one or two bent ends and a mechanism for delivering the loops to the sewing machine. The apparatus also includes an arrangement for shifting the needle of the sewing machine from one end of the loop to the other while still holding the loop in a folded condition.

The apparatus of the invention is fully automatic in the sense that the operator no longer has to touch any part of the material to form the loop. The speed of delivery of the folded loops from the apparatus to the sewing machine is under the control of the operator, preferably by the use of pedals or treadles which are a part of the sewing machine. It has been found that the apparatus can fold and deliver loops to the sewing machine at a rate which is considerably faster than what can be accomplished manually. This increases the speed at which the sewing machine operator can work and thereby decreases the end cost of the garment.

It is therefore an object of the present invention for providing apparatus which can automatically cut pieces of a predetermined length from an elongated piece of material and fold these pieces into loops.

A further object is to provide apparatus which can form loops and deliver the loops to a sewing machine.

Another object is to provide apparatus for sequentially forming loops of material from an elongated piece of material and for sequentially delivering the loops to a sewing machine and holding them while they are sewn to a garment.

Other objects and advantages of the present invention will become more apparent upon reference to the following specification and annexed drawings in which:

FIG. **1** is an overall side elevational view of one embodiment of the machine;

FIG. **2** is a top plan view of the machine of FIG. **1**;

FIG. **3** is a front view of the machine looking along the lines **3—3** of FIG. **1** and showing the loop forming and loop transfer mechanism;

FIG. **4** is a top view showing the tape feed mechanism taken along the line **4—4** of FIG. **1**;

FIG. **5** is a cross-section view of the tape feed mechanism of FIG. **4** taken along lines **5—5** of FIG. **4**;

FIG. **6** is a cross-sectional view of the front portion of the carriage for transporting cut pieces of tape from the tape supply to the loop forming mechanism and of the tape cutting mechanism looking along lines **6—6** of FIG. **1**;

FIG. **7** is a side view in cross-section of the mechanism for moving the tape from the supply to the cutter;

FIG. **8** is a cross-sectional view of the mechanism of FIG. **7** taken along lines **8—8** of FIG. **7**;

FIG. **9** is a side elevational view of the loop forming jaws taken along the line **9—9** of FIG. **2**;

FIG. **10** is a cross-sectional view of the mechanism for delivering folded loops from the jaws to the sewing machine taken along lines **10—10** of FIG. **3**;

FIGS. **11** and **12** are views similar to FIG. **3** showing a portion of the delivery system and the loop forming jaws in a different position;

FIGS. **13** and **14** are side views similar to FIG. **9** of the loop forming jaws and a portion of the delivery system shown in different positions of operation;

FIG. **15** is a section view of the mechanism for delivering folded loops from the jaws to the sewing machine taken along the line **15—15** of FIG. **12**;

FIG. **16** is a view in section similar to FIG. **15**, but showing the mechanism for delivering folded loops in position for sewing the loop;

FIG. **17** is a top plan view of a portion of another embodiment of mechanism for transporting a folded loop from the folding station to the sewing machine;

FIG. **18** is a side elevational view, in cross-section, along lines **18—18** of FIG. **17**;

FIG. **19** is a front view, partially in cross-section, of a portion of the loop delivery mechanism and a portion of the sewing machine;

FIG. **20** is a top view, in cross-section, along lines **20—20** of FIG. **19**; and

FIG. **21** is a side elevational view partly in cross-section, of the mechanism of FIG. **20**.

GENERAL DESCRIPTION OF THE MACHINE

FIG. **1** shows a general overall view of the machine, the various portions of which are described in detail below.

The machine is mounted on a base B and includes a supply reel **1** for fabric material mounted on a frame support **2**. The fabric material on the reel **1** is usually in the form of a narrow tape T, for example from about one-quarter to 1 inch wide which is to be used for making loops for such articles as pants, dresses, etc., through which a belt is to pass. The term "tape" is used to designate all types of material of any width or length.

It should be understood, however, that the machine will form loops from material of any manageable width which is consistent with the design of the apparatus. Also, instead of using a roll of material, lengths of the material can be used, for example in the order of one to several feet long, for short runs of making the loops or for better shade, color, matching or pattern matching. The purpose of the machine is to take the tape T, which is fed in a continuous web, cut it into predetermined lengths, fold the predetermined lengths with one or two bent-under ends and then to deliver the completed bent loop to a sewing machine station.

The tape T is unrolled from reel 1 and pulled to the cutting station generally designated by the number 10. At the cutting station the continuous tape is cut into predetermined lengths. The cut pieces of tape are delivered sequentially from the cutting station 10 by a carriage to a folding and delivery station 100. At the folding and delivery station 100 the cut pieces of tape from station 10 are sequentially folded with the one or two bent-under ends to form a belt loop. The folding-delivery station 100 also operates to sequentially deliver a completed loop to a sewing machine station which is designated by the reference letter S (FIG. 3).

II. SUPPLY REEL STATION

The supply reel 1 is any conventional type reel of suitable width for the tape and the stand 2 is any suitable bracket arrangement. If desired, a friction brake (not shown) can be used with the supply reel 1 to provide tension for the tape as it is fed to the cutting station 10. The machine also can handle strips of material which need only be fed into the machine by hand as far as rollers 19, 20, described below, or which can be placed on the reel.

III. CUTTING STATION

The cutting station 10 is described with reference to FIGS. 1, 2, 4, 5, 6, 7 and 8.

The tape T passes from the reel 1 onto a horizontal plate 12 which is attached to a vertical bracket 14. While on plate 12, tape T passes through a pair of guides 16 and 17 (FIG. 7) which have upstanding vertical walls to prevent sideward movement of the tape. The guides 16, 17 straddle a pair of opposed lower and upper rollers 19 and 20. Roller 19 is a driver roller and its axis is located below the top of bed 12. The surface of roller 19 protrudes through an opening 12a in the bed to engage the bottom surface of the tape. Roller 20 is an idler roller which engages the top surface of the tape. As shown in FIG. 1, the idler roller 20 is mounted for rotation on one leg of a generally U-shaped arm 22. The other leg of arm is pivotally mounted on a spring loaded pivot 23 on the end of a post 24 which extends upwardly from housing 14. Idler roller 20 applies pressure to the top surface of the tape to ensure positive drive by the bottom roller 19. The tape drive mechanism 225, which is located in housing 14, is described in detail below in section VII.

From the exit end of guide 17, the tape is inserted into a funnel shaped end of another guide member 30 (see FIGS. 4 and 5) which is adjustably mounted by a bracket 32 on a roll feed and scissor assembly. The major portion of guide 30 is partially cut away leaving only a channel 31 in which one edge of the tape rides. The channel 31 covers only a relatively small portion of the total width of the tape. The width of the channel 31 is such to permit two pins 35 and 37 to be located beneath the major portion of tape T while at the same time clearing the channel member 31. The two pins 35 and 37 have their ends remote from channel 31 fixed in the side arm of a carriage 40. Enlarged diameter spacers 42 and 43 are provided for pins 35 and 37 to prevent lateral movement of the tape. A clamp jaw 36 which is also fixedly mounted on the carriage side arms is located between the two pins 35 and 37. The longitudinal positions of pins 35 and 37 is preferably made adjustable so that different size loops can be formed. Also, the pins are preferably threaded onto the carriage so that one or the other can be removed. When this is done, a loop having only one bent over end is formed.

Carriage 40 travels along a pair of upper and lower rails 45 and 47. The left end of each of the rails, as seen in FIG. 2, is mounted in a block 49 which is fastened to a bottom horizontal brace 50 mounted on a base B. The other end of each of the rails is mounted in a second block 51 which is in turn connected to the bottom horizontal base 50. An adjustable stop 52 is located in the block 51 to limit the travel of carriage 40 to the right, as shown in FIG. 1.

A flat clamp 55 (FIGS. 2, 4 and 5) for the tape is mounted on the end of an arm 56 which is in turn pivotally mounted on pivot 57 to the carriage 40. Clamp 55 cooperates with the clamp jaw 36 to hold the tape. As seen best in FIG. 6, arm 56 has a generally U-shaped portion 56*a* which extends above bed 12. A generally S-shaped stop tab 59 (see FIG. 6), has a base portion 60 fastened by screws 61 to the top of the carriage 40. The operative portion of stop tab 59 is located to engage clamp arm 56, in a manner described below.

A first pneumatic cylinder 63 has its stationary cylinder portion 64 connected to the base B by a mounting bracket 65 (See FIG. 2). The piston rod 67 of the cylinder 63 has a bifurcated bracket whose arms are fastened by a pin 70 to the tape clamp arm 56 at a point above pivot 57 (see FIG. 6). Extension and retraction of piston 67 of cylinder 63 moves clamp arm 56 through while carriage 40 is moved toward and away from folding station 100. The carriage movement is described below.

IV. CUTTING MECHANISM

A second cylinder 74 (see FIG. 6) has its lower stationary end connected to the vertical upright 5 by a mounting bolt 75. The piston rod 76 of cylinder 74 has a bifurcated bracket 77 having a pin 78 which extends through the bracket and one end of a crank arm 79. The crank arm 79 is pivotally mounted about a pivot 80 on upright 5. The lower end of crank arm 79 has a fixed bearing pin 82 which rides the slot 84 formed in one leg of a generally L-shaped knife 85.

The cutting edge 86 of the knife is on the base leg and the knife 85 is pivoted at the intersection of its two legs about a point 88 located on an angle bracket 90 attached to the vertical upright 5. Retraction of piston 76 moves crank arm 79 counterclockwise thereby moving the edge 86 of knife 85 down. A stationary blade 86*a* (see FIG. 5) is fixedly mounted on the bracket 90. The stationary blade 86*a* is mounted close to the end of bed 12 so the tape will be fairly well supported at the point of cut. Tape T is cut by a shearing action between blades 86 and 86*a* as knife 85 is moved down. The point of cut is between guide 17 and 30, off the bed 12. Extension of the piston 76 turns the crank arm 79 clockwise to raise the knife 85.

A third cylinder 92 (see FIG. 1) is mounted by a bracket 93 to the vertical upright 5. The piston rod 94 of cylinder 92 carries a roller assembly with an offset roller 95. The assembly includes a mounting block 96 on the piston which rides against a guide arm 97 fastened to the lower end of cylinder 92.

In a typical cycle of the carriage movement and cutter operation, neglecting for the time being the tape

feed, the carriage **40** is all the way to the left as viewed in FIG. **1**. At the time arm **56** is pulled to the up position by piston **67** of cylinder **64** which at this time is not energized. Cylinder **92** first operates to move roller **95** down on top of clamp **55**, bringing the clamp down into engagement with the tape against clamp jaw **36**. This holds the tape firmly for cutting. Piston **76** of the knife operating cylinder is then retracted to move knife **85** down and make the cut. Piston **76** is then extended to bring the knife up.

The piston rod **67** of the first cylinder **64** is then actuated to start the carriage **40** moving to the right. The clamp **55** will slide out from under roller **95**. Clamping pressure is still maintained on the tape by piston **67** holding clamp **55** down. Cylinder **92** is operated to retract piston rod **94** and roller **95** after clamp **55** has cleared same.

The motion of carriage **40** continues to the right to the folding station with the cut piece of tape clamped between members **36** and **55** until the carriage hits stop pin **52**. A limit switch (not shown) is actuated which starts the operation of the mechanism at the folding station to fold and remove the cut piece of tape from between clamp **55** and jaw **36**. Once the piece is removed, another switch (not shown) is actuated to start retraction of piston rod **67**. When piston rod **67** is retracted, the arm **56** is first pulled backwards, raising clamp **55**. The arm moves backward until the curved portion **56a** hits the stop **59**. Further retraction of piston **67** pulls carriage **40** to the left to a stop position against another stop pin (not shown). At this time, clamp **55** is in the up position away from the tape.

V. FOLDING STATION

A. Loop Transfer Head

Folding station **100** includes a loop transfer head assembly **101** which is supported on a structure for moving the head both up and down and also in and out when the head is in both of these positions. Loop transfer head **101** also carries a pair of articulated folding and gripping jaws **140** (FIG. **9**) whose function it is to do the actual folding of the free ends of the cut piece of tape to form the loop. In FIG. **1**, head **101** is shown down with the carriage **40** to the left. This view is illustrative only and does not shown the actual operation of the machine.

As seen best in FIGS. **2**, **3**, **11** and **12**, a block **102** is mounted on a pair of rods **103**, **104** which are slidably mounted within suitable bearings of a pair of spaced bearing mounting blocks **106**, **107**. The rods have adjustable stop nuts **108**. The bearing blocks **106**, **107** are connected to a plate **110** which is pivotally mounted around a shaft **111** attached to a bracket **113**. An upwardly turned end **115** is formed on a horizontal arm **114** attached to bracket **113**. End **115** has adjustable stop **116** to limit the travel of head **101**. A pneumatic cylinder **119** (see FIGS. **2** and **3**) has its body pivotally mounted on the bracket **113** and its piston rod **121** pivotally connected to the plate **110** by a spacer bushing **122**. Extension and retraction of piston rod **121** pivots plate **110** and the head **101** about the axis **111**.

The body **125** of a pneumatic cylinder **124** is fixedly mounted to blocks **106** and **107**. The free end of piston rod **126** is connected to the transfer head block **102** as shown at **127**. Extension of piston rod **126** moves head **101** to the left, as shown in FIGS. **11** and **12**, while retraction of the piston moves the head to the right. Travel to the left or right is limited by the stop nuts **108**.

B. Loop Forming Jaws

As shown best in FIGS. **9**, **13** and **14**, a pair of arms **130** are fixedly mounted to the block **102** of head **101**. Each arm has a finger **131** which fits over the outside of a corresponding pin **35** and **36** attached to carriage **40** with the ends of the cut tape piece therebetween.

A plurality of guide slots **135** is formed in each of the arms **130**. The slots **135** each have a vertical upper portion terminating in an outwardly and downwardly sloping portion. A jaw **140** for folding an end of the piece of material is attached to each arm **130**. Each of the folding jaws **140** has a respective fixed follower **142** on the inner face thereof which rides in a respective slot **135**. A pneumatic cylinder **145** is mounted vertically on the head block **102** and its piston **146** rod is connected by a cross-piece **147** and a double-ended articulated linkage **148** to the jaws **140**.

As seen in FIG. **9**, the lower end of each jaw **140** has a curved finger **141**. Piston **146** is shown in the fully extended position. This brings fingers **141** out of contact with the tape. The free ends of the cut piece of tape will normally drape over the pins **35** and **37**. When piston **146** is retracted, as shown in FIG. **13**, the jaws **140** and their fingers **141** move upwardly and inwardly to fold the free ends of the tape back onto the central section of the piece held between pins **35** and **37**. If only one folded under end is desired for the loop, one of the pins **35** or **37** is removed and a short stub left. The end of the tape which is not to be folded would rest on the stub.

In operation, when carriage **40** travels to the right and reaches stop **52**, the head assembly is held at rest pivoted upward by cylinder **119** and with the head retracted by cylinder **124**, in position I shown in dotted lines in FIG. **11**. At this time the jaw actuating cylinder **145** is in the extended position (FIG. **9**) so that the jaws **140** are open. As the carriage reaches stop **52** it actuates a switch (not shown) which sets up a circuit. Upon command of the operator, normally by actuating a pedal, the pivoting cylinder **119** is caused to retract its piston to bring the head assembly **101** down to position II (FIGS. **3** and **9**). As the head assembly **101** moves downwardly, the open arms **130** engage the free ends of the tape piece held by clamp **36**, **55** and start to fold the ends around the pins **35** and **37**. When the head assembly is in the full down position II, the fingers **131** of the arms **130** hold the ends of tape folded down (FIG. **9**). At this time jaw actuating cylinder **145** is operated to move piston rod **146** up. This closes jaws **140** and forms the folded loop around pins **35** and **37** (FIG. **13**). After jaws **140** close, another switch (not shown) is closed to actuate cylinder **124** to move the head assembly **101** to the left to position III as shown in FIG. **11** in dotted lines. This pulls the folded loop (FIG. **13**) off of the pins **35** and **37**.

As head assembly **101** moves to position III, it actuates another switch (not shown) which causes both piston rod **121** of the head assembly pivoting cylinder **119** and piston rod **126** of the head assembly reciprocating cylinder **124** to extend. This moves the

head assembly to a raised extended position IV shown in dotted lines in both FIGS. 11 and 12. When head assembly 101 is in position IV, its pivoting cylinder 119 is again activated to retract piston rod 121. This brings head assembly 101 down to position V as also shown in FIGS. 11 and 12.

VI. TRANSFER TO SEWING MACHINE

The folded loop held by jaws 140 in position V of FIG. 11 is now to be transferred to the sewing machine's movable shoe 150 (FIGS. 3, 10, 12, 15 and 16). Referring to FIG. 11, in position V, the transfer head assembly 101 is in front of a transfer clamp assembly 155. Assembly 155 includes a bracket 157 which is attached to a traveling block 159. A rod 160 is connected to block 159, the rod riding in bearings (not shown) in a pair of bearing blocks 162, 163. The blocks 162, 163 are attached perpendicularly to a vertical bracket 165 which in turn is held in position by bracket 113 by a pair of guide rails 168 attached to bracket 165.

A pneumatic cylinder 170 is mounted between bearing blocks 162 and 163. The cylinder's piston rod 171 is attached to the traveling block 159 to move it and the transfer clamp assembly toward and away from the sewing machine shoe 150. The end of piston rod 171 is mounted in a slip clutch 164 whose function is described below. A clamp actuating pneumatic cylinder 173 is mounted on traveling block 159 to move with the block. The rear end of cylinder 173 clears a hole in bearing block 162.

An upper clamp member 175 is connected to the forward end of the clamp bracket 157. This clamp member includes a pair of side arms 176 between which is held a plate 177 on which is formed an upstanding socket 178 with a concave depression within which a sewing machine needle locating lug 191*a* or 191*b* is to be placed, as is described below. A pair of loop registration prongs 180 are mounted on a cross-piece 181 having bearings 182 (FIG. 10) within which the respective free ends of a pair of rods 183 travel. The other ends of rods 183 are fixedly mounted in a block 184 attached to the top of bracket 157. A respective spring 185 is located on each rod 183 between cross-piece 181 and block 184. The prongs 180 are thus free to travel with cross-piece 181 which forms a spring loaded assembly.

An L-shaped lower clamp arm 187 is pivotally mounted between the clamp assembly side arm 176. The lower vertically extending leg of clamp arm 187 is positioned to be contacted by the plunger of cylinder 173. The generally horizontal upper leg forms the lower clamping surface for clamp assembly 175.

Considering the action of clamp assembly 175, in FIG. 11, the loop transfer head 101 is shown in position V with the loop already formed. The transfer clamp assembly 175 is in the rest position. Cylinder 170 is actuated to move piston rod 171 carrying block 159 forward toward the loop forming jaws 140 to a position where the side arms 176 of the assembly 175 overlies the top of the formed loop (FIGS. 12, 14 and 15). At this time cylinder 173 is actuated so that the horizontal upper leg of the lower clamp arm 187, which has a pair of gripping jaws 187*a*, is moved upward thereby clamping the formed loop between side arms 176 and clamp jaws 187*a*.

The prongs 180 abut and then are held against the arms 130 of head 101 as the clamp assembly moves from the position shown in FIG. 11 to that shown in FIG. 12. This causes prong carrying cross-piece 181 to move to the fully retracted position (FIG. 15). The cylinder 145 for the loop forming jaws 140 is then extended (FIG. 14) to move jaws 140 away from the loop, leaving it clamped between members 176 and jaws 187*a*. The head assembly pivoting cylinder 119 is actuated to pivot the head assembly up to position IV (FIG. 11) and then cylinder 124 is actuated to retract its piston to move the head back to position I, ready to accomplish the folding of the loop from the next cut piece of tape delivered to the folding station by carriage 40. As the jaws 140 move away from the clamp assembly 155, the prongs 180 spring forward (FIG. 16) to engage the folded ends of the loop. This holds the loop in registration so that the ends do not twist.

When jaws 140 of head 101 clear the transfer clamp assembly 155, the folded loop is ready to be delivered to sewing machine movable shoe 150. This is accomplished (FIG. 12) simply by continuing the extension of the piston of cylinder 170 until the loop clamp assembly is over the movable shoe 150 of the sewing machine. The alignment of the sewing machine with respect to the loop transfer clamp is first such that the socket 178 of the upper clamp member 175 lies below a locating lug 191*a* fixed to the sewing machine. This position is shown in FIG. 16. In this position, the needle N is positioned to sew through the top of the loop and one of the bent-over end portions. To accomplish this, the sewing machine operator moves a first control (not shown) which is preferably attached to a pedal or treadle. This locates lug 191a in socket 178 and bring needle N down to the loop and garment (not shown) to start the sewing.

During sewing of one end of the loop, the shoe 150 of the sewing machine is automatically moved in a slightly arcuate path to a final position as shown by the dotted lines in FIG. 16. There is an outward movement of the clamp assembly 175 since the clamp is held by lug 191*a*. This is permitted by the slip clutch 164 on block 159. In FIG. 11, the block 159 would be moved out against the enlarged stop at the end of the clutch.

After the sewing of one end of the loop is completed, the operator actuates another control, also preferably part of the treadle action, which raises needle N and lugs 191*a*, 191*b*. Shoe 150 moves back to the solid line position of FIG. 16 and the slip clutch 164 moves the clamp assembly back to the solid line position. At the same time this actuates a cylinder 200 which is mounted between the bracket 113 and a vertical block 203 fixed on base B (FIG. 10). Piston rod 205 of cylinder 200 is fixedly connected by a nut assembly 207 to the upright 165. The pair of rods 168 have their head ends connected to vertical upright 165 by nuts 211 and ride in bearings (not shown) in blocks 113, 203. The rear ends of rods 168 are connected together by a cross-piece 213. When cylinder 200 is actuated to extend its piston, upright 165 is moved (down as shown in FIG. 10 and out of the plane of the drawing of FIG. 12) to move the upright 165 carrying the transfer clamp assembly 155 and the loop in the same direction. This locates socket 178 of the loop transfer clamp below the second lug 191b on the sewing machine. The other end

of the formed loop is now in a position to be sewn and the operator presses down on the treadle to lower the machine so that lug **191b** rests in socket **178**. The operator sews the other end of the loop as the shoe **150** moves in the arcuate path. When the sewing is completed, the operator actuates another control (also preferably on the treadle) which causes the piston of cylinder **200** to retract, moving all of the assemblies connected to upright **165** back to their original position ready to fold the next loop and transfer it to the sewing machine.

VII. TAPE TRANSPORT

FIGS. **7** and **8** show the details of the tape-moving mechanism **225**. A rack **227** is slidably movable within vertical housing **14** and a bearing plate **229** by the piston rod **231** of a cylinder **230**. The end of piston rod **231** is swivel mounted to rack **227**. An adjustable stop **228** (FIG. 1) in the shape of a finger is fastened to housing **14** and is adjustable longitudinally of the housing with a pin **227***a* which is fixed to and travels with the rack **227** in a slot **233**. The teeth of the rack engage a pinion gear **235** which rotates on an axle **237** mounted in bearing block piece **14**. The teeth of the pinion gear **235** engage the teeth of a pinion **239** mounted on the intermediate portion of a shaft **241**. The latter is held within a cylindrical bearing **243** mounted on vertical bracket section **14** at one end thereof by a collar **245** and a nut **246** threaded on a screw **247** which is attached to shaft **241**. A flange **250** having ratchet teeth **252** for a ratchet formed on one face thereof is mounted to the shaft **241** adjacent gear **239**. The drive roller **19** is generally cylindrical and the inner end has a slide fit over flange **250**. A plurality of ratchet teeth **260** are formed on the inner face of drive roller **19**.

A first square or rectangular plunger type pawl **261** is located within a cylindrical housing **262** which is press fitted between the inner face of drive wheel **19** to rotate with the shaft **241**. Pawl **261** loaded by a spring **264** located within housing **262** to engage the teeth **252** on the flange **250**. Spring **264** is held within the housing by a cap **255** fastened to shaft **241**. The cap has a slide fit with respect to the wheel **19** so that the latter can rotate relative to the cap. The respective angles of inclination of the teeth **252** and the pawl **261** are such that when rack **227** is moved in a direction to advance the tape towards the carriage **40**, pawl **261** locks into the teeth **252**. When the rack is moved in the opposite direction, pawl **261** slips relative to the teeth **252** to provide a one-way clutch action.

A second one-way clutch in the form of a square or rectangular pawl **270** is held within a housing **272** and is loaded by a spring **274** backed up against a set screw **276**. The pawl **270** engages the teeth **260** on the inner face of the drive roller **19**. Housing **272** is mounted to the vertical bracket **14**.

The operation of the drive mechanism is as follows. When the cylinder **230** is actuated, piston rod **231** is moved to the left (as seen in FIG. **7**). This rotates the pinion gear **235** which in turn drives shaft **241** through the gear **239**. Pawl **261** of the first one-way clutch locks up on one of the ratchet teeth **252**. This causes wheel **19** to rotate since the clutch housing **262** is carried between shaft **241** and drive roller **19**. At this time, the pawl **270** of the second clutch slips over the teeth **260** on roller **19**. When piston rod **231** is moved to the right, shaft **241** is rotated in the opposite direction. Pawl **270** of the second one-way clutch locks up on the teeth **260** of roller **19** to prevent the wheel from rotating. Pawl **261** of the first one-way clutch slips over the teeth **252**.

VIII OPERATING SEQUENCE

The following is a description of a cycle of the operation of the machine. The various switches referred to are not shown on the drawings since their placement as would the wiring thereof to control the various pneumatic cylinders is matter of design choice within a range of considerable flexibility and is also well within the skill of those familiar with the art. Further, the timing of the cycle described below also can be varied.

Consider that the operator is about to or has just completed the sewing of the second end of a loop on the machine. At this time, the material clamp carriage **40** is moving towards or is at rest all the way over to the right, as viewed in FIG. **1**, cylinder **173** releases with a cut piece of tape thereon. At this time, head **101** is in rest position I. The clamp assembly is on the platen **150** and the operator is holding a second (right) pedal depressed to finish the sewing operation. The operator releases the right pedal, when the sewing is completed, the sewing head raises from the platen **150**. He then depresses a left pedal and holds it down. A relay circuit is set up which causes the cylinder **173** to de-energize to release clamp arm **187** of the clamp assembly **155** and to retract the piston of cylinder **170** all the way back to move the clamp assembly to the retracted position shown in FIG. **3**. When the clamp assembly is fully retracted, the operator released the left pedal.

As the clamp assembly **155** retracts it actuates a switch which starts head **101** to cycle through its sequence from rest position I (with no loop) through all of the positions to its final position V. At the start of the head cycle, the pivoting cylinder **119** is first actuated to move the head from position I to position II (FIG. **3**). At the same time, cylinder **200** is actuated to retract its piston to move the clamp assembly **155** back to its initial position. When head **101** reaches position II it trips a switch which causes the actuating cylinder **145** for jaws **140** to retract its piston and move the jaws upwardly to bend the ends of the cut tape around pins **35**, **37**.

The completion of the bending of the tape end causes jaws **140** to rip a switch which actuates cylinder **124** to move head **101** forward from position II to position III and clear the loop of tape from the pins **35**, **37**. As head **101** moves to position III it trips a switch which actuates in sequence the pivoting cylinder **119** and a further movement of the cylinder **124**. This moves head **101** to position IV. At this position, another switch is tripped which causes pivoting cylinder **119** to retract its piston to move head **101** to position V.

The head stays in position V with a folded loop until command is initiated by the operator. The operator depresses the first (left) pedal. This trips a switch which actuates the loop transfer clamp assembly cylinder **170** causing its piston to move block **159** and the clamp assembly **155** to the left (FIG. **12**). After the piston of cylinder **170** has travelled for a short distance, it trips a switch which actuates cylinder **173** to pivot the clamp

187 upwardly to hold the loop now in the jaws 140. The full extension of the plunger of cylinder 173 trips a switch which actuates the jaw cylinder 145 to move its piston downward so that the jaws 140 clear the clamp assembly. Opening of jaws 140 actuates the head control cylinders 119 and 124 to move head 101 back to rest position I. The clamp assembly continues to move to the sewing machine platen 150 under the head of the sewing machine. The operator releases the first (left) pedal causing the head of the sewing machine to move down to locate lug 190*a* within the socket 178.

The operator steps down on a second (right) pedal which causes the machine to sew one side of the loop onto a garment (not shown) laid on platen 150. The platen is moved in its arc by the sewing machine as the sewing commences. After a predetermined time, the sewing motion of the machine sets up a relay for the next operator's move.

The operator again steps on the first (left) pedal. The sewing machine head is raised and platen 150 returns to its original position. Cylinder 200 is actuated to shift the clamp assembly to a position with socket 178 under pin 191*b* to sew the second side of the loop to the garment. The first (left) pedal is released and pin 191*b* moves into the socket. The operator then steps down on the second pedal and sews. Platen 150 again moves in the arcuate path. The sewing action sets up another relay after a predetermined time. After the sewing operation is completed, the operator again steps down on the first (left) pedal and holds it down. This first actuates cylinder 200 to move the clamp assembly back to the first position and then cylinder 170 to retract the clamp assembly. As the clamp assembly 155 retracts it releases the loop which is sewn to the garment. At this point, the operator is free to move the garment to another position so that another loop can be located. Depression of the left pedal after the head is in position V moves the clamp assembly toward the sewing machine. The latter action is locked out, by the circuit, during the time that head 101 is cycling from position I to position V.

The control of the carriage 40 is as follows. As the head 101 reaches position III, it trips a switch which actuates the drive cylinder 63 to retract its piston and move carriage 40 back to the left to receive another piece of tape from the feed roller mechanism 225. When the carriage reaches the left (FIG. 1) and stops it trips a switch which actuates the feed roll mechanism 225. At the completion of the stroke of the rack 227 of the feed roll, with a desired length of tape fed out between the point of cut of knife 86 and a point beyond the loop bending pin 37, a switch is tripped by the movement of rack 227 which actuates the material lock clamp cylinder 92 to bring its roller down onto clamp 55 and move it down against the tape. When the piston of cylinder 92 clamps the tape, it trips a switch which energizes the knife cylinder 74 to retract its piston to cause knife 85 to cut the tape. The piston of cylinder 74 is immediately extended to bring knife 85 back to the rest position.

The upward movement of the piston of knife cylinder 74 trips a switch which actuates drive cylinder 63 to extend its piston and start carriage 40 moving to the right. After carriage 40 has moved from under roller 95, for example about one-fourth inch, the piston rod 67 will have established pressure on the Tape T by the pivoting clamp 55. At the same time, a switch is tripped to actuate cylinder 230, which drives the feed roll rack 227, to retract the rack. The feed roll mechanism rests. As the carriage 40 moves to the right past the cutting station, a switch is tripped to actuate cylinder 92 to retract the roller 95. The carriage 40 continues to move to the right until it reaches stop 52. At this point it waits for the head to come and pick up the cut piece of tape and form the loop.

As should be apparent, the formation of the loop is automatic and the delivery to the sewing machine is under the control of the operator. The timing of the cycle described can be altered in a desired manner consistent with the operation of the apparatus. Further, the operator commands can be initiated in any of a number of ways other than by the pedals. Also, instead of using the relay and switch controls mentioned, solid state (electronic) switching can be used for the relays and photoelectric type sensors used for the actuating switches. In addition, any type of prime movers can be used for the various cylinders. All of these alternatives are well within the skill of a person skilled in the art.

IX. SECOND EMBODIMENT OF LOOP DELIVERY MECHANISM

FIGS. 17 through 21 show another embodiment of the portion of the invention for delivering the folded loops to the sewing machine. This embodiment of the delivery system is preferred since, for reasons described below, it operates more rapidly and has a higher delivery rate of loops to the sewing machine. This is true primarily because the clamp assembly is loaded while the operator is sewing a loop to the garment and there is no pause to wait for loading as in the previous embodiment described.

In this embodiment, the machine up through the folding station 100 and the head 101 are the same as previously described with respect to FIGS. 1–16 with the exception that the cylinder 200 which moves the vertical upright 165 and the transfer clamp 155 transversely for the stitching action of the belt loop is eliminated. This transverse motion is now performed by an addition to the sewing machine. Also, the slip clutch 164 is not used.

Referring first to FIGS. 17 and 18, the loop which has been folded around the bending pins 35 and 37 by the jaws 140 when the head is in positions II and III is picked from the jaws 140 in much the same manner as described in the preceding embodiment when the head is in position V. However, here a different type of transfer clamp assembly 300 is used.

The clamp assembly includes a generally Z-shaped base plate 302 whose right end is connected to the top of the traveling block 159 which moves under the control of the cylinder 170 whose piston rod 171 is shown. A slot 308 (FIG. 18) is formed in the upper arm of plate 302 adjacent the bend to accept the trailing end of an L-shaped lever 312 which is pivotally mounted at 314 on the plate. The lower end of lever 312 is operated by the plunger of air cylinder 173 in the same manner as the clamp arm 187 of the previous embodiment. The other end of lever 312 lies above the top of plate 302, and on the other side of the pivot 314 from the plunger of cylinder 173, and is bent to lie below and

operate a clamp **316**. This clamp, as shown best in FIGS. **17** and **18**, is generally S-shaped and has a pair of fingers **317** on the lower arm to engage the top of the formed loop. Fingers **317** lie above a corresponding pair of fingers **318** which terminate the plate **302**. Clamp **316** is pivoted about point **319** as shown best in FIG. **18**. It is biased upwardly by a butterfly spring **321** one of whose ends rides against the underside of the clamp **316** and the other of whose ends rests on the plate **302**.

A fan-shaped guide **323** (FIG. **17**) is adjustably mounted by screws **324** on a upstanding base **325** on the plate **302**. The wider front edge of guide **323** determines the stop point of the clamp assembly **300** with respect to the jaws **140** of the head **101** when the pickup of the folded loop is made from the jaws. This operates much the same way as the spring-loaded fingers **180** of the previous embodiment which is shown in FIG. **15**.

In the operation of the clamp assembly **300**, the head **101** is in position V with the folded loop in the jaws **140** as shown in FIGS. **12** and **13**. When cylinder **170** is actuated, the traveling block **159** and the clamping assembly **300** are moved forward a slight amount so that the folded loop **306** lies between the fingers **317** and the lower fingers **318**. At this time clamp **316** is biased upwardly by the spring **321**. The location of the fan-shaped guide **323** determines the forwardmost point of clamping assembly **300** when the head **101** is in position V. The cylinder **173** is actuated to move the lever arm **312** up and thereby push the clamp plate **316** down. As before, the actuation of cylinder **173** is determined by the longitudinal position of head **101** as it is moved by cylinder **124**. When the plunger of the cylinder **173** reaches its forwardmost position, clamping the loop, a switch is actuated which opens the jaws **140** (see FIG. **14**) and the sequence described with respect to FIGS. **3**, **11** and **12** moves the head **101** through its cycle by the various cylinders back to position I ready to accept another cut piece of tape from the carriage **40** for forming as a loop.

The clamp assembly is now loaded. Upon command of the operator (such as by depressing the left pedal) the piston rod **171** driving the traveling block **159** is moved forward further to locate the folded loop in a sewing position over a sewing plate **329** located on the sewing machine table **330**. A garment (not shown) on which the loops are to be sewn lies on the sewing plate **329** and the loops are delivered on top of the garment. The ends of the loop are located over respective openings **331** in the sewing plate **329** (FIG. **17**) into which the sewing machine needle can project. Sewing plate **329** is attached to a C bracket **362** by screws **329***a*. The sewing machine head is shown generally by the number **332** and carries an arm **334** on a shaft **336** which is retractable into the head. Arm **334** engages a pin **338** which is attached to a plunger **339** which rides in a bracket **342**. The pin **338** travels in a slot **340** in this bracket (see FIGS. **18** and **21**). The plunger **339** is spring-biased downwardly by an elongated spring **343** having one end located in a slot at the top of the plunger. The other end of spring **343** is bent and fits into a lug **334** on a harp-shaped vertical spacing member **346** which is mounted on a base plate **350** by a pair of screws **348**. The tension in spring **343** is adjustable by a screw **349** which is mounted on the harp and engages the spring. respective bracket **344** base

The lower end of plunger **339** is located to engage an extension **351** of a clamp bracket **352** when the plunger moves downwardly. Clamp bracket **352** has a downwardly extending element **354** which is held to the main bracket **352** by the screws **355** (see FIGS. **18** and **21**). Three clamp fingers **357***a*, **357***b* and **357***c* are held to element **354** by screws **359** which travel in slots in the element **354** to longitudinally adjust the position of the fingers **357***a* and **357***c*. As shown in FIG. **19**, the fingers **357** are undercut, with the end fingers **357***a* and **357***c* having shoulders surrounding the undercut portions to prevent lengthwise or sidewards movement of the loop. Middle finger **357***b* prevents sidewards movement of the loop. As seen in FIG. **17**, the position of the fingers **357** are such as to straddle the fingers **317** and **318** of the clamp assembly **300**. The two end fingers **357***a* and **357***c* are positioned to engage the ends of the folded loop. The middle finger **357***b* unlike fingers **357***a* and **357***c* clamps only one layer of the folded loop. A vertical slot **358** allows adjustment of finger **357***b* with respect to sewing plate **329**. Finger **357***b* is guided within a vertical slot **354***a* in element **354**.

The clamp bracket **352** is hinged about a shaft **360** which is held between the opposing arms of the C-shaped upright member **362** (FIG. **17**) whose lower arm is cut off. Upright **362** is attached to the base **350**. Clamp bracket **352** has knuckles which fit over shaft **360**. A butterfly spring **363**, one end of which engages the underside of bracket **352** and the other end of which is located in a cutout portion in the upright **362**, upwardly biases the entire clamp bracket **352** and the attached fingers **357**. This is shown in FIG. **18**.

Base **350** is mounted by screws **367** on a pivot arm **366** which extends under the base (FIG. **20**). The pivot arm is actuated by the sewing machine. A pneumatic cylinder **380** has its head end mounted to a vertical plate **382** which is in turn mounted on base **350** (FIG. **20**). The rear end (not shown) of cylinder **380** is free so that when arm **366** pivots, cylinder **380** moves with it. Cylinder **380** has a right angle connection **384** and an arm **386** which moves a rod **390** which slides in a milled out rectangular or square track in a housing **394** which is mounted on base **350**. The open wall of housing **394** is closed off by a vertical plate **396** which has a slot in which arm **386** of the cylinder **380** can travel. The cylinder mounting plate **382** has a cutout to provide a bearing surface for rod **390**. An adjustable stop **399** for the arm **386** is slidably mounted in a track **400** which is formed in base **350**. The setting of stop **399** is set to match the distance between the points on the two ends of the loop which are to be sewn. As seen in FIG. **20**, the bracket **362** for clamp **352** is attached to the rod and the sewing plate **329** is attached to the bracket.

To explain the operation of the system, consider that the operator has signalled, by stepping down on one of the treadles, that a loop already loaded in clamp assembly **300** is to be moved to the sewing machine. The folded loop in the clamp assembly is moved onto the sewing plate **329** as shown in FIGS. **17** and **18**. This actuates a switch which causes arm **334** on the machine to move downwardly to release plunger **339**. Plunger **339** moves clamp **352** down by the engagement with the extension **351** to clamp the loop against the gar-

ment (not shown) on top of sewing plate **329**. This is shown in FIGS. **19–21**. The clamp is held down by the spring-loaded plunger during the sewing operation. As the clamp **352** moves down it engages a microswitch (not shown) which causes cylinder **173** to de-energize to release the clamp lever **312** and permit the clamp fingers **317** to move away from the loop. Cylinder **170** is also actuated to withdraw piston **171** and the clamp assembly **300** is retracted by the cylinder **170**. Retraction of the delivery clamp actuates a switch which causes the head **101** to move from rest position I through the cycle to position V to receive another cut piece of tape from carriage **40** and to form the loop. The head **101** moves to position V (FIG. **11**) at which time there is a signal to actuate clamp assembly **300** to pick up and hold another loop ready for delivery to the sewing machine upon command of the operator. As should be apparent, in this embodiment, a folded loop is always awaiting the operator when he signals for it. This is unlike the prior embodiment where the loop is folded after the operator signals for delivery.

After the clamp assembly **300** has retracted the operator commences the sewing operation on one end of the loop by pressing down on the right pedal. The sewing machine head moves down. The sewing machine is programmed, such as by a suitable cam, to move the pivot arm **366** in an arcuate motion as the operator starts sewing. This permits a stitch to be made completely across the width of one end of the loop without moving the article being sewn. The formation of the stitch sets up a relay circuit. After sewing is completed on one end of the loop, the operator releases the right pedal which causes the needle to rise and the cylinder **380** to be actuated. This causes rod **390** to move the sewing plate and clamp forward so that the other end of the loop is under the needle. The pivot arm **366** returns to its original position. The operator then commences sewing by again depressing the right pedal. The sewing machine head lowers and the pivot arm moves again so that the stitch can be sewn across the loop end. This sets up another relay. After the sewing is completed the operator releases the treadle. The needle moves up as does the arm **334**, raising the plunger **339**. Cylinder **380** moves back to start position against adjustable stop **339***a* (FIG. **20**). This permits the garment to be moved to the next place where a loop is to be sewn. The operator then actuates the left treadle switch to cause clamp assembly **300** to deliver another loop to the sewing machine for sewing. The operation repeats in sequence, as previously described, upon command of the operator.

What is claimed is:

1. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, means for feeding a predetermined length of said material from an elongated web to said cutting means, a carriage having at least one member thereon around which an end of a cut piece can be folded, said feeding means feeding said material onto the said member, and means for folding at least one end of a cut piece to form a loop.

2. Apparatus as in claim **1** further comprising means for moving said carriage from one location to said folding means.

3. Apparatus as in claim **2** further comprising means at said folding means for removing the piece of material of predetermined length from the carriage.

4. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, and means for folding at least one end of a cut piece to form a loop, said folding means comprising at least one arm, at least one jaw, at least one member on which a piece of material is located, means for bringing the piece of material and said arm into engagement for partially folding an end of the piece of material around said member, and means for bringing said end of the piece of material and said jaw into engagement for completing the folding of said end of the piece of material around said member.

5. Apparatus as in claim **4** further comprising a carriage on which said member is located, and means for moving the carriage from a first location where a cut piece of material is located on said member to said folding means.

6. Apparatus as in claim **4** further comprising clamp means, means for operating said clamp means to remove a folded loop from the jaw.

7. Apparatus as in claim **5** further comprising clamp means, means for operating said clamp means to remove a folded loop from the jaw.

8. Apparatus as in claim **4** further comprising means for operating said jaw to remove the folded loop from said member, clamp means, and means for operating said clamp means to remove the folded member from said jaw.

9. Apparatus as in claim **8** further comprising means for moving said clamp means to deliver the folded loop to another location.

10. Apparatus as in claim **9** wherein said other location is a sewing machine further comprising means at said sewing machine for holding said folded loop after delivery by said clamp means, said moving means being operated to remove the clamp means from said sewing machine after said holding means is operated.

11. Apparatus as in claim **10** further comprising means at said sewing machine for moving said holding means as said loop is being sewn.

12. Apparatus as in claim **4** further comprising means for moving said arm in a first direction to engage the piece of material, and means for moving said jaw in the opposite direction to engage said end of the piece of material.

13. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, and means for folding at least one end of a cut piece to form a loop, said folding means comprising a pair of spaced pins on which a piece of material is located, and means for engaging the piece of material to wrap the ends of the piece of material around said pins.

14. Apparatus as in claim **13** wherein said engaging means comprises a pair of jaws, and means for moving said pair of jaws to said pair of spaced pins in paths such that said jaws engage the piece of material and wrap the ends thereof around said pins.

15. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, means for folding at least one end of a cut piece to form a loop, means for delivering the folded loop to

a sewing machine, said delivery means being operated to retract from said sewing machine prior to the commencement of the sewing action, and means for operating said folding means to provide a loop to said delivery means during the sewing of the loop at the machine.

16. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, and means for folding at least one end of a cut piece to form a loop, wherein said folding means comprises a pair of arms, a pair of jaws, a pair of members on which a piece of material is located, means for bringing the piece of material and said pair of arms into engagement for partially folding the ends of the piece of material around said members, and means for bringing the ends of the piece of material and said pair of jaws into engagement for completing the folding of the ends of the piece of material around said members.

17. Apparatus as in claim 16 further comprising means for moving said pair of arms in a first direction to engage the piece of material, and means for moving said pair of jaws in the opposite direction to engage the ends of the piece of material.

18. Apparatus for forming belt loops comprising means for cutting pieces of material from a longer piece, means for feeding a predetermined length of said material from an elongated web to said cutting means, a carriage having a pair of spaced pins thereon around which both ends of a cut piece can be folded, means for bringing the material and said pins into operative relation, means for folding at least one end of the piece of material around a corresponding one of said pins to form a loop, and means to deliver the folded loop to a sewing machine.

19. Apparatus for forming belt loops for use with a sewing machine for sewing the belt loops to a garment comprising means for cutting pieces of material from a longer piece, means for folding at least one end of a cut piece to form a loop, and means for delivering the folded loop to the sewing machine, said delivery means holding the folded loop while the loop is being sewn.

20. Apparatus as in claim 19 further comprising guide means adapted to be mounted on the sewing machine so as to engage said delivery means after the folded loop has been delivered to the sewing machine.

21. Apparatus as in claim 20 wherein said guide means include at least one pin, and said delivery means is formed with a socket adapted to receive said pin.

22. Apparatus as in claim 21 wherein said guide means includes a pair of spaced pins adapted to be mounted on the sewing machine such that when one of said guide pins is received in said socket the folded loop is positioned for sewing one end thereof, and when the other of said guide pins is received in said socket the folded loop is positioned for sewing the other end thereof, and further comprising means for displacing said delivery means between positions in which said socket is in registry with said guide pins.

23. Apparatus for forming belt loops for use with a sewing machine for sewing the belt loops to a garment comprising means for cutting pieces of material from a longer piece, means for folding at least one end of a cut piece to form a loop, a sewing plate adapted to be mounted on the sewing machine and adapted to receive the garment and each belt loop to be sewn thereto, means for delivering the folded loop to a position over said sewing plate, said delivery means being operated to retract from the sewing machine prior to the commencement of the sewing action, means adapted to be mounted on the sewing machine for clamping the folded loop against relative displacement with respect to said sewing plate during the sewing action, and means for moving said sewing plate and said clamp means together in a first direction during the sewing action.

24. Apparatus as in claim 23 wherein said moving means includes an arm adapted to be pivotally mounted on the sewing machine, said sewing plate and said clamp being mounted on said arm, the first direction in which said sewing plate and said clamp are moved being defined by the locus of said pivoted arm.

25. Apparatus as in claim 23 further comprising means for moving said sewing plate and said clamp means together in directions substantially perpendicular to the first direction, whereby each end of the folded loop is sewn while said sewing plate and said clamp means are moved in the first direction, and the folded loop is transferred between positions for sewing the ends thereof by moving said sewing plate and said clamp means in the substantially perpendicular directions.

26. Apparatus as in claim 25 wherein said first direction moving means includes an arm adapted to be pivotally mounted on the sewing machine, said sewing plate and said clamp being mounted on said arm, the first direction in which said sewing plate and said clamp are moved being defined by the locus of said pivoted arm, and further comprising a rod mounted for rotation with said pivoted arm, said rod being slidably mounted for movement in directions substantially perpendicular to the locus of said pivoted arm, and wherein said means for moving said sewing plate and said clamp means together in directions substantially perpendicular to the first direction includes means for sliding said rod in directions substantially perpendicular to the locus of said pivoted arm.

27. Apparatus for sewing a piece of material to another material for use with a sewing machine comprising a sewing plate adapted to be mounted on the sewing machine and adapted to receive the other material and the piece of material to be sewn thereto, means for delivering the piece of material to a position over said sewing plate, said delivery means being operated to retract from the sewing machine prior to the commencement of the sewing action, means adapted to be mounted on the sewing machine for clamping the piece of material and the other material against relative displacement with respect to said sewing plate during the sewing action, means for moving said sewing plate and said clamp means together in a first direction during the sewing action, and means for moving said sewing plate and to directions substantially perpendicular to the first direction, whereby the piece of material and the other material may be sewn together in at least two mutually spaced apart areas.

28. Apparatus as in claim 27 wherein said first direction moving means includes an arm adapted to be pivotally mounted on the sewing machine, said sewing plate and said clamp being mounted on said arm, the first direction in which said sewing plate and said clamp are moved being defined by the locus of said pivoted

arm, and further comprising a rod mounted for rotation with said pivoted arm, said rod being slidably mounted for movement in directions substantially perpendicular to the locus of said pivoted arm, and wherein said means for moving said sewing plate and said clamp means together in directions substantially perpendicular to the first direction includes means for sliding said rod in directions substantially perpendicular to the locus of said pivoted arm.

29. Apparatus for sewing a piece of material to another material comprising a sewing head including a needle reciprocatable along a predetermined path, a sewing plate mounted in operative relation to the needle path and adapted to receive the other material and the piece of material to be sewn thereto, means for delivering the piece of material to a position over said sewing plate, said delivery means being operated to retract from said sewing plate prior to the commencement of the sewing action, means for clamping the piece of material and the other material against relative displacement with respect to said sewing plate during the sewing action, means for moving said sewing plate and said clamp means together in a first direction during the sewing action, and means for moving said sewing plate and said clamp means together in directions substantially perpendicular to the first direction, whereby the piece of material and the other material may be sewn together in at least two mutually spaced apart areas.

30. Apparatus as in claim **29** wherein said first direction moving means includes an arm pivotally mounted with respect to said sewing head, said sewing plate and said clamp being mounted on said arm, the first direction in which said sewing plate and said clamp are moved being defined by the locus of said pivoted arm, and further comprising a rod mounted for rotation with said pivoted arm, said rod being slidably mounted for movement in directions substantially perpendicular to the locus of said pivoted arm, and wherein said means for moving said sewing plate and said clamp means together in directions substantially perpendicular to the first direction includes means for sliding said rod in directions substantially perpendicular to the locus of said pivoted arm.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,699,907 Dated October 24, 1972

Inventor(s) Sven Anderson et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 48, "shown" should be --show--;

Column 10, line 22, delete "cylinder 173 releases";
line 51, "rip" should be --trip--;

Column 14, line 2, delete "respective bracket 344 base";

Column 18, line 58, delete "to" and add --said clamp means together in--.

Signed and sealed this 17th day of April 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents