April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

Filed Sept. 10, 1962 8 Sheets-Sheet 1

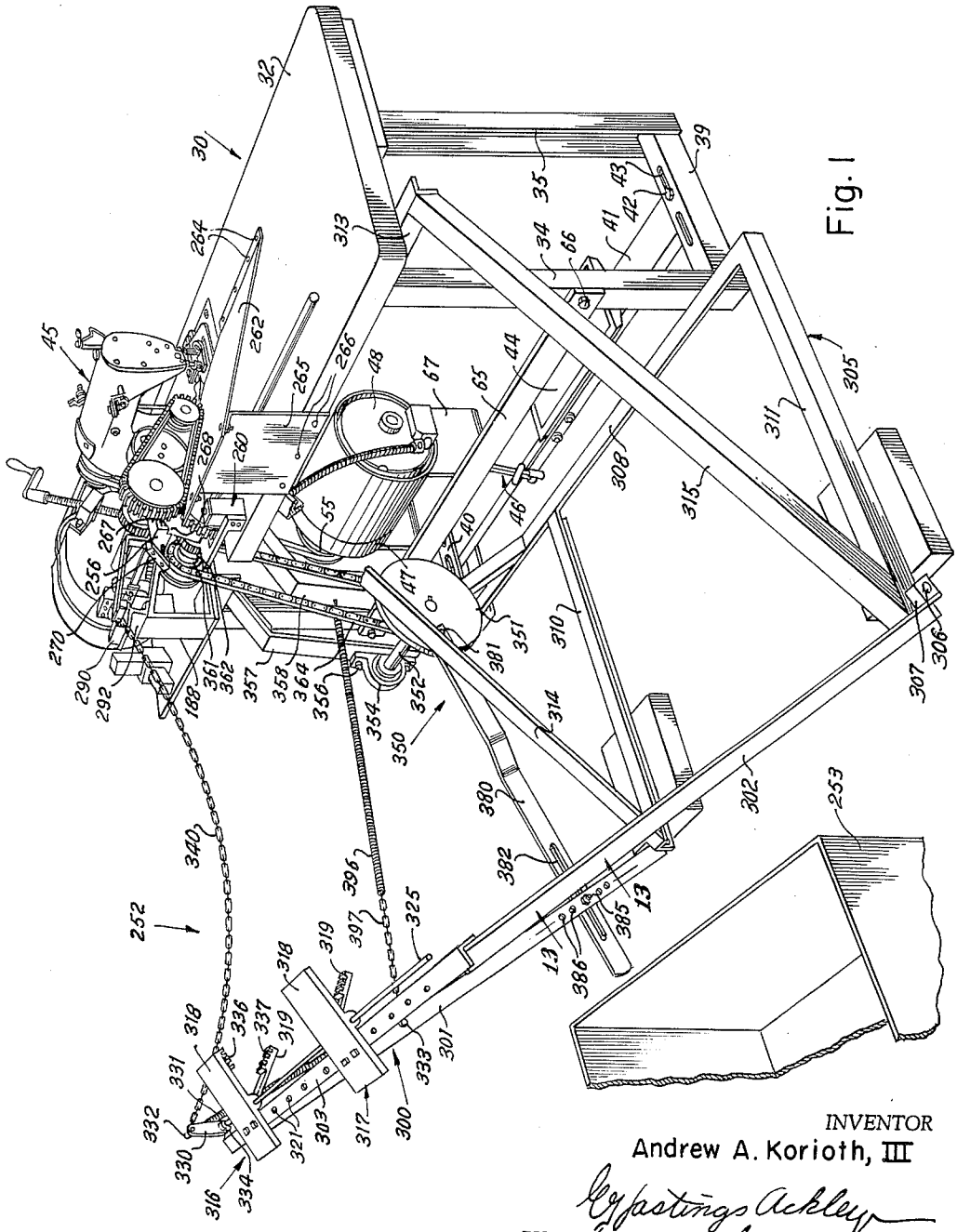


Fig. 1

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEY

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SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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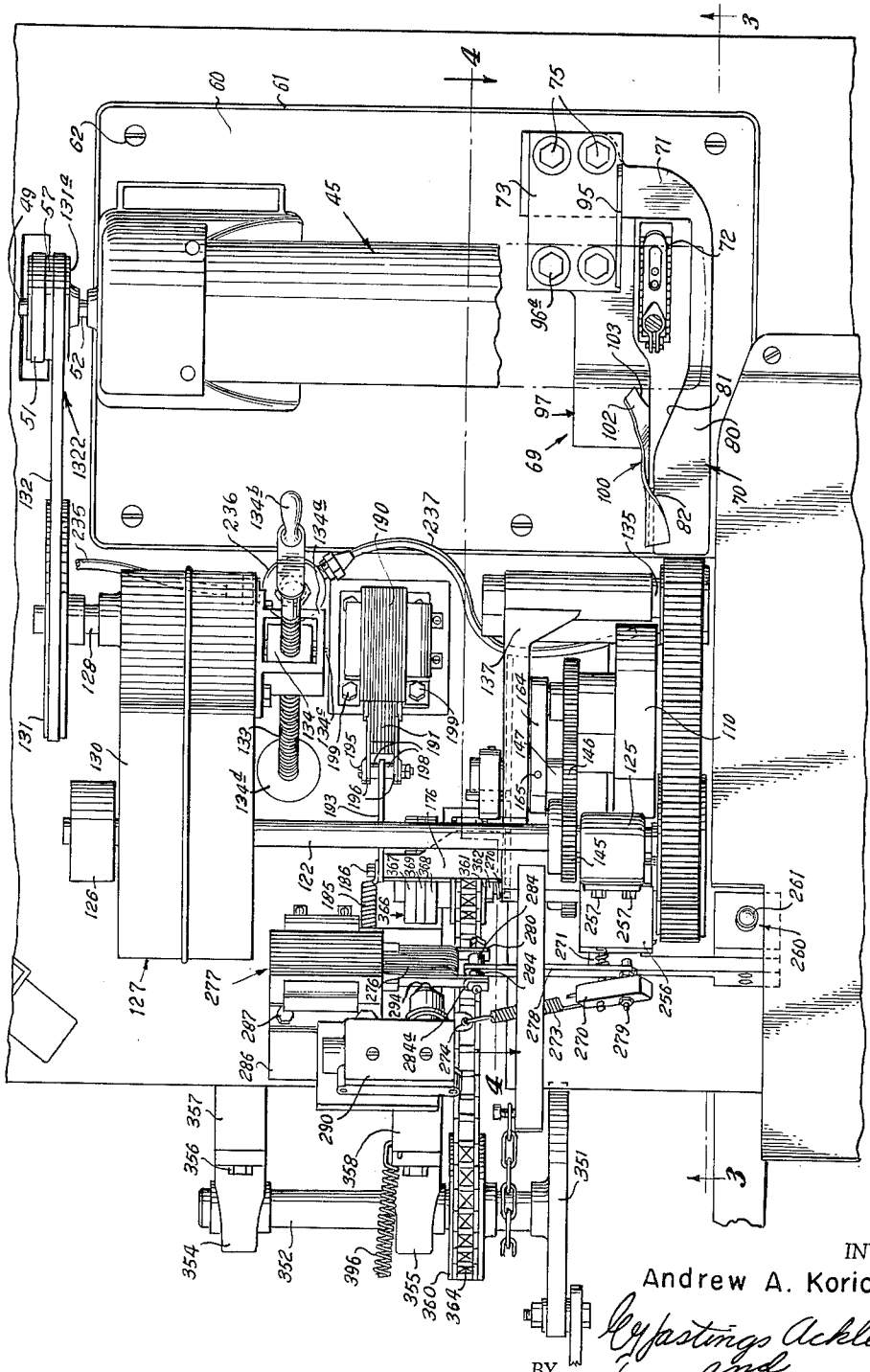


Fig. 2

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEYS

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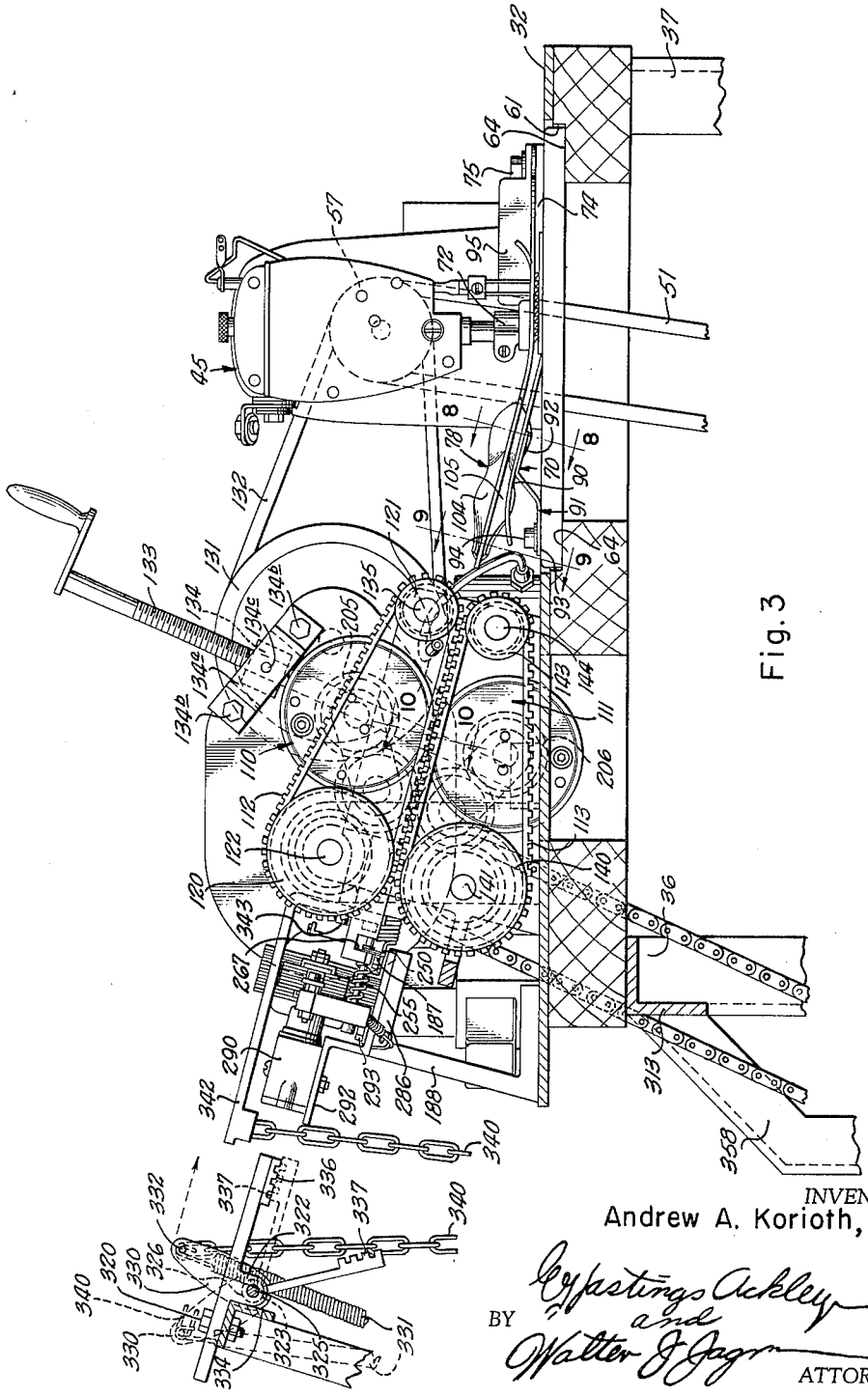


Fig. 3

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEYS

April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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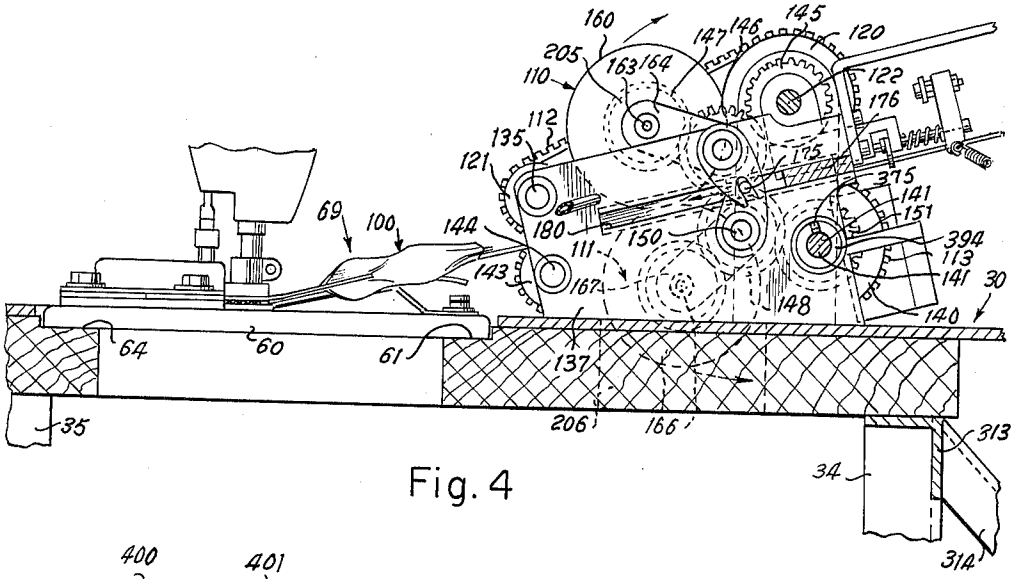


Fig. 4

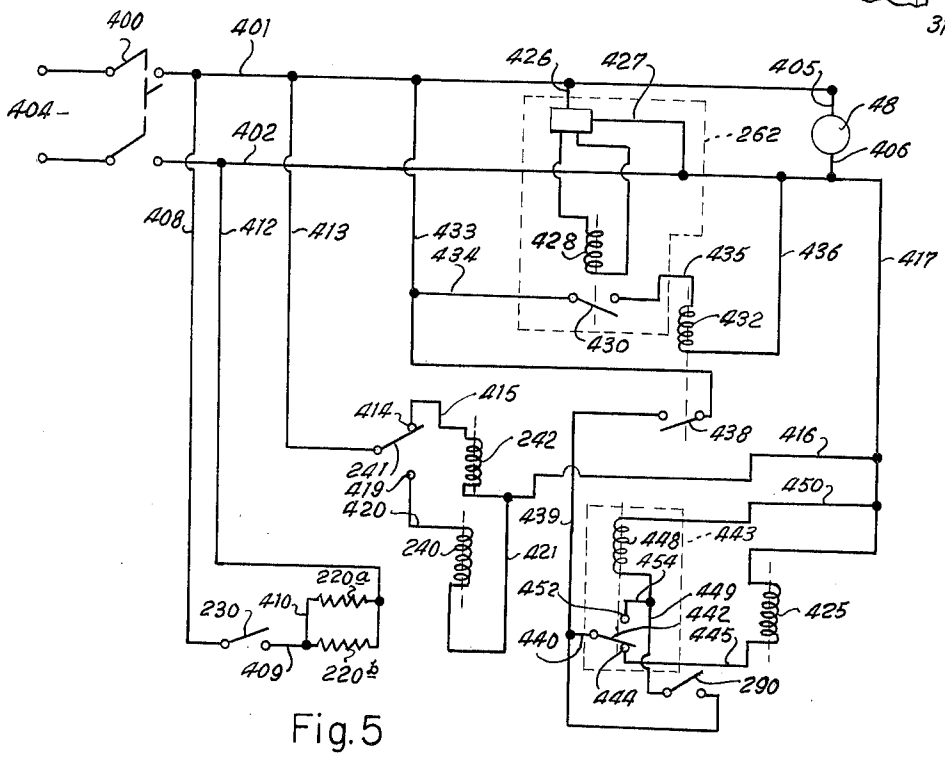


Fig. 5

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEYS

April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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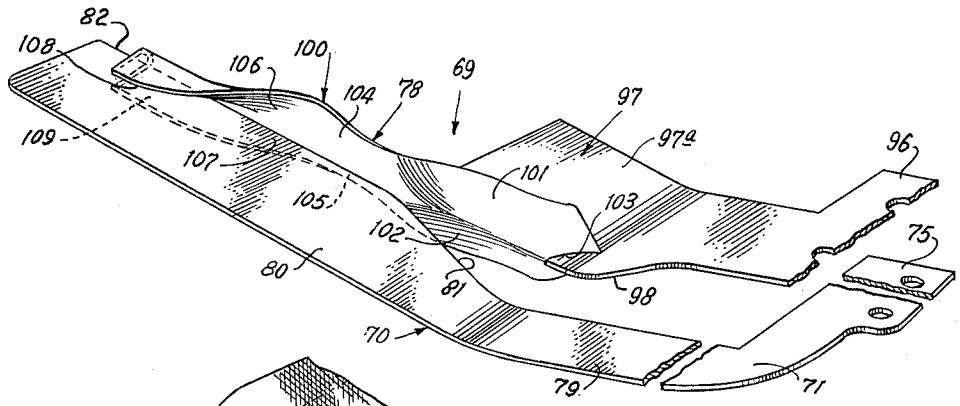


Fig. 6

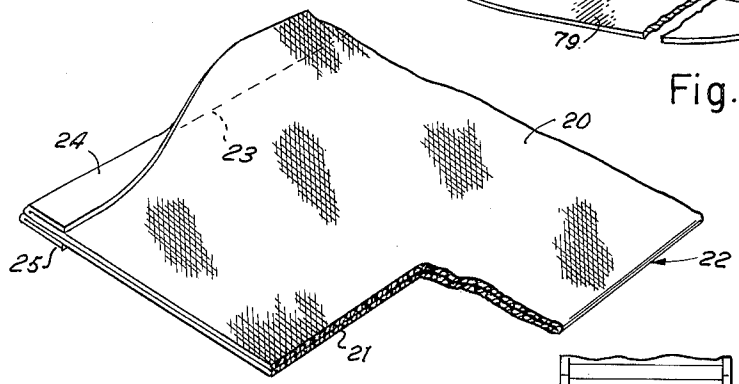


Fig. 7

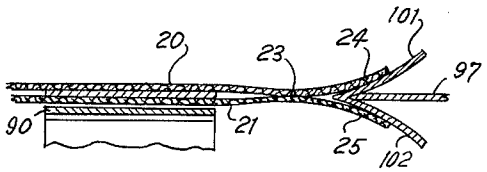


Fig. 8

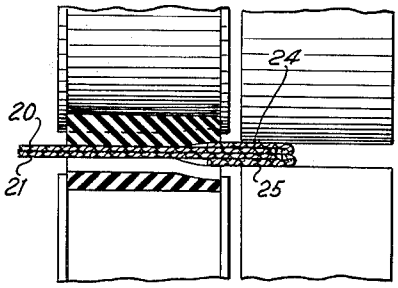


Fig. 10

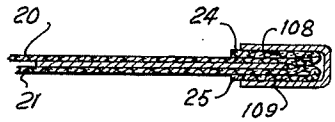


Fig. 9

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEYS

April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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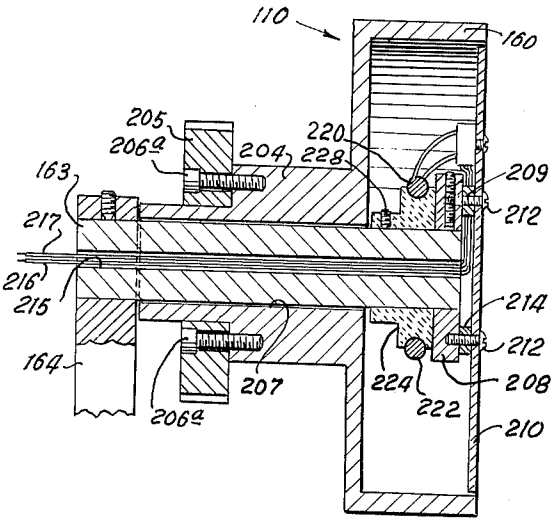


Fig. 11

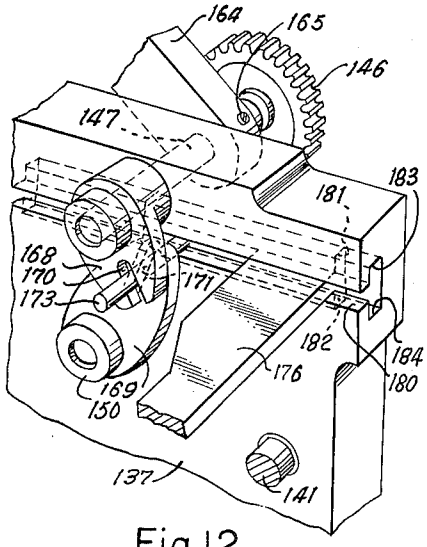


Fig. 12

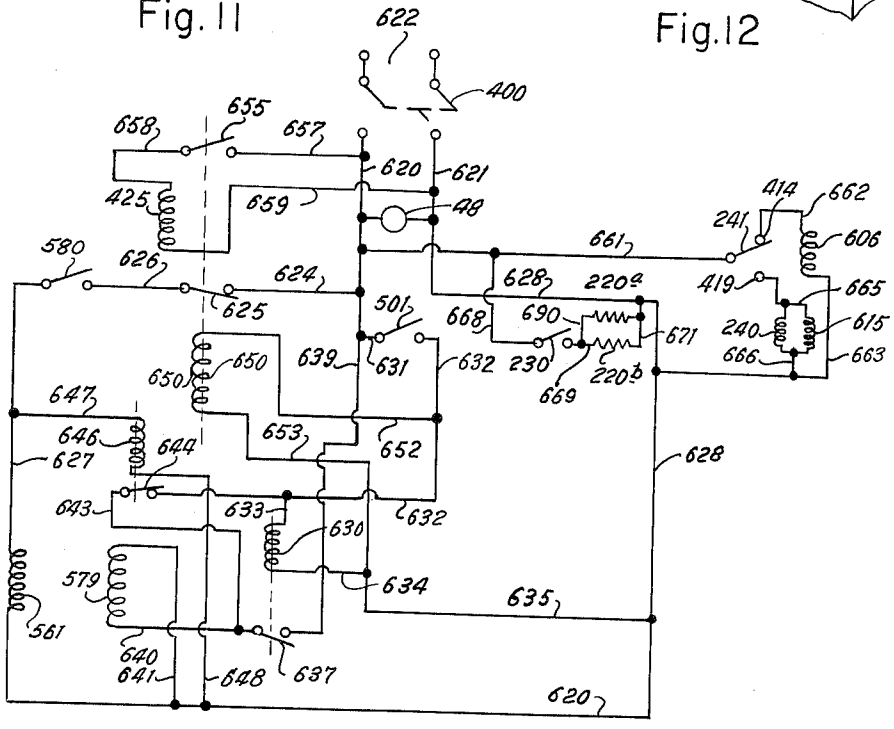


Fig. 16

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr
ATTORNEYS

April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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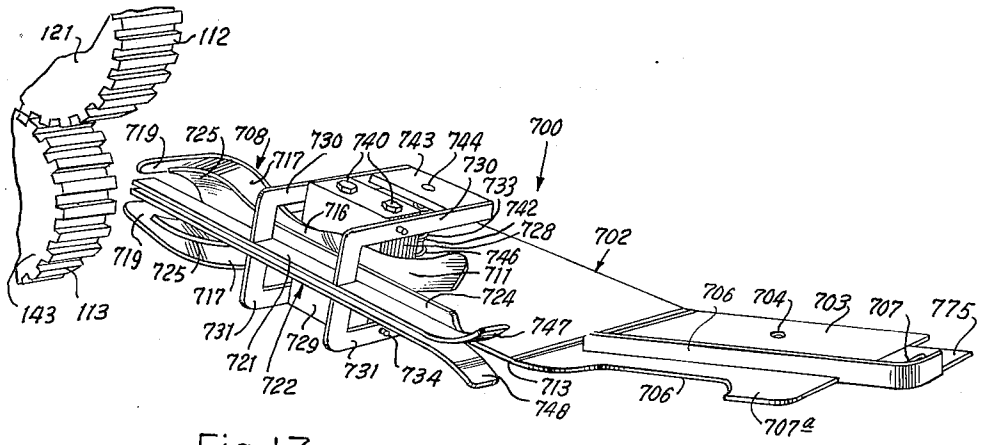


Fig. 17

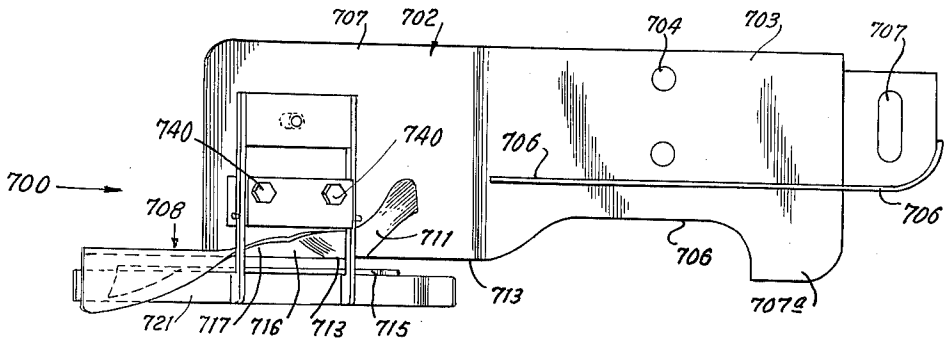


Fig. 18

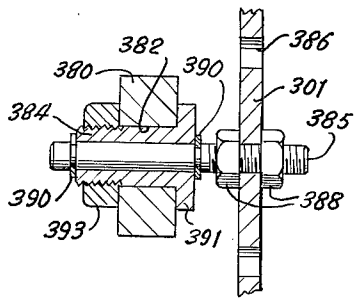


Fig. 13

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr
ATTORNEYS

April 19, 1966 A. A. KORIOTH III 3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

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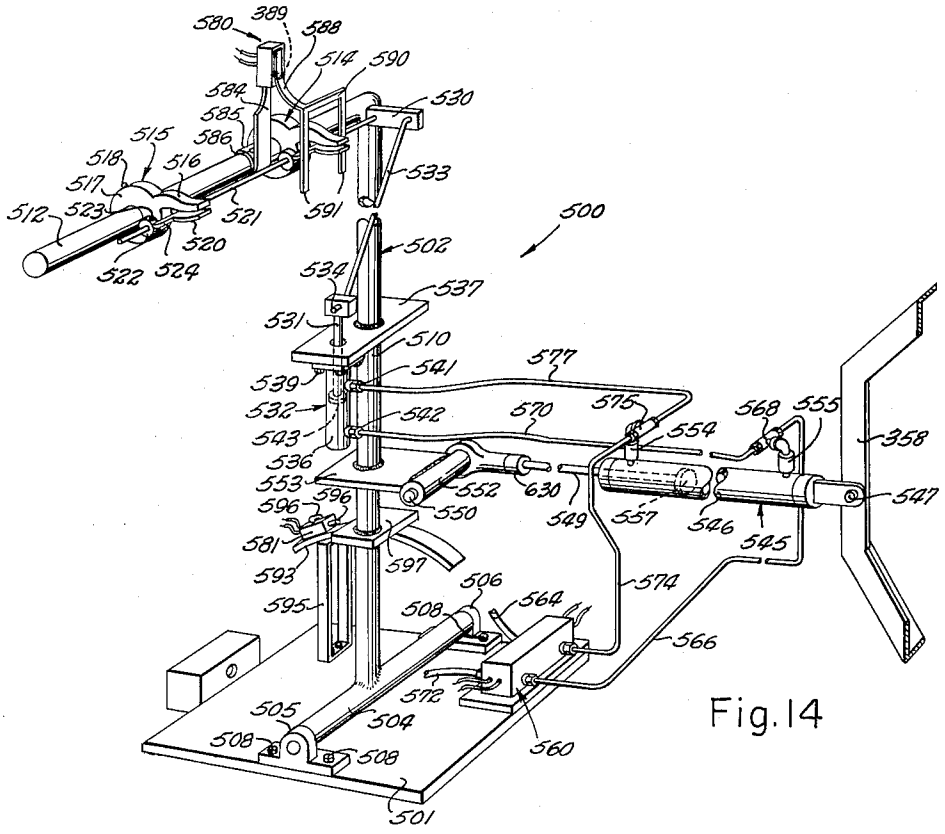


Fig. 14

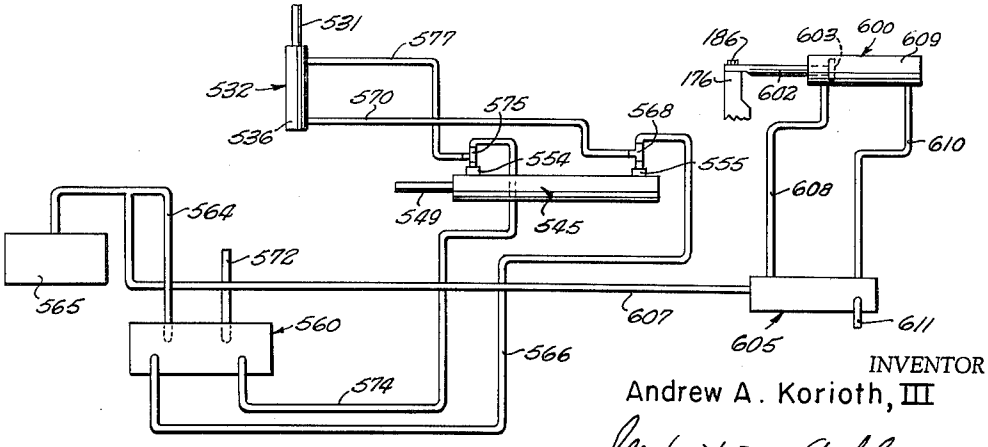


Fig. 15

INVENTOR
Andrew A. Korioth, III

BY Hastings Ackley and Walter J. Jagr

ATTORNEYS

United States Patent Office 3,246,616 Patented Apr. 19, 1966

3,246,616

SEAM FOLDING AND PRESSING MEANS ASSOCIATED WITH ARTICLE MOVING AND REMOVAL MEANS

Andrew A. Korioth III, Sherman, Tex., assignor to Machinery Automation Research Corporation, Dallas, Tex., a corporation of Texas

Filed Sept. 10, 1962, Ser. No. 222,731
18 Claims. (Cl. 112—2)

This invention relates to sewing devices and more particularly to a device for sewing together two overlapped portions of material, folding back side edge sections of the overlapped sewed portions to lie flat against the overlapped portions and pressing the side edge sections to cause them to remain in folded back position.

In such operations as the manufacture of garments, it is often desirable that two portions of overlapped material, of one piece of material or two separate pieces of material, be sewed together along a line or seam spaced from the edges of the overlapped portions and that the side edge sections of the two portions of the material be folded back from the seam on the portions to lie flat therealong. For example, in the manufacture of trousers, each trouser leg is formed of a single piece of material which is folded on itself longitudinally and a longitudinal seam is stitched in the overlapped portions of the material by the usual sewing machine along a longitudinal line spaced from the side edges of such overlapped portions throughout the length of the trouser leg. This sewing operation is performed with the trouser leg turned inside out so that the side edge sections of the material will be located inside the trouser leg when it is turned to its usual position. It is necessary that the side edge section be folded back to lie flat against the portions of the material of the trouser leg and be treated, as by steam heat and pressure, along the crease or line of fold of each side edge portion when in the folded back condition so that they will remain in this flattened position when the trouser leg is turned right side out. It is desirable that such folding back of the longitudinal side edge sections of the overlapped portions be performed automatically as the two portions of material are sewed together so that once the trouser leg is sewed, it will be ready for succeeding steps in the manufacture of the trousers without the necessity of an additional operation of folding back and pressing the side edge sections.

Accordingly, it is an object of the invention to provide a new and improved device for automatically folding back the side edge sections of two portions of material sewed together from the seam joining them at the same time as the seam is being sewed.

Another object is to provide a device having means for pressing the folded back side edge sections on the overlapped portions of the material simultaneously with the sewing of the seam and the folding back of the side edge sections.

Still another object is to provide an accessory device for a power sewing machine having folding means engageable with the side edge sections of overlapped portions of material being sewed together by the sewing machine along a seam for folding the side edge sections extending laterally outwardly from the seam of each portion back on such portion and also having means for pressing the molded back portions to cause them to lie permanently in parallel position relative to such portions.

A further object is to provide a device for sewing machine having conveyor or drag means for engaging the material and moving it past press rollers after the side edge sections have been folded back on the overlapped portions to cause the side edge sections to remain permanently in such folded back positions.

A still further object of the invention is to provide means for engaging the sewed portions of material after the side edge sections have been folded back and pressed and moving it to a position remote from the device on the completion of each sewing, folding and pressing operation.

Another object is to provide a device for sewing two overlapped portions of material to one another along a longitudinal seam, folding back outwardly extending lateral side edge sections, which extend outwardly from the back seam, in opposite directions back on the overlapped portions, pressing the overlapped side edge sections to cause them to lie flat permanently against their overlapped portions, and moving the overlapped sewed portions from the device to a position remote from the device.

Still another object is to provide a device of the type described wherein in plurality of pairs of overlapped portions of material may be sequentially sewed to one another, the side edge sections extending laterally outwardly from the seam folded back in opposite directions on the opposite sides of the overlapped portions of material and then pressed to cause the side edge sections to lie flat against the overlapped portions, the device having means for cutting the chain stitch formed by the sewing machine, or the threads, if a lock stitch sewing machine is employed, connecting each pair of overlapped portions of material on the completion of the pressing operation and the removal of the pair of overlapped portions from the machine.

A still further object of the invention is to provide a device of the type described wherein all steps of the sequence of operations are performed automatically.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

FIGURE 1 is a perspective view, with some portions broken away, of the device embodying the invention;

FIGURE 2 is a fragmentary top view of the device illustrated in FIGURE 1;

FIGURE 3 is a sectional view taken on line 3—3 of FIGURE 2;

FIGURE 4 is a sectional view taken on line 4—4 of FIGURE 2;

FIGURE 5 is a side diagrammatic illustration of the electric control circuit of the device;

FIGURE 6 is a fragmentary perspective view of the side edge section of the folding assembly of the device;

FIGURE 7 is a fragmentary perspective view of two overlapped portions of material showing the manner in which the side edge sections of such portions are folded back;

FIGURE 8 is a sectional view taken on line 8—8 of FIGURE 3 showing the manner in which the side edge sections are moved toward folded positions as they move through the folding assembly at the position indicated by the line 8—8 of FIGURE 3;

FIGURE 9 is a sectional view taken on line 9—9 of FIGURE 3 showing the position of the folded back side edge sections of the overlapped portions of material as they move through the folding assembly at the position indicated by the line 9—9 of FIGURE 3;

FIGURE 10 is a sectional view taken on line 10—10 of FIGURE 3 showing the position of the overlapped portions of materials as they move past the location indicated by line 10—10, and are engaged by the press rollers of the device;

FIGURE 11 is a sectional view of one of the press rolls of the device;

FIGURE 12 is a fragmentary perspective view show-

ing the means for moving the press rolls of the device toward and away from each other;

FIGURE 13 is a fragmentary sectional view taken on line 13—13 of FIGURE 1;

FIGURE 14 is a perspective view of a preferred modified form of the stacker or removal device;

FIGURE 15 is a schematic diagram of the pneumatic circuit of the modified form of the device illustrated in FIGURE 14;

FIGURE 16 is a diagrammatic illustration of the electric control circuit of the modified form of the stacker device illustrated in FIGURES 14 and 15;

FIGURE 17 is a perspective view of a preferred modified form of a folding assembly for folding the side edge sections of the sewed overlapped portions of material back on the overlapped portions of material; and,

FIGURE 18 is a top plan view of the folding assembly illustrated in FIGURE 17.

Referring now to the drawings, the device embodying the invention for sewing two overlapped portions of material **20** and **21** to one another along a longitudinal seam **23**, folding back the side edge sections **24** and **25** extending outwardly from the seam and pressing the side sections to cause them to lie flat in folded back positions includes a table **30** having a rectangular planar top **32** supported by four channel shaped columns **34**, **35**, **36** and **37**. The lower ends of the columns **34** and **35** are connected by a transverse angle member **39** and the lower ends of the columns **36** and **37** may similarly be connected by a similar transverse angle member **40**. The transverse angle members **39** and **40** are connected by a longitudinal bar **41** adjustable transversely of the table and of the transverse angle members **39** and **40** by means of the bolts **42** which extend through the slots **43** in the horizontal flanges of the transverse angle members **39** and **40**. The usual treadle **44** for controlling operation of the sewing machine **45** is pivotally mounted on the longitudinal bar of the table and is connected by the usual linkage **46** to the clutch **47** which connects the drive shaft of the motor **48** to the drive shaft **49**. The drive shaft is connected to the drive shaft **52** of the sewing machine by means of the belt **51** which extends about the pulley **55** rigidly secured to the drive shaft and the pulley **57** non-rotatably secured to the drive shaft **52** of the sewing machine head.

The base plate **60** of the sewing machine is disposed in a rectangular aperture **61** of the table top **32** and is secured to the table top in any suitable manner as by screws **62** which extend into the rectangular ledge **64** of the table top on which end and side edge portions of the base plate rest.

The combination of the sewing machine **45**, the clutch **47**, the motor **48** and the belt and pulley transmission between the drive shaft **49** of the clutch and the drive shaft **52** of the sewing machine is old and well known and will not therefore be further described.

The motor **48** is supported beneath the table by a longitudinal support bar **65** whose opposite ends are connected to the rear columns **34** and **36** of the table in any suitable manner as by the bolts **66**. The saddle shaped base mount **67** of the motor may be rigidly connected to the support bar in any suitable manner, as by welding.

The folding assembly **69** for folding the side edge sections **24** and **25** of the overlapped portions of material **20** and **21**, respectively, in opposite directions back on the overlapped portions from the seam **23** sewed by the sewing machine includes a divider plate **70** having a horizontal rear portion **71** extending longitudinally of the base plate of the sewing machine disposed in front of the presser foot **72** of the sewing machine. The rear portion is positionable between the clamp plate **73** and spacer plate **74** interposed between the rear portion and the top surface of the base plate **60** of the sewing machine, the rear portion, the clamp plate and the spacer plate being secured to the base plate by the screws **75**, whereby the horizontal section **79** of the divider plate which extends transversely of the base plate is held spaced above the top surface of the base plate of the sewing machine so that the bottom portion **21** may pass below the divider plate and the top surface of the base plate while the top portion **20** may pass above the divider plate as the sewing machine stitches the two together and forms the seam **23**.

The divider plate **70** has an upwardly and rearwardly inclined rear section **80** whose inner side edge has a tapered side section **81** and straight edge section **82** thereof which is disposed inwardly of the seam **23** as the top and bottom portions of the material are moved by the sewing machine rearwardly on each side of the divider plate. A support plate **90** for the bottom portion of material **21** is disposed in spaced relation below the inclined rear section **80** of the divider plate and is secured to the base plate **60** of the sewing machine by a suitable bracket **91** having an inclined end portion **92** secured to the support plate in any suitable manner, as by welding, and whose rear portion **93** rests upon and is secured to the base plate **60** by any suitable means such as the screw **94**. The clamp plate has an upstanding flange **95** which may be used to determine the width of the side edge sections. The end portion **96** of the folder plate **97** also extends between the spacer plate and the clamp plate and is secured to the base of the sewing machine by the screws **96***a*. The screws **96***a* and **75** extend through elongate slots in the clamp plate to permit adjustment of the flange **95** relative to the presser foot.

The folder plate **97** has a connector section **97***a* which extends upwardly and rearwardly from the base section and whose lateral edge **98** is secured, as by welding, the cam plate **100** which has the upper and lower laterally outwardly flared surfaces **101** and **102** which extend laterally outwardly in opposite directions relative to the edge **98** thereof and above and below the connector section to which the cam plate is secured. The edges **103** of the cam plate below and above the forward portions of the flared sections **102** and **103** engage the upper and lower surfaces of the folder plate and are secured thereto in any suitable manner, as by solder. The lateral portions of the folder plate disposed laterally of the flange **95** of the clamp plate toward the presser foot extend between the substantially parallel side edge sections **24** and **25**, respectively, of the two portions of material **20** and **21** as the two sewed portions of material are moved rearwardly by the sewing machine in the usual manner so that the side edge sections are supported by the lateral portions of the folder plate. The horizontal end portion **96** is supported by the spacer plate in spaced position above the base of the sewing machine so that the lower side edge section **25** may pass below the lateral portion of the folder plate. The engagement of the forward surfaces **101** and **102** of the cam plate causes the flat side edge sections **24** and **25** to bend upwardly and downwardly, respectively, as these sections move past these surfaces to engage the intermediate substantially vertical surfaces **104** and **105** of the cam plate which cam or continue the folding of the side end sections **24** and **25** and cause them to extend perpendicularly outwardly relative to the portions **20** and **21**. The cam plate then curves inwardly to provide the surfaces **106** and **107** which curve inwardly towards each other and then to the surfaces **108** and **109** which extend parallel to one another and to the opposed surfaces of the inclined section **80** of the divider plate. As the side edge sections **24** and **25** move past the surfaces **106** and **107**, they are bent or folded back on the portions **20** and **21**, respectively, and are finally moved to the positions illustrated in FIGURE 9 wherein the parallel surfaces **108** and **109** hold the side edge sections in parallel relation to one another abutting the portions **20** and **21** of the material which are held

thereby in engagement with the top and bottom surfaces of the inclined section of the divider plate. It will be apparent that the cam plate 100 progressively moves the longitudinally extending side edge sections disposed laterally outwardly of the seam 23 and away from each other on opposite sides of the divider plate to positions substantially perpendicular to the portions 20 and 21 and then to positions in which they are folded back on the portions 20 and 21, respectively.

The sewing machine of course feeds the sewed portions rearwardly past the folding assembly 69 of the divider plate 70 and the folding plate 97 and the folding of the side edge sections is accomplished automatically and continuously as the sewing of the portions progresses.

The folded back side edge sections are carried past a pair of press rolls 110 and 111 by a pair of endless drag belts 112 and 113 between which the folded back side edge sections and the overlapped portions 20 and 21 pass immediately upon moving out of engagement with the divider plate. The upper drag belt 112 extends about a large rear drive pulley 120 and a small forward idler pulley 121. The rear drive pulley 120 is rigidly mounted on the shaft 122 journaled in the pillow blocks 125 and 126 whose lower surfaces rest upon and are rigidly secured to the table top 32 in any suitable manner, as by screws or welding. The shaft 122 is the output shaft of a suitable speed reducing transmission 127 whose input shaft 128 is suitably journaled in the housing 130 of the speed reducing transmission and has a pulley 131 rigidly secured thereto. The input shaft 128 of the speed reducing transmission is driven from the shaft 52 of the sewing machine by a belt 132 which extends about the pulley 131 and the pulley 131*a*. The pulleys 57 and 131*a* are components of a speed varying pulley assembly 132*a* which causes the speed of rotation of the pulley 131*a* to vary in relation to the speed of rotation of the pulley 57 and therefore of the drive shaft 52. The speed varying pulley assembly may be of the type commercially available under the trademark "Var-A-Cone Pulley" manufactured by the Gerbing Mfg. Corp., Elgin, Illinois. The tension of the belt 132 may be varied by the tensioning screw 133 threaded through a suitable bore of a block 134 which is secured to one side of the transmission housing 130 by a suitable bracket 134*a*. The bracket is secured to the housing by screws 134*b* and the block is secured by a suitable pin 134*c* for partial movement relative to the bracket. The lower end of the tensioning screw is received in a suitable recess of a foot plate 134*d* secured to the table top and its other end is provided with a handle 134*e*. The tensioning screw may pivot on its lower end. When the tensioning screw is rotated in one direction the housing is pivoted upwardly about the output shaft 122 to increase the tension on the belt 132 and that when it is rotated in the opposite direction the housing pivots downwardly about the output shaft to decrease the tension on the belt 132. The speed of rotation of the output shaft 122 relative to the fixed speed of rotation of the drive shaft 52 of the sewing machine may thus be varied to adjust the speed of movement of the drag belts relative to the speed of operation of the sewing machine and the rate of movement imparted thereby to the material being sewed by the sewing machine.

The forward idler pulley 121 of the upper drag belt 112 is rigidly secured to the shaft 135 journaled in a suitable support plate 137 mounted on the table top 22. The large rear drive pulley 140 of the lower drag belt 113 is rigidly secured to the shaft 141 journaled in the supporting plate 137 and the small forward idler pulley 143 of the lower drive belt is rigidly secured to a shaft 144 journaled in the support plate 137. The drive pulley 140 is rotated from the output shaft 122 of the speed reducing transmission 127 by means of the gear 145 rigidly secured to the output shaft 122 which meshes with the gear 146 rotatably mounted on a shaft 147 journaled in the support plate 137, a gear 148 rotatably mounted on the shaft 150 also journaled in the vertical support plate 137 and the gear 151 rigidly secured to the shaft 141 which meshes with the gear 148.

It will be apparent that when the output shaft 122 is rotated in a counter-clockwise manner, as seen in FIGURE 4, the pulley 120 is also rotated in a counter-clockwise manner, the gear 146 is rotated in a clockwise manner, the gear 148 is rotated in a counter-clockwise manner and the gear 151 is rotated in a clockwise manner so that the parallel adjacent portions of the upper and lower drag belts 112 and 113 move simultaneously and at the same speed rearwardly and upwardly and move the sewed portions 20 and 21, with side edge sections 24 and 25 thereof folded back, from the folding assembly 69 and between the two press rolls 160 and 161. The press rolls are rotatably mounted between the large and small rollers of the drag belts and laterally offset from the drag belts so that the folded back side edge sections which extend laterally outwardly from the drag belts are pressed in their folded back positions by the headed press rolls.

The upper press roll 160 is rotatably mounted on a shaft 163 rigidly mounted on the upper end of a rocker arm 164 whose lower end is rigidly secured to the shaft 147 as by the set screw 165.

The lower press roll 161 is similarly rotatably mounted on a shaft 166 rigidly secured to the lower end of the lower rocker arm 167 rigidly secured to the shaft 150. The operator arms 168 and 169 for rotating the shafts 147 and 150, respectively, are rigidly secured to these shafts and have downwardly and upwardly opening slots 170 and 171, respectively, in which is received the pin 173 of a slide plate 176. The slide plate extends into and is slidable in a dovetailed longitudinal slot 180 of the support plate 137. The slide plate has upwardly and downwardly extending longitudinal flanges 181 and 182 receivable in the upper and lower dovetailed portions 183 and 184, respectively, of the longitudinal slot whereby the slide plate while movable longitudinally in the longitudinal slot 180, is held against lateral displacement therefrom.

The slide plate is biased rearwardly by a spring 185 one of whose ends is rigidly secured to the slide plate as by the screw 186 and its other end is secured as by a screw 187 to a suitable support bracket 188 fixed to the table top in any suitable manner. When the slide plate is in the rearmost position illustrated in FIGURE 4, the pin 173 of the slide plate by its engagement with the operator arms 168 and 169 of the shafts 147 and 150 yieldingly holds the shaft 147 against clockwise rotation which would cause the upper press roll 110 to pivot upwardly about the axis of the shaft 147 away from the lower press roll and also to yieldingly hold the shaft 150 against rotation in a counter-clockwise direction which would cause the lower press roll 111 to pivot downwardly about the axis of the shaft 150 away from the upper press roll 110. It will be apparent that when the slide plate is moved forwardly in the longitudinal slot 180, the engagement of the pin 173 with the operator arms of the two shafts rotates the upper gear shaft 147 in a clockwise manner and the lower shaft 150 in a counter-clockwise manner thereby moving the press rolls away from each other.

Forward movement may be imparted to the slide plate by a solenoid 190 whose armature 191 is connected to the slide plate 176 by the link 193. One of the links is pivotally connected to the slide plate by means of the bolt 186 which extends through a suitable aperture in one end of the link and its other end is pivotally connected to the armature by a suitable bolt 195 which extends through the suitable aligned apertures in the forwardly extending arms 196 of the armature and through a suitable aperture in the other end of the link. Suitable spacers 198 may be interposed between the arms 196 and the link 193 to hold it properly centered.

The solenoid is rigidly secured in any suitable manner to the table top as by bolts 199.

It will be apparent that when the solenoid 190 is energized the armature 191 is moved forwardly to retracted position and pulls the slide plate 176 forwardly thereby moving the press rolls in opposite directions away from each other and that when the solenoid 190 is de-energized, the spring 185 moves the slide plate 176 rearwardly, at the same time moving the armature 191 of the solenoid to extended position, thereby moving the press rolls toward one another.

Each of the press rolls has a dish shaping housing 200 comprising a circular base 202 and a cylindrical peripheral flange 203. The press roll has a hub 204 integral with the base 202 through which the shaft 163 or 166 on which it is mounted extends. The gear 205 of the upper press roll and the gear 206 of the lower press roll which mesh with the gears 146 and 148, respectively, for rotating the press rolls are also rigidly secured to the hubs of these press rolls in any suitable manner, as by screws 206*a* or the like. The shaft on which each press roll is mounted extends thereof in a suitable central aperture 207 of the hub and base thereof into the press roll and has a mounting ring 208 rigidly secured thereto in any suitable manner as by means of a set screw 209. The circular side cover plate 210 of each press roll is secured to the mounting ring by means of the screws 212 which extend into suitable threaded bores of the mounting ring through the washers 214 interposed therebetween.

Each of the shafts 163 and 166 is provided with a central longitudinal bore 215 through which the electrical conductors 217 and 218 may extend into the press roll to supply electric current to the resistance heating units or coils 220 disposed in the peripheral recess 222 of the heater coil retainer 224 also disposed about the shaft and held against movement relative thereto by a suitable set screw 228. A thermostat 230 secured to the cover plate of each press roll is connected in the circuit of its heating coil to control the energization of the heating coil and thus maintain the temperature of each press roll at a desired value.

Steam is directed to the portions of material as it moves from the folding assembly 69 toward the press rolls from a suitable source of steam through the steam conduit 235, the solenoid valve 236 and a steam discharge conduit 237 connected to the outlet of the solenoid valve. The solenoid coil 240 of the steam valve 236 is controlled by the treadle operated switch 241 actuated whenever the treadle 44 is pivoted to cause operation of the sewing machine to energize the steam valve solenoid and de-energize the coil 242 of the press roll solenoid 190 so that the spring 185 moves the press rolls toward each other and the steam valve 236 is opened to permit discharge of the steam onto the sewed portions of material passing toward the press rolls whenever the sewing machine is in operation and which de-energizes the solenoid coil 240 of the steam solenoid valve and energizes the coil 242 of the press roll solenoid 190 whenever the sewing machine is not in operation to stop discharge of the steam and to move the press rolls away from one another.

A knife 250 is provided to cut the chain stitch which connects adjacent ends of adjacent pairs of the overlapped portions of material as the first pair of portions is moved out of engagement with the drag belts while the second pair is still being sewed together and moved by the drag belts in order that the removal or stacker device 252, which engages the forward end of each pair of overlapped portions as such end is moved rearwardly of the drag belts, may move the first pair of portions to a position remote from the drag belt, as for example a bin 253.

The knife is rigidly secured to a shaft 255 rotatably journaled in a support block 256 secured to the pillow block 125 by the screws 257. The support block extends rearwardly from the pillow block and to one side of the drag belts so that the knife is pivotable upwardly to engage the chain stitch connecting adjacent ends of the two pairs of portions of material as soon as the first pair of portions moves out of engagement with the drag belts. The photocell assembly 260 which controls operation of the knife is mounted on the table top immediately rearwardly of the port of disengagement of the rear end of each pair of portions of the material with the drag belts so that the photocell 261 of the assembly, which has been shielded from light by the pair of overlapped portions as they are moved by the drag belts rearwardly and over the support plate 262 which is rigidly secured to the table top 32 on one side of the drag belts to support each pair of overlapped portions during the movement of the side edge sections thereof between the drag chains and between the press roll. The support plate 262 has its forward horizontal section secured to the table top in any suitable manner, as by the screws 264 and its rear portions by a vertical plate 265 whose lower edges are secured to the table top 32 in any suitable manner as by the screws 266. As the rear end of each pair of overlapped portions of material moves from between the drag belts and past the photocell, the photocell is exposed to light and causes energization of the solenoid 277 which operates the knife. The knife support block is located above the path of movement of the chain stitch of the seam of each pair of sewed portions of material and therefore over the path of movement of the chain stitch which connects adjacent ends of adjacent pairs of the portions. The support block has a flat surface 267 providing a cutting edge which cooperates with the cutting edge 268 of the knife 250 to sever the chain stitch as the curved free end portion of the knife moves outwardly beneath the chain stitch and raises the chain stitch until further upward movement of the chain stitch is stopped by its engagement with the lower surfaces of the knife support block whereupon continued movement of the knife moves its knife edge upwardly past the cutting edge of the support block and results in the cutting of the chain stitch. The shaft 255 extends rearwardly from the knife support block and has a crank arm 270 rigidly secured thereto in any suitable manner. The spring 271 disposed about the shaft 255 has its opposite ends bearing against the crank arm and against the support block and biases the knife toward engagement with the flat surface 267 of the support block. The shaft 255 is mounted in the support block for limited longitudinal movement as well as rotatable movement, the engagement of the knife with the support block limiting movement of the knife shaft 255.

The knife is yieldingly biased to its retracted or inoperative position by a spring 273 one of whose ends is connected to the crank arm of the knife shaft and whose other end is connected to a lateral lug 274 of the support bracket 188. The armature 276 of the knife solenoid 277 is connected to the crank arm of the knife shaft 255 by a link 278 one of whose ends is pivotally secured to the crank arm at a position remote from the knife shaft by a bolt 279 which extends through aligned apertures or bores in one end of the link and in the crank arm. The other end of the link is pivotally connected to the arms 280 of the armature by means of the bolt 282 which extends through suitable aligned apertures in the arms 280 and in the other end of the link 278. A pair of tubular washers or spacers 284 are interposed between the armature arms and the link to hold the link in proper centralized position between the arms.

The knife solenoid is rigidly secured to the downwardly and forwardly extending upper section 286 of the support bracket 188 in any suitable manner, as by the screws or bolts 287. A switch 290 mounted on a bracket 292 secured to the top section by bolts 293 has an actuating button 294 which is engaged by the shoulder 294*a* of the armature arm 280 upon the retraction of the armature 276 to a position wherein the knife has cut the chain

stitch, to energize momentarily a relay winding 295 and cause de-energization of the knife solenoid upon the completion of the cutting operation. The spring 273 then rotates the knife shaft to cause the knife to move to its inoperative retracted position and to move the armature 276 to its extended position.

The removal or stacker device 252 includes a rocker 300 which is substantially of inverted U-shaped having a pair of parallel spaced legs 301 and 302 connected at their upper ends by a connector member 303. The legs and connector member may be formed of angles and the connector member may be secured to the upper ends of the legs by welding. The lower ends of the rocker frames are pivotally secured to the lower end of the support frame 305 by means of the stub shafts 306 which extend laterally outwardly from the support frame into suitable bearing blocks 307 rigidly secured as by welding to the lower ends of the rocker frame legs.

The support frame includes a lower longitudinally extending angle member 308 which is rigidly secured to the rear columns 34 and 36 of the table 30, as by welding, and which has the spaced parallel rearwardly extending angle members 310 and 311. An upper longitudinal member 313 may be rigidly secured to the table 30 in any suitable manner as by welding, bolts or the like. The brace members 314 and 315 have their upper ends rigidly secured, as by welding, to the upper longitudinal member 313 of the support 305 and their lower ends are rigidly secured, as by welding, to the rear ends of the rearwardy extending angle members 310 and 311. The stub shafts 306 may be welded or secured in any other suitable manner to the rear ends of the angle members 310 and 311.

Two pairs of jaws 316 and 317 are secured to the connector member 303 of the rocker 300 and each includes an upper jaw 318 rigid with the connector member and a lower movable jaw 319. The upper jaws 318 are secured in any adjusted position along the length of the connector angle member 303 by means of the bolts 320 which extend through suitable apertures in the upper jaw and any selected ones of the apertures 321 of the connector angle member. Each of the upper jaws has a pair of downwardly extending spaced lugs 322 between which the hub 323 on the upper or rear end of the movable lower jaw 319 is positioned. The movable jaws 319 are rigidly secured to the jaw shaft 325 in any adjusted position thereon by means of the set screws 326 which extend through threaded bores in the hubs of the movable jaws.

The jaw shaft has an arm 330 rigid therewith to whose upper end is connected one end of the biasing spring 331 by the bolt 332. The other end of the rocker spring is rigidly secured, as it 333, to the leg 301 of the rocker. Clockwise rotation of the jaw shaft, as seen in FIGURE 3, is limited by the engagement of the stop 334 of the arm 330 with the connector member 303 and counter clockwise rotation of the jaw shaft if limited by the engagement of the friction sections 336 and 337 of the fixed and movable jaws either with each other or with the portions of material gripped therebetween. It will be noted that the spring 331 biases the arm either to the position shown in full lines in FIGURE 3 or to the position shown in broken lines in FIGURE 3, since the straight line connecting the points of connection of opposite ends of the spring moves to opposite sides of the axis of the jaw shaft as the arm moves between these two extreme positions. Movement of the jaw shaft arm 330 as the rocker pivots in a counter clockwise manner (FIGURE 1) about the axis of the shafts 306 is limited by the release chain or flexible member 340, one of whose ends is connected to the arm and the other of whose ends is connected to the actuator bar 342 which projects rearwardly of the table and whose forward end is rigidly secured to the support plate 137 in any suitable manner as by the bolts 343. When the rocker is moving in this counterclockwise direction, the lower jaws 319 are in their upper closed positions and the arm 330 is in the broken line position indicated in FIGURE 3, so that the spring 331 holds and yieldably biases the lower movable jaws toward closed position and each pair of jaws grips the overlapped portions of material therebetween. When the rocker moves to the position where rearward movement of the arm 330 is arrested by the chain 340, continued counterclockwise pivotal movement of the rocker causes the arm 330 to be pivoted in a clockwise manner and the shaft rotated in the same direction until the spring 331 moves to the right hand side of the axis of the jaw shaft whereupon the lower jaws 319 are moved to their open positions releasing the pair of overlapped portions of material previously held thereby to permit them to fall into the bin or receptacle 253.

During clockwise pivotal movement of the rocker toward the table, the lower jaws are in their open positions. When the rocker moves to the position wherein the jaws of each pair of jaws are disposed above and below the forward end portions of material being moved by the drag belts, the jaw shaft arm is engaged by the forward end of the actuator bar 342 to arrest such movement of the arm. As the movement of the rocker in a clockwise direction continues, the jaw arm 330 is pivoted and the jaw shaft is rotated in a counterclockwise direction about the longitudinal axis of the jaw shaft until the spring 331 moves to the left of the axis of the jaw shaft whereupon the spring 331 moves the movable jaws toward the upper jaws which engage and grip the forward end portions of overlapped portions of material moving rearwardly from between the drag belts. The rocker is then moved in a counterclockwise direction about the axis of the shafts 306 and the overlapped portions of material thus gripped by the jaws are pulled away from the drag belts to be dropped into the receptacle 253 upon completion of the rearward or counterclockwise pivotal movement of the rocker.

The rocker 300 of the removal or stacker device 252 is pivoted back and forth by a drive mechanism 350 which includes a drive disk 351 rigidly secured to the shaft 352. The drive disk shaft is rotatably supported by the pillow blocks 354 and 355, rigidly secured by the screws or bolts 356 to the substantially vertically disposed support beams 357 and 358, respectively, whose upper ends are rigidly secured to the upper longitudinal angle member 313 of the support frame 305 and whose lower ends are rigidly secured to the lower longitudinal angle member 308 of the support frame in any suitable manner, as by welding. The sprocket 360 rigidly secured to the drive disk shaft is connected to a sprocket 361 whose hub 362 is mounted on the shaft 141 of the large rear lower drive pulley 140 of the lower drag belt 113 by means of the endless chain 364. The hub is movable both rotatably and longitudinally on the shaft 141. The shaft 141 is connectable in driving relation to the sprocket 361 by a friction clutch mechanism 366 which includes a clutch plate 367 rigidly secured to the shaft 141, the clutch plate 368 integral with the hub 362 of the sprocket 361 and a friction ring or element 369 disposed between the clutch plate and about the shaft 141. The hub 362 and therefore the clutch plate 368 integral therewith is biased toward the clutch plate 367 by a spring 370 disposed about the shaft 141. One end of the spring bears against annular end surface of the sprocket hub and its other end bears against the annular end surface of the collar 374 rigidly secured to the shaft 141 in any longitudinally adjusted position by the set screw 375. It will be apparent that the force with which the clutch plate 368 is urged toward the clutch plate 367 by the spring 370 may be varied by adjusting the longitudinal position of the collar 374 on the shaft 141.

The drive disk 351 is connected to the rocker by a connector bar 380 whose forward end is pivotally connected to the drive disk in any suitable manner, as by the bolt 381, at a position spaced from the axis of rotation of the drive disk. The connector bar has an elongate slot 382

in which is receivable a roller 384 rotatably mounted on the pin 385 which may extend through any one of the plurality of longitudinally spaced apertures 386 of the leg 301 and be secured thereto by the nuts 388 threaded on the pin on opposite sides of the leg. The roller 384 is rotatably mounted on the pin and is held against longitudinal movement or displacement on the pin by a pair of split retainer rings 390 disposed on opposite ends of the roller and received in suitable external annular recesses of the pin. The roller is provided at one end with an external annular flange 391 which is engageable by one side of the connector bar, the other side of the connector bar being engaged by the nut 393 threaded on the outer end of the roller whereby the connector bar may be rigidly secured to the roller in any adjusted position of the roller in the slot 382 by tightening the nut 393 to clamp the connector bar between the flange 391 of the roller and the nut 393. It will be apparent that the angle through which the rocker is oscillated during each complete rotation of the drive disk 351 may be varied by varying the position of the roller and pin in the elongate slot 382 of the connector bar and that the connector bar may pivot about the pin due to the rotational mounting of the roller on the pin.

The angle through which the rocker is pivoted back and forth during each revolution of the drive disk and the angular position of the rocker relative to the drive disk at any particular position of the drive disk relative to its axis of rotation may also be changed or varied by securing the pin 385 to the leg 301 at the different locations of the spaced apertures 386 thereof. One end of a spring 396 is connected to the leg 301 of the rocker by the piece of chain 397, one of whose ends is connected to the rocker leg 301 by the bolt 333 and whose other end is connected to the rear end of the spring 396. The forward end of the spring is connected in any suitable manner to the vertical beam 358 as by the engagement of the hooked end thereof in an aperture of the beam. The spring is stretched as the rocker approaches the limit of its counterclockwise pivotal movement and the force then exerted thereby on the rocker applies a force to the connector bar tending to move the connecting bolt 381, which connnects the connector bar to the drive disk past, and the drive disk past dead center position relative to the axis of rotation of the drive disk to ensure proper reversal of the direction of pivotal movement of the rocker.

The rate or speed of travel of the portions of material moved by the drag belts 112 and 113 is determined by the rate of rotation of the rear drive pulleys 120 and 121 and is considerably slower than the rate or speed of free movement of the upper end of the rocker. The rate of movement of the upper end of the rocker pivotally in a counterclockwise position as seen in FIGURE 1, when the jaws of the stacker assembly grip the portions of material moving rearwardly from between the drag belts is slowed down to equal the rate of movement of the drag belts. When the jaws of the rocker are in engagement and hold the forward end portion of the material passing between the drag belts, the rocker merely exerts a force pulling the portions of material rearwardly of the table. The friction clutch permits slippage of the clutch plate 367 relative to the clutch plate 368, and therefore rotation of the shaft 141 relative to the sprocket 361, but at the same time causes a predetermined force to be exerted on the rocker tending to move it pivotally in a counterclockwise direction about the axis of the shafts 306. Pivotal movement of the rocker in a clockwise direction about the shaft 306 moving the jaws thereof toward the drag belts is not limited or restricted in any manner and such clockwise pivotal movement of the rocker is much more rapid than the movement of the material by the drag belts so that the rocker will move back to a position wherein its jaws will engage the forward end portions of the next pair of portions of material moving rearwardly from between the drag belts before such forward end portions have moved any substantial distance rearwardly of the drag belts and will then pull them with the same predetermined force rearwardly of the drag belts and will then pull them with the same predetermined force rearwardly from the drag belts to deposit them in the bin 253.

Referring now particularly to FIGURE 5 of the drawing, the electric control circuit for the various operable elements of the device embodying the invention includes a main switch 400 which connects the main conductors 401 and 402 to opposite sides of the input circuit 404 which is connected to any suitable source of electricity. The motor 48 is connected across the main conductors 401 and 402 by the conductors 405 and 406 so that the motor will be energized and will run whenever the main switch 400, which may be located at any suitable location on the table 30, is closed. The motor, however, will not cause operation of either the sewing machine or any other component of the device until the treadle is pivoted to actuate the clutch 47. The heater coils 220*a* and 220*b* of the press rolls 110 and 111, respectively, are connected in parallel across the main conductors 401 and 402 by means of the conductor 408, the thermostat switch 230, which may be of any suitable type, as for example, one employing a bi-metallic element, the conductor 409, the conductor 410, which connects one pair of sides of the heating elements 220*a* and 220*b* together, and the conductor 412. The heating elements 220*a* and 220*b* of the two press rolls will therefore be connected across the main conductors 401 and 402 by the thermostat switch 230 located in one of the press rolls, for example the upper press roll 110, whenever the temperature within the upper press rolls drops below the predetermined value at which the thermostat switch 230 closes and will open when the temperature within the upper press roll rises above the predetermined value. The heating coils will therefore heat and maintain the press rolls at a predetermined temperature whenever the main switch 400 is in closed position. The lower press roll is in the same environment as the upper roll and will therefore be maintained at substantially the same temperature as the upper press roll since its structure and its heating element are identical to that of the upper press roll. If desired, of course, both the upper and the lower press rolls can be provided with individual thermostats for individually controlling the energization of their heating coils. The coil 242 of the press roll solenoid 190 is connected across the main conductors 401 and 402, whenever the treadle is not pivoted to the position wherein it causes actuation of the clutch 47 and therefore operation of the device, through the conductor 413, the two position switch 241 which is now in its upper position engaging its upper stationary contact 414 and the conductors 415, 416 and 417. When the treadle is pivoted to cause operation of the sewing machine, the switch 241 is moved out of engagement with its upper stationary control thereby de-energizing coil 242 of the press roll solenoid and into engagement with its other stationary contact 416 thereby connecting the coil 240 of the solenoid of the steam valve 236 through the conductors 413, 420, 421, 416 and 417 whereupon the steam valve is opened.

The photocell assembly 262 which controls the energization of the coil 425 of the knife solenoid 277 may be of any suitable commercially available type whose operative circuit is supplied with current from the main conductors 401 and 402 by the conductors 426 and 427 and whose relay winding 428 is energized when the photocell 261 is exposed to the light present in the workroom in which the sewing device is disposed. The relay winding 428 of the photocell assembly moves its movable contact 430 to a closed position when the photocell is exposed to the light to connect the relay winding 432 across the main conductors through the conductors 433, 434, 435 and 436. The relay winding 432 when energized moves its movable contact 438 to closed position to connect the coil 425 of the knife solenoid 277 across the main con-

ductors through the conductors 433, 439 and 440, the movable contact 442 of a holding relay 443 which is now in its lower position in engagement with its stationary contact 444, and the conductors 445 and 417. The coil 425 of the knife solenoid is de-energized immediately upon the completion of the cutting stroke of the knife by means of the switch 290 which is normally in open position and is moved momentarily to closed position by the engagement of the shoulder 284*a* of the armature 276 with the pushbutton 294 upon the movement of the armature 276 of the knife solenoid to its fully retracted position. When the switch 290 moves to its closed position, the winding 448 of the holding relay is connected across the main conductors through the conductor 433, the relay contact 438, which is still in its closed position, the conductor 439, switch 290 and the conductors 449, 450 and 417. The holding relay winding, when energized, moves the movable contact 442 from its normal lower position in contact with the lower stationary contact 444 upwardly into engagement with its upper stationary contact 452 whereupon the knife solenoid coil 425 is de-energized and the knife is moved back to its retracted position by the force of the spring 185. The relay winding 448 is kept connected across the main conductor even though the switch 290 moves to its normal open position as soon as the armature of the knife solenoid moves toward its retracted position, since it is now connected across the main conductors through the conductor 433, the relay contact 438, which is still in its upper position, the conductors 439 and 440, movable contact 442 and the conductors 454, 449, 450 and 417. The holding relay winding will now remain energized preventing energization of the knife solenoid coil 425 even though the photocell is still exposed to light until the next portion of material being sewed by the sewing machine moves over the photocell to shield it from the light whereupon the relay winding 428 of the photocell assembly is de-energized permitting its relay contact to move to its normal open position which in turn causes de-energization of the relay winding 432 and the movement of its contact 438 to its normal open position which now thus prevents energization of the knife solenoid coil 425. When the contact 438 moves to its open position, the relay winding 448 of the holding relay 443 is also de-energized and its movable contact 442 moves to its normal lower position in engagement with the lower stationary contact 444. The knife solenoid coil will now remain in its un-energized condition until the photocell is again exposed to light to cause the relay winding 428 of its relay assembly to be again energized whereupon the above sequence of operation is again repeated.

In use, when the device embodying the invention is employed to perform such operations as to sew overlapped portions of a piece of material to form a trouser leg 22, the main switch 40 is closed which causes the motor 48 to start operation. Simultaneously the heating coils 220*a* and 220*b* are energized if their temperature is below the predetermined value. The press rolls are now held in positions remote from one another since the coil 242 of the press roll solenoid 190 is now energized and moves the armature 191 to its retracted position as soon as the main switch 400 is closed since the treadle operated switch 241 is in its upper position. The photocell 261 of the photocell assembly is exposed to light since no trouser leg is positioned above it and its relay winding 428 is energized and causes energization of the knife solenoid coil 245 immediately upon the closure of the main switch 400. The knife will therefore be pivoted to its cutting position and will then immediately move back to its retracted position as the switch 290 is momentarily closed and causes energization of the holding relay 448. The knife now therefore remains in its retracted position. The tension of the belt 132 may be adjusted to cause the variable speed pulley assembly to vary the speed of rotation of the output shaft 122 relative to the drive shaft 52 of the sewing machine so that the drag belts will move the overlapped portions at a desired speed which may be exactly the same as the speed with which the overlapped portions are moved by the sewing machine or a slightly faster speed if it is desired that the overlapped portions be in tension while being sewed.

The operator now places the overlapped portions 20 and 21 of the single piece of material from which the trouser leg is to be formed on the table top 32, with the upper portion 20 supported by the divider plate and the lateral portions of the folder plate and with the lower portion supported on the table top, and into desired alignment with the presser foot 72 of the sewing machine so that the seam 23 will be positioned a desired predetermined distance inwardly of the extreme side edges of the overlapped portions 20 and 21 and so that the trouser leg as it is sewed will move upwardly on the inclined support plate 262. The operator then pivots the treadle to cause the clutch 47 to connect the drive shaft of the motor to the drive shaft 49 so that the drive shaft 52 of the sewing machine will now be rotated by the belt 51 and the sewing machine will now sew the two overlapped portions of the material to one another and form the longitudinally extending seam 23 as the operator feeds the overlapped portions beneath the presser foot toward the folding assembly 69. The rotation of the drive shaft 52 of the sewing machine causes simultaneous rotation of the input shaft 128 of the speed reducing transmission 127 and therefore the rotation of the output shaft 122 thereof. When the output shaft 122 is rotated, the large drive pulleys 120 and 121 are also rotated and cause the drap belts to move continuously with adjacent parallel sections thereof moving rearwardly and upwardly. The actuation of the treadle also causes movement of the switch 241 from its upper position engaging the upper stationary contact 414 to its lower position wherein it engages its lower stationary contact 419 and causes energization of the coil 240 of the solenoid steam valve 236 and therefore opening of the steam valve so that steam now will flow from the source of steam to which the conduit 235 is connected through the steam valve and the steam discharge conduit 237 at a point immediately forward of the press rolls and onto the material as it is moved by the drag belts toward the press rolls. When the treadle switch 241 is moved to its lower position, the press roll solenoid 242 is de-energized and the press rolls are moved into engagement with one another by the spring 185. As the two overlapped portions of the material 20 and 21 are sewed and then moved rearwardly in the usual manner by the pressing machine toward and past the folding assembly 69, the side edge sections 24 and 25 thereof extending laterally outwardly from the seam 23 are folded back on the overlapped portions as described above and the overlapped portions move between the drag belts which are formed of a suitable resilient substance which yields to accommodate the overlapped portions as they enter therebetween. The drag belts engage the overlapped portions of the trouser leg and move them rearwardly of the seam rests upon the support plate 262.

wardly of the seam rests upon the support plate 262.

As the folded back side edge sections of the trouser leg move rearwardly and upwardly, they pass adjacent the open end of the steam discharge conduit and are subjected to the steam being discharged therethrough. The thus moistened side edge sections are then moved into and between the hot press rolls 110 and 111 which also are rotating in directions tending to move the material passing therebetween rearwardly and upwardly. The press rolls are yieldably biased towards one another by the spring 185 and may move outwardly relative to one another to permit the movement of the overlapped side edge sections of the trouser leg therebetween. The spring biasing the press rolls urges them toward one another with a predetermined force so that the sections of the

portions of the sewed trouser leg which are now in a steamed or moistened condition are now subjected to the heat and pressure of the press rolls as they pass therebetween and the side edge sections **24** and **25** are pressed back on the overlapped portions **21** and **20** of the trouser leg and take a permanent set so that they will thereafter inherently tend to lie flat against the overlapped portions.

Should the operator at any time during the sewing of the trouser leg find it necessary to stop operation of the sewing machine, he pivots the treadle to a position inactivating the clutch **47** whereupon rotation of the shaft **52** and therefore of the output shaft **122** of the speed reducing transmission is arrested. The movement of the drive belts therefore is stopped immediately upon the cessation of the operation of the sewing machine. Simultaneously, the treadle switch **241** moves to its upper position so that the solenoid coil **240** of the steam valve is deenergized and the steam valve closes and the coil **242** of the press roll solenoid is energized and moves the press rolls away from each other and out of engagement with the material which are disposed therebetween. The hot press rolls therefore do not remain in contact with the material when it is not moving therepast. This is desirable since prolonged contact of the hot press rolls with the same portion of the material for any prolonged period of time might scorch or burn the material. When the operator again pivots the treadle to resume the sewing operation, the drive belts are again simultaneously energized to move the sewed and folded back sections of the trouser leg rearwardly. At the same time the press rolls are moved in the manner described above toward each other to engage the folded back side edge sections and the solenoid steam valve is opened to cause the sections of the trouser leg moving toward the hot press rolls to be treated with steam.

As the front end of the trouser leg moves over the support plate **262**, it moves over the photocell **261** and shields it from the light. This causes the relay winding **428** of the photocell assembly to become de-energized whereupon its movable contact **430** moves to its open position causing de-energization of the relay winding **432** and the movement of its movable contact **438** to its open position, the de-energization of the holding relay winding **448** so that its movable contact **442** moves into its lower position in engagement with the stationary contact **444**. The controls circuit of the knife solenoid coil **426** is now in condition to cause the coil **425** to be energized when the photocell is again exposed to light.

When the output shaft **122** of the speed reducing transmission is rotating, the drive disk **351** is continuously rotated. Until the front end portions of the sewed trouser leg, with the side edge sections folded back and pressed on the overlapped portions, move into position where the front end of the trouser leg may be engaged by the jaws of the stacker device **252**, the rocker **300** oscillates back and forth rapidly, since, as was explained above, the rate of movement of the trouser leg by the drag belts is much slower than the rate of the free oscillatory movement of the top end of the rocker. When the front end of the trouser leg moves rearwardly of the drive belts and into position wherein the front end portion of the trouser leg is engageable by the jaws, the next time the rocker **300** pivots forwardly, its upper jaws move above and its lower jaws below such front end portions of the trouser leg. When the arm **330** engages the actuator bar **342** during such forward pivotal movement and the lower jaws are moved upwardly toward the stationary upper jaws, the front end portion of the trouser leg is securely gripped by the two pairs of jaws which are then biased towards one another by the spring **331**. Counterclockwise rearward pivotal movement of the rocker is now slowed down and the rocker moves only at the same rate or speed as the drag belts. The clutch **366** permits rotation of the shaft **141** relative to the sprocket **361** whose rotation is now slowed but also maintains a constant force tending to cause the sprocket to rotate with the shaft **141** whereby the stacker device **252** pulls on the front end of the trouser leg with a constant force and moves it rearwardly as the trouser leg continues to move rearwardly between the drag belts.

When the sewing of one trouser leg is finished, the operator places the overlapped portions **20** and **21** of the next trouser leg to be sewed in proper position on the table top and then moves the forward end of such overlapped portions beneath the presser foot of the sewing machine without cutting the chain stitch so that the rear end of the first trouser leg is connected to the front end of the succeeding trouser leg to be sewed by the sewing machine by a chain stitch. The operator permits a certain length of the chain stitch to be formed so that the rear end of the first trouser leg is spaced a certain distance from the front end of the second or succeeding trouser leg to be sewed. As the rear end of the first trouser leg now moves rearwardly of the drag belts and out of engagement therewith, it is still connected by the chain stitch to the front end of the next trouser leg which is now being moved rearwardly by the drag belts. One pair of the jaws engages the front end of the first trouser leg at the seam so that it exerts a rearwardly pull on the trouser leg in exact alignment with the seam so that the stacker device may aid in holding adjacent trouser legs and their seams in exact longitudinal alignment and help move the trouser legs through the device. After the rear end of the first trouser leg moves past the knife and then the photocell **261**, which is disposed rearwardly of the knife, the photocell is exposed to light and energizes the relay winding **428** of the photocell assembly. The knife is now pivoted by the armature **276** of the knife solenoid so that its cutting edge engages the chain stitch which connects the rear end of the first trouser leg to the front end of the second trouser leg and moves it upwardly therewith until further upward movement of the chain stitch is stopped by its engagement with the lower surfaces of the knife support block whereupon the engagement of the knife edge **267** with the edge provided by the flat surface **268** of the knife support block cuts the chain stitch. The rocker is now freed for accelerated rearward movement and moves to its extreme rearward position, the chain **340** causing the lower jaws to thus free the trouser leg gripped thereby and permit it to fall into any suitable receptacle **253** positioned below the jaws. The rocker then oscillates rapidly in a clockwise direction about its shaft **306** to cause its pairs of jaws to again engage and grip the front end portions of the next trouser leg before the front end portion of the next trouser leg moves any substantial distance rearwardly of the drag belts. This sequence of operation continues as long as the operator continues to sew the overlapped portion of the material forming the trouser leg to one another.

The trouser legs whose overlapped portions have been sewed together while in wrong-side-out position may be turned right side out and the side edge sections **24** and **25** will remain in proper flattened position against the inside of the trouser leg since they have been steamed and pressed into this position.

It will be apparent that the means for driving the drag belts is properly timed by suitable gear ratios to cause the drag belts to have the proper rate or speed of travel so that they move the trouser leg at the same rate at which the sewing machine sews and moves the trouser leg.

It will also be apparent that the drag belts have serrations or corrugations as shown in the drawings in order to provide the proper frictional engagement thereof with the material being moved by the drag belts or that the drag belts may simply have a roughened exterior surface for the same purpose.

It will also be apparent that any suitable tensioning means may be provided such as additional adjustable idler pulleys which would engage the upper belt in its upper

path of travel between the forward and rear pulleys thereof and which would engage the lower drag belt in its lower path of travel between its forward and rear pulley.

It will now be seen that a new and improved device has been illustrated and described for sequentially sewing two overlapped portions of material to one another, folding back side edge sections of the overlapped portions back on the overlapped portions from the seam connecting such portions, pressing the folded back side edge sections to cause them to lie permanently in flat position against such overlapped portions and then moving the sewed overlapped portions to a suitable receptacle or the like.

It will further be seen that the folding assembly includes a cam plate which progressively moves the side edge sections to positions perpendicular to the overlapped portions and then back to positions parallel thereto and in flat engagement therewith and that the folded back sections are gripped by the drag or conveyor belts and held in such folded back positions while being moved by the drag belts past the means which ejects steam onto the folded back side edge sections to moisten them and then between and past the hot press rolls which engage the steamed side edge sections and press them to cause them to permanently lie in flattened parallel position against the overlapped portions of material.

It will further be seen that the device permits the sequential sewing of a plurality of trouser legs by the sewing machine and that the chain stitch connecting the rear end of each trouser leg to the front end of the next succeeding trouser leg is automatically cut upon the movement of the rear end of the first trouser leg out of engagement with the drag belts which move the trouser legs past the press rolls.

It will further be seen that the means for moving the sewed trouser leg after the side edge sections thereof have been folded back and pressed includes a rocker having means which engage the front end portion of each trouser leg as it moves rearwardly of the drag belts and pulls it rearwardly of the device and releases the trouser leg, when the trouser leg is freed from the next succeeding trouser leg by the cutting of the chain stitch, for deposit on a pallet, receptacle or the like.

It will further be seen that the device embodying the invention has been provided with controls for automatically performing the above steps of the operation of the device and that it includes means for automatically moving the press rolls out of contact with the material if the operation of the device is arrested to prevent scorching or burning of the material which might otherwise occur if the hot press rolls are held against a particular portion of the material for any prolonged period of time.

The removal or stacker device **500** illustrated in FIGURE 14 may be used in place of the removal or stacker device **252** and includes a base **501** which may be secured to the supporting floor rearwardly of the table in any suitable manner. The rocker **502** includes a shaft **504** whose opposite ends are journaled in suitable pillow blocks **505** and **506** rigidly secured to the base by means of the screws or bolts **508**. The rocker column **510** has its lower end rigidly secured to the rocker shaft **504**, as by welding, and has an upper arm **512** extending perpendicularly from the upper end thereof on which are mounted the two pairs of gripping jaws **514** and **515**. Each of the pairs of gripping jaws includes an upper stationary jaw **516** which extends forwardly from the mounting collar **517** rigidly secured to the rocker arm **512** in any adjusted position thereon by the set screw **518** threaded in a suitable bore of the collar. The lower movable jaw **520** is rigidly secured in any desired adjusted position on the jaw shaft **521** by means of the retaining collar **522** which is rigidly secured to the shaft by the set screw **523**. Each movable lower jaw has a laterally offset portion **524** connecting it to its collar which is disposed to one side of the upper jaw collar **17** so that the lower jaw may be positioned in proper alignment with the upper jaw.

The jaw shaft **521** is disposed parallel to the rocker arm **512** and extends through suitable aligned apertures in the mounting collars **517** of the upper jaws. An additional collar, not seen in FIGURE 14, is rigidly secured to the jaw shaft on the side of one of the mounting collars **517** opposite to that engageable by the mounting collar **522** of the lower jaw to prevent longitudinal movement of the jaw shaft. A crank arm **530** has one end rigidly secured to the jaw shaft and its other end connected to the piston rod **531** of a pneumatic ram **532** by means of the line **533** whose upper angular end portion extends pivotally through a suitable aperture in the crank arm **530** and whose lower angular end portion extends pivotally through a suitable aperture in a retainer block **534** on the upper end of the piston rod. The cylinder **536** is secured to the mounting plate **537** of the rocker column in any suitable manner as by means of the screws **539** which extend into suitable threaded bores of the mounting plate. The cylinder is provided with the usual fittings **541** and **542** through which air may be introduced or released from the cylinder on opposite sides of the piston **543**.

It will be apparent that when air under pressure is admitted into the cylinder **536** through the fitting **542** and is permitted to escape from the cylinder above the piston **543**, the piston and its rod **531** move upwardly to rotate the jaw shaft **521** in a counterclockwise manner and pivot the lower jaws upwardly into engagement with the stationary upper jaws and that when the air under pressure is introduced into the upper part of the cylinder through the fitting **541** and released from the lower part of the cylinder through the fitting **542**, the jaw shaft is rotated in a clockwise manner to pivot the lower jaws away from the upper jaws.

The rocker **502** is pivoted about the longitudinal axis of its shaft **504** by a pneumatic ram **545** whose cylinder **546** is piovtally connected, as by the bolt **547**, to any appropriate member of the table **30**, such as the beam **358**. The piston rod **549** of the ram has a shaft **550** on its outer end which extends perpendicularly to the piston rod and is received rotatably in the bearing sleeve **552** rigidly secured, as by welding, to the mounting plate **553** of the rocker shaft **510**.

The cylinder **545** is provided with the usual fittings **554** and **555** through which air may be introduced into or released from the cylinder on opposite sides of the piston **557**. It will be apparent that when air under pressure is introduced into the cylinder through the fitting **555** while air is permitted to escape from the cylinder through the fitting **554**, the piston will move rearwardly in the cylinder **545** and will cause the rocker **502** to pivot rearwardly in a counterclockwise direction and that when air under pressure is introduced into the cylinder on the rear side of the piston through the fitting **554** and air is released from the forward side of the piston **557** through the fitting **555**, the piston is moved forwardly and the rocker is pivoted in a clockwise manner about the longitudinal axis of its shaft **504**.

Introduction and release of air from the cylinders of the jaw and rocker pneumatic rams **532** and **545** is controlled by a solenoid operated control valve **560** which may be of any commercially available type such as the valve manufactured by the Skinner Electric Division, Skinner Precision Industries, Inc., New Britain, Conn. under Model No. V935DEH2100. Such control valve has one solenoid coil **561** for moving the operative element of the valve to one extreme position wherein the valve permits air under pressure, which is supplied to the solenoid valve through the conduit **564** from any suitable source **565**, to flow through the conduit **566** and the T connector **568** connected between the valve and the fitting **555** into the cylinder **545** of the rocker ram and through the conduit **566**, the T connector **568** and the conduit **570** into the cylinder **536** of the jaw ram **532** below the piston **543**. When in this one extreme position of its operative element, the solenoid valve **560** also permits exhaust or release of

the air through its exhaust duct 572 from the rear end of the cylinder of the rocker ram by means of the conduit 574 and the T connector 575 connected to the fitting 554 and the simultaneous release of the air from the upper end of the cylinder 536 of the jaw ram by means of the conduit 574, T connector 575 and the conduit 577. When the operative element of the solenoid valve 560 is moved to its other extreme position by a second solenoid coil 580, the valve permits flow of air under pressure from the inlet conduit 564 into the rear end of the cylinder 546 of the rocker ram and to the upper end of the cylinder 536 of the jaw ram through the conduit 574, the T connector 575 and the conduit 577 and simultaneously permits air to be exhausted or released through the exhaust duct 572 of the solenoid valve from the front end of the cylinder 546 of the rocker ram and from the lower end of the cylinder 536 of the jaw ram through the conduit 566, the connector 568 and the conduit 570.

The operation of the stacker device 500 and of the knife 250 is controlled by the jaw switch 580 and rocker 581. The switch 580 is mounted on the rocker arm 512 by means of the bracket 584 rigidly secured to a collar 585 as by welding. The collar is rigidly secured in any adjusted position on the rocker arm by means of set screw 586 threaded in a suitable bore in the collar. The normally open switch 580 is moved to its closed position by the resilient operator arm 588 which may be secured to the housing of the switch and which operates the usual plunger or button 589 of the switch 580. The forward end of the resilient arm 588 is provided with a U-shaped sensor bracket 590 whose legs 591 are disposed on opposite sides of the pair of jaws 514 so that the sensor bracket is engaged by the front end of the trouser leg extending rearwardly of the drag belts as the rocker pivots forwardly toward the drag belts. The contact of the front end of such trouser leg moves the bracket and operator bar rearwardly and closes the switch 580 to cause energization of the solenoid coil 561 of the control valve 560 so that the lower jaws move upwardly towards the upper jaws and grip the front end portion of the trouser leg. The front end of the trousers is thus held between the jaws and the switch 580 is held in closed position until the jaws are caused to open and release the trouser leg gripped thereby when the rocker moves to its extreme rear position.

The switch 581 is mounted on the arcuate plate 593 mounted on the base 501 by means of the bracket 595. The switch 581 may be secured to the arcuate plate in any adjusted position along the length thereof by any suitable means such as the C clamp 596. The operator or push button 596 of the switch is engaged by the contact plate 597 of the rocker when the rocker moves to the desired extreme rear position.

If desired, the slide plate 176 which moves the press rolls toward and away from one another may be reciprocated in the slot 180 of the support plate 137 by a pneumatic ram 600 instead of by the solenoid 190 and the spring 185. In this event, the piston rod 602 is connected to the slide plate 176 by the screw 186 and the movement of its piston 603 is controlled by a control valve 605, which may be identical with the control valve 560, having one solenoid coil 606 which when energized moves the operative element of the control valve to the position wherein the control valve permits flow of air under pressure from its inlet conduit 607, which may be connected to the source of air under pressure 565 through the conduit 564, through the conduit 608 into one end of the cylinder 609 of the ram on one side of the piston 603 and simultaneously permits exhaust or release of air from the cylinder from the other side of the piston through the conduit 610 and the exhaust outlet 611 of the valve whereby the piston is moved into retracted position and the press rolls are moved away from each other. The control valve also has a solenoid coil 613 which when energized moves the operative element of the valve to another extreme position wherein the valve permits flow of air under pressure from its inlet conduit 607 into the cylinder through the conduit 610 on the one side of the piston 603 and simultaneously permits exhaust or release of the air from the other side of the piston through the conduit 608 and the exhaust 611 of the valve. It will thus be apparent that when the solenoid coil 615 is energized the piston rod 602 will be moved to its extended position and the press rolls will be moved toward each other.

The electrical control circuit of the device embodying the invention when it is provided with the removal or stacker device 500 instead of with removal or stacker device 252 and with the pneumatic ram 600 instead of the solenoid 190 for moving the press rolls is illustrated in FIGURE 16. The main switch 400 which may be located in any desired position on the table connects the main conductors 620 and 621 to the input circuit 622 which is connected to any suitable source of electricity. The switch 580 connects the solenoid coil 561 across the main conductors 620 and 621 when it is moved to closed position through the conductor 624, the relay contact 624 and the conductors 626, 627 and 628. The switch 581 when it is moved to closed position connects the relay winding 630 across the main conductors through the conductors 631, 632, 633, 635 and 628. The relay winding 630 when energized moves its normally open contact 637 to connect the solenoid coil 580 of the control valve 560 across the main conductors through the conductors 639, 640, 641 and 628. Once the movable contact 637 is in closed position, the relay winding 630 will remain connected across the main conductors after the switch 581 moves back to its normal open position through the conductors 639, the contact 637, the conductor 643, the normally closed contact 644 and the conductors 632, 633, 634, 635 and 628. The relay contact 644 is moved to open position whenever the jaw switch 580 moves to closed position since its relay winding 646 is then connected across the main conductors through the conductors 624, the relay contact 625, the conductors 626, the switch 580 and the conductors 647, 648 and 628 so that the relay winding 630 is de-energized and its contact 637 moves to open position to de-energize the coil 580 when the jaw switch is closed by the engagement of its sensor bracket 590 with the forward end of a trouser leg which is to be gripped by the jaws.

The solenoid coil 561 of the control valve 560 is de-energized when the rocker switch 581 is closed to cause the jaws to open and release the trouser leg gripped thereby whenever the rocker 502 moves to its extreme rearward position determined by the position of the rocker switch on the arcuate plate 593 and closes the rocker switch due to the opening of the normally closed relay contact 625 by its relay winding 650 which is connected across the main conductors when the rocker switch is closed by the conductors 631, 632, 652, 653, 635 and 628. The relay winding 650 when energized also causes its second normally open contact 655 to move to closed position to cause the coil 425 of the knife solenoid 277 to be connected across the main conductors 620 and 621 through the conductors 657, 658 and 659 so that the knife will be actuated to cut the chain stitch connecting the rear end of the trouser leg whose front end portion is still gripped by the jaws of the stocker device 500 to the front end of the next trouser leg when the rocker reaches its extreme rearward position.

When the sewing machine is not in operation the treadle switch 241 connects the solenoid coil 606 of the control valve 605 across the main conductors through the conductors 661, its upper stationary contact 414 and the conductors 662, 663 and 628. When the treadle 44 is pivoted to cause operation of the sewing machine, the treadle switch connects the other solenoid coil 615 of the control valve 605 across the main conductors through the conductors 661, its lower stationary contact 419 and the conductors 665, 666, 663 and 628. When the treadle switch 241 is moved to its lower position, the solenoid coil 240

of the steam valve 236 is also energized being then connected by the treadle switch across the main conductors through the conductors 661, 665, 666, 663 and 628.

The heating coils of the press rolls are connected across the main conductors 620 and 621 by means of the conductors 661 and 668, the thermostat switch 230 and the conductors 669, 670, 671 and 628. The press rolls will therefore be heated and maintained at the proper temperature.

In use, when the sewing device embodying the invention is provided with the stacker device 500 instead of with the stacker device 252 and with the pneumatic ram 600 instead of the press roll solenoid 190, the device is placed in operation by the closure of the main switch 400. Assuming that at this time the rocker arm is in its extreme forward position with the lower jaws in their lower positions, the jaw and rocker switches 580 and 581 are open. The closure of the main switch causes energization of the heating coils 220*a* and 220*b* of the upper and lower press rolls 110 and 111 if the thermostat switch 230 is in its closed position and the temperature of the press rolls will be raised to and maintained at a predetermined desired value by the thermostat switch.

The solenoid coil 606 of the control valve 605 is energized when the main switch 400 is moved to closed position since the treadle switch is now in its upper position and the control valve 605 will therefore supply air under pressure to the cylinder 609 through the conduit 608 and release air from the cylinder through the conduit 610 so that the slide plate 176 is moved forwardly and moves the press rolls apart from each other.

At this time neither one of the solenoid coils 561 or 579 of the control valve 560 are energized but the operative element of the control valve 560 is in the position wherein it causes air under pressure to be admitted to the rear end of the cylinder 546 of the rocker ram 545 and to the upper end of the cylinder 536 of the jaw ram 532. If desired, the solenoid coil may actuate the button 596 of the switch momentarily and cause energization of the solenoid coil 579 as explained above. When the operator now positions the overlapped portions of the piece of material of which the trouser leg is to be formed in proper position on the table top and moves the front end of the overlapped portions toward the presser foot of the sewing machine to begin operating, the treadle switch 241 is moved to its lower position wherein it engages its lower stationary contact 419 and the solenoid coil 240 of the solenoid steam valve 236 is energized to open the steam valve and simultaneously the solenoid coil 615 of the control valve 605 is energized to cause the pneumatic ram 600 to move the slide plate rearwardly to thus cause the press rolls to move toward one another. The sewed overlapped portions of the trouser leg then move through the folding assembly 69 of the device which causes the side edge sections of the overlapped portions 24 and 25 to be folded back on the overlapped portions and then into engagement with the drag belts which then move the folded back side edge sections past the steam discharge conduit and past and between the heated press rolls which may move apart to the required degree to accommodate the side edge sections since the piston of the ram 600 may move back compressing the air in the front end of the cylinder. The air under pressure supplied to the ram is of a predetermined pressure and causes the press rolls to engage and press the side edge sections with a predetermined force. When the front end of the sewed trouser leg moves rearwardly of the drag belts and between the two pairs of upper and lower jaws 516 and 520 on the rocker arm 512, the front or leading end of the trouser leg engages the sensor bracket 590 and moves it rearwardly thereby causing the arm 588 to close the jaw switch 589. When the jaw switch is closed, the solenoid coil 561 of the control valve 560 is energized since the contact 625 is now in its normally closed position, the rocker switch being in open position, and the control valve permits air under pressure to be introduced into the forward end of the cylinder 546 of the rocker arm and into the lower end of the cylinder 536 of the jaw ram. As a result, the piston rod 531 is moved upwardly to cause the lower jaws to pivot upwardly whereby the two pairs of jaws grip the front end portion of the trouser leg and simultaneously the piston rod 549 of the rocker ram begins to move rearwardly and out of the cylinder 546. The rearward movement of the piston rod 549 and therefore the rearward or counterclockwise pivotal movement of the rocker 502 can take place only at the same speed as the speed with which the trouser leg is being moved rearwardly by the gripping belts.

The switch 581 is positioned on the arcuate plate 593 in such position that its button 596 will be engaged by the touch plate 597 when the rear end of the trouser leg whose front end is gripped by the jaws of the rocker moves out of engagement with the drag belts and rearwardly of the knife. The rear end of the trouser leg is now of course still connected to the next trouser leg, which is being moved by the drag belts, by the chain stitch. As the touch plate 597 engages the push button 596 and closes the rocker switch 581, the rocker switch closes and connects the relay winding 650 across the main conductors. When the relay winding 650 is energized, it immediately causes its contact 655 to close whereupon the coil 425 of the knife solenoid 277 is energized and the knife cuts the chain stitch. The mechanical interconnection of the contacts 625 and 655 of the relay winding 650 is such that the contact 655 moves to closed position before the contact 625 moves to open position so that the knife operates and cuts the chain stitch before the contact 625 opens so that the jaws still grip the front end of the trouser leg at the time the chain stitch is cut. The contact 625 is then opened and the solenoid coil 561 of the control valve 560 is de-energized.

When the relay control 625 moved to open position, the relay winding 646 was de-energized and the relay contact 644 moved to its closed position so that the relay winding 630 will remain energized after the rocker switch 581 moves to open position. The relay control 625 moves to open position and permits the contact 644 to move to closed position in the period of time necessary to move the operative element of the control valve from one position to the other since the solenoid coil 561 must be deenergized before the operative element of the control valve may be moved to the position due to the energization of the other solenoid coil 579 which causes the jaw ram to move the lower jaws downward and the rocker ram to move the rocker forwardly. This ensures that the control 644 is in closed position before the rocker is moved forwardly and thus before the switch 581 is permitted to move to its open position. As a result, the control 644 will be closed before the rocker switch opens so that the solenoid coil 579 will remain energized until the jaw switch is opened again. The solenoid coil 579 which was energized upon the closure of the switch 581 due to energization of the relay winding 630 and the movement of the contact 637 to closed position, now moves the operative element of the control valve to the position wherein the control valve introduces air under pressure into the upper end of the cylinder of the jaw ram and released from the upper end thereof so that the piston 531 moves downwardly to pivot the lower jaws away from the upper jaws so that the front end of the trouser leg which has been gripped by the jaws is released and the trouser leg drops into a suitable receptacle and the switch 580 closes. At the same time air under pressure is introduced into the rear end of the rocker ram cylinder and released from the front end thereof so that the rocker moves forwardly very swiftly

until the engagement of the bumper or shock absorber 630 on the piston rod with the rear end of the cylinder 546 stop further forward movement of the rocker. The open jaws of the rocker are now positioned immediately to the rear of the drag belts to receive the front end of the next trouser leg and the bracket 590 is now in position to be engaged by the front end of the next trouser leg which is being moved rearwardly by the drag belts.

When the switch 581 moved to its open position, the relay winding 650 was de-energized and the contact 625 moved back to its normal closed position and the contact 655 to its normal open position so that the coil 625 of the knife solenoid was de-energized and the knife moved back to its retracted position before any forward movement of the rocker took place.

When the forward end of the next trouser leg engages the sensor bracket to again close the jaw switch 580, the relay winding 646 is energized and moves its contact 644 to its open position. When the contact 644 moves to its open position, the relay winding 630 is de-energized and permits its relay contact 637 to move to its normal open position. As a result, the solenoid coil 580 of the control valve 560 is de-energized since the solenoid coil 561 thereof is now energized because the jaw switch is closed, air under pressure is again introduced into the forward end of the cylinder 546 of the rocker ram and into the lower end of the cylinder 536 of the jaw ram and released from the rear end of the rocker ram cylinder and the upper end of the jaw ram cylinder to again cause the lower jaws to move upwardly and grip the forward end of the trouser leg and at the same time cause the ram 544 to exert a force on the rocker tending to move it rearwardly. This sequence of operation is repeated as each trouser leg is sewed, moved by the drag belts through the folding assembly and the press rolls and then moved by the stacker device 500 to a position remote from the drag belts and into any suitable receptacle.

It will now be apparent that the electric control circuit illustrated in FIGURE 16 is employed when the stacker device 500 is used instead of the stacker device 252 and that the stacker device 500 will function in the same manner as the stacker device 252 under the control of its electric control circuit which employs the photocell assembly 262 and the friction clutch 266 for the operation of the knife and of the rocker 300. When the pneumatically operated stacker device 500 and the pneumatic ram 605 are employed instead of the rocker device 252 and the knife solenoid 277, the drive mechanism 350 and the photocell assembly and its associated circuitry are of course not needed.

If desired the jaw switch 580 could be mounted on a stationary part of the device, as for example the support plate 262 with a feeler or sensor arm extending into the path of travel of the front end of each pair of overlapped portions to be engaged thereby as it moves between the jaws into position to be gripped thereby.

The folding assembly 700 illustrated in FIGURES 17 and 18 may be used in place of the folding assembly 69. The folding assembly 700 includes a support plate 702 having a forward horizontal portion 703 which is rigidly secured to the base plate 60 of the sewing machine and to the spacer plate 74 by means of the screws 75 which extend through the apertures 704 of the horizontal portion and through suitable apertures in the spacer plate and the base plate. A flange plate 775 has an upstanding flange 706 which extends over the horizontal portion to the upwardly and rearwardly inclined portion 707 of the support plate. The flange plate is secured to the base plate by means of the bolts which extend through the slot 707 of the flange plate and suitable apertures in the spacer plate and the base of the sewing machine. The flange 706 aids the operator in determining the width of the side edge portions 24 and 25 of the overlapped materials. The lateral extension 707*a* of the support plate is positionable forwardly of the presser foot to help support the upper portion 20. The upwardly and rearwardly inclined portion 702 of the support plate is positioned forwardly of the drag belts 112 and 113 and rearwardly of the presser foot of the sewing machine and has a cam plate 708 rigidly secured, as by welding, to its lateral edge. The cam plate 708 is of a configuration substantially similar to that of the cam plate 100 of the folding assembly 69 having upper and lower laterally outwardly flared forward surfaces 711 which extend laterally outwardly in opposite directions relative to the edge 713 of the support plate and engage the side edge sections of the two portions disposed on opposite sides and extending over and under lateral portions of the support plate as the two sewed portions of the material being moved rearwardly by the sewing machine. The engagement of the upper and lower forward surfaces 711 with the side edge sections 24 and 25 causes them to bend upwardly and downwardly, respectively, as the sections move past the surfaces to engage the intermediate substantially vertical sections 716 of the cam plate which cam or continue the folding of the side edge sections 24 and 25 and cause them to extend perpendicularly outwardly relative to the portions 20 and 21. The cam plate 708 then curves to provide the curved surfaces 717 which curve inwardly toward each other and to the surfaces 719 which extend parallel to one another and in spaced parallel relationship to the upper and lower planar surfaces of the presser plates 721 and 722, respectively, which extend therebetween.

Each of the presser plates has a vertical outwardly extending inner flange 724 provided at its rear end with a curved portion 725 disposed between the presser plate and the adjacent curved planar surfaces 717 and 719 of the cam plate. The upper and lower press plates 721 and 722 are pivotally secured to the upper and lower press blocks 728 and 729, respectively, by means of the arms 730 and 731, respectively, which extend on opposite sides of the support blocks and are pivotally secured thereto by means of the pivot pins 733 and 734. The support blocks are rigidly secured to the inclined portion 717 of the support plate by means of the bolts 740 which extend through suitable aligned apertures in the blocks and in the support plate.

Each of the press plates is biased towards the other press plate by a spring 742 one of whose ends bears against the support plate and whose other end bears against a connector member 743 connecting the free ends of the arms 730 and 731 of the two plates. Each connector member 743 has a suitable spring retainer pin 744 which extends into one end of the coil spring and the mounting plate has a similar retainer pin 746 which extends in opposite directions into the other ends of the two springs. The forward ends of the press plates 721 and 722 have outwardly, upwardly and downwardly curved sections 747 and 748, respectively, which help guide the front end of each pair of overlapped portions of the material between the planar or flat portions of the press plates as the sewed overlapped portions 20 and 21 move rearwardly from the sewing machine toward the drag belts.

The folding assembly 700 functions in substantially the same manner as the folding assembly 69 in such operations as in the sewing of a single piece of material to form a trouser leg. The operator moves the overlapped portions 20 and 21 of the single piece of material which is to form the trouser leg 22 beneath the presser foot of the sewing machine and positions the side edge sections 24 above the lateral portions of the support plate extending toward the presser plate from the flange 706 and the side edge section between such lateral portion and the base plate of the sewing machine, the spacer plate holding the support plate spaced above the base plate. The overlapped portions are sewed together by the sewing machine which forms the seam 23. As the forward sewed end of the trouser leg moves rearwardly of the

sewing machine, the operator guides the front end of such trouser leg between the forward upwardly and downwardly curved sections 747 and 748 of the press plates 721 and 722 which then support and hold the overlapped portions in proper alignment with the cam plate 708 so that the point 715 of the cam plate will enter between the substantially parallel side edge sections 24 and 25. The sewing machine then continues to move the overlapped portions rearwardly and between the press plates 721 and 722 if the material is of sufficient rigidity since the force with which the press plates engage the material is quite small. If the material is very soft or flexible, the operator may have to guide the movement of the front end portion of the trouser leg between the press plates until it enters between and is engaged by the drag belts 112 and 113.

As the side edge sections 24 and 25 move past the cam plate 708, they are first bent or folded upwardly and downwardly, respectively, by the forward flared surfaces 711 of the cam plate, then upwardly and downwardly by the substantially vertical surfaces 716 of the cam plate, then back toward the overlapped portions 20 and 21 as they move past and between the curved surfaces 717 of the cam plate and the curved rear portions 725 of the press plates, and then into positions parallel to the overlapped portions as they move past and between the planar surfaces 719 of the cam plate and the upper and lower surfaces of the press plates. Once the front end of the trouser leg enters between the drag belts 12 and 13, the drag belts continue to pull the trouser leg through the folding assembly 700 as the sewing operation continues.

The front end of the second trouser leg is of course connected to the rear end of the first trouser leg by the chain stitch formed by the sewing machine and the second trouser leg and each succeeding trouser leg thereafter is moved toward and between the press plates and then past the cam plate 708 by such chain stitch as the preceding trouser leg is pulled rearwardly by the drag belts so that the operator need not concern himself with properly positioning the front end of each succeeding trouser leg between the press plates 721 and 722.

It will be apparent that the press plates perform the same function of supporting the overlapped portions and guiding the side edge sections thereof in proper position past the cam plate as the divider plate 70 and the bracket 91 of the folding assembly 69.

It will be apparent that a device has been illustrated and described for sewing two overlapped portions of material, folding back side edge sections of the overlapped sewed portions to lie flat against the overlapped portions, and pressing the side edge sections to cause them to remain in folded back position on the overlapped portions has been illustrated and described which permits the continuous sequential fabrication of such articles as trouser legs with minimum of attention by the operator and which permits the operator of the sewing machine to perform all the operations required to fabricate the article and then remove it to a location remote from the sewing machine.

It will further be apparent that while the operation of both forms of the device was described in connection with the sewing of a trouser leg formed of a single piece of material that the device of the invention may be employed to sew together trouser legs formed of two pieces of material in which case one seam of each trouser leg of the plurality of trouser legs would be sewed at one time and then the trouser legs would then be run through the device again to sew the other side edges thereof together to form the second seam.

It will also be apparent that either form of the device of the invention may be employed to sew together either overlapped portions of one piece of material or two or more pieces of material together along various seams wherever it is desired that the side edge sections extending outwardly from any such seam, as in the manufacture of dresses, shirts and the like, are to be pressed back on the portions of material from which they extend laterally outwardly of the seam joining such portion.

It will further be seen that while each trouser leg has been described as being connected to its succeeding trouser leg by a chain stitch each such trouser leg would be connected to its succeeding trouser leg merely by two threads in the event that a lock stitch sewing machine were employed and accordingly the term "chain stitch" as used herein designates any thread means so connecting successive trouser legs or portions of material to one another.

It will further be apparent that the tightness of the stitch may be varied by varying the rate of movement of the drag belts relative to the speed of operation of the sewing machine by means of the variable speed pulley assembly connecting the drive shaft 52 of the sewing machine to the input shaft 128 of the speed reducing transmission, the drag belts tending to maintain the portions of material between the presser foot and the drag belts under tension if the speed of the movement of the drag belts exceeds slightly the speed of movement imparted to the material by the sewing machine.

It will further be seen that one of the pairs of jaws of the stacker device is positioned to grip the front portion of each pair of overlapped portions of material as they move rearwardly of the drag belts at the seam formed by the sewing machine so that the rocker of the stacker device will exert a rearwardly directed force on the trouser leg in alignment with the seam so that the drag belts and the stacker device will pull each pair of materials directly rearwardly along the seam and therefore cause proper movement and alignment of each succeeding pair of overlapped portions past the folding and pressing means of the device.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A device for use with a sewing machine including: folding means adapted to be disposed rearwardly of a sewing machine for engaging and folding side edge sections of two overlapped portions of material sewed by the machine, said side edge sections extending laterally outwardly of the seam formed by the sewing machine, said folding means being adapted to fold each of said side edge sections back on the portion from which it extends; pressing means disposed rearwardly of said folding means for pressing the folded back side edge sections to cause them to lie permanently in folded back positions on said overlapped portions; means biasing said pressing means toward engagement with the folded back side edge sections; moving means disposed rearwardly of said folding means for engaging the overlapped portions and moving them past said pressing means to cause said folded back side edge sections to move into engagement with said pressing means; means for moving said pressing means out of engagement with said folded back side edge sections; and control means operatively associated with said pressing means and said moving means for causing operation of said means for moving said pressing means out of engagement when said moving means is inoperative and rearward movement of said overlapped portions is arrested.

2. A device for use with a sewing machine including: folding means adapted to be disposed rearwardly of a sewing machine for engaging and folding side edge sections of two overlapped portions of material sewed by the machine, said side edge portions extending laterally outwardly of the seam formed by the sewing machine, said folding means being adapted to fold each of said

side edge sections back on the portion from which it extends; pressing means disposed rearwardly of said folding means for pressing the folded back side edge sections to cause them to lie permanently in folded back positions on said overlapped portions; means biasing said pressing means toward engagement with the folded back side edge sections; moving means disposed rearwardly of said folding means for engaging the overlapped portions and moving them past said pressing means to cause said folded back side edge sections to move into engagement with said pressing means; removal means disposed rearwardly of said moving means for engaging the overlapped portions as they move rearwardly of said moving means and transporting said overlapped portions to a location remote from said sewing machine and said moving means; means for moving said pressing means out of engagement with said folded back side edge sections; and control means operatively associated with said pressing means and said moving means for causing operation of said means for moving said pressing means out of engagement when said moving means is rendered inoperative and rearward movement of said overlapped portions is arrested.

3. A device for use with a sewing machine including: folding means adapted to be disposed rearwardly of a sewing machine for engaging and folding side edge sections of two overlapped portions of material sewed by the machine, said side edge sections extending laterally outwardly of the seam formed by the sewing machine, said folding means being adapted to fold each of side edge sections back on the portion from which it extends; pressing means disposed rearwardly of said folding means for pressing the folded back side edge sections to cause them to lie permanently in folded back positions on said overlapped portions; means biasing said pressing means toward engagement with the folded back side edge sections; moving means disposed rearwardly of said folding means for engaging the overlapped portions and moving them past said pressing means to cause said folded back side edge sections to move into engagement with said pressing means; removal means disposed rearwardly of said moving means for engaging the overlapped portions as they move rearwardly of said moving means and transporting said overlapped portions to a location remote from said sewing machine and said moving means; drive means for simultaneously operating said moving means, said pressing means and said removal means; means for moving said pressing means out of engagement with said folded back side edge sections; and control means operatively associated with said drive means and said means for moving said pressing means out of engagement for causing said means for moving said pressing means out of engagement to be operative when said drive means is inoperative and rearward movement of said overlapped portions is arrested.

4. A device for folding back substantially parallel side edge sections of two overlapped portions of material which extend laterally outwardly from a seam connecting the two overlapped portions including: a cam plate having a pair of oppositely extending forward surfaces flaring outwardly in opposite directions from an edge providing a forward point receivable between the two substantially parallel side sections and curving rearwardly from said point toward a pair of substantially vertical surfaces of said cam plate extending in opposite directions relative to said edge, said cam plate having intermediate arcute surfaces curving rearwardly and toward each other from said vertical surfaces in directions opposite to that of said forward surfaces, said cam plate having a pair of rear parallel surfaces extending rearwardly from said intermediate curved sections whereby the side edge sections when moved into engagement with and past said cam plate are progressively and subsequently folded away from said seam to positions extending substantially perpendicularly relative to said overlapped portions and then to positions adjacent and substantially parallel to said overlapped portions and to one another; and means disposed adjacent said cam plate for holding said overlapped sewed positions and guiding movement of said overlapped sewed portions past said cam plate, said holding means comprising a pair of presser plates and means biasing said presser plates toward one another, said overlapped portions being movable between said presser plates, said presser plates engaging said overlapped portions on the side of the seam opposite from the side of the seam from which said side edge sections extend laterally outwardly, said presser plates having guide portions disposed adjacent said intermediate arcuate surfaces of said cam plate and providing arcuate surfaces facing, spaced from and having configurations corresponding substantially to the configuration of the intermediate arcuate surfaces.

5. A device for use in combination with a sewing machine for folding back side edge sections of a pair of overlapped portions of material from the seam formed by the sewing machine securing the two overlapped portions to one another, including: folding means adapted to be disposed rearwardly of a sewing machine for folding side edge sections of two overlapped portions of material sewed together by the sewing machine back on the overlapped portions and being moved rearwardly of and by the sewing machine; pressing means disposed rearwardly of said folding means and including a pair of press rolls individually mounted for pivotal movement relative to one another between a first position wherein said press rolls are adapted to engage and press the folded back side edge sections as they move rearwardly and between said press rolls and a second position wherein said press rolls are moved to positions out of engagement with said side edge sections, said press rolls having means for heating the press rolls; means for moving said press rolls between said first and second positions; moving means disposed rearwardly of said folding means for engaging said overlapped portions and moving said folded side edge sections of the overlapped portions between said press rolls; drive means operatively associated with said sewing machine for driving said moving means whenever said sewing machine is in operation; means for discharging steam on said side edge sections before they move between and into engagement with said press rolls; and control means operably associated with said sewing machine and said means for moving said press rolls and said means for discharging steam for moving said press rolls toward said first position and for causing steam to be discharged on said folded back side edge sections when said sewing machine is in operation and for moving said press rolls to said second position and for stopping discharge of steam when said sewing machine is not in operation.

6. A device for use in combination with a sewing machine for folding back side edge sections of a pair of overlapped portions of material from the seam formed by the sewing machine securing the two overlapped portions to one another, including: folding means adapted to be disposed reawardly of a sewing machine for folding side edge sections of two overlapped portions of material sewed together by the sewing machine back on the overlapped portions and being moved rearwardly of and by the sewing machine; pressing means disposed rearwardly of said folding means and including a pair of press rolls individually mounted for pivotal movement relative to one another between a first position wherein said press rolls are adapted to engage and press the folded back side edge sections as they move rearwardly and between said press rolls and a second position wherein said press rolls are moved to positions out of engagement with said side edge sections, said press rolls having means for heating the press rolls; means for moving said press rolls between said first and second positions; moving means disposed rearwardly of said folding means for engaging said overlapped portions and moving said folded side edge sections of the overlapped portions between said press rolls; drive means operatively associated with said sewing machine for driv-

ing said moving means whenever said sewing machine is in operation; means for discharging steam on said side edge sections before they move between and into engagement with said press rolls; control means operably associated with said sewing machine and said means for moving said press rolls and said means for discharging steam for moving said press rolls toward said first position and for causing steam to be discharged on said folded back side edge sections when said sewing machine is in operation and for moving said press rolls to said second position and for stopping discharge of steam when said sewing machine is not in operation; removal means disposed rearwardly of said moving means for engaging said overlapped portions and exerting a predetermined rearwardly acting force on said overlapped portions as they are moved rearwardly of said moving means; and drive means for said removal means operatively associated with said sewing machine and operable when said sewing machine is in operation.

7. A device for use in combination with a sewing machine for folding back side edge sections of a pair of overlapped portions of material from the seam formed by the sewing machine securing the two overlapped portions to one another including: folding means adapted to be disposed rearwardly of a sewing machine for folding side edge sections of a pair of overlapped portions of material sewed together by the sewing machine back on the overlapped portions and being moved rearwardly of and by the sewing machine; pressing means disposed rearwardly of said folding means and including a pair of press rolls individually mounted for pivotal movement relative to one another between a first position wherein said press rolls are adapted to engage and press the folded back side edge sections as they move rearwardly and between said press rolls and a second position wherein said press rolls are moved to positions out of engagement with said side edge portion, said press rolls having means for heating the press rolls; means for moving said press rolls between said first and second positions; means for discharging steam on said folded back side edge sections before they move between and into engagement with said press rolls; moving means disposed rearwardly of said folding means for engaging said overlapped portions and moving said folded side edge sections of the overlapped portions between said press rolls; drive means operatively associated with said sewing machine for driving said moving means whenever said sewing machine is in operation; removal means disposed rearwardly of said moving means for engaging overlapped portions of material and exerting a predetermined rearwardly acting force on said overlapped portions as they are moved rearwardly of said moving means by said removal means; and drive means operatively associated with said sewing machine and operable when said sewing machine is in operation for moving said removal means between a first extreme position wherein said removal means are in position to engage the front end portions of said overlapped portions of material as they are moved rearwardly of said moving means and a second extreme position remote and rearwardly of said moving means.

8. The device of claim 7; and control means operably associated with said sewing machine and said means for moving said press rolls and said means for discharging steam for moving said press rolls toward said first position and for causing steam to be discharged on said folded back side edge sections when said sewing machine is in operation and for moving said press rolls to said second position and for stopping discharge of steam when said sewing machine is not in operation.

9. A folding device for use in combination with a sewing machine having a drive shaft for folding back side edge sections of a pair of overlapped portions of material from the seam formed by the sewing machine securing the two overlapped portions to one another, said device including: folding means adapted to be disposed rearwardly of a sewing machine for folding side edge sections of two overlapped portions of material back on the overlapped portions while the portions are being sewed and being moved rearwardly of and by the sewing machine; pressing means disposed rearwardly of said folding means and including a pair of press rolls individually mounted for pivotal movement relative to one another between a first position wherein said press rolls are adapted to engage and press the folded back side edge sections as they move rearwardly and between said press rolls and a second position wherein said press rolls are moved to positions out of engagement with said side edge sections, said press rolls having means for heating the press rolls; means for moving said press rolls between said first and second positions; moving means disposed rearwardly of said folding means for engaging said overlapped portions and moving said folded side edge sections of the overlapped portions between said press rolls; drive means for driving said moving means; means for discharging steam on said side edge sections before they move between and into engagement with said press rolls; and means for connecting the drive shaft of the sewing machine to said drive means of said moving means whereby said moving means is placed in operation whenever said sewing machine is in operation.

10. The device of claim 9; and removal means disposed rearwardly of said moving means for engaging front end portions of the overlapped portions of material as they move rearwardly of said moving means and exerting a predetermined rearwardly acting force on said overlapped portions; and drive means for said removal means for moving said removal means between a first extreme position wherein said removal means are disposed adjacent said moving means and in position to engage the front end portions of overlapped portions being moved rearwardly by said moving means and a second extreme position wherein said removal means are disposed rearwardly and remote of said moving means, said means connectable with said drive shaft of said sewing machine, also connecting said drive means of said removal means to said drive shaft of the sewing machine whereby said removal means is placed in operation when said drive shaft of said sewing machine is rotated.

11. The device of claim 10 wherein said means connecting said drive means of said removal means and said drive shaft of said sewing machine includes friction clutch means whereby a predetermined rearwardly acting force is exerted by said removal means on the overlapped portions engaged thereby and being moved by said movable means, said removal means having a free movement toward and away from said moving means which is substantially faster than the movement of said overlapped portions of material by said moving means.

12. In a device for use with a sewing machine for sequentially sewing a plurality of pairs of overlapped portions of material to one another along the lines spaced from the side edges thereof whereby each pair of overlapped portions has a pair of side edge sections extending laterally outwardly from the seam formed by the sewing machine and whereby the rear end of each pair of sewed overlapped portions is connected to the front end of the succeeding pair of overlapped portions by a chain stitch; said device including: folding means adapted to be disposed rearwardly of a sewing machine for engaging and folding the side edge sections of each pair of overlapped portions of material back on the portion from which each extends laterally outwardly; means disposed rearwardly of said folding means for pressing the folded back side edge sections to cause them to lie permanently in folded back positions on said overlapped portions; means disposed rearwardly of said folding means for engaging the overlapped portions and moving them past said folding means and said pressing means to cause said folded back side edge sections to move into engagement with said pressing means; means disposed rearwardly of said moving

means for cutting the chain stitch connecting adjacent ends of adjacent pairs of portions of material to one another upon the movement of the rear end of each overlapped pair of portions out of engagement with and rearwardly of said moving means; means for operating said cutting means; removal means movable between one extreme position adjacent said moving means and a second extreme position rearwardly and remote of said moving means, said removal means having gripping means for engaging front end portions of said each pair of overlapped portions upon the movement of such front end portions rearwardly of said moving means; means for actuating said gripping means to cause them to engage the front end portions of each pair of overlapped portions; means for moving said removal means between said first and second positions; control means having sensor means adapted to be engaged by the front end portion of each pair of portions of material as it is moved rearwardly of said moving means and into position to be engaged by said gripping means for causing said gripping means to grip the front end portions and for causing movement of said removal means from said first position toward said second position; and means responsive to the movement of said removal means to said second position for causing said operating means to actuate said cutting means to cut the chain stitch connecting the rear end of the pair of portions whose front end portions are held by said gripping means to the front end of the succeeding pair of portions being moved by said moving means, causing said gripping means to release the front end portion of the pair of portions gripped thereby and causing said movable means to move from said second position to said front position to place said gripping means adjacent the movable means in position to grip the front end portions of the succeeding pair of portions being moved rearwardly by said moving means.

13. In a device for use with a sewing machine for sequentially sewing a plurality of pairs of overlapped portions of material to one another along the lines spaced from the side edges thereof whereby each pair of overlapped portions has a pair of side edge sections extending laterally outwardly from the seam formed by the sewing machine and whereby the rear end of each pair of sewed overlapped portions is connected to the front end of the succeeding pair of overlapped portions by a chain stitch; said device including: folding means adapted to be disposed rearwardly of a sewing machine for engaging and folding the side edge sections of each pair of overlapped portions of material back on the portion from which each extends laterally outwardly; means disposed rearwardly of said folding means for pressing the folded back side edge sections to cause them to lie permanently in folded back positions on said overlapped portions; means disposed rearwardly of said folding means for engaging the overlapped portions and moving them past said folding means and said pressing means to cause said folded back side edge sections to move into engagement with said pressing means; means disposed rearwardly of said moving means for cutting the chain stitch connecting adjacent ends of adjacent pairs of portions of material to one another upon the movement of the rear end of each overlapped pair of portions out of engagement with and rearwardly of said moving means; means for operating said cutting means; removal means including a rocker; first means for moving said rocker between a first extreme position and a second extreme position; gripping means mounted on said rocker and positioned adjacent said movable means for gripping the front end portion of a pair of portions being moved rearwardly by said moving means when said rocker is in said first extreme position and being remote from said moving means when said rocker is in said second extreme position; second means for operating said gripping means to engage the front end portion of a pair of overlapped portions of material when said rocker is in said first position and for operating said gripping means to release said front end portion of the pair of overlapped portions gripped thereby when the rocker is in said second extreme position; and electrically operable means for controlling operation of said first and second means.

14. The device of claim 13 wherein said control means includes switch means on the rocker adapted to be engaged by the front end portion of a pair of overlapped portions being moved rearwardly of and by said moving means for causing said second means to move said gripping means into gripping engagement with said front end portions of said pair of portions and for causing said first means to move said rocker from said first position toward said second position, and a second switch means operable when said rocker reaches its second position for actuating said operating means to cause said cutting means to cut the chain stitch connecting the rear end of the pair of portions whose front end is gripped by the gripping means to the rear end of the succeeding pair of portions being moved by said moving means, causing said first means to move said gripping jaws to position releasing said front end portions gripped thereby and causing said first means to move said rocker to said second position.

15. The device of claim 14 wherein said first means includes a ram pivoted on said rocker, said second means includes a ram connected to said rocker and said control means includes electrically operable valve means for controlling flow of fluid under pressure to said rams and exhaust of fluid from rams.

16. The device of claim 9 wherein said means connecting the drive shaft of the sewing machine to said drive means of said moving means includes means for varying the speed of movement of said moving means relative to the speed of rotation of said drive shaft.

17. A device including: moving means for moving flexible material; a rocker; first means for moving said rocker between a first extreme position adjacent the moving means and a second extreme position remote from said moving means; gripping means mounted on said rocker and positioned adjacent said moving means when said rocker is in said first position for gripping the front end of material being moved rearwardly by said moving means; second means for operating said gripping means to engage the front end portion of material being moved by said moving means when said rocker is in said first extreme position and to release said front end portion when said rocker is in said second extreme position; means for controlling operation of said first and second means, said control means including switch means engageable by the front end portion of the material being moved rearwardly of and by said moving means for causing said second means to move said gripping means into gripping engagement with said front end portion and for causing said first means to move said rocker from said first position toward said second position; and second switch means operable when said rocker reaches said second extreme position for causing said second means to move said gripping means to position releasing said front end portion and causing said first means to move said rocker to said second position.

18. The device of claim 16 wherein said first means includes a ram pivoted on said rocker, said second means includes a ram connected to said rocker and said control means includes electrically operable valve means for controlling the flow of fluid under pressure to said rams and the exhaust of fluid from said rams.

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JORDAN FRANKLIN, *Primary Examiner.*

DAVID J. WILLIAMOWSKY, *Examiner.*