June 9, 1931. J. P. WEIS 1,809,460

MACHINE FOR MAKING MULTIPLE SEAMS

Filed Nov. 13, 1928 6 Sheets-Sheet 1

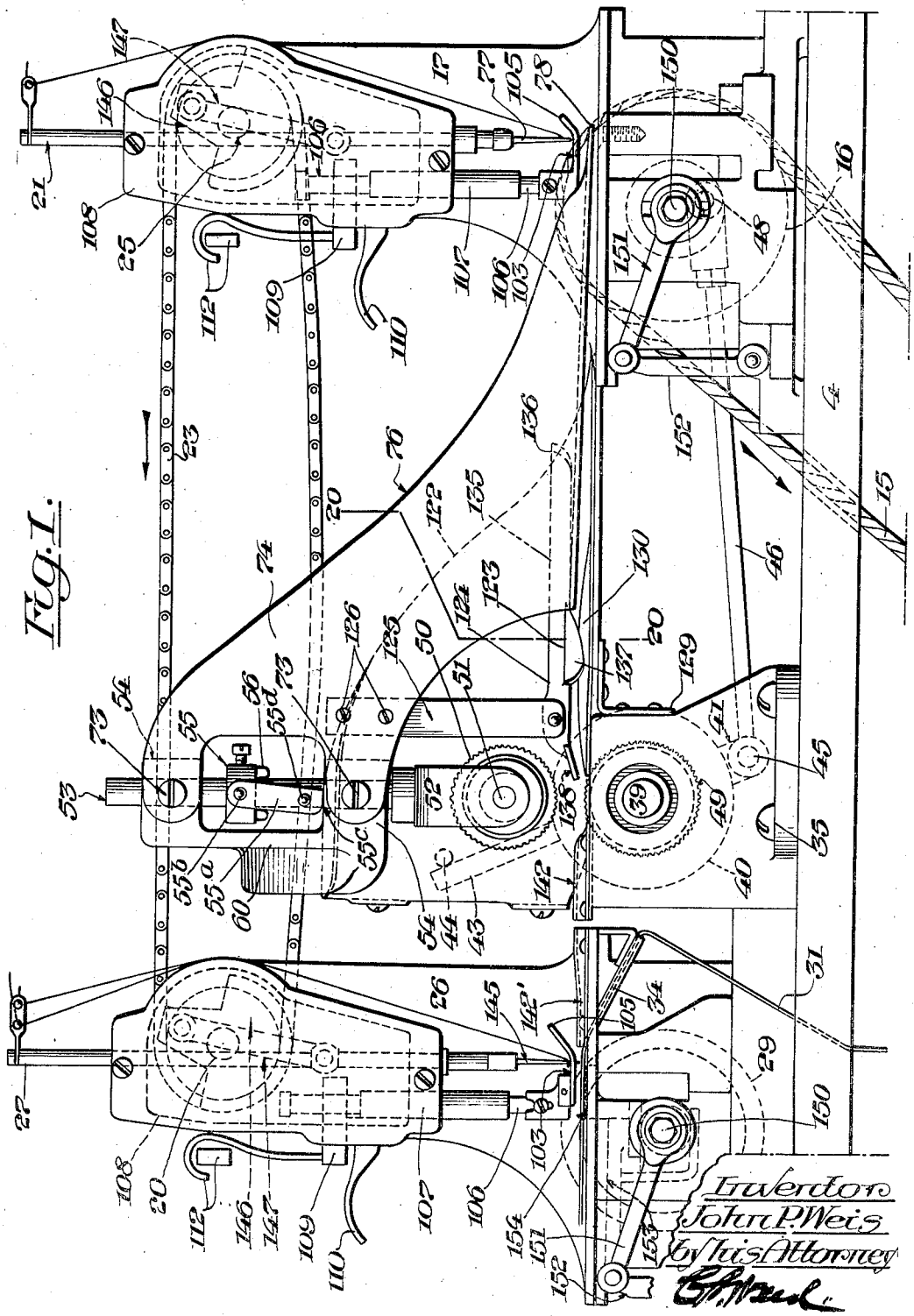


Fig. 1.

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Fig. 2.

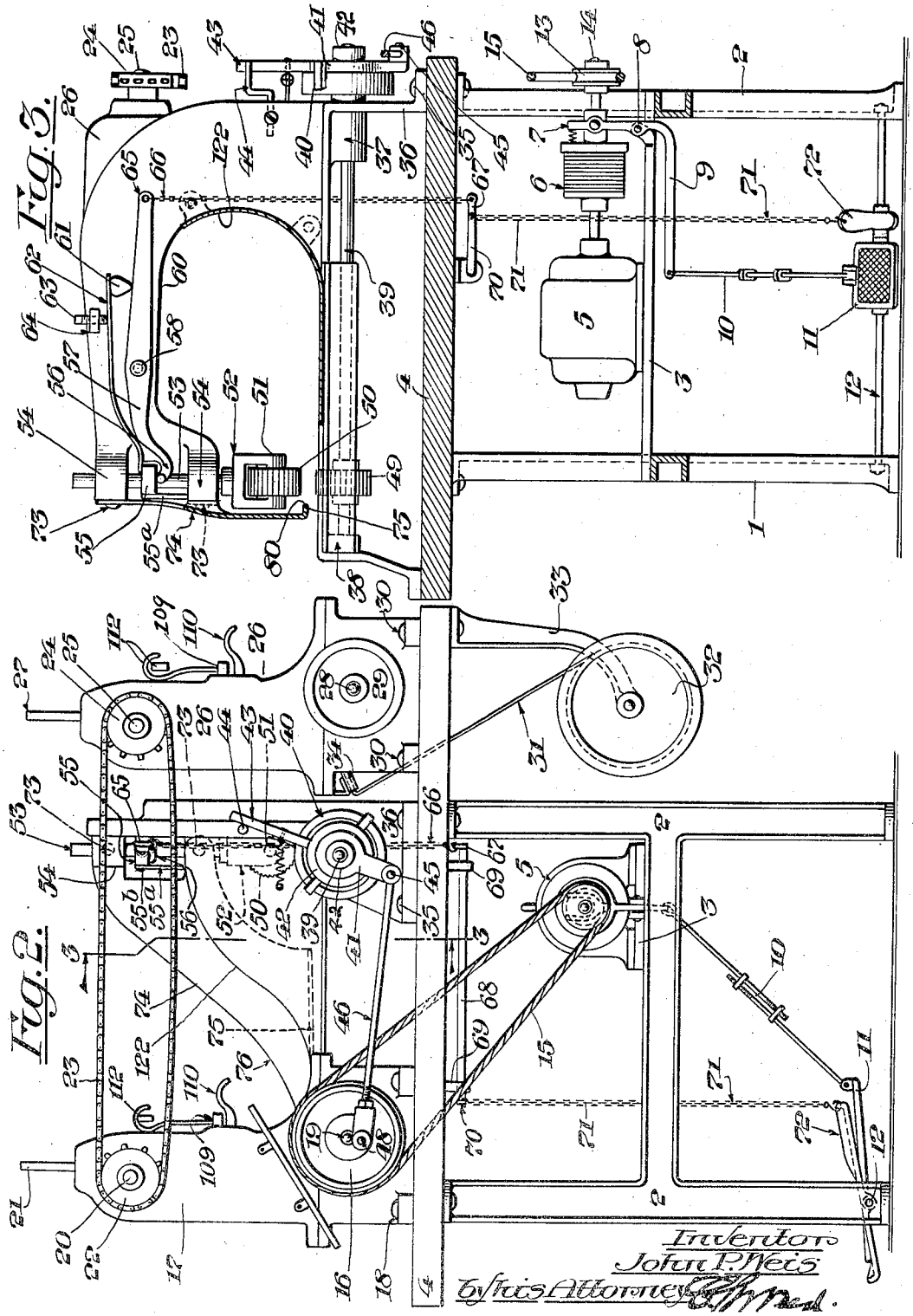


Fig. 3.

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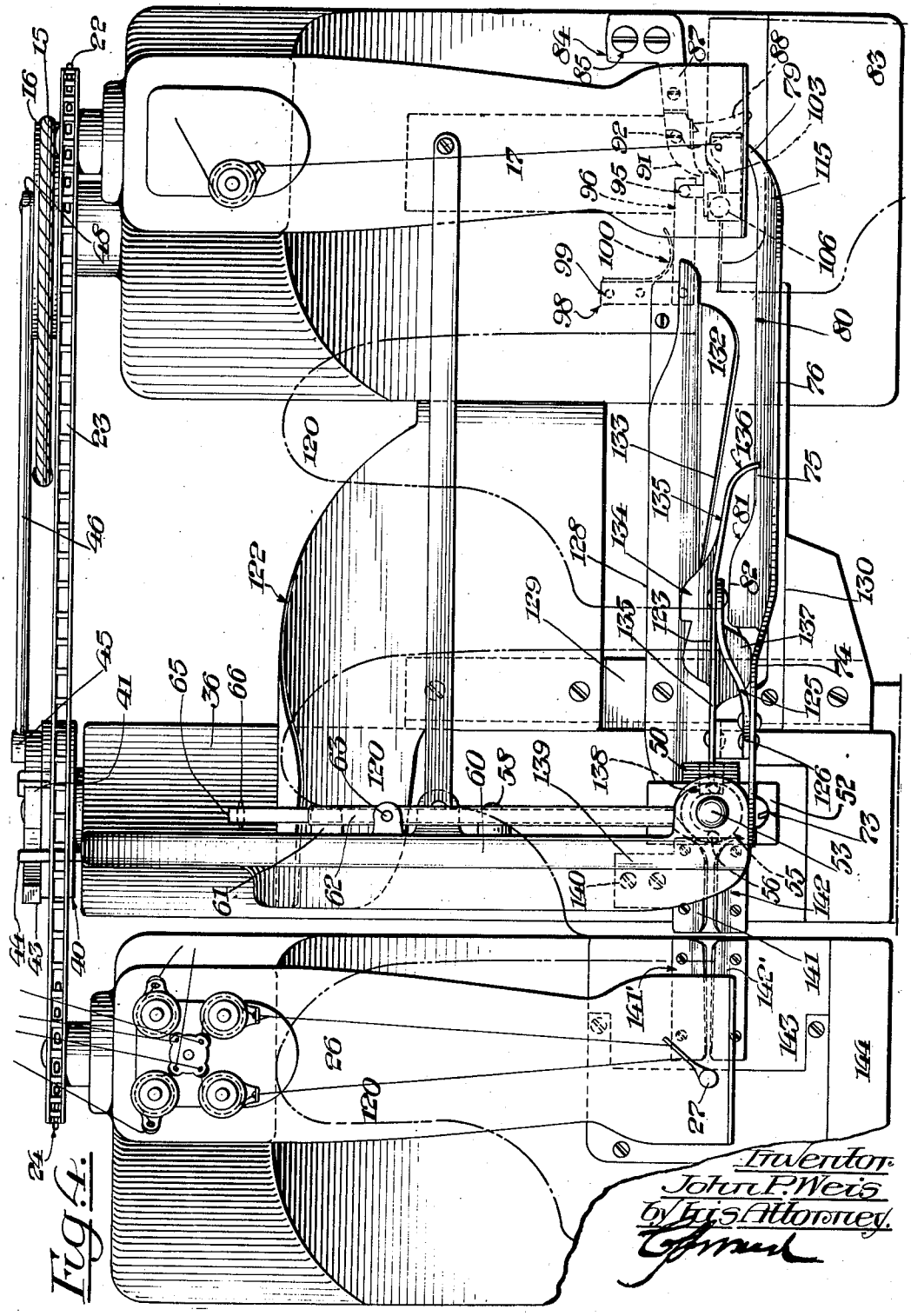


Fig. 4.

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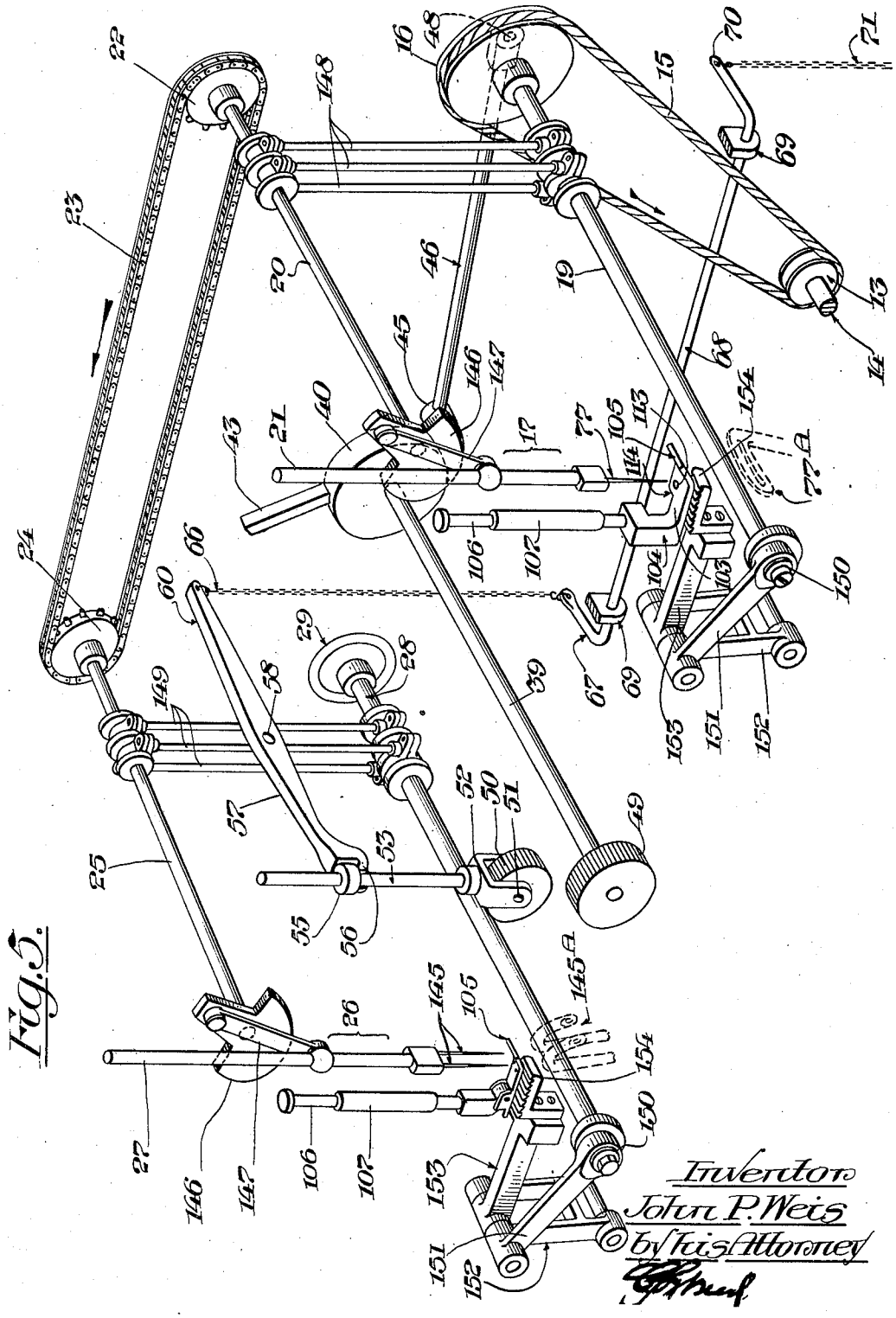


Fig. 5.

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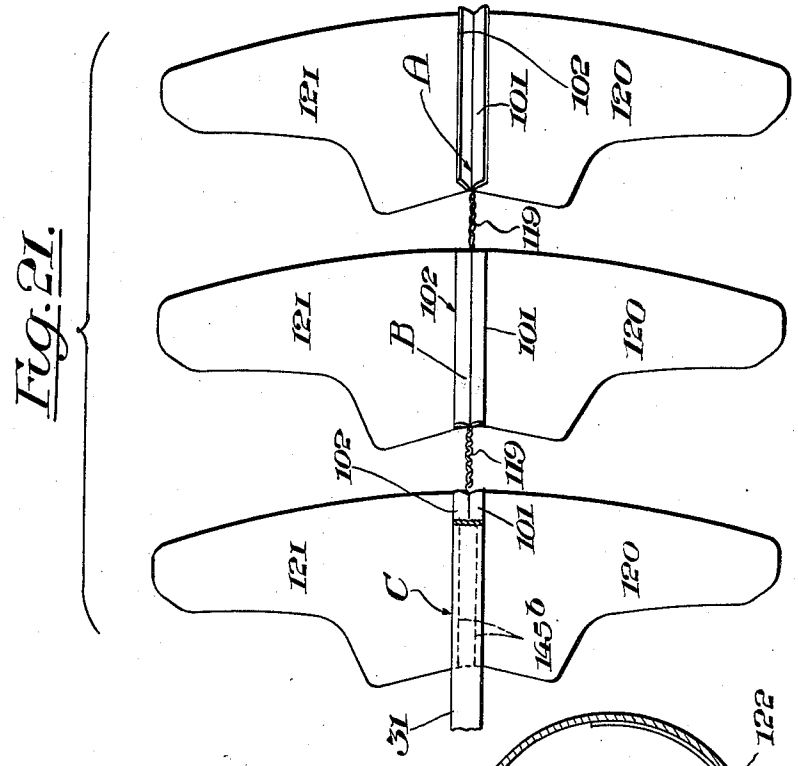


Fig. 21.

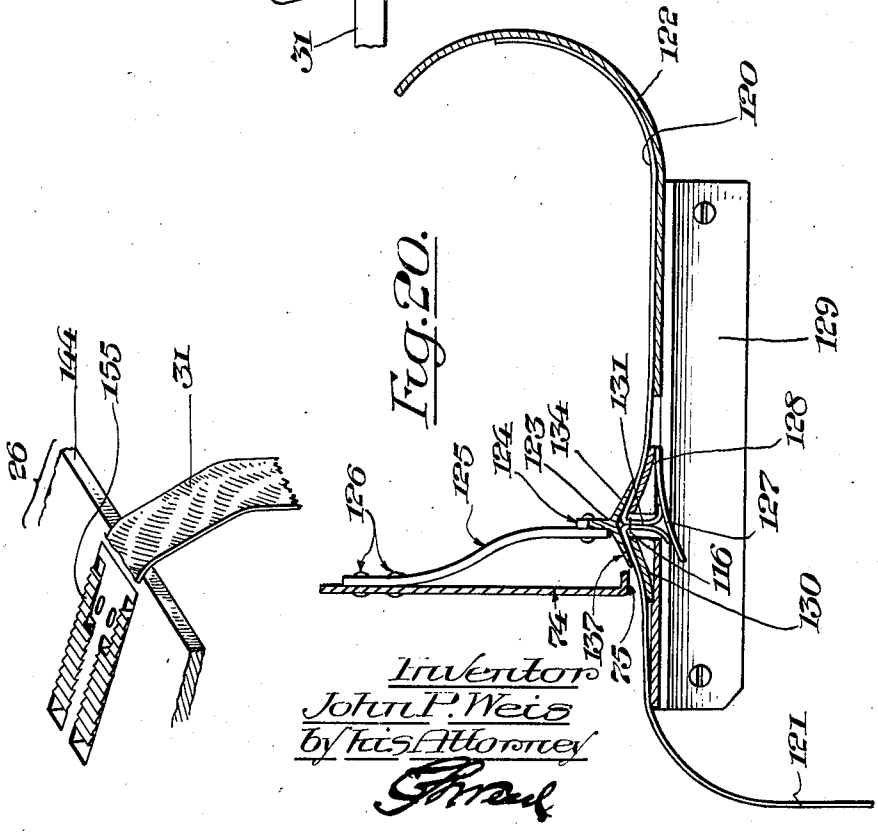


Fig. 20.

Fig. 19.

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Patented June 9, 1931 1,809,460

UNITED STATES PATENT OFFICE

JOHN P. WEIS, OF NYACK, NEW YORK, ASSIGNOR TO METROPOLITAN SEWING MACHINE CORPORATION, OF NYACK, NEW YORK, A CORPORATION OF DELAWARE

MACHINE FOR MAKING MULTIPLE SEAMS

Application filed November 13, 1928. Serial No. 319,072.

This invention relates to sewing machines and particularly to an improved machine for making multiple seams, with a single handling of the work by the operator, in various articles of manufacture, such as shoes, sporting goods articles made from leather, canvas and other materials, and other wearing apparel requiring a strong, flat seam,—the present improved machine being particularly adapted for the sewing of taped shoe uppers or quarters, the method of making this seam has been claimed in my contemporaneously pending application No. 377,682, filed July 12th, 1929.

A further object of the invention is the provision of an improved machine for first stitching the superposed parts or plies of the article with a single line of stitches, subsequently opening and flattening the seam, and stitching to the so flattened seam a reinforcing tape in an expeditious manner by parallel lines of stitches, with one handling of the article by the operator.

A still further object of the invention is the provision of a plurality of stitching and feeding mechanisms so combined with an auxiliary feeding mechanism that a multiple seam may be produced with but a single handling of the work by the operator.

Another object of the invention is the provision of mechanism for feeding and guiding several plies of work to a group of sewing mechanisms arranged in tandem relation, whereby the work can be stitched with the plies superposed and finally stitched with the plies separated and lying flat in opposite directions.

Another object of the invention is to so combine a plurality of sewing mechanisms in tandem relation with means between the two to convey the work from one to the other automatically for the production of sewed articles having a seam comprised of two separate and distinct stitch characteristics, whereby the superposed parts of the article may be first stitched together and then flattened out and subsequently stitched to complete the seam.

Another object of the invention is the provision of stitching mechanisms so organized that, simultaneously with the stitching of the first seam, the margins of the top and bottom plies of the seam will be diverted in opposite directions initially to open the seam and during the guiding thereof to a second feeding mechanism, and simultaneously with such movement from one mechanism to the other, a portion of the work will be overturned in readiness to receive one or more lines of stitching in the final stitching operation for the formation of a taped, flat seam.

Another object of the invention is the provision of a group of stitching and feeding instrumentalities and corelated mechanism so located and combined that several superposed plies of material will be first stitched and the margins of the seam then opened, with the opposed edges thereof laid in opposite directions to each other and flattened simultaneously with the stitching thereof, and then guided to seam-flattening means, and then fed to a taped-seam stitching mechanism, whereby the chain of stitches extending from one article to the other will serve as a connecting medium to assist in the feeding of the work from one mechanism to the other.

Another object of the invention is the provision of sewing mechanisms so organized in tandem relation with an auxiliary feeding mechanism interposed therebetween that seams of different kinds, requiring more than one operation, can be made by a single passage of the work through the machine and handled by a single operator,—thus effecting a material saving in cost of operation, a saving in space, a saving in the handling of the work, and a saving in the power for operating the machine, as well as many other savings.

In the drawings accompanying and forming a part of this specification—

Figure 1 is a front end view of this improved machine illustrating the stitching mechanism for sewing the superposed plies of material, the means for overturning one ply of the work and flattening the seam, the means for applying a tape to the flattened seam, and the stitching mechanism for stitching the flattened seam and tape with parallel rows of stitches;

Fig. 2 is a rear end view of the machine shown mounted upon a power-table;

Fig. 3 is a partly cross-sectional view of this improved machine taken on line 3—3, Fig. 2, and illustrates a front view of the interposed puller feed mechanism;

Fig. 4 is a top plan view of Fig. 1;

Fig. 5 is a perspective view of the operating connections of the feeding and stitching mechanisms of the machine;

Fig. 6 shows the two plies or pieces of work sewn together with a plain seam or single line of stitches;

Fig. 7 shows the two pieces of work with the seam margins spread in opposite directions and illustrates the first step in the seam opening and flattening process;

Fig. 8 shows the third step in the process where the top ply of the work is being overturned or flopped over;

Fig. 9 shows the top ply of the work overturned still further;

Fig. 10 shows the work with the top ply all the way over;

Fig. 11 shows the work completely flattened out;

Fig. 12 shows the work with the tape stitched to the flattened-out seam by two parallel lines of stitches;

Fig. 13 is a perspective view illustrating how the two plies of work are separated during the first stitching operation by means of suitable guiding members projecting between the pieces of work;

Fig. 14 illustrates the seam flattened by the pressure rolls of the puller feed mechanism;

Fig. 15 is a sectional view of a portion of the seam guiding and controlling means for acting upon the flattened seam as it passes from the feed rolls to the tape stitching mechanism;

Fig. 16 is a detail, partly sectional, view showing the initial seam flattening means and the separating members for overturning one ply of the work;

Fig. 17 is an enlarged plan view of the parts shown in Fig. 16;

Fig. 18 is a perspective view of the initial seam flattening means for effecting the first flattening of the seam during the first stitching operation;

Fig. 19 is a perspective view of the throat-plate and feed dog of the tape stitching mechanism;

Fig. 20 is a detail, cross-sectional view taken on line 20—20, Fig. 1, looking in the direction of the arrow; and

Fig. 21 is a detail view illustrating three shoe uppers in which the two plies of the upper A are stitched together by a single line of stitches and the seam then flattened, as illustrated by the upper B, and then covered by a tape applied and stitched by two lines of stitching, as illustrated by the upper C,—the said uppers being united by a single line of stitches, whereby the feeding through the machine is facilitated.

Similar characters of reference indicate corresponding parts in the several views.

Before explaining in detail the present improvement and mode of operation thereof, I desire to have it understood that the invention is not limited to the details of construction and arrangement of parts which are illustrated in the accompanying drawings, since the invention is capable of other embodiments, and that the phraseology which I employ is for the purpose of description and not of limitation.

In practice I have preferred to make use of a power-table equipment such as shown in Figs. 2 and 3, for instance, upon which the machine is mounted, although this is not essential. Such a power-table, however, will facilitate the handling of the work by a single operator and offers advantages by reason of the fact that the various units of mechanisms making up the machine can be located to advantage in the factories where they are used so that the inspection of the work coming from the machine may be taken care of by a single person engaged in the examination of the product delivered from these stitching units, which is not so readily accomplished if the stitching units are erected on ordinary sewing tables.

This power-table consists of two pairs of connected supporting legs 1 and 2, connected by a brace or cross-member 3, which support a table top 4 upon which the machine is mounted for operation. An electric motor 5 is suitably mounted under the table top and is connected to a clutch 6 of any well-known type. This clutch is under the control of an arm 7 of a bell-crank lever pivoted at 8 to the cross-member 3. The other arm 9 has connected to it an adjustable rod 10, the lower end of which is connected to a treadle 11. This treadle is pivotally supported on a brace rod 12 also connected to the legs 1 and 2. By manipulating the treadle the clutch 6 of the electric motor 5 starts or stops the operation of the belt wheel 13 carried on the end of the clutch shaft 14 and carrying the sewing machine drive belt 15 which operates the belt wheel 16 to give power to the sewing mechanism, generally indicated by 17, for stitching the two plies of the work, in the form of machine shown, by a single line of stitches.

This sewing mechanism 17 is equipped with suitable stitching and feeding mechanism. While I have shown a sewing mechanism of the well-known "Metropolitan" rotary construction, the invention is not limited thereto, for any other type of sewing mechanism can be used for this purpose. However, in addition to the usual mechanisms employed for ordinary stitching, it is necessary to use additional mechanisms to accomplish the desired result, which consists of special means for separating, guiding and controlling portions

of the work, so that instead of an ordinary seam being made by the sewing mechanism, a special form of seam is produced, delivered therefrom with the margins of the seam opened up flat for subsequent operations.

The sewing mechanism 17 is secured to the table by bolts 18 and is provided with a bottom shaft 19 (see, for instance, Fig. 5) and a top shaft 20 for operating the needle bar 21 carrying a needle 77. Co-operating with the needle 77 is a thread-carrying looper 77*a*. The top shaft carries a sprocket wheel 22 for a chain 23 which operates a similar sprocket 24 carried on a shaft 25 of the second sewing mechanism, generally indicated by 26. This second sewing mechanism 26 has a needle bar 27 carrying a pair of needles 145 operated by the shaft 25 and which also has a bottom shaft 28 provided with a hand wheel 29 for convenience in turning the sewing mechanism by hand. Co-operating with the pair of needles 145 is a pair of loopers 145*a*, each carrying a thread. The sewing mechanism 26 is also secured to the table by bolts 30 and may also be of the well-known "Metropolitan" rotary construction, but instead of being equipped with a single needle and looper like the first sewing mechanism 17, it is provided, as stated, with two needles and two loopers for making two separated parallel rows of stitches for the purpose of stitching a tape 31.

The needle bars 21 and 27 are operated by the usual crank 146 and pitman connections 147. To transmit rotary motion from the shaft 19 to the shaft 20 in the sewing mechanism 17, three-throw crank shafts and connecting rods 148 are provided, while to transmit motion from the shaft 25 to the shaft 28 similar crank shafts and connections 149 are provided.

The four-motion feed mechanisms of both sewing mechanisms comprise an adjustable crank 150 operating a link connection 151 and a feed rocker frame 152 carrying the usual feed bar 153 and feed dog 154. The feed dog 154 of the sewing mechanism 26, however, is shaped to suit the feeding of the tape 31 and to accommodate the two needles for making the two lines of stitches.

Thus each of the sewing mechanisms above referred to is provided with suitable feeding mechanisms for feeding the work and with suitable looper and needle operating mechanisms.

The tape 31 is carried by a reel 32 supported by a hanger 33 attached to the bottom of the table top 4 (Fig. 2). This tape feeds upward through the table top into a guide 34 carried by the sewing mechanism 26, from which it is guided into proper stitching position.

In co-operative relation wth the sewing mechanisms 17 and 26 is a puller feed mechanism which assists in feeding, guiding and flattening the work as it passes from the first to the second sewing mechanism. This puller feed mechanism (see Fig. 3) is also secured to the table top by bolts 35 passing through the frame 36 thereof which is provided with bearings 37 and 38 in which operates a shaft 39. On one end of this shaft is secured a feed operating wheel 40. Adjacent to this wheel is a reciprocating ratchet member or lever 41 carrying one or more feed pawls for intermittent gripping action on the feed wheel 40. A collar 42 holds the parts in operative position. A back-lash pawl or member 43 controls the movement of the feed wheel 40 in one direction. This pawl is adjustably held in place by a fixed crank arm 44. Connected to the lever 41, at 45 (see Figs. 1, 2 and 5), is a rod 46, the other end of which is connected to a crank pin 48 carried by the belt wheel 16 which thus gives movement to the rod 46, whereby intermittent movement is given to the puller feed shaft 39 and the feed roll 49 secured thereto.

This feed roll 49 co-operates with an upper feed roll 50 revolving on a shaft 51 carried by a yoked bracket 52. This yoked bracket is secured to a presser bar 53 operating in bearings 54 for up and down movement. Attached to this presser bar is a lifting collar 55 which co-operates with the curved forked end 56 of a lifting lever 57 pivotally secured to the frame, as at 58. This part of the puller feed frame is in the form of an overhanging arm 60 terminating in the two bearings 54. A lug 61, formed as part of the overhanging arm, provides a support for a presser spring 62, the other end of which rests on the collar 55, thus giving a downward pressure to the roller 50 which thus acts as a pressing roll for flattening the seam simultaneously with the feeding of the work. To regulate the pressure on this spring 62, a screw 63 is provided tapped into a lug 64 of the overhanging arm 60. In order to lift the top roller 50, the lever 57 has an extending end 65 to which is connected a chain 66 reaching down to one arm 67 of a rock shaft 68 carried by bearings 69. The other arm 70 (see Fig. 5) has connected to it another chain 71 extending downward and connected to a foot treadle 72 which is also pivotally supported on the rod 12 side by side with the treadle 11 (see Fig. 3). Pressure on this treadle 72 operates through the chains and the lever 65, pivoted at 58, to lift the roller 50 from the roller 49.

If it be desired, for any reason whatever, to hold the feed roll 50 in an elevated position, as shown in Fig. 1, a swinging latch 55*a* is provided and is pivoted to the collar 55 at 55*b* and can be swung into contact with the casting at 55*c* and thus hold the roller up. This swinging latch is provided with a knob or handle 55*d* for convenience in swinging it into and out of operative position by hand.

The ply overturning or flopping means 74

is secured to the bearings 54 of the puller feed mechanism at 73—73 (see Figs. 2 and 3) and is shown formed of sheet metal, and extends downward and outward toward the sewing mechanism 17. This member 74 (see Figs. 2 and 4) has a right-angled bent portion 75, the edge 80 of which forms a guide, for the purpose hereinafter set forth, and a curved vertical edge 76 (see Figs. 1 and 2), and this curved vertical edge 76 extends into position opposite the needle 77 of the sewing mechanism 17. The member 74 terminates at 78 in a pointed member 79 (see Figs. 4, 13, 16 and 17) which extends backward and laterally to form the right-handed bent portion 75 having the guiding edge 80 hereinbefore referred to (Fig. 17). This right-angled bent portion 75 (see Fig. 4) is toward the rear of this member 74 increased in width, as at 81, so as to form a flared portion 82 to act upon the seam in the manner hereinafter described. This overturning member 74 has its point 79 projecting in between the plies of material as it is fed through the machine and thus separates one ply from the other and gradually effects the overturning or reversal of one portion or ply of the material being stitched as this ply is fed up the vertical inclined edge 76 of the member 74.

Attached to the cloth-plate 83 of the sewing mechanism 17 is a guide 84 (see Fig. 17) adjustably secured thereto by screws 85 and provided with an elevating screw 86 tapped into the guide shank 87, whereby the guide can be adjusted up and down and the projecting end 88 thereof, which is secured to the shank by a screw 89, can be adjusted vertically. This projecting end 88 extends across the path of the feed of the work to be stitched and is spaced above the cloth-plate, so that one ply feeds underneath while the other ply feeds over the top thereof (see Fig. 13). The adjusting screw 86 permits the vertical shifting of the guide so that the proper space is provided underneath the same for the free passage of the work between it and the top surface of the cloth-plate. The guide is provided with an upstanding lip 90 for guiding the work and regulating the margin thereof from the stitch line to the edge and so control the width of the seam. The guide 84—87 for controlling and separating the work is so located relatively to the stitching position as to effectively control the work as it feeds through the first sewing mechanism, while at the same time it will not interfere with the ease of placing the articles to be stitched in position, so that the feed and foot will immediately take hold of the work and feed same through the sewing mechanism.

It is, therefore, important to have the parts arranged, as shown, relatively to the needle. Adjustably secured to this guide 84, by a screw 92, is an extending portion 91 having a part 93 in position to engage a seam-flattening member 94 (see Fig. 17) carried by a stem 95 secured in a holder 96 pivoted at 97 to a bracket 98 secured to the cloth-plate by screws 99. A spring 100 attached to the bracket 98 has its free end exerting pressure against the holder 96 so as to hold it against the work as it is fed through to flatten the seam, as shown in Fig. 16, with one edge 101 turned upward and the other edge 102 turned downward. The object of the spring 100 is not only to exert pressure so as to flatten the seam, but also to yield so as to accommodate different thicknesses of material.

The presser foot 103, with a laterally-extending shank 104 and an upturned end 105, is carried by the presser bar 106 operating in the bearing 107 of the machine head 108. A guide 109 (see Fig. 1) prevents the bar from turning in its bearing, and a hand lifter 110 is used for lifting the presser foot, a presser spring being provided to give pressure to the foot. For lifting the presser foot by a knee shift or otherwise, a hook and lever, generally indicated by 112, may be used, either or both of which may be connected by chains with the pedal 72 whereby they may be simultaneously lifted with the presser feed roller.

The foregoing description of the presser foot mechanism of sewing mechanism 17 will also suffice for sewing mechanism 26.

The presser foot 103 is provided with a needle hole 113 and a curved edge 114 to permit the edges of the work, as it is being stitched, to turn outward and downward so that the flared portions of the seam will pass through the narrow channel indicated at 115 (Fig. 16).

Now, viewing Figs. 6 to 11, inclusive, it will be seen that the needle 77 passing through the needle holder 113 of the presser foot 103 forms the seam 116 of Fig. 6. Immediately after the first stitches are made, the edges 101 and 102 are forced upward and downward to the position shown in Figs. 7 and 8; then, as the work proceeds, the top ply rides up the incline 76, which causes it to turn over, as indicated by 117 (Fig. 9); and then, as the work proceeds further, this top ply is laid over, as indicated by 118 in Fig. 10. As the work progresses to this position, the edges 101 and 102 gradually turn under so as to flatten out to the position shown in Fig. 11, while the seam is guided and drawn through by the chain of stitches 119 (see Fig. 21). As the work is fed through, the seam has a tendency to resume its initial condition, as shown in Fig. 6, and before it enters the guiding members about to be described it thus has a tendency to spring back into a condition such as illustrated in Fig. 20, wherein the bottom ply is indicated by 121 and the top ply is indicated by 120 and which top ply has been turned over. To prevent this, a curved guard 122 (see also Fig. 4) limits and controls the top ply 120, while a crotch-

shaped guide member 123 rests upon the outside or open portion of the seam of the work. This member has a shank 124 secured to a bracket arm 125 (see Figs. 1 and 20) carried by the turn-over member 74, being attached thereto by screws 126. This crotch-shaped member 123 is adjustable vertically to suit different kinds of seams and materials. The marginal edges of the seam contact with a curved member 127 (see Fig. 20) attached to the underside of a bent-up guide plate 128 carried by a right-angled bracket 129 secured to the frame of the puller feed mechanism (see Figs. 1 and 20). This right-angled bracket 129 also carries another bent-up guide 130, thus forming a space or trough between them for the passage of the seam, as indicated at 131 (Fig. 20). When the work reaches this point, however, it is fed and drawn along by the chain of stitches 119 (Fig. 21) by reason of the pull of the feed rolls 49 and 50 of the puller feed mechanism,—the work having been guided from the first stitching mechanism by suitable guides, comprising the edge 80 of the overturning member 74 and an overhanging edge of a companion guide 132 (see Fig. 4), both of which, at their front ends, are located adjacent to the first sewing mechanism—the guide 132, however, being somewhat in the rear of the front end of the overturning member 74. These guides thus receive the seam from the sewing mechanism in an approximately flattened condition by reason of the first spreading and flattening means 94,—the ply, however, having been partially turned over when it reaches the opposed guide edges 80 and 132 by means of which the seam is, as stated, properly guided to the crotch-shaped member 123 and so prevented from returning to its initial condition. The guide edge of the guide 132 is cut at an angle, as at 133, and extends under the overhanging part 134 which is a continuation of one portion of the crotch-shaped member 123, the other part thereof being the oppositely-extending member or plate 137 (see Figs. 4 and 20). A top guide member 135, shown formed as a part of the crotch shank 124 (see Figs. 1 and 4), has a curved forward end 136 extending over the right-angled portion 75 of the turn-over member 74 and acts against the work as it feeds through after being turned over to force the seam down underneath the laterally-extending curved edges 81 and 82 (see Fig. 4) of the guiding means, whereby it is led to the crotch-shaped member 123. Thus, when the seam reaches the crotch-shaped member 123, it is confined between the guide plates 128 and 130 (Fig. 20) and so passes directly under the crotch-shaped member 123 comprising the angularly-extending plates 134 and 137. These members or plates 134 and 137 extend back toward the lower feed roll 49 and an extending lip 138 (see Figs. 1 and 4) of the top guide 135 reaches out from the rear of such top guiding member 135, which, as stated, is a continuation of the shank portion 124 of the crotch-shaped member 123, and so maintains the seam in proper position for passage to the feed rolls. By reason of these several guiding members, the seam is controlled and fed directly to the feed rolls 49 and 50, where it is further flattened (see Fig. 14) and fed to the rear stitching mechanism 26. From the feed rolls of the puller feed mechanism the seam of the work passes through a trough-shaped guide formed by a guide member 141 comprising a bent-up plate attached by screws to a shank 139, which shank is attached to the frame of the puller feed mechanism by screws 140, and which guide member 141 forms a guide at one side, while a similarly bent-up plate 142, attached by screws, forms a guide for the opposite side of the seam. These guides are substantially the same as the guide plates 128 and 130 so far as the control of the seam is concerned. Duplicates of these guide plates, as 141′ and 142′, are also attached to the slide plate 143 of the sewing mechanism 26. This slide plate fits into the cloth-plate 144 and is held in place by a simple spring clip, affording a quick means for the removal and replacement of the plate for convenience in threading the loopers. The seam passes through the two sets of guide plates just described to the needles 145 of the sewing mechanism 26, which needles are suitably spaced (see Fig. 5) to make two parallel rows of stitches, one along each side of the junction of the flattened seam, so as to place two rows of stitching through the plies of work 120 and 121 and through each portion 101 and 102 of the flattened seam and also through the marginal edges of the reinforcing tape 31 (see Fig. 12).

As the work feeds out from the final stitching operation, the seam is thus completed with three stitch lines, as shown, 116 and 145b, and forms a taped seam adapted for use with shoes and other articles of wearing apparel, as well as for sporting goods articles made from leather, canvas and other materials requiring a strong, flat seam.

The operation of the machine is as follows: Upon operating the foot treadle 11 the clutch 6 is thrown into operation and thereupon the motor 5 drives the belt wheel 16 of the first sewing mechanism by the drive belt 15. Simultaneously therewith the rear sewing mechanism 26 is started by the chain 23 connecting the two sewing mechanisms, and at the same time the puller feed mechanism is started by the rod 46 connected with the operating means of the first sewing mechanism The operator thereupon places the two plies of work (in this instance, a pair of shoe quarters or uppers) in position on the cloth-plate 83, one ply on top of the other, with the pro-

jection 88 of the ply separating means 84 and the forward or separating end 79 of the ply turn-over member 74 between the plies (Fig. 13). The two superposed plies are then fed through the first stitching mechanism of the machine, making the stitch line 116 (Fig. 6). As the marginal edges of the seam which extend to the right of this stitch line project into the path of the seam flattening member 94 (Fig. 16, for instance), one edge is diverted upward and the other downward and somewhat flattened. Space is required for the free movement of the diverted edges, and to accommodate the downward bend edge 102 of the work I provide a clearance cut 102*a* (Fig. 17) in the cloth-plate 83 in the rear of the stitching mechanism. As the first sewed article emerges from the sewing mechanism 17, the top ply of the work 120 feeds up the inclined edge 76 of the turn-over member 74 until the work has passed from between the feed and presser foot of the sewing mechanism 17. Then another article is started in the same manner as the first one just described. After the first article has passed the sewing mechanism 17 and while the second article is being stitched, it is necessary to assist the feeding of the first article until the feed rolls of the puller feed mechanism can act upon it to feed it through to the second sewing mechanism 26, unless the length of the first article be sufficient to reach from the feeding mechanism of the first sewing mechanism to the feed rolls of the puller feed mechanism. From then on, however, the feeding of the work continues automatically, it being merely necessary for the operator to place the two plies of work into position on the cloth-plate 83 in the manner just described to be sewed by the first stitching mechanism. The puller feed mechanism forces the stitched article along until it is gripped by the feeding mechanism of the second sewing mechanism 26 for the final stitching operation thereon. In Figs. 4 and 21 it will be seen that there are three articles representing portions of shoes, such as shoe quarters, illustrated by the broken dotted lines as the top plies 120—one in position to receive the final stitching of the tape to the seam, the next in the process of having the seams pressed down between the rollers of the puller feed mechanism, and the next just passing beyond the stitching position of the sewing mechanism 17.

To facilitate the feeding of the separate articles from one mechanism to the other, the connected chain of stitches 119 is utilized (Fig. 21), this chain of stitches running from one article to another as the stitching proceeds, there being sufficient strength to the chain of stitches joining the articles to enable the sewing mechanism 26 to do the entire feeding of the work; but, to insure a more positive feeding of the work and also to flatten the seam, the feed rolls of the puller feed mechanism also assist in such feeding, and to facilitate the starting of the work at the beginning of the stitching operation the feeding mechanism of the sewing mechanism 17 is employed.

From the foregoing it will be understood that when the sewing mechanism 17 is placed in operation, the puller feed mechanism and also the sewing mechanism 26 are likewise operated in the manner hereinbefore explained, the movements of which are timed in relation to one another through the connections hereinbefore described, so that the needles and feeding movements are timed in relation one to another to effect the proper working of the several mechanisms of the machine.

While I have shown three mechanisms in the group forming this improved machine, two of which have stitching mechanisms, it is to be understood that the invention is not thus limited, for it is obvious that other stitching mechanisms can be operated in a similar manner to effect a series of different operations by the one handling or passing of the work through the group.

It is also to be understood that while the drawings and description show rotary and four-motion feeding mechanisms grouped in a particular manner to suit the operation on the work described, with the puller feed mechanism in between the two sewing mechanisms so as to permit this puller feed mechanism to act as a puller and a pusher in the feeding of the work, yet for some kinds of work it may be desirable to have the puller feed mechanism in the rear of the sewing mechanism 26 so as to pull the work through both sewing mechanisms.

In the present improved machine the arrangement of the feeding mechanisms and the operation thereof provide independent adjustments for the stroke of each feeding device, which permits the use of a slightly longer stroke on any of the feeds as may be desired, according to the character of the work the machine is operating on. By adjusting the crank pins 150 (see Fig. 5) of the two sewing mechanisms, the feed stroke may be regulated. By adjusting the crank 48 (see Figs. 1 and 2), the stroke of the puller feed is regulated. Moreover, since each of the three mechanisms has an independent pressure by the medium of presser foot or presser roller acting on top of the work, different degrees of pressure can be had, not only for pressing the seams but also to effect a change or regulation as a means of control for the feeding.

The cross-sectional view of the work in Fig. 12 shows two lines of stitching 145*b* made by the needles 145 of the sewing mechanism 26. The illustration is exaggerated to more clearly illustrate the seam structure by reason of the slight space shown between the marginal edges 101 and 102 and the plies

120 and 121, whereas in practice these parts are so flattened out and drawn together by the stitches that there is no space whatever between the two. Thus it will be seen that the row of stitches 116 extends transversely to the parallel rows of stitches 145*b*; that is to say, the first stitch line at first is at right angles to the plane of the work (Fig. 16), but in the completed article (Fig. 12) it is parallel to the plane of the work, while the two parallel lines of stitches are always at right angles to the plane of the work (Fig. 12) and, therefore, transverse to the row of stitches 116.

Fig. 21 illustrates three articles representing shoe quarters, the first having the seam A partly flattened out and illustrates the seam as it emerges from the first sewing mechanism 17, while the seam B illustrates the work as it is passing through the puller mechanism where the seam is completely flattened, while the part C shows the completed seam with the tape 31 stitched in place by the two lines of stitches 145*b*.

Since the work produced by the machine shown and described may be frequently in the form of separate articles stitched together, such articles being small portions of shoes or other similar articles, they are delivered from the machine connected by means of the tape 31 as well as a chain of stitches 119. It is, therefore, necessary that these parts be separated. This operation, in some instances, can best be accomplished by an attendant who inspects the work as the pieces are cut apart, while in other instances it may be desirable to employ a mechanically-operated shears or severing device located just behind the presser foot of the sewing mechanism 26, so that as each article feeds through the knife or shear will separate one from the other.

A brace bar preferably connects the overhanging arms of the sewing mechanism 17 and puller feed mechanism.

It is to be understood that by describing in detail herein any particular form, structure or arrangement, it is not intended to limit the invention beyond the terms of the several claims or the requirements of the prior art.

Having thus explained the nature of my said invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I claim:

1. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches and positioning the seam margins at an angle to the work, means for overturning one ply of material, means for holding the seam margins spread in opposite directions and in parallelism with the plies of material, and means for stitching the seam margins with parallel rows of stitches.

2. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for spreading the seam margins in opposite directions and flattening the same, means for then overturning one ply of material into a reversed position to bring the inner face outside, and means for stitching the flattened seam with parallel rows of stitches.

3. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for then overturning one ply of material into a reversed position to bring the inner face outside, means for holding the seam margins separated, and means for stitching the seam margins with parallel rows of stitches.

4. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for spreading the seam margins in opposite directions and flattening the same, means for then overturning one ply of material into a reversed position, means for guiding the seam, means for further flattening the seam, and means for stitching the flattened seam with parallel rows of stitches.

5. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches and positioning the seam margins at an angle to the work, means for overturning one ply of material and positioning the seam margins parallel with the work, means for flattening the seam, and means for stitching the seam margins with parallel rows of stitches.

6. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material, means for spreading the seam margins substantially at right angles to the work and flattening the same, means for feeding the work, means for overturning one ply of the work whereby the seam margins will be substantially at right angles to their original angled position, means for pulling the work from the stitching mechanism and feeding it and simultaneously flattening the seam, and means for stitching the so flattened seam margins.

7. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for overturning one ply of material into a reversed position to bring the inner side uppermost, means for holding the seam margins spread in opposite directions and in parallelism with the plies of material, means for feeding a tape to the spread seam margins, and means for stitching the tape to the

seam margins and plies with parallel rows of stitches.

8. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for spreading the seam margins in opposite directions and flattening the same, means for then overturning one ply of material into reversed position, means for feeding a tape to the flattened seam margins, and means for stitching the tape to the seam margins and plies with parallel rows of stitches.

9. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for spreading the seam margins in opposite directions and flattening the same, means for then overturning one ply of material into reversed position, means for guiding the seam, means for further flattening the seam, means for applying a tape to the flattened seam margins, and means for stitching the tape to the seam margins and plies with parallel rows of stitches.

10. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material, means for spreading the seam margins substantially at right angles to the work and flattening the same, means for feeding the work, means for overturning one ply of the work whereby the seam margins will be substantially at right angles to their original angled position, means for pulling the work from the stitching mechanism and feeding it and simultaneously flattening the seam, and means for feeding a tape to the flattened seam and stitching the same with parallel rows of stitches.

11. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material supported in a horizontal plane, means for spreading the seam margins substantially at right angles to the work and flattening the same, means for feeding the work, means for then overturning one ply of the work in a reversed position and opposite to its companion ply, both then supported in a horizontal plane whereby the seam margins will be substantially at right angles to their original angled position, means for pulling the work from the stitching mechanism and feeding it and simultaneously flattening the seam, and means for feeding a tape to the flattened seam and stitching the same with parallel rows of stitches, the first series of stitches acting to assist in the feeding of the work from the first stitching mechanism to the pulling mechanism.

12. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a single row of stitches, means for opening the seam margins and spreading and flattening the same, means for feeding the work, means for overturning one ply of the work, means for guiding the seam with the seam margins in their substantially spread position and preventing the return thereof to their initial position, means for pulling the work and further flattening the seam, and means for stitching the so flattened seam margins with parallel rows of stitches.

13. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a single row of stitches, means for opening the seam margins and spreading and flattening the same, means for feeding the work, means for overturning one ply of the work, means for guiding the seam with the seam margins in their substantially spread position and preventing the return thereof to their initial position, means for pulling the work and further flattening the seam, means for guiding the flattened seam from the pulling means, and means for stitching the so flattened seam margins with parallel rows of stitches.

14. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a single row of stitches, means for opening the seam margins and spreading and flattening the same, means for feeding the work, means for overturning one ply of the work, means for guiding the seam with the seam margins in their substantially spread position and preventing the return thereof to their initial position, means for pulling the work and further flattening the seam, means for feeding a tape to the flattened seam, and means for stitching the tape to the flattened seam with parallel rows of stitches.

15. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a single row of stitches, means for opening the seam margins and spreading and flattening the same, means for feeding the work, means for overturning one ply of the work, means for guiding the seam with the seam margins in their substantially spread position and preventing the return thereof to their initial position, means for pulling the work and further flattening the seam, means for guiding the flattened seam from the pulling means, means for feeding a tape to the flattened seam, and means for stitching the tape to the flattened seam with parallel rows of stitches.

16. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a single row of stitches, means for guiding the work during such stitching thereof, means for spreading the seam margins in opposite directions and flattening the same during such stitching thereof, means for overturning one ply of the work subsequent to the stitching thereof, means for guiding the stitched seam and preventing the return of the spread margins to their initial position, means for pulling

the work from the stitching mechanism and further flattening the seam, means for guiding the seam from the pulling means, means for feeding a tape to the flattened seam, and means for stitching the tape to the flattened seam with parallel rows of stitches.

17. In a machine for sewing multiple seams, the combination of a plurality of stitching mechanisms and feeding mechanisms and a pulling mechanism so located with relation to the stitching mechanisms as to carry the work from one stitching mechanism to the other, means under the control of the operator for operating all of said mechanisms simultaneously, means carried by one of said stitching mechanisms for stitching superposed plies of material with a row of stitches, means for spreading the seam margins in opposite directions, flattening the same, guiding and holding the same to prevent the return thereof to their initial position, means for feeding a stay strip to the flattened seam, and means carried by another of said stitching mechanisms for stitching the stay strip to the seam with parallel rows of stitches.

18. In a machine for sewing multiple seams, the combination of a plurality of stitching mechanisms and a pulling mechanism located between the stitching mechanisms to carry the work from one stitching mechanism to the other, means under the control of the operator for operating all of said mechanisms simultaneusly, means carried by one of said stitching mechanisms for stitching superposed plies of material with a row of stitches, means for spreading the seam margins in opposite directions, flattening the same, guiding and holding the same to prevent the return thereof to their initial position, means for feeding a stay strip to the flattened seam, and means carried by another of said stitching mechanisms for stitching the stay strip to the seam with parallel rows of stitches, said pulling mechanism being operative to further flatten the seam prior to the application of the stay strip thereto and also effective to pull and feed several connected articles through the machine.

19. In a machine of the class described comprising a plurality of sewing mechanisms and a puller feed mechanism located in tandem relation, means for operating all of said mechanisms one from another, means for controlling the operation of said mechanisms, co-operating means for controlling the work from one of said mechanisms to the others thereof, said mechanisms being effective to stitch a plurality of plies together, spread and flatten the seam margins in opposite directions, overturn one of said plies, guide and hold the seam in position for the final stitching operation and stitch the flattened seam by parallel rows of stitches, and means for applying a stay strip to the flattened seam prior to the stitching thereof by the parallel rows of stitches.

20. In a machine for sewing multiple seams, the combination of means for feeding superposed plies of material in a flat condition and stitching the same with a line of stitches, means for shifting the marginal edges of the seam into a substantially vertical position at right angles to the body of the work, means for shifting the seam margins into a substantially horizontal position in line with the body of the work but spaced therefrom, means for pressing the seam margins and the work together to eliminate space between the seam margins and the work, and means for stitching the seam margins to the work.

21. In a machine for sewing multiple seams, the combination of means for feeding superposed plies of material in a flat condition and stitching the same with a line of stitches, means for shifting the marginal edges of the seam into a substantially vertical position at right angles to the body of the work, means for shifting the seam margins into a substantially horizontal position in line with the body of the work but spaced therefrom, means for pressing the seam margins and the work together to eliminate space between the seam margins and the work, and means for feeding a covering tape to the seam margins and stitching the same to the work.

22. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for overturning one ply of material and throwing it into a reversed position with the inside thereof outside and in a direction opposite to its companion ply, and means for stitching the seam margins with parallel rows of stitches.

23. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a line of stitches, means for overturning one ply of material to throw it into a reversed position with the inside thereof outside and in a direction opposite to its companion ply, means for feeding a tape to the seam margins, and means for stitching the tape to the seam margins and plies with parallel rows of stitches.

24. In a machine for sewing multiple seams, the combination of means for feeding superposed plies of material in a horizontal direction, means for stitching the horizontally-located plies of material with a line of stitches, means for overturning one ply of material to throw it into a reversed position with the inside thereof outside and in a direction opposite to its companion ply of material, and means for stitching the seam margins with parallel rows of stitches.

25. In a machine for sewing multiple

seams, the combination of means for feeding superposed plies of material in a horizontal direction, means for stitching the horizontally-located plies of material with a line of stitches, means for overturning one ply of material to throw it into a reversed position with the inside thereof outside and in a direction opposite to its companion ply of material, means for feeding a tape to the seam margins, and means for stitching the tape to the seam margins and plies with parallel rows of stitches.

26. In a machine for sewing multiple seams, the combination of means for feeding superposed plies of material in a horizontal direction, means for stitching the horizontally-located plies of material with a line of stitches, means for positioning the seam margins at an angle to the work, means for overturning one ply of material to throw it in a direction opposite to its companion ply and positioning the seam margins parallel with the work and at right angles to their original angled position, and means for stitching the seam margins with parallel rows of stitches.

27. In a machine for sewing multiple seams, the combination of means for feeding superposed plies of material in a horizontal direction, means for stitching the horizontally-located plies of material with a line of stitches, means for positioning the seam margins at an angle to the work, means for overturning one ply of material to throw it in a direction opposite to its companion ply and positioning the seam margins parallel with the work and at right angles to their original angled position, means for feeding a tape to the seam margins, and means for stitching the tape to the seam margins and plies with parallel rows of stitches.

28. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same.

29. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same and comprising a member having an inclined vertically located edge.

30. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same and comprising a member having an inclined vertically located curved edge.

31. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same and terminating in a pointed end for separating the plies.

32. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same, said member having a right angle bent lower edge forming a guide.

33. In a machine for sewing multiple seams, the combination of a pair of sewing mechanisms located one behind the other and means therebetween for overturning a ply of material thereby to reverse it and throw it in a direction opposite to its companion ply and comprising means for separating the unstitched portion of the plies and means for gradually raising the ply and overturning the same and comprising a member having a curved vertical edge terminating in a pointed portion for separating the plies and having a right angle bent lower edge of increased width toward the rear of said member.

34. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a row of stitches, means for overturning a ply of material and throwing it in a direction opposite to its companion ply, with the inside outside, means for subsequently stitching the seam, and yielding means between said stitching means and yieldable to compensate for different thickness of material.

35. In a machine for sewing multiple seams, the combination of means for stitching superposed plies of material with a row of stitches, means for controlling the material to the first stitching mechanism, means for overturning a ply of material and throwing it in a direction opposite to its companion ply with its inside outside, and means for again stitching the seam.

36. In a machine for sewing multiple seams, the combination of means for stitch-

ing superposed plies of material with a line of stitches, means for overturning one ply of material to throw it into a reverse position with the inside thereof outside, and in a direction opposite to its companion ply, and means for feeding and applying a tape to the seam margins to cover the same.

Signed at Nyack, New York, this 9th day of November, 1928.

JOHN P. WEIS.