Jan. 18, 1944. R. J. SAILER 2,339,653

STRING-INSERTING MECHANISM FOR SEWING MACHINES

Filed Oct. 8, 1942 3 Sheets-Sheet 1

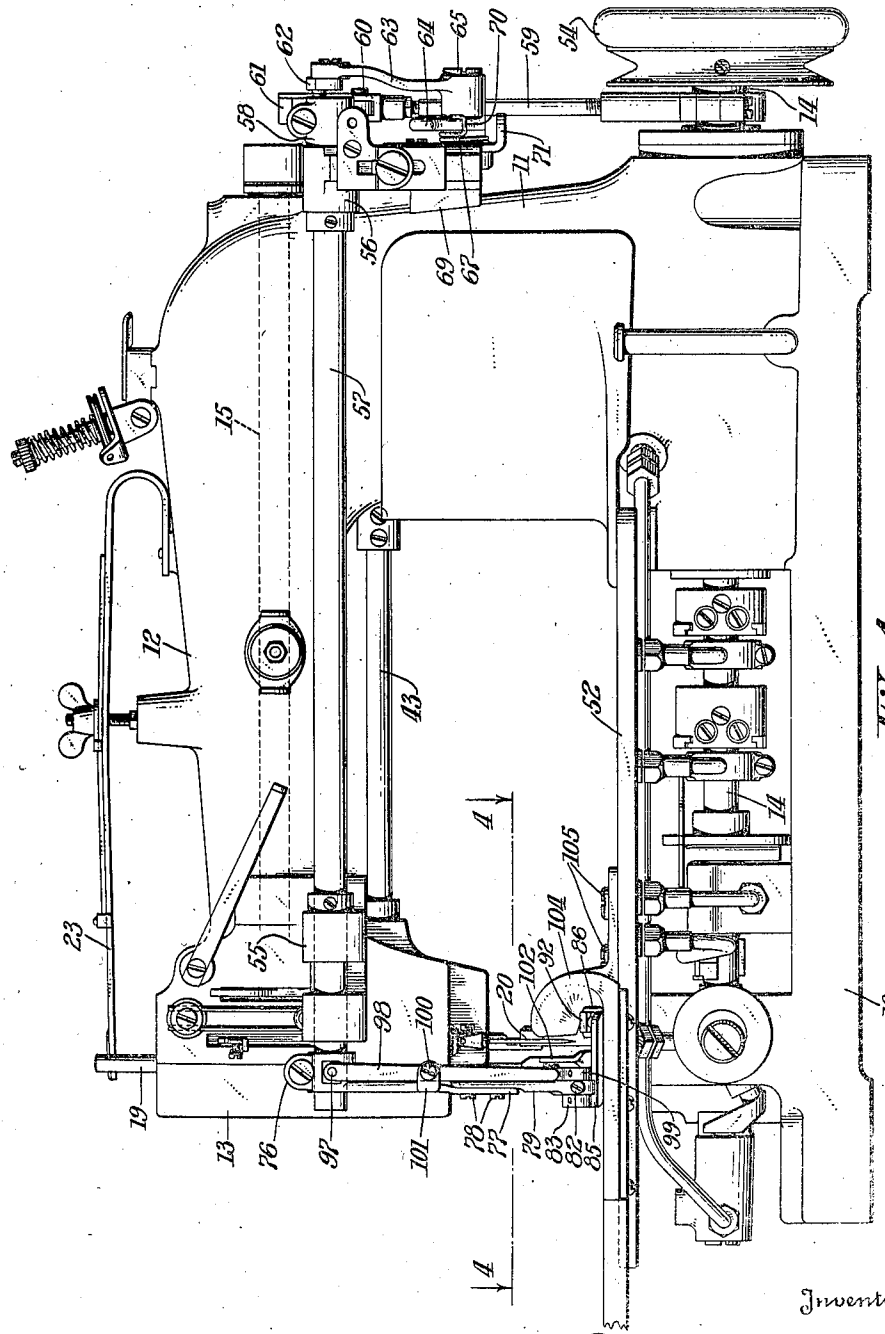


Fig. 1.

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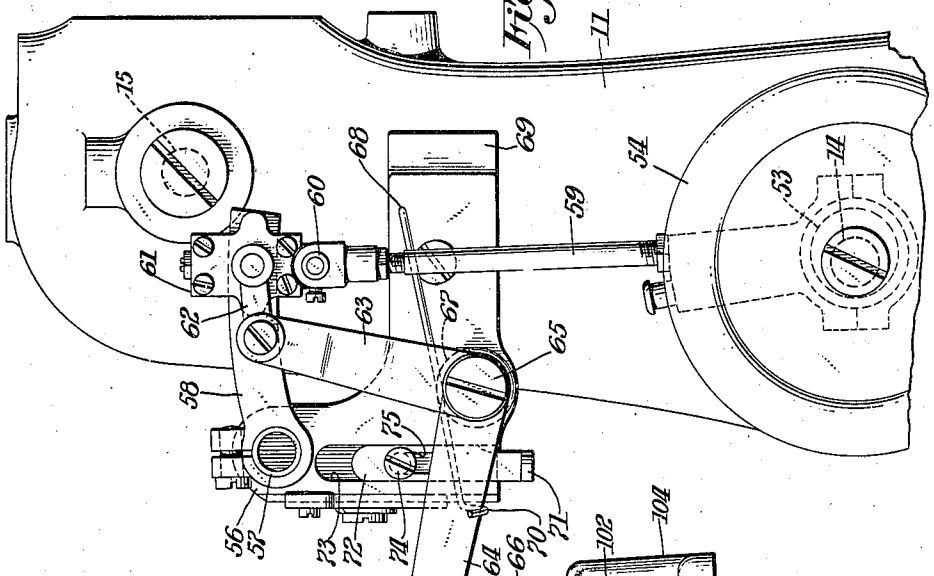
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Filed Oct. 8, 1942 3 Sheets-Sheet 2

Fig. 3.



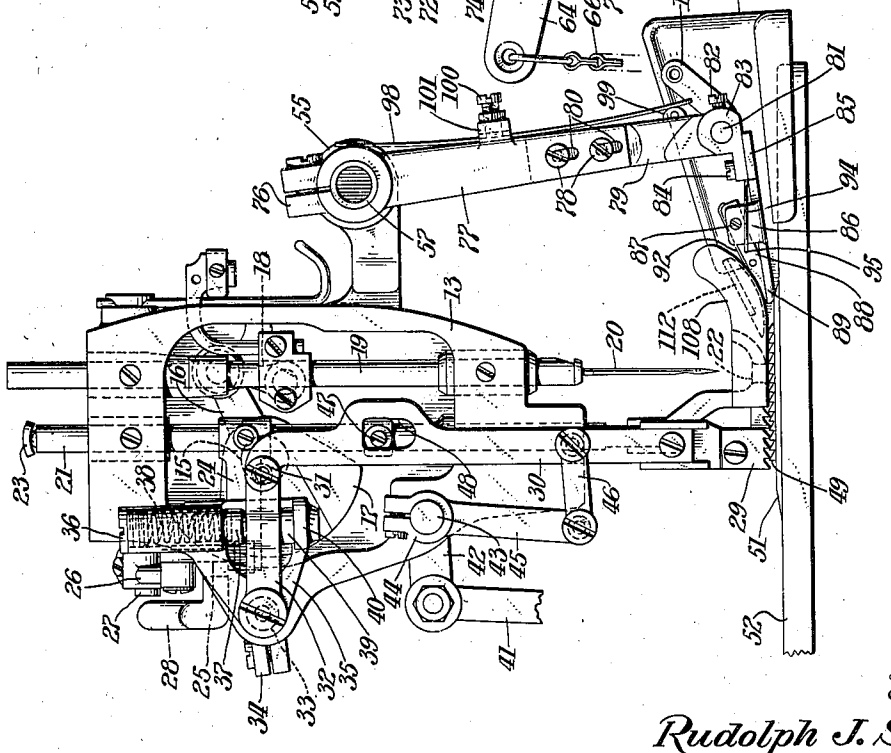


Fig. 2.

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Filed Oct. 8, 1942 3 Sheets-Sheet 3

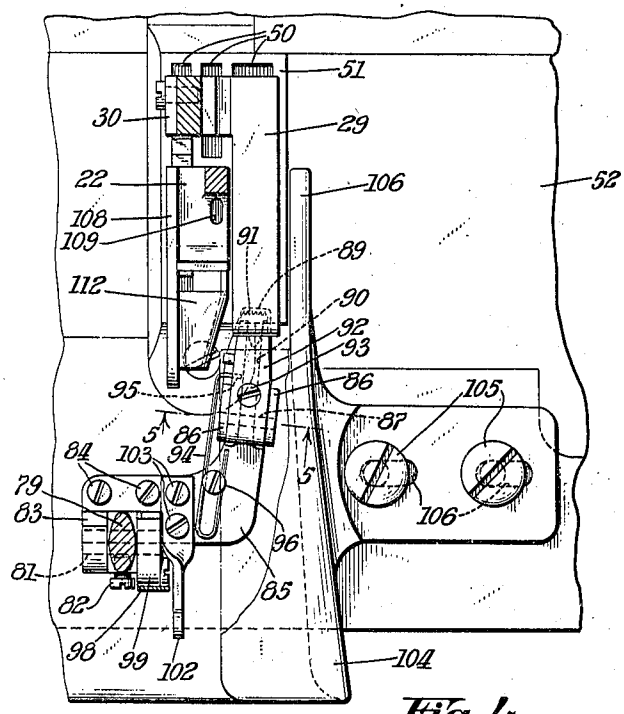


Fig. 4.

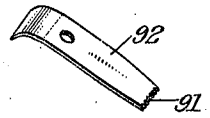


Fig. 7.

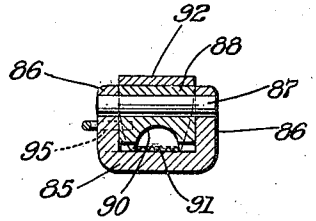


Fig. 5.

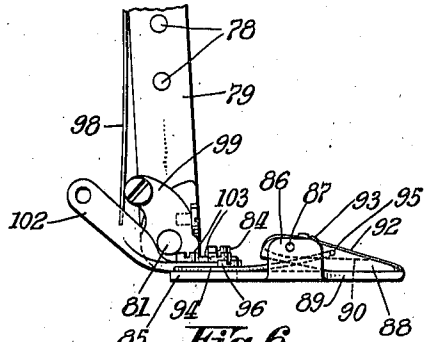


Fig. 6.

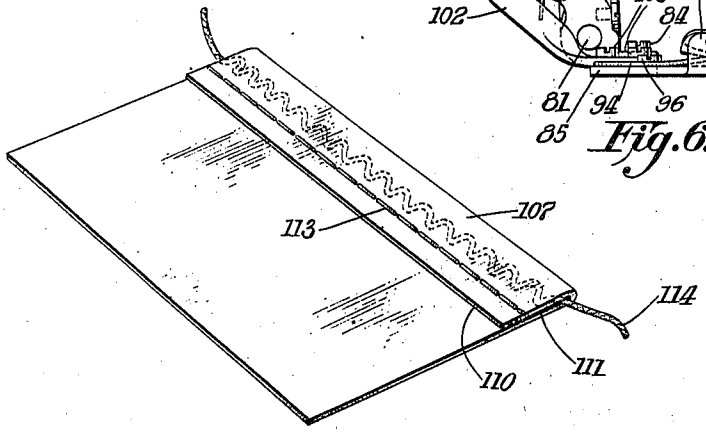


Fig. 8.

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UNITED STATES PATENT OFFICE

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STRING-INSERTING MECHANISM FOR SEWING MACHINES

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Application October 8, 1942, Serial No. 461,301

11 Claims. (Cl. 112—2)

This invention relates to sewing machines and more particularly to a sewing machine which is adapted to lay a string within a folded portion of a body material.

The invention has for its principal object to provide a sewing machine with means to lay an excess length of draw-string within a hem-pocket in a hem folding and stitching operation. This provides a surplus length of draw-string within the hem-pocket, so that such hem-pockets may be formed in a continuous strip of material which is subsequently severed transversely and the surplus draw-string pulled from the hem-pockets to complete the articles. The invention is useful in the production of bags equipped with draw-strings.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the accompanying drawings

Fig. 1 is a front side elevation of a sewing machine incorporating the present invention.

Fig. 2 is a front end elevation of the sewing machine with the face-plate removed.

Fig. 3 is a rear end elevation of the present sewing machine.

Fig. 4 is a top plan view of the stitching area taken substantially along line 4—4 of Fig. 1.

Fig. 5 is a transverse sectional view of the draw-string clamp taken substantially along line 5—5 of Fig. 4.

Fig. 6 is a left side view of the string-clamp.

Fig. 7 is a perspective view of the string-clamp nose-piece.

Fig. 8 is a perspective view of a completed work-piece.

In the embodiment of the invention illustrated 10 represents the bed of a sewing machine frame having a standard 11, and an overhanging bracket-arm 12 terminating in a head 13.

Journaled in the bed 10 is the main shaft 14 which is connected by means not shown herein to an upper rock-shaft 15 journaled in the bracket-arm 12.

The rock-shaft 15 has secured rigidly thereto a crank-arm 16 and counter-balance head 17; the crank-arm 16 being connected by a link 18 to the needle-bar 19 carrying the needle 20.

Slidable vertically in the head 13 is the presser-bar 21 to the lower end of which is fixed the presser-foot 22 the smooth under face of which bears upon the work at all times during a sewing operation being held yieldingly thereupon by the usual presser-spring 23 of the leaf type which bears at its free end upon the upper end of presser-bar 21 and reacts against the machine frame. The presser-bar 21 has rigidly fixed thereto a lateral arm 24 which has connected thereto the lower end of a link 25 which is pivotally connected at its upper end to the forward end of an arm 26 fast on the usual thread-controller rock-shaft 27 journaled in the head 13. The forward end 28 of the usual manually-operated presser-lifting lever underlaps the forward end of the arm 26 and is adapted to engage and lift the latter and the presser-bar 21 connected therewith, for removal and insertion of work.

A top feed-foot 29 is mounted on the lower end of the vertical feed-bar 30 which is pivotally hung at 31 upon the forward end of the lever 32 fulcrumed at its rearward end upon a rock-shaft 33 journaled within the head 13. The rock-shaft 33 has adjustably clamped thereon a split-hub 34 of a crank-arm, not shown herein, which is oscillated about and with the rock-shaft 33 by means of rock-shaft 15. For a more detailed description of this upper feeding mechanism reference may be had to U. S. Patent No. 2,119,316, dated May 31, 1938, to A. B. Clayton.

The rock-shaft 33 has formed integral therewith a plate-like head 35 which has formed thereon a cylindrical housing 36 for a spring-pressed plunger 37 backed by a coil spring 38, the plunger bearing upon the lever 32 and normally holding the leather button 39 on the underside thereof in contact with the unyielding ledge 40 at the lower edge of the head 35. Through the described mechanism the rock-shaft 33 is oscillated about its axis carrying the head 35 along with it thereby to impart up-and-down movements to the feed-bar 30; the down movements being imparted to the feed-bar through the coil-spring 38 which is made stiff enough for the purpose and which may yield to prevent the application of crushing pressure to the work or damage to the mechanism. This mechanism constitutes power-driven means which reacts against the machine frame independently of the presser-foot spring 23 and includes a lost-motion spring-and-shoulder connection 37, 40 which is yielding in one direction to lower the feed-bar 30 and is positive in the opposite direction to raise the feed-bar 30.

The feed-bar 30 receives its feed-and-return movements from means connected to the main-shaft 14. Such means are clearly disclosed in the above noted Clayton patent. These means are operatively connected to the lower end of the link 41 and oscillate the latter up and down. The upper end of the link 41 is pivotally connected to a crank-arm 42 fast on a rock-shaft 43. The rock-shaft 43 has clamped thereon the split-hub 44 of a depending crank-arm 45 which is connected by a link 46 to the top feed-bar 30.

The presser-bar 21 carries a lateral stud 47 which is received in the clearance slot 48 in the feed-bar 30. When the presser-bar 21 is lifted for removal of work, the stud 47 engages the upper end of the slot 48 and lifts the feed-bar 30 and the foot 29; the spring 38 yielding to this lifting movement.

The top feeding-foot 29 preferably works in opposition to the conventional four-motion feed-dog 49; the two elements 29 and 49 clamping the work between them during the feeding stroke and releasing it for the return stroke. The lower feed-dog 49 works through slots 50 provided in the usual throat-plate 51 which is mounted within an opening provided in the cloth-plate 52 and may be considered as a part thereof. A more complete disclosure of the hereinabove noted feeding mechanism may be found in the above mentioned Clayton patent.

The rear end portion of the main shaft 14 carries an actuating eccentric 53 and the usual balance-wheel 54. Journaled horizontally in bearings 55 and 56 at the front side of the bracket-arm 12 is a rock-shaft 57. This rock-shaft 57 has fixed to its rearward portion a curved crank-arm 58 which, in its uppermost position, is concentric with the axis of the main-shaft 14. The crank-arm 58 is actuated by the vertical pitman 59 which at its lower end embraces the actuating eccentric 53. The pitman 59 is pivotally connected at its upper end at 60 to a guide-head 61 preferably constructed substantially in accordance with the disclosure of the Clayton Patent No. 1,815,881, dated July 21, 1931. The guide-head 61 is slotted to receive and slide upon the curved arm 58 toward and away from the rock-shaft 57. It will be evident that the closer the guide-head 61 is moved to the rock-shaft 57 the greater will be the amplitude of the oscillations imparted to the rock-shaft 57. The guide-head 61 is connected by means of a link 62 to an arm 63 of a manually operated bell-crank lever 63, 64, fulcrumed at 65 on the standard 11. A suitable pull-chain 66 extends from the bell-crank lever-arm 64 to a suitable pedal or knee-shift, not shown. The bell-crank lever 63, 64 is biased in a clockwise direction, Fig. 3, or in opposition to the pull of the chain 66, by the spring 67 which is coiled about the fulcrum-screw 65 and is anchored at one end 68 in the bearing bracket 69 of the bearing 56 and at its other end 70 is hooked under the arm 64. The downward motion of the arm 64 to increase the amplitude of the rock-shaft movements is limited by the stop 71 which is in the form of an L-shaped member, the shank 72 of which is received in a vertical guideway 73 in the bearing bracket 69. A screw 74 passing through a slot 75 in the shank 72 is threaded into the bearing bracket 69 to hold the stop 71 in any desired position of vertical adjustment to predetermine the maximum desired rock-shaft amplitude.

Mounted upon the forward end portion of the rock-shaft 57 by means of a split collar 76 is a depending vibratory arm 77 to the lower portion of which is secured by means of screws 78 an adjustable stub-arm 79. Slots 80 provided in the arm 77 permit the stub-arm 79 to be shifted longitudinally of the former.

Mounted transversely of the stub-arm 79 is a pin 81 held rigidly within the stub-arm by a set screw 82. Pivotally carried upon the pin 81 is a divided collar 83 to which is secured by screws 84 an L-shaped platform member 85 having a pair of upturned ears 86 formed thereon. Secured within and crosswise of the ears 86 is a pin 87 upon which a jaw 88 is pivotally mounted. This jaw 88 and the forward or jaw portion 89 of the platform member 85 form a unitary string-clamp or auxiliary work-feeding member. A grooved string passageway 90 is provided longitudinally of and within the bottom of the jaw 88. Teeth 91 are provided on the forward portion of a spring metal nose-piece 92 which is secured upon the top of the jaw 88 by means of a screw 93. The purpose of this toothed nose-piece 92 is to permit a piece of string to be pulled through the string clamp in a forward direction and to prevent the string from having any retrograde motion; the string being impaled upon the teeth 91 whenever it is moved in a backward direction. Figs. 6 and 7 show that the teeth 91 are positioned upon the resilient nose-piece 91 so that they will dig into the string only when the latter moves in a retrograde direction. The jaw 88 is forced against the platform member 85 by means of a spring 94 of which one end 95 is received within the jaw 88 and the other end is anchored upon the platform member 85 by means of a screw 96.

Projecting from the split collar 76 is a pin 97, Fig. 1, upon which is hung a flat spring 98 having its lower portion in engagement with a projecting lug 99 formed upon one side of the divided collar 83. A set screw 100 mounted within a boss 101 formed upon the arm 77 bears against the spring 98 and by adjusting the screw the tension of the spring may be varied. As may be best seen in Fig. 6 the spring 98 is operative to force the divided collar in a clockwise direction about the pin 81 thereby forcing the string-clamp toward the cloth-plate 52. A lever 102 is secured by means of screws 103 to the platform member 85 for the purpose of providing a means whereby the operator may elevate the string-clamp against the action of the spring 98.

As hereinabove noted the pitman 59 oscillates the shaft 57 about its longitudinal axis. The depending arm 77 and consequently the string-clamp are therefore oscillated back and forth relative to the presser-foot 22. Due to the fact that the curved crank-arm 58 is concentric with the axis of the main-shaft 14 whenever the crank-arm is in its raised or uppermost position, the string-clamp will always be brought forward toward the feed-foot 29 to the same point no matter what the adjusted amplitude of vibration may be. Adjustment of the bell-crank lever 63, 64 will, of course, vary the stroke of the string-clamp.

Adjustably secured to the cloth-plate 52 is an edge folder 104. Screws 105 and slots 106 permit the folder 104 to be adjusted longitudinally of the cloth-plate 52. As may be best seen in Figs. 1 and 4, the string-clamp is positioned so that it will reciprocate within the folder which is adapted to form a single marginal fold in a primary work-piece to provide a hem-pocket, within which hem-pocket a draw-string or secondary

work-piece is loosely disposed by means of the string-clamp. The egress end of the folder is provided with a finger 106 the function of which is to guide the outer edge of the folded material as the latter is being fed along by the feeding dogs 29 and 49, respectively.

In the present outfit, the top feed-foot 29 is disposed so as to engage the fold-edge 107 of the bag or primary work-piece, and the presser-foot 22, which is provided with an edge-guide 108 and a needle-aperture 109 is disposed alongside the top feed-foot 29 so as to engage the raw edge portion 110 of the material. The edge-guide 108 of the presser-foot 22 engages the edge 110 of the material to insure that the hem-pocket 111 will be properly formed. Projecting sidewise from the edge-guide 108 and spaced from the presser-foot proper is a wing portion 112 which is adapted to extend under the raw edge portion 110 of the bag material and elevate the same so that the string-clamp may reciprocate beneath that portion of the material. The edge 110 of the bag material is led over the wing 112 and then it is delivered beneath the presser-foot proper. The machine, therefore, places a line of stitching 113 through the main and folded edge-portions of material to produce a hem-pocket 111 of sufficient width to enclose the draw-string or secondary work-piece 114.

In order to place an excess of the draw-string 114 within the hem-pocket 111 the above described pitman 59, through the medium of the arm 58 and the rock-shaft 57, swings the draw-string clamp back and forth relative to and in synchronism with the top and bottom feeding mechanisms. The eccentric 53 is so timed that the string-clamp and the feed-foot 29 swing towards and away from each other. The string-clamp is adapted to swing lengthwise of and within the edge-folder 104 and also within the partially folded marginal portion of the bag-material, so that the clamp may deliver its string beneath the top feed-foot 29 which is lifted off the work whenever the clamp is in its forward position. As the clamp begins to swing away from the stitching area the top feed-foot 29 descends and the lower feed-dog 49 rises early enough to clamp an excess length of the draw-string within the hem-pocket, and as the draw-string clamp continues to back away, a supply of draw-string is drawn through the clamp by the combined action of the backwardly moving clamp and the forwardly moving feeding mechanisms. It is to be understood that as the clamp is swung forward it carries with it a supply of draw-string which it, in effect, stuffs within the hem-pocket between the raised top feed-foot 29 and the lowered feed-dog 49. An excess of draw-string within the hem-pocket is thereby insured. To vary the amount of draw-string placed within the hem-pocket the operator need only adjust the stroke of the arm 77 by shifting the arm 64. It will be clear from Fig. 3 that as the guide-head 61 is moved toward the rock-shaft 57 the stroke of the arm 77 will increase thus swinging the string-clamp, on its back stroke, further from the feed-foot 29 thereby to draw a greater length of string through the jaws 88 and 89. Therefore, when the jaws swing forward they will deliver a greater length of string beneath the foot 29 than was possible before the adjustment of arm 64 was made.

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

1. In a sewing machine, the combination of a work-feeding mechanism having work-advancing and feed-return strokes during its cycle of operation, a string-clamp disposed in front of said work-feeding member and adapted to receive string from a supply source, said string-clamp comprising a unit having a string passageway therein and means to permit the string to pass through said passageway in only one direction, and means for actuating said string-clamp unit in a direction opposite to the direction of feed of the work during the work-advancing stroke of the work-feeding mechanism thereby to pull a quantity of string through said passageway, said last mentioned means being operable to actuate said string-clamp unit in the direction of the feed of the work during the feed-return stroke of the work-feeding mechanism thereby to present the quantity of pulled string to said work-feeding mechanism.

2. In a sewing machine, the combination of a lower feed-dog having work-advancing and feed-return strokes during its cycle of operation, an upper work-engaging member, means to yieldingly urge said work-engaging member against the work during the work-advancing stroke of said feed-dog, means to raise said work-engaging member above the work during the feed-return stroke of the feed-dog, a string-clamp comprising a unit having a string passageway therein, said string-clamp unit being disposed in front of said work-engaging member, and means to reciprocate said string-clamp unit in opposition to the work-advance and feed-return strokes of the feed-dog.

3. In a sewing machine, the combination of a work-support, a four-motion feed-dog operable below the level of said work-support, a four-motion feed-dog operable above the level of said work-support and timed to cooperate with said first mentioned feed-dog in the feeding of a work-piece, a string-clamp comprising a unit having a string passageway therein, said string-clamp unit being mounted in front of said feed-dogs, and means to reciprocate said string-clamp unit in opposition to the feed-advance and feed-return movements of said feed-dogs.

4. In a sewing machine, the combination of a work-support, a work-engaging member yieldingly urged against said work-support, a work-folder mounted upon said work-support and in front of said work-engaging member, a string-clamp disposed within said work-folder, said string-clamp comprising a unit having a string passageway therein and means to permit the string to pass through said passageway in only one direction, and means to reciprocate said string-clamp unit back and forth within said work-folder and relative to said work-engaging member for the purpose of placing a quantity of string beneath said work-engaging member.

5. In a sewing machine having a frame including a work-support and a bracket-arm, the combination of a work-feeding mechanism having work-advancing and feed-return strokes, a work-folder mounted upon said work-support and in front of said work-feeding mechanism, a string-clamp disposed within said work-folder, said string-clamp comprising a unit having a string passageway therein and means to prevent retrograde movement of the string within said passageway, and means carried by and depending from said bracket-arm for reciprocating said string-clamp unit in opposition to the work-advance and feed-return strokes of said work-feeding mechanism.

6. In a sewing machine having a frame including a work-support and bracket-arm, the combination of a lower feed-dog having work-advancing and feed-return strokes, an upper work-engaging member, means to yieldingly urge said work-engaging member against the work during the work-advancing stroke of said feed-dog, means carried within said bracket-arm for raising said work-engaging member above the work-support during the feed-return stroke of the feed-dog, a work-folder secured upon the work-support in front of said work-engaging member, a string-clamp comprising a unit having a string passageway therein, said string-clamp being disposed within said work-folder and being carried by a member depending from said bracket-arm, and means to reciprocate said string-clamp unit within said work-folder in opposition to the work-advance and feed-return strokes of said feed-dog.

7. In a sewing machine having a frame including a work-support and a bracket-arm, the combination of a four-motion feed-dog operable below the level of said work-support, a work-folder carried upon said work-support and adapted to fold the edge portion of a body material to form a hem-pocket and to direct the same toward said feed-dog, a presser-foot carried by said bracket-arm and disposed so as to yieldingly engage the raw edge of the folded body material, a work-engaging member carried by the bracket-arm and disposed so as to yieldingly engage the folded edge portion of the body material, means to periodically raise said work-engaging member above the work, a string-clamp disposed in front of said work-engaging member and comprising a unit having a string passageway therein, and means for reciprocating said string-clamp unit back and forth in the line of feed and within said hem-pocket, said last mentioned means being timed so that said string-clamp unit will move in the direction of feed when said work-engaging member is raised above said work-support.

8. In a sewing machine having a frame including a work-support and a bracket-arm, the combination of a lower four-motion feed-dog, a work-folder carried upon said work-support and adapted to fold the edge portion of a body material to form a hem-pocket and to direct the same toward said lower feed-dog, a presser-foot carried by said bracket-arm and disposed so as to yieldingly engage the raw edge of the folded body material, an upper four-motion feed-dog carried by the bracket-arm and disposed so as to yieldingly engage the folded edge portion of the body material, said upper feed-dog being timed to cooperate with said lower feed-dog in the feeding of the body material, a string-clamp disposed in front of said upper feed-dog, said string-clamp comprising a pair of opposed spring-pressed jaws defining a string passageway therebetween and means to permit the string to pass through said passageway in only one direction, and means for reciprocating said string-clamp including said jaws back and forth in the line of feed and within said hem-pocket, said last mentioned means being timed so that said string-clamp will move in opposition to the feed-advance and feed-return movements of said feed-dogs.

9. In a sewing machine having a frame including a work-support, the combination of means disposed below said work-support for engaging and feeding a primary work-piece, a work-engaging member disposed above said work-support for yieldingly engaging the work-piece and urging the same toward said first mentioned means, means to periodically raise said work-engaging member above the work, an auxiliary work-feeding unit disposed in front of said work-engaging member and being adapted to deliver a length of a secondary work-piece to said first mentioned means in excess to the length of primary work-piece fed thereby, said auxiliary work-feeding unit comprising a pair of opposed members defining a thread passageway therebetween, and means to reciprocate said auxiliary work-feeding unit back and forth in the line of feed, said last mentioned means being operative to move said auxiliary work-feeding unit in the direction of feed whenever said work-engaging member is raised above the work.

10. A sewing machine having a frame including a work-support and a bracket-arm, a reciprocatory needle-bar journaled in said bracket-arm, work-feeding means disposed below said work-support and operative to feed a primary work-piece past said needle-bar, a work-engaging member carried by said bracket-arm and being operative to engage and urge the work toward said feeding means, means to periodically raise said work-engaging means off the work, means to deliver a length of a secondary work-piece beneath said work-engaging member in excess of the length of primary work-piece fed past said needle-bar, said last mentioned means comprising a unit having a work passageway therein, means upon said unit to prevent any retrograde movement of the secondary work-piece within said unit, an arm depending from said bracket-arm, said unit being carried by the lower end of said arm and being disposed in front of said work-engaging means, and means to reciprocate said unit back and forth in the line of feed and to move the same toward said needle when said work-engaging member is raised off the work.

11. In a sewing machine having a work-support and an overhanging bracket-arm, the combination of a lower feed-dog having work-advancing and feed-return strokes during its cycle of operation, an upper work-engaging member, means to yieldingly urge said work-engaging member against the work during the work-advancing stroke of said feed-dog, means to raise said work-engaging member above the work during the feed-return stroke of the feed-dog, an arm depending from said bracket-arm, an auxiliary work-feeding unit secured upon the lower end of said depending arm and disposed in front of said work-engaging member, said auxiliary work-feeding member comprising a pair of opposed spring-pressed jaws defining a work-passageway therebetween, means carried upon said jaws to prevent retrograde movement of work therebetween, and means to reciprocate said auxiliary work-feeding unit in opposition to the work-advance and feed-return strokes of said feed-dog.

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