Jan. 3, 1933. J. KIEWICZ 1,892,895

SEWING MACHINE

Filed Aug. 14, 1930 6 Sheets-Sheet 1

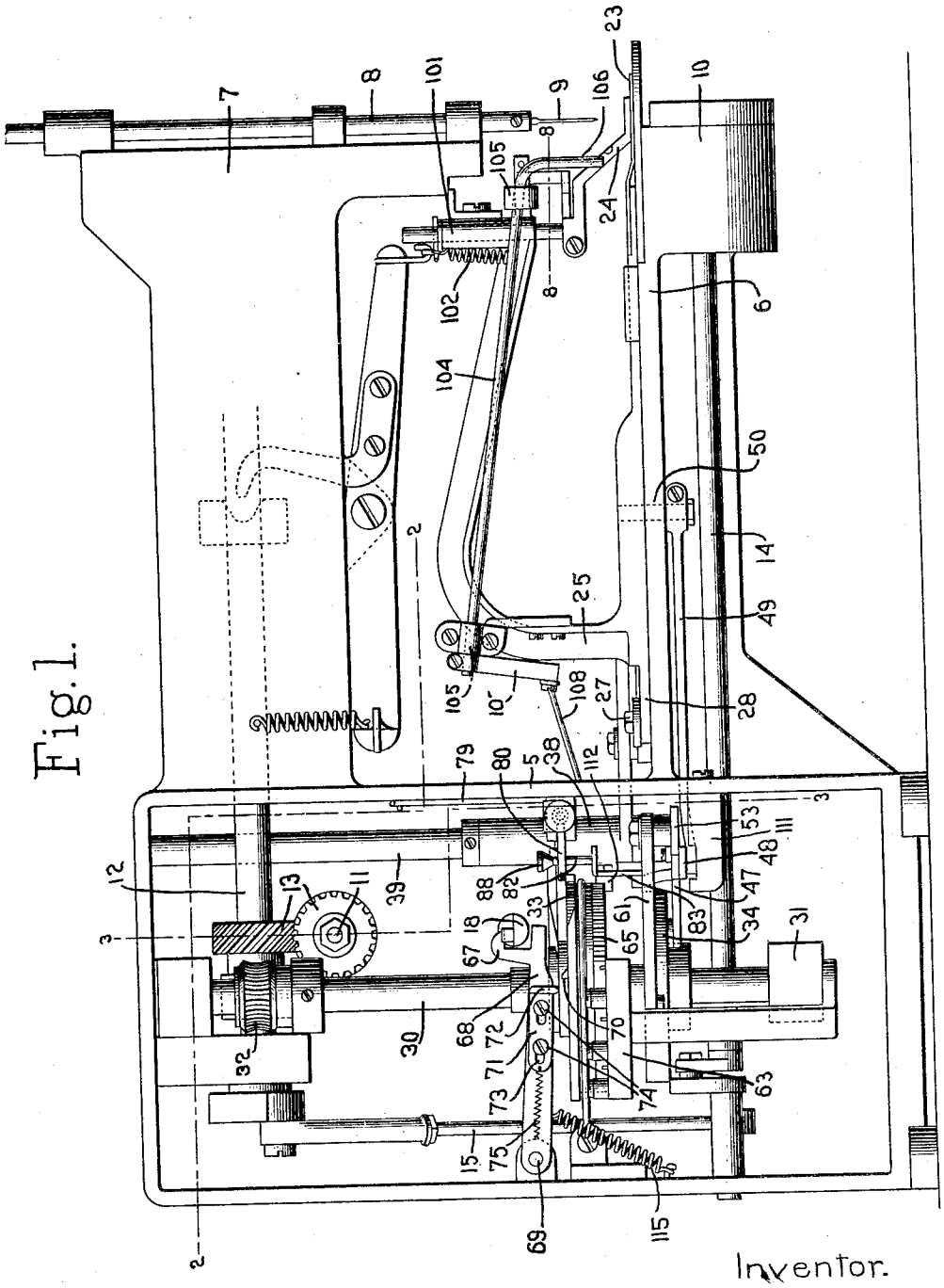

Fig. 1.

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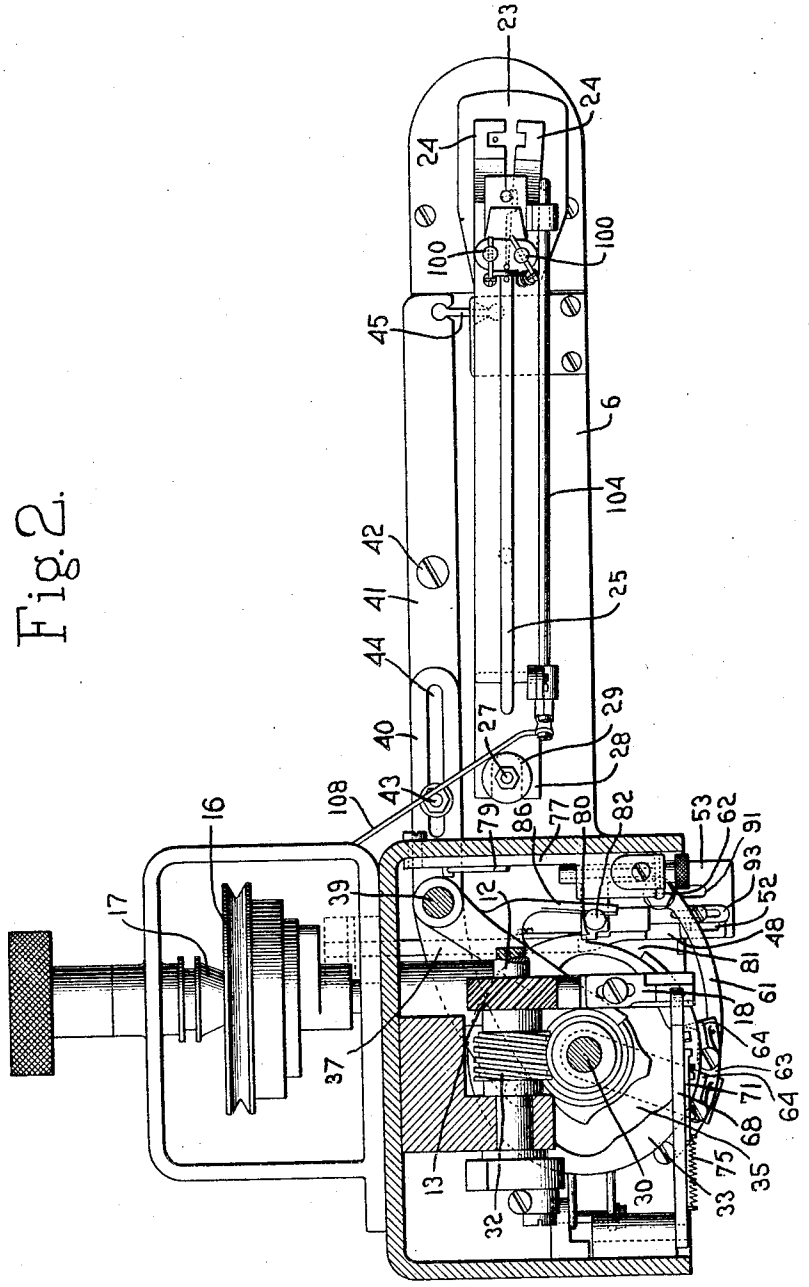
Fig. 2.



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SEWING MACHINE

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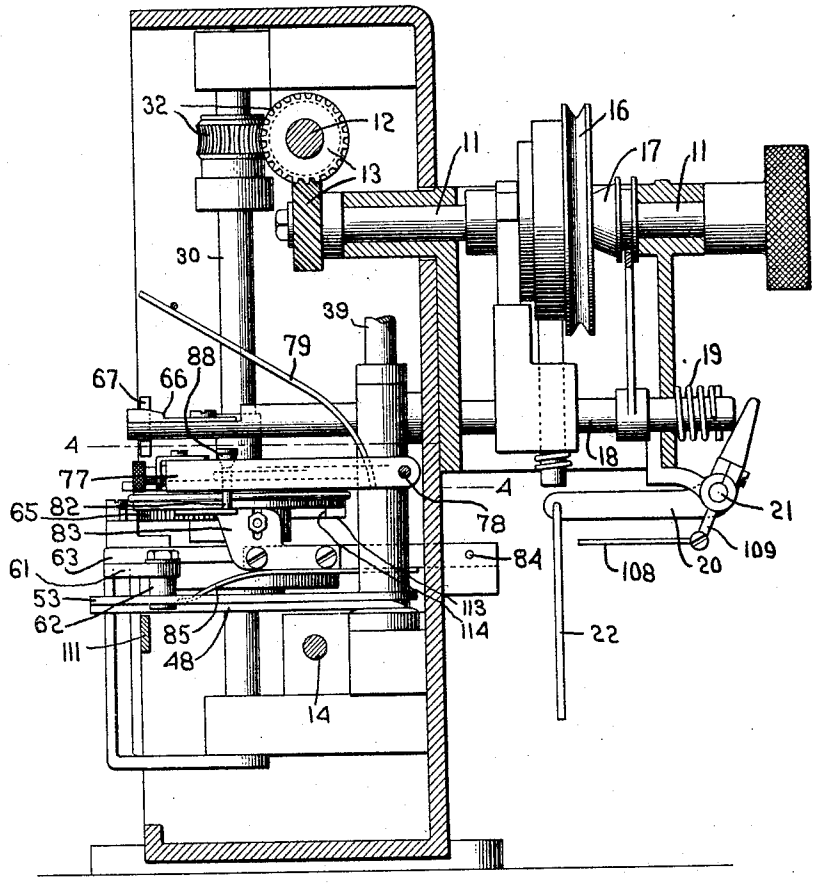
Fig.3.



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SEWING MACHINE

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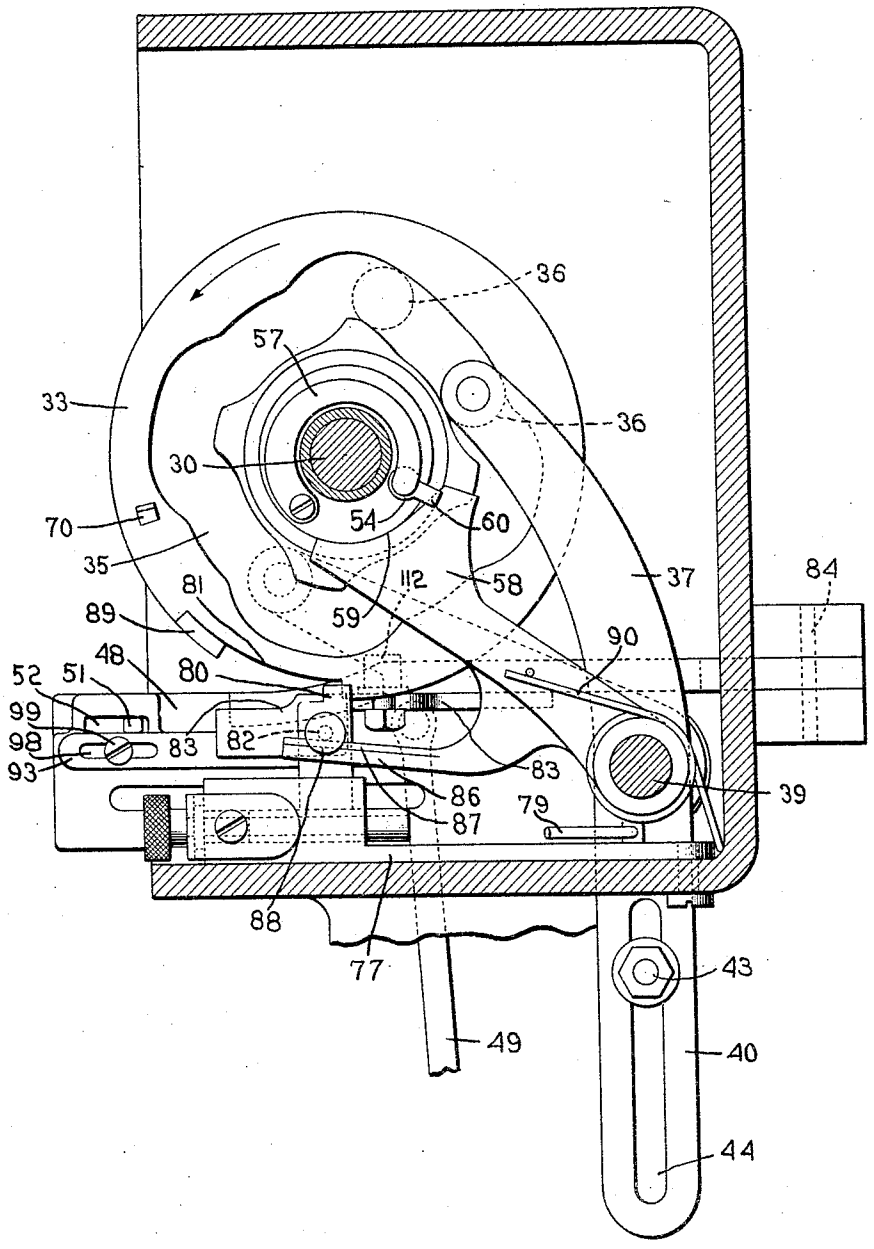
Fig. 4.



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SEWING MACHINE

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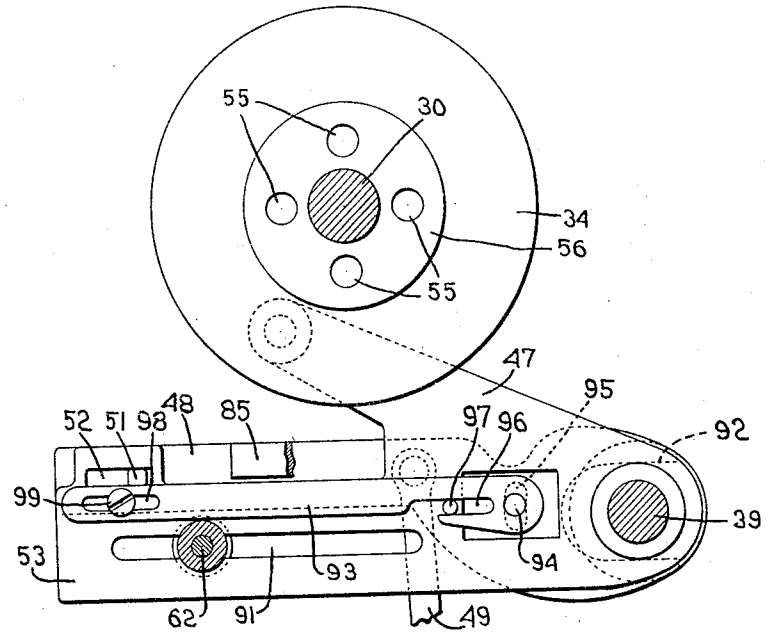
Fig. 5.



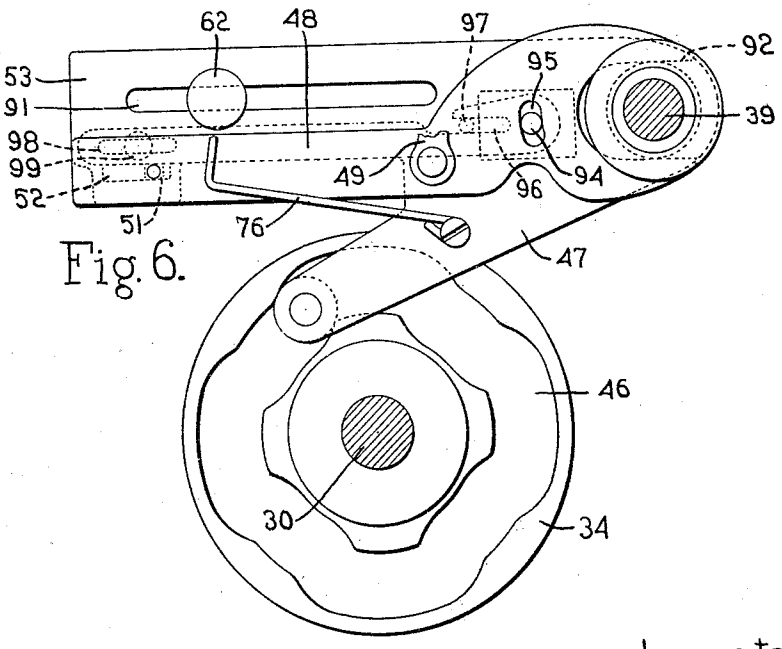


Fig. 6.

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SEWING MACHINE

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Fig. 7.

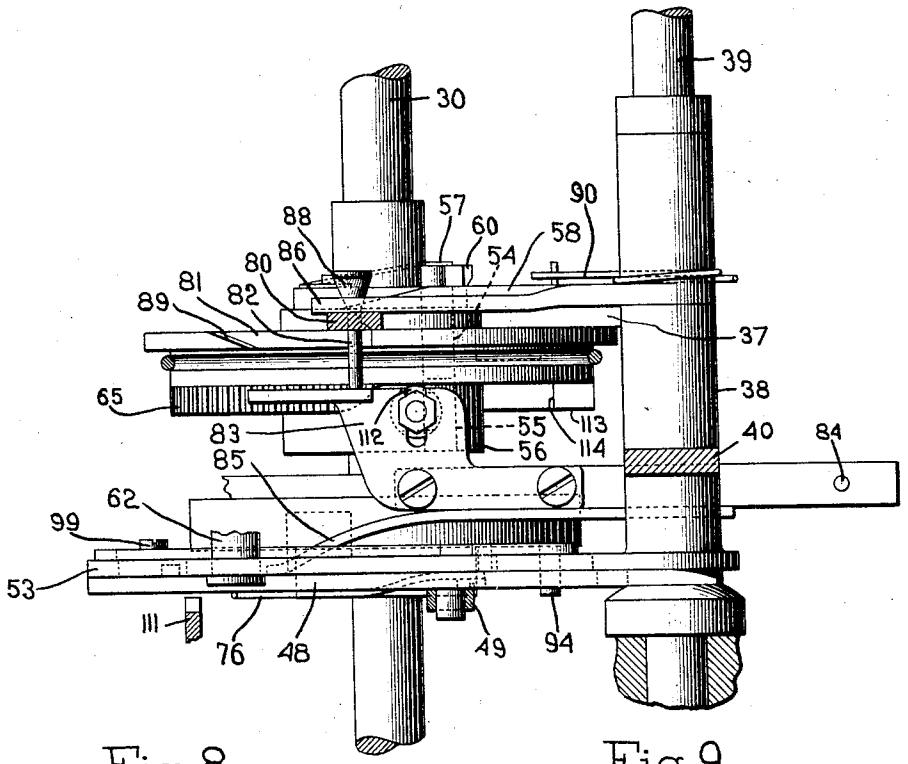


Fig. 8.

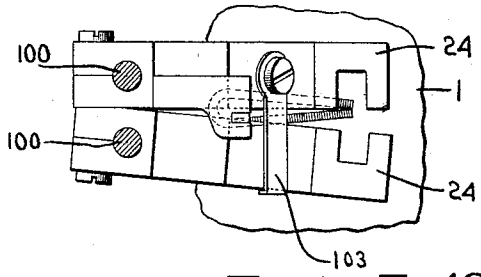


Fig. 9.

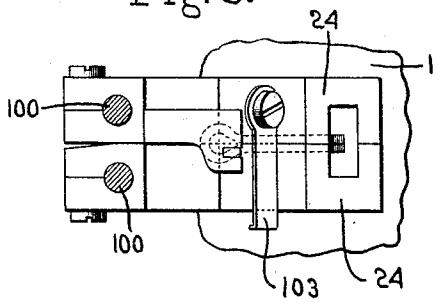
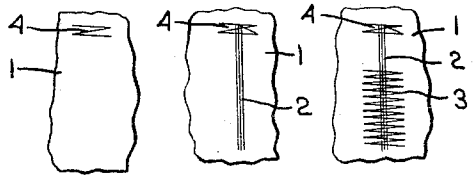


Fig. 10. Fig. 11. Fig. 12.



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Patented Jan. 3, 1933

1,892,895

UNITED STATES PATENT OFFICE

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SEWING MACHINE

Application filed August 14, 1930. Serial No. 475,197.

This invention relates to sewing machines of the type known to the trade as "tackers", that is, sewing machines that are adapted to sew a tack or stay seam at the ends of button-holes, at the corners of pockets or openings in clothing and similar places. These sewing machines are usually so constructed that they will sew a so-called "tack" which is composed of a series of long underlying stitches, and then a series of short overlying or cross-stitches which lie transversely to the long stitches and extend from one end to the other thereof.

The machine forming the subject matter of the present invention sews a tack of this type and one object of the invention is to provide an improved and simplified machine.

Another object of the invention is to provide a novel sewing machine which is constructed so that when it is started in operation it will sew two or three short stitches which are in the nature of tying-in stitches for the purpose of anchoring the thread, and then will sew the usual long underlying stitches and shorter cross or overlying stitches.

In order to give an understanding of the invention I have illustrated in the drawings a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a side view of a sewing machine embodying my invention;

Fig. 2 is a section on the line 2—2, Fig. 1;

Fig. 3 is a section on the line 3—3, Fig. 1;

Fig. 4 is an enlarged section on the line 4—4, Fig. 3;

Fig. 5 is a sectional fragmentary view showing the means for giving the movement to the work clamp required for forming the short underlying stitches;

Fig. 6 is an under side view of Fig. 5;

Fig. 7 is a fragmentary view of the cam mechanism for controlling the movement of the work holder, said view being one looking toward the left in Fig. 2;

Fig. 8 is an enlarged view of the work clamps taken on the line 8—8, Fig. 1 and showing the clamps open or spread;

Fig. 9 is a similar view showing the clamps closed together as they are during the forming of the tack;

Figs. 10, 11 and 12 show different stages in the formation of the tack or stay.

As stated above the stay or "tack" which is formed in the work 1 by the sewing machine comprises the usual long underlying stitches 2, see Fig. 12, and a plurality of short overlying stitches 3 which extend from one end of the long stitches to the other. In forming the tack or stay with the machine of the present invention, however, the first operation, after the machine is started, is to form two or three short tying-in stitches 4 as shown in Fig. 10, these stitches being for the purpose of thoroughly anchoring the thread to the cloth. After these tying-in stitches have been formed then the long stitches 2 are formed and subsequently the shorter overlying or cross stitches 3 are formed beginning with the end of the long stitches opposite the tying-in stitches, said short stitches 3 being carried the length of the long stitches 2 until they meet the tying-in stitches 4.

The sewing machine herein shown is provided with a main frame 5 which is provided with a work-supporting arm 6 on which the work-holding means is carried and an overhanging arm or head 7 which supports the usual reciprocating needle bar 8 carrying the needle 9. This needle co-operates with an oscillatory hook (not shown) situated beneath the work-supporting arm 6 and operating in a suitable housing 10.

The stitch-forming mechanism is operated from a driving shaft 11. This shaft is geared to a needle-operating shaft 12 through suitable gearing 13 and the shaft 12 is provided with any suitable or usual means for reciprocating the needle bar 8.

The oscillatory hook is operated by a shaft 14 which is connected to the shaft 12 through a crank and connecting rod 15, the latter being so constructed that rotation of the shaft 12 will oscillate the shaft 14.

The driving shaft 11 is shown as driven from a driving pulley 16 and any suitable clutch device may be used for connecting the pulley to and disconnecting it from the shaft. As herein shown the clutch is actuated by a

clutch cone 17 slidably mounted on the shaft 11 and actuated by a clutch-actuating rod 18 that is slidably mounted in the frame. The rod is normally held in its retracted position shown in Fig. 3, in which position the clutch is disengaged through the medium of a clutch spring 19 and the clutch may be thrown into engagement by shifting the rod 18 to the left Fig. 3. For accomplishing this I have shown an elbow lever 20 pivoted at 21, one arm of which engages the end of the rod 18 and the other arm of which has a member 22 connected thereto which leads to a treadle or other manually-operable device so that depressing the treadle will turn the bell crank 20 and thus shift the rod 18 to the left Fig. 3.

The work 1 is held by work-holding means which is shiftable first in one direction and then in the other as the sewing proceeds thereby to form the stitches as shown in Figs. 10, 11 and 12. This work-holding means comprises a work-supporting plate 23 on which the work is held and work clamps 24 for clamping the work to the plate 23. Both the work plates 23 and work clamps 24 are carried by a U-shaped frame member 25 which is mounted on the work-supporting arm 6 and is pivoted thereto at 27 and is also capable of sliding longitudinally of the arm.

This is provided for by forming the extension 28 of the frame 25 with a slot 29 in which is received the bolt 27 that constitutes a pivot for the frame 25. This allows not only a back and forth swinging movement of the work holder about the pivot 27 which is necessary to form the long underlying stitches but also a movement of the work holder longitudinally of the arm 6 which is necessary in forming the short overlying stitches.

The mechanism for producing this necessary movement in the work holder comprises a combined long-stitch and feed cam member adapted to produce the back and forth swinging movement of the work holder about its center 27 for forming the long underlying stitches 2 and also for giving said work clamp a gradual feeding movement while the overlying stitches 3 are being formed, and also a short-stitch cam member designed to give the work-holding means a movement longitudinally of the arm 6 to form the short stitches 3 while the arm is being swung gradually from one extreme position to the other about the pivot 27. These cams are mounted on a vertically-disposed cam shaft 30 which is journalled in suitable bearings 31 carried by the frame. Said shaft is driven from the shaft 12 through the medium of suitable spiral gears 32.

The combined long-stitch and feed cam is indicated at 33 and the short-stitch cam at 34. The cam member 33 is loose on the shaft while the short-stitch cam 34 is fast thereto.

The combined long-stitch and feed cam member 33 is provided with a cam groove 35 in which is received a follower 36 on the end of an arm 37 fast on a sleeve 38 that is loosely mounted on a vertical post 39, said sleeve having rigid therewith a slotted arm 40 which is connected to the work clamp frame 25 through the medium of a lever 41, (see Fig. 2). This lever 41 is pivoted to the work-supporting arm 6 at 42 and it is connected to the arm 40 through the medium of a bolt or screw 43, which latter extends through slots formed in the arm 40 and the portion of the lever 41 which the arm overlies. The slot in the arm 40 is shown at 44. The lever 41 is connected to the work clamp frame 25 through a link member 45 which is pivoted to both the arm and the work-clamp frame. The rocking movement of the arm 37 which is produced by the cam groove 35 will cause a corresponding turning movement of the lever 41 about its pivot 42 which in turn will cause a swinging movement of the work-clamping frame 25 about its pivot 27.

The means for giving the work clamp its movement longitudinally of the arm 6 for forming the short overlying stitches comprises a cam groove 46 in the under side of the cam member 34 in which operates a follower carried by an arm 47 that is pivotally mounted on the post 39. This arm 47 is connected to a swinging member 48 also mounted to turn about the post 39 and to which is pivotally connected one end of a link 49, the other end of said link being pivoted to a stud 50 depending from the frame 25 and operating in a slot in the arm 6.

The oscillating movement of the arm 47 given to it by the cam groove 46 will oscillate the member 48 and through the link 49 will move the work clamp 25 back and forth in a direction longitudinally of the supporting arm 6.

The cam 34 is fast on the shaft 30 so that the arm 47 is continuously vibrating when the machine is in operation and means are provided for clutching the member 48 to the arm 47 at such time as the short overlying stitches are to be formed and unclutching said arm from the member 48 during the time that the long underlying stitches are being formed. This clutching device comprises a projection 51 rising from the member 48 and adapted to enter a slot 52 formed in an extension 53 with which the arm 47 is provided. When the projection 51 occupies the slot 52 then the oscillating movement of the arm 47 and its extension 53 will be transmitted to the member 48 whereby the work-clamping frame 25 will be reciprocated through the link 49.

The member 48 is constructed so that it can be moved in a vertical direction sufficiently to cause the lug 51 to be withdrawn from the slot 52 thereby to uncouple the part 48 from said extension, or to cause said lug to

enter the slot 52 thereby coupling the part 48 to the rocking member 47.

The arm 48 is disconnected or uncoupled from the rocking member 47 during the sewing of the long underlying stitches 2 but is coupled to said rocking member during the formation of the short overlying stitches 3.

During the time that the long underlying stitches 2 are being formed the cam 33 is locked or clutched to the shaft 30 and rotates therewith in the direction of the arrow Fig. 4. During its rotation the arm 37 is vibrated thereby giving the necessary swinging movement to the work holder to form the long underlying stitches 2. During this time the continuously vibrating arm 47, which derives its vibration from the cam groove 46 in the cam 34 which is fast on the shaft 30, is uncoupled or unclutched from the arm 48 so that said arm 48 is unaffected by the vibrating movement of the member 47.

As soon as the long underlying stitches 2 have been completed the cam 33 is unclutched from the shaft 30 and the continuously-vibrating member 47 is coupled or clutched to the arm 48 so that the work clamp will have a short vibrating movement longitudinally of the arm 6 for forming the short overlying stitches 3. During this time when the short overlying stitches are formed the cam 33 acts as a feed cam and is slowly rotated to give a gradual feeding movement of the work clamp from one end of the tack to the other. The cam 33 makes one complete revolution for the formation of each tack or stay and Fig. 4 shows the position of the parts when the machine is at rest. When the machine is started the cam is rotated in the direction of the arrow Fig. 4 and when it arrives at such position that the follower 36 will have the position in the cam groove indicated by the dotted line position Fig. 4 the cam member 33 is disconnected from the shaft 30 and is thereafter given a slow feeding movement in the direction of the arrow by which the follower will travel in the cam groove from the dotted to the full line position which will give the desired feeding movement for forming the overlying stitches.

The clutch for clutching the cam to the shaft is in the form of a clutch pin 54 which extends down through the hub of the cam and is adapted to engage in any one of several apertures 55 formed in a collar 56 that is fast to the shaft. This clutch pin is acted on by a spring 57 which normally tends to depress it into engagement with one of the recesses 55. It is withdrawn from the recesses thereby to unclutch the cam from the shaft at the proper time in the cycle of operations by a clutch-releasing member 58 which is in the form of an arm that is mounted for turning movement on the post 39 and which has a bevelled or wedge face 59 adapted to engage a lateral extension 60 formed on the clutch pin 54.

As the cam rotates in the direction of the arrow Fig. 4 the extension or nose 60 of the clutch pin will ride onto the left hand end of the bevelled edge 59 of the clutch-releasing member and as the cam continues the turning movement the pin will be gradually raised by the inclined cam face thereby withdrawing it from the aperture 55. As stated above this occurs at about the time the cam is in such a position that the follower 36 will have the dotted line position in the cam shown in Fig. 4. Thereafter the cam is fed forward with a slow movement until it reaches the position shown in Fig. 4 when the machine is brought to rest. This slow feeding movement of the cam 33 is accomplished by the following means.

The extension 53 of the vibrating member 47 has a link 61 pivotally connected thereto at 62 and this link is connected to an oscillating pawl carrier 63 which is pivoted coaxially with the shaft 30 and which is provided with a plurality of pawls 64 adapted to engage teeth 65 formed on the periphery of the cam member 33. The teeth 65 do not extend around the periphery of the cam member but are so situated thereon that by the time the cam 33 has been rotated into a position where it is disconnected from the shaft the teeth 65 will have been brought into position to be engaged by the pawls 64. Since the members 47 and 53 are constantly oscillating the pawl carrier 63 will also have a constantly oscillating movement and as soon as the cam 33 has been disconnected from the shaft 30 then said cam will be fed forward by the operation of the pawls 64 and ratchet teeth 65, this movement being a slow intermittent feeding movement.

When the overlying or cross stitches have been completed the driving clutch by which the driving pulley 16 is clutched to the shaft is disconnected thereby bringing the machine to rest and the disconnection or disengagement of the clutch is controlled by the cam 33.

The clutch rod 18 is formed with a shoulder 66 which is adapted to engage the nose 67 formed on the end of a latch arm 68 that is pivoted at 69 to the frame of the machine and is acted on by a spring 115. When the driving clutch is disengaged this nose 67 is resting on the portion of the rod at the left of the shoulder 66 as shown in Fig. 3 but when the clutch rod 18 is moved to the left to throw the clutch into engagement the shoulder 66 will be carried beyond the nose 67 and the latter will drop into engagement with the nose thereby locking the clutch in its engaged position.

This latch lever 68 is raised to release the nose 67 from the shoulder 66 through the medium of a projection 70 formed on the cam 33. The latch lever 68 has mounted on

it a plate 71 carrying a depending finger 72 which, when the latch lever 68 is in the lowered position which it assumes when the nose 67 is in engagement with the shoulder 66, is in the path of movement of the projection 70 on the cam. The plate 71 is provided with slots 73 in which are received guiding screws 74 carried by the arm 68 and said plate is acted on by a spring 75 which tends to hold it in the position shown in Fig. 1. When, during the rotation of the cam 33, the projection 70 engages the depending finger 72 the plate will first be moved forward by the moving projection 70 to the limit allowed by the slots 73 and thereafter during the forward movement of the projection 70 the lever 68 will be forced upwardly thereby releasing the nose 67 from the shoulder 66. This will allow the spring 19 to disengage the clutch and bring the machine to rest. The spring 75 immediately returns the plate 71 to its rearward position with the finger 72 in the rear of the projection 70.

The machine is so constructed that when it is started in operation the first stitches that are formed will be short cross stitches as indicated at 4, these stitches constituting tying-in stitches which anchor the thread in the work 1 before the long stitches 2 are formed. Hence when the machine is brought to rest and when it is first started the cam 33 is still disconnected from the shaft 30 and the member 48 is coupled to the oscillating extension 53. After one or two of the tying-in stitches have been formed, as indicated at 4, then the cam 33 is automatically coupled to the shaft 30 and at the same time the member 48 is disconnected or uncoupled from the extension 53 of the rocking member 47 so that the long underlying stitches 2 will be formed.

The means which couples the cam 33 to the shaft 30 and which uncouples or disconnects the arm 48 from the extension 53 is controlled by the cam 33.

The member 48 is acted on by a spring 76 (see Fig. 6), which normally holds it raised into a position into which the lug 51 occupies the slot 52. At the proper time in the cycle of operations, however, a spring-impelled device is released by the cam 33 which engages the upper side of the arm 48 and depresses it downwardly against the action of the spring 76 thereby withdrawing the lug 51 from the slot 52. This spring-impelled device is in the form of an arm or carrier 77 pivoted at 78 to the frame and acted upon by a spring 79 which tends normally to swing it downwardly. This swinging member 77 has adjustably mounted thereon an arm or detent 80 which is adapted to ride over the peripheral portion of the cam 33. So long as the arm 80 is engaging the periphery of the cam 33 the arm 77 will be held in its raised position against the action of the spring 79.

The cam 33 is provided with a notch 81 in its periphery which is brought into alignment with the finger 80 just after the machine has started. A slight rotation of the cam 33 in the direction of the arrow from the position shown in Fig. 4 will bring the notch 81 into a position to release the arm 80 and the spring 79 will then swing the arm 77 downwardly. This arm carries a finger 82 which engages a member 83 pivoted to the frame at 84 and said member 83 has a spring arm 85 on its under side which rests on the arm 48.

When the notch releases the finger 80 the spring 79 will depress the arm 77 and the part 83 and through the finger 85 will depress the arm 48 sufficiently to disengage the lug 51 from the slot 52 thereby disconnecting the cam 34 from the work clamp. This same movement of the arm 77 also actuates the clutch-releasing member 58 so as to allow the clutch pin 54 to move downwardly into one of the recesses 55 and thereby couple the cam 33 to the shaft 30.

The clutch-releasing member 58 is provided with a finger 86 having an inclined face 87 which co-operates with a tapered head 88 formed on the pin 82. When the member 77 is released the downward movement of the arm 80 and the pin 82 causes the tapered head 88 to engage the bevelled face 87 and thereby swing the member 58 backwardly to withdraw the portion 59 from beneath the nose 60 of the clutch pin 54. This will allow the spring 57 to act to throw the clutch pin into one of the recesses 55.

The machine is brought to rest in the position shown in Fig. 4 and the release of the arm 77 takes place just after the machine is started and just after the two or three tying-in stitches 4 have been formed.

As soon as the cam 33 is thus clutched to the cam shaft 30 and the arm 48 is disconnected from the vibrating member 47 the sewing machine will function to form the long underlying stitches 2. While these stitches are being formed the releasing member 77 is raised to its normal position and for this purpose one end of the notch 81 has an inclined face 89 which acts as a cam face that enters under the finger or arm 80 and raises the member 77 against the action of the spring 79. As the finger 80 and the pin 82 is raised the clutch-releasing member 58 will be allowed to swing forwardly into the position shown in Fig. 4 through the action of a spring 90 and said clutch-releasing member is thus in proper position to effect a disengagement of the clutch pin 54 from its recess 55 at the end of the formation of the long stitches. The arm 48 is held in uncoupled relation with the rocking member 47 after the finger 80 has risen by the engagement of the part 83 with the underside of the cam 33. The underside of said cam is so shaped that the arm 48 will be held depressed till the long

stitches have been completed, at which time the part 83 will pass off from the shoulder 101 and drop into a recess on the underside of the cam 33, whereby the arm 48 will be raised and thus coupled to the member 47.

The machine herein shown is further so constructed that the length of the underlying stitches can be adjusted without effecting any change in the number or length of the overlying stitches and the number and spacing of the overlying stitches can be varied for different lengths of underlying stitches. Furthermore, the length of the overlying stitches can be adjusted independently of other adjustments. It is possible, therefore, to change the length of the underlying stitches without changing the number of overlying stitches and it is also possible to change the number and spacing of the overlying stitches without changing the length of the underlying stitches, or both changes can be made at the same time.

The length of the underlying stitches is varied by shifting the point of connection between the arm 40 and the lever 41. These parts are connected through the screw or bolt 43 and by shifting this longitudinally of the slots formed in the arm 40 and lever 41, one of the slots being shown at 44, the amplitude of swinging movement of the clamping frame 25 may be varied thereby varying the length of the underlying stitches.

The number and spacing of the overlying stitches depends upon the rapidity with which the cam 33 is operated while it has its feeding movement or while the follower 36 is moving from the dotted to the full line position Fig. 4. This feed is adjusted by adjusting the point of connection between the link 61 and the extension 53 of the member 47. This extension is provided with a slot 91 and the pivotal connection 62 of the link 61 is adjustable longitudinally of the slot. The member 53 has a fixed amplitude of movement but the adjustment of the pivotal connection 62 provides for varying the amplitude of movement of the pawl carrier and thus the rate of feed. By reducing the amplitude of movement of the pawl carrier 63 the rate of feed of the cam will be correspondingly reduced and this will result in a greater number of cross stitches 3 being formed. By increasing the amplitude of movement of the pawl carrier 63 the rate of feed of the cam 33 will be increased whereby fewer cross stitches will be made. This adjustment is quite independent of that controlling the length of the underlying stitches.

The length of the overlying stitches can be adjusted by shifting the arm 48 radially so that the point of connection between the link 49 and said arm will have a greater or less radial distance from the center of oscillation. While this arm 48 oscillates about the post 39 as a center yet it can be moved radially, for which purpose the end of the arm is shown as being forked to embrace a collar on the shaft 39 as indicated at 92 in Figs. 5 and 6.

For holding the arm 48 in any adjusted position there is provided a clamping member 93 which overlies the extension 53 and is provided at its right hand end with a pin 94 that extends into a curved slot 95 formed in the arm 48. This adjusting member 93 has a slot 96 in which is received a guide pin 97 carried by the extension 53 and at its left hand end the member 93 is slotted as shown at 98 and in the slot is a clamping screw 99 by which the member 93 can be clamped to the extension 53. By loosening the screw 99 and shifting the adjusting member 93 radially the arm 48 will be correspondingly adjusted in a radial direction thereby changing the radial distance from the post 39 of the point where the link 49 is connected to the plate 48. This change will, of course, vary the amplitude of movement of the link 49 and consequently the length of the overlying stitches.

There are two work clamps 24 and these are normally spread from each other as shown in Fig. 8. When the machine is started they will be moved together as shown in Fig. 9 thus condensing the work slightly. This is of special advantage in sewing a tack or stay on the end of a buttonhole for the closing action of the clamps serves to close up the buttonhole while the stay is being formed.

Each of the work clamps 24 is carried by a post 100 which is anchored in the portion 101 of the clamp frame 25. One of the posts is capable of turning movement and is acted on by a spring 102 which normally tends to swing its clamp 24 away from the other clamp as shown in Fig. 8. This swinging tendency is limited by a stop member 103.

Means are provided whereby when the clutch is thrown into engagement to start the machine the work clamps 24, which have been previously lowered onto the work, are moved toward each other into the position shown in Fig. 9. For this purpose the work clamp frame 25 is provided with a rock shaft 104 which is journalled in suitable bearings 105 on said frame and said rock shaft has at one end a laterally-extending arm 106 adapted to engage the movable work clamp 24. This rock shaft 104 has at its rear end an arm 107 which is connected by a link connection 108 to an arm 109 rigid with the clutch-actuating elbow lever 20. As a result when the lever 20 is operated by a downward pull on the connection 22 the rock shaft 104 will be turned through the connection 108 and arm 109 thereby closing the work clamps together which will result in closing up the buttonhole slit before the tack is sewed.

I claim.

1. In a sewing machine the combination with work-holding means, of stitch forming mechanism, means to give the work-holding

means and stitch forming mechanism a relative movement in one direction to form long underlying stitches and means to give said work-holding means and stitch forming mechanism a relative movement in another direction prior to the formation of the long underlying stitches, thereby to form anchoring stitches and also subsequent to the formation of said underlying stitches to form short overlying stitches.

2. In a sewing machine, the combination with work-holding means, of stitch forming mechanism, means to give the work-holding means a vibratory movement in one direction thereby to form long underlying stitches, and means to give said work-holding means a shorter vibratory movement in another direction prior to the formation of the long underlying stitches, thereby to form anchoring stitches, and also subsequent to the formation of said underlying stitches thereby to form short overlying stitches.

3. In a sewing machine, the combination with work-holding means, of stitch forming mechanism, means to give the work-holding means a vibratory movement in one direction thereby to form long underlying stitches, and means to give said work-holding means a shorter vibratory movement in another direction prior to the formation of the long underlying stitches, thereby to form anchoring stitches, and also subsequent to the formation of said underlying stitches thereby to form short overlying stitches, said first-named means operating to produce a relative feeding movement between the work-holding means and stitch forming mechanism while the short overlying stitches are being formed.

4. In a sewing machine for forming a tack or stay, the combination with means to form anchoring stitches, of means to form long underlying stitches and means to render the first-named means operative after the long stitches have been formed to form short overlying stitches.

5. In a sewing machine for forming a tack or stay the combination with means to form anchoring stitches, of means to form long underlying stitches and means actuated by the last-named means when the long stitches have been completed to render the first-named means operative thereby to form short overlying stitches.

6. In a sewing machine adapted to perform a predetermined sewing cycle and then come to rest the combination with work-holding means and stitch forming mechanism of a combined long stitch and feed cam, a short stitch cam separate from said combined long stitch and feed cam, means operated by said long stitch and feed cam during a portion of the sewing cycle to produce a relative movement between the work-holding means and stitch forming mechanism by which long underlying stitches are formed, means operated by the short stitch cam during another portion of the sewing cycle to produce relative movement between the stitch forming mechanism and the work-holding means by which short overlying stitches are formed, said combined long stitch and feed cam operating to give feeding movement to the work-holding means and stitch forming mechanism during the formation of the short overlying stitches and means to operate the combined long stitch and feed cam at a different speed when long stitches are being formed than when said cam is giving relative feeding movement to the work-holding means and stitch-forming mechanism.

7. In a sewing machine adapted to perform a predetermined sewing cycle and then come to rest the combination with work-holding means and stitch forming mechanism of a combined long stitch and feed cam, a short stitch cam, means to give the long stitch and feed cam one rotation and then bring it to rest, means actuated by said cam during a part of its rotation to give the work-holding means and stitch forming mechanism a relative movement by which long underlying stitches are formed, means actuated by the short stitch cam during the remainder of the rotative movement of the long stitch cam by which the work-holding means and stitch forming mechanism are given a relative movement to form short overlying stitches, and means to actuate the long stitch cam by the short stitch cam thereby to produce a feeding movement while the short stitches are being formed.

8. In a sewing machine, the combination with work-holding means and stitch forming mechanism, of a cam shaft means to rotate it, a combined long stitch and feed cam loose on the cam shaft, a short stitch cam fast thereon means to connect the first-named cam to the cam shaft during a portion of the sewing cycle and then disconnect it therefrom, means actuated by said cam while so connected to the cam shaft to produce a relative movement between the work-holding means and stitch forming mechanism to form a series of long underlying stitches, means actuated by the short stitch cam during the remaining portion of the sewing cycle for producing a relative movement between the work-holding means and stitch forming mechanism by which overlying stitches are formed and means for operating the long stitch and feed cam from the short stitch cam while the latter is functioning thereby to give the work a feeding movement.

9. In a sewing machine adapted to perform a sewing cycle and then come to rest, the combination with work-holding means and stitch forming mechanism, of two cams, operative connections between each cam and the work-holding means, and means to ren-

der one of said operative connections inoperative during a portion of the sewing cycle, both operative connections being operative during the remainder of the sewing cycle.

10. In a sewing machine adapted to perform a sewing cycle and then come to rest, the combination with work-holding means and stitch forming mechanism, of two cams, a permanently operative connection between one cam and the work-holding means whereby the work-holding means is always under the control of said cam, and means operative during a portion only of the sewing cycle to establish operative connections between the other cam and the work-holding means.

11. In a sewing machine, the combination with stitch forming mechanism and work-holding means, of a combined long stitch and feeding cam, means operated by said cam to give the work-holding means a vibrating motion in one direction during a part of each rotation of the cam and a feeding motion during the remainder of each rotation, a second cam, connections between said second cam and the work-holding means by which the latter is given a vibrating movement in another direction, and means to disrupt the connections and maintain them disrupted while the work-holding means is being vibrated by the combined long stitch and feed cam.

12. In a sewing machine, the combination with stitch forming mechanism and work-holding means, of a cam shaft, a combined long stitch and feed cam loose thereon, a short stitch cam fast thereon means to rotate the shaft, means to clutch the combined long stitch and feed cam to the shaft for a partial rotation thereof and then to unclutch it from said shaft, means operated by said long stitch cam while so clutched to the shaft to vibrate the work-holding means, means to rotate the said long stitch and feeding cam from the short stitch cam when the former is unclutched from the cam shaft, said long stitch and feed cam at such time giving the work-holding means a feeding movement, and means operated by the short stitch cam to vibrate the work-holding means in another direction during the feeding movement of the work-holding means.

13. In a sewing machine the combination with stitch forming mechanism and work-holding means, of a cam shaft, a cam loose thereon for reciprocating the work-holding means in one direction, a second cam fast thereon for reciprocating the work-holding means in another direction, operative connections between each cam and the work-holding means, means to connect the first-named cam to the cam shaft and then to disconnect it therefrom after it has performed a predetermined sewing operation, means to disrupt the connection between the second cam and the work-holding means while the first cam is reciprocating the work-holding means and means to actuate the first cam from the second cam when the latter is controlling the work-holding means.

14. In a sewing machine the combination with stitch forming mechanism and work-holding means, of a cam shaft, a cam loose thereon for reciprocating the work-holding means in one direction, a second cam fast thereon for reciprocating the work-holding means in another direction, operative connections between each cam and the work-holding means, means to connect the first-named cam to the cam shaft and then to disconnect it therefrom after it has performed a predetermined sewing operation and means to disrupt the connection between the second cam and the work-holding means while the first cam is reciprocating the work-holding means, and means actuated by the second cam to give the first cam a slow feeding movement while the work-holding means is being reciprocated by said second cam.

15. In a sewing machine adapted to perform a predetermined sewing cycle and then come to rest, the combination with work-holding means and stitch-forming mechanism, of a combined long stitch and feed cam, a short stitch cam separate from said combined long stitch and feed cam, means operated by said long stitch and feed cam during a portion of the sewing cycle to produce a relative movement between the work-holding means and stitch-forming mechanism by which long underlying stitches are formed, means operated by the short stitch cam during another portion of the sewing cycle to produce relative movement between the stitch-forming mechanism and the work-holding means by which short overlying stitches are formed, said combined long stitch and feed cam operating to give feeding movement to the work-holding means and stitch-forming mechanism during the formation of the short overlying stitches, and means to operate the combined long stitch and feed cam at a faster rate when the long stitches are being formed than when said cam is giving relative feeding movement to the work-holding means and stitch-forming mechanism.

In testimony whereof, I have signed my name to this specification.

JOHN KIEWICZ.