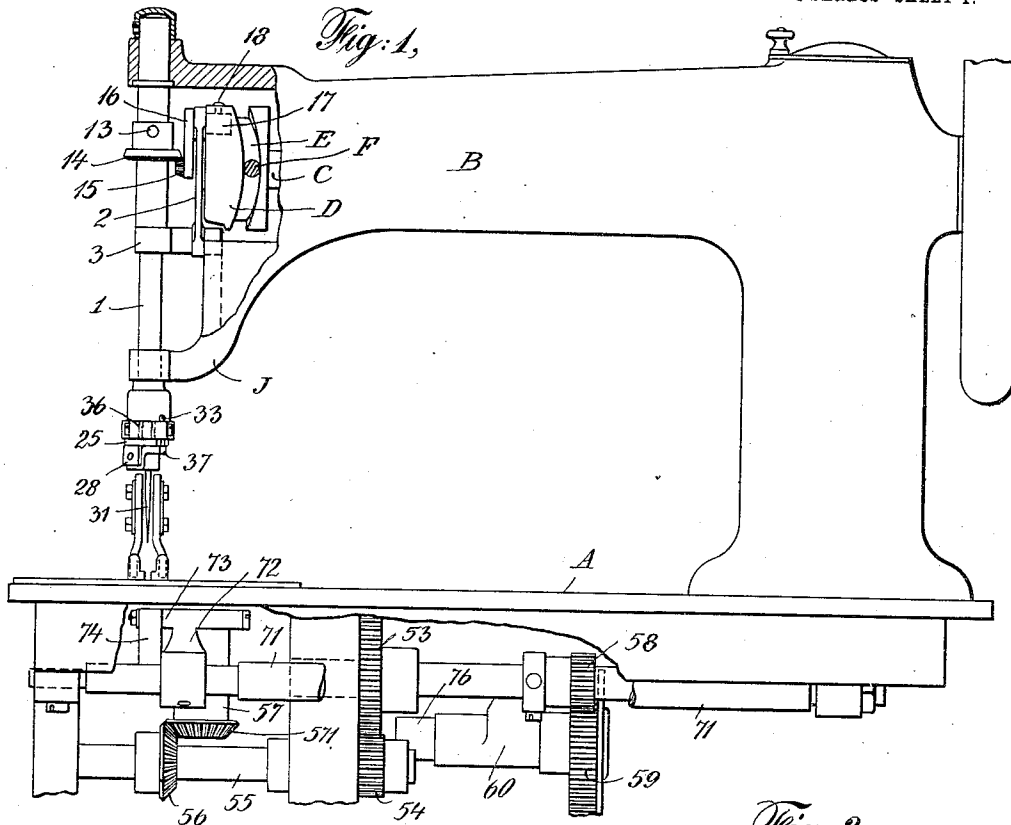


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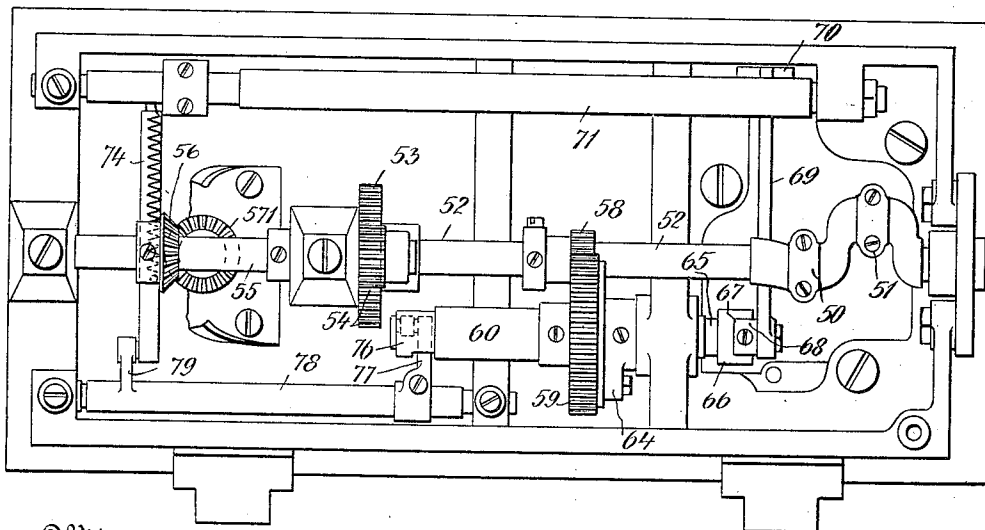
J. LEATHEN.  
SEWING MACHINE.  
APPLICATION FILED DEC. 28, 1910.

Patented Feb. 13, 1912.

3 SHEETS—SHEET 1.



*Fig. 2.*



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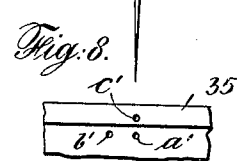
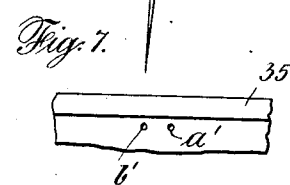
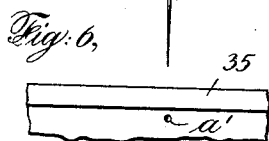
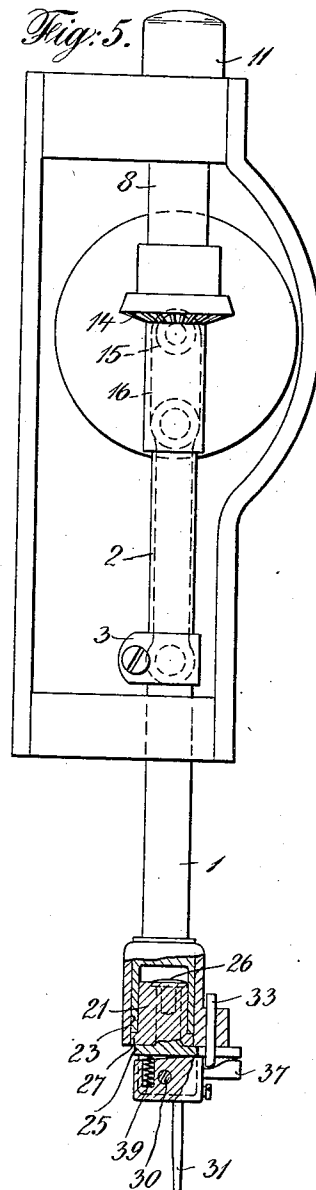
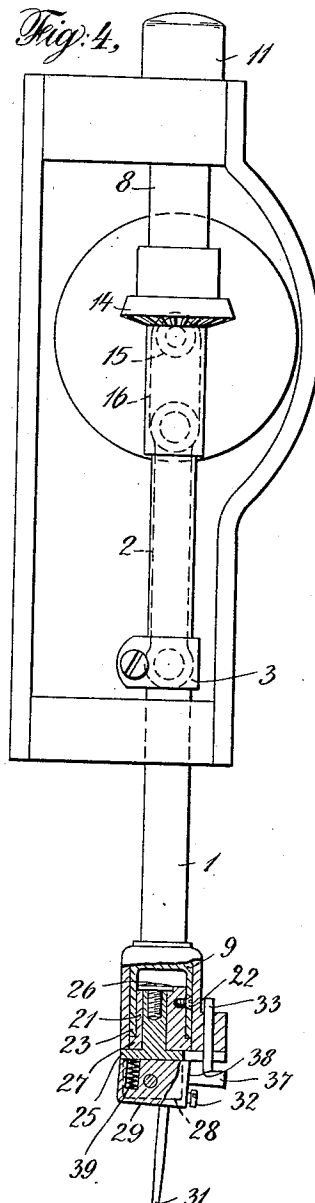
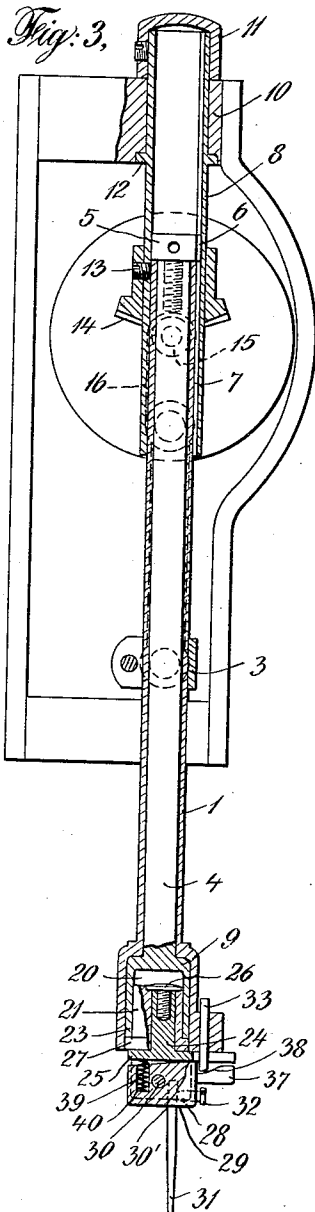
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1,017,568.

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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 9,

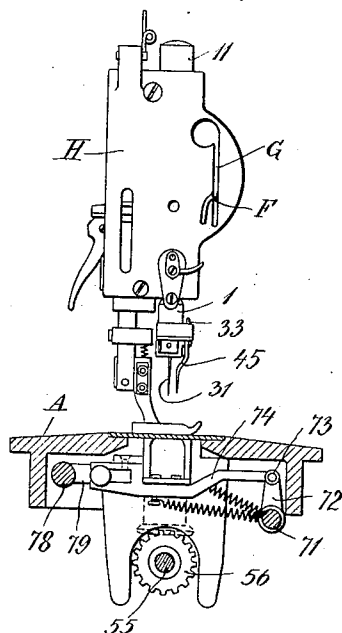


Fig. 10,

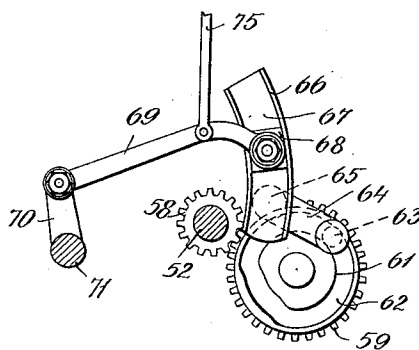


Fig. 11,

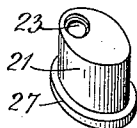


Fig. 12,

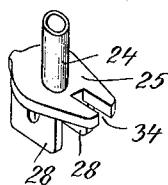
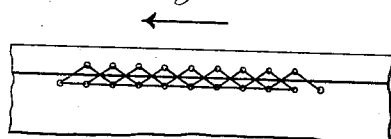


Fig. 13.



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# UNITED STATES PATENT OFFICE.

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## SEWING-MACHINE.

1,017,568.

Specification of Letters Patent.

Patented Feb. 13, 1912.

Application filed December 28, 1910. Serial No. 599,686.

*To all whom it may concern:*

Be it known that I, JAMES LEATHEM, a citizen of the United States, residing at New York, in the county of Richmond and State of New York, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to sewing machines, more particularly to the needle motions for such machines, and the objects of the invention are to improve the construction of such machines and increase their efficiency of operation.

Other objects of the invention are to provide a needle motion for a hemstitching machine, which will obviate feeding the material back and forth.

While the invention is to be described with particular reference to a hem stitching machine, and to the details of construction, it is not to be understood as to be limited thereto, as many and various changes may be made, and the same may be embodied in widely varying forms without limiting the invention to the construction shown and described.

According to my invention the general structure of a sewing machine is not affected, the machine comprising, as is usual, a bed plate, an overhanging arm, a needle bar mounted to reciprocate up and down in the end of this arm, means for so reciprocating it, and the usual needle plate, feed mechanism, etc. In hem stitching it is desired that two stitches be placed off the hem fold and one on. One means of doing this is to provide the needle bar with a vibrating needle carrier which is adapted to be operated in connection with a feeding mechanism capable of imparting two forward movements to the material alternating with one backward movement, the needle being kept perpendicular to place the two stitches off the hem fold and inclined by suitable vibrating mechanism to place one stitch on the hem fold. Instead of so doing, and according to the present invention the needle is actuated so as to permit of the material being fed only forward, and not backward and forward as is customary in what are called return feed machines.

According to the present invention, the needle is mounted in a holder, on a rotary shaft, carried by the needle bar in its reciprocations, the needle being eccentric to the axis of rotation of the shaft, means being provided for rotating said shaft a part of a revolution each time the needle bar reciprocates. Customarily, the said shaft rotates one third of a revolution during each reciprocation of the needle bar, the holes made by the needle in the material being, therefore, arranged in a triangle, two off the hem fold and one on.

For the method of stitching which I prefer, it is desirable that each set of needle holes shall not be at the corners of an equilateral triangle, as may be produced by a needle mounted eccentrically on an intermittently-rotating shaft, as described, but shall be at the corners of what is, actually or approximately, a right angled triangle, so that half of the stitches crossing the line of the hem-fold shall cross at right angles. To this end the needle is not only eccentrically mounted in relation to the shaft but is also eccentrically mounted in relation to the needle holder. Therefore I do not mount the needle directly on said intermittently rotating shaft, but upon a needle holder, the motion of which is modified with reference to that of the shaft by cam mechanism hereinafter described.

Suitable means are provided for feeding the material forward after a complete revolution of the shaft, so that the needle will on its second entrance into the material, to place a second stitch off the hem fold, enter the hole made by the needle in the first stitch off the hem fold, made in the preceding series of stitches.

The accompanying drawings illustrate one form of hem-stitching mechanism such as above described.

In said drawings: Figure 1 is a side elevation with parts broken away of a machine showing one embodiment of my invention; Fig. 2 is a bottom view of the machine showing the feeding mechanism; Fig. 3 is an enlarged detail view, partly in section and with parts broken away of the needle bar, showing the needle in its lowermost position to place the first stitch off the hem; Fig. 4 is a view similar to Fig. 3 with the needle in its lowermost position to place the second stitch off the hem; Fig. 5 is a view

similar to Figs. 3 and 4 with the needle in its lowermost position to place the first stitch on the hem; Figs. 6, 7 and 8 are detail views of a portion of the material to be hemmed showing respectively the holes made by the needle in its different downward movements as shown in Figs. 3, 4 and 5; Fig. 9 is an end view with a portion of the bed plate in cross section; Fig. 10 is a detail view of a part of the feeding mechanism; Fig. 11 is a detail perspective view of the cylindrical block; Fig. 12 is a detail perspective view of the actuating cam. Fig. 13 is a detail view showing a series of stitches made by the machine.

Referring to the drawings A designates the bed plate, B the overhanging arm in which is mounted the needle bar actuating shaft C, to the end of which is secured the hub D, provided with the peripheral cam slot E which actuates the take-up lever F, one end of which extends through the slot G in the face plate H which is secured to the head J.

The needle bar 1 is mounted in the head J, and is reciprocated by means of a link 2, one end of which is pivoted to the hub D, and the other end of which is pivoted to the collar 3 secured to the needle bar 1. The needle bar 1 is made hollow throughout its length so as to contain the actuating shaft 4, to the upper end of which is secured a set screw provided with a collar 5, which bears upon the top of the needle bar 1, said collar being provided with a feather 6, which is arranged to engage a vertical groove 7 on the inner side of an actuating sleeve 8, which, with the actuating shaft 4, is adapted to rotate about the axis of the needle bar 1, which latter is held against rotation by means of the collar 3 secured to the link 2, as before described.

The actuating shaft 4 is provided near its lower end with a circular shoulder 9, which fits into a corresponding recess in the needle bar 1, so that the actuating shaft 4 is held from moving vertically in relation to the needle bar 1 by means of the collar 5 at one end, and the shoulder 9 at the other end, but at the same time may be rotated. The actuating sleeve 8 is rotatably mounted in a suitable bearing 10, on the head J of the machine, and is held in position by means of a cap 11, secured to the top of the sleeve, which bears upon the top of the bearing 10, and a flange or collar 12, also secured to the actuating sleeve 8, which bears against the bottom of the bearing 10.

Suitably secured to the actuating sleeve 8, by means of a set screw 13, is a bevel gear 14 which meshes with a bevel pinion 15 secured to one end of a link 16, the other end of which is secured to the hub D through the medium of a pin 17, upon which one end of the link 2 is pivoted as before

referred to. The pin 17 is held in position in the hub D by means of a set screw 18.

From the above it will be seen that as the hub D turns in the operation of the machine the needle bar 1 will be reciprocated up and down through the medium of the link 2 whereas the actuating sleeve 8 will be rotated through the medium of the pinion 15, which is mounted concentrically in relation to the hub D and the needle bar actuating shaft C, the pinion 15, in the present instance, being of such size in relation to the gear 14, that the actuating sleeve 8 is turned, together with the actuating shaft 4, a third of a revolution for each reciprocation of the needle bar.

In the lower end of the actuating shaft 4 is preferably provided a cylindrical recess 20 in which is adjustably mounted a cylindrical block 21 by means of a set screw 22. The cylindrical block 21 is provided with an eccentric bearing 23 in which is journaled a stud 24, secured to an actuating cam 25, the stud 24 being rotatably secured in the bearing 23 by suitable means such as a screw 26, the head of which engages the top of the cylindrical block 21. The bottom of the cylindrical block 21 is preferably provided with a flange 27, adapted to bear against the bottom of the actuating shaft 4.

The actuating cam 25 is provided with two depending lugs 28 which are spaced apart and adapted to support a needle holder 29 which is preferably pivoted to the lugs 28 by means of a pivot pin 30. The needle holder 29 is provided with a hole 30' in which the upper end of the needle 31 is secured by means of a suitable set screw 32. The needle 31 is set eccentrically to the actuating shaft 4 and also eccentrically to the stud 24 of the actuating cam 25. The actuating cam 25 is adapted to oscillate about a pin 33 in the needle bar 1 which engages a slot 34 in said actuating cam.

The throw of the needle 31 is regulated by the distance the actuating cam 25 is set off the center of the actuating shaft 4 and is further regulated by the distance the needle is set off the center of the actuating cam 25 and also by the position of the pin 33. If the needle 31 were set in the needle holder 29 so as to be in line with the center of the actuating cam 25, it would be found that the needle would in its three successive movements into the material make three stitches which would be equally spaced apart, so as to form an equilateral triangle, but in order to space the stitches at unequal distances apart, the needle is set in the needle holder 29 so as to be off the center of the actuating cam 25, which will permit the needle in its three successive movements into the material to space the stitches at unequal distances apart, so as to form a triangle the sides of which are of different

lengths, depending upon the distance the needle is set off the center of the actuating cam. The relation of the three stitches to each other is also varied by the position of the pin 33 and its relation to the actuating cam 25, the throw of which can be varied in relation to the pin 33 by turning the needle bar 1 which is accomplished by loosening the collar 3. As shown in the drawings, the needle is set at a greater distance off the center of the actuating cam 25 than the actuating cam is set off the center of the actuating shaft 4. In this manner the needle can be adjusted to place two stitches off the hem fold and one on, the stitches off the hem being in line with each other while the stitch in the hem is preferably at right angles to one of the stitches made off the hem. The relative position of the needle in its three consecutive positions before entering the material is shown in Figs. 3, 4 and 5, below each of which is shown in Figs. 6, 7 and 8, the material 35 with the corresponding holes made by the needle which are marked respectively  $a'$ ,  $b'$  and  $c'$ .

The number of stitches to the inch or the distance between the holes  $a'$  and  $b'$  can be regulated by turning needle bar 1 as before described or by changing the position of the pin 33 on the end of the needle bar 1, additional holes 36 being provided for this purpose. In this manner the distance between the holes  $b'$  and  $c'$  can also be varied. In case it is desired to produce a fewer number of stitches to the inch, by increasing the distance between the holes  $a'$  and  $b'$ , the needle holder 29 is provided with an outwardly extending arm 37, the top of which is provided with a cam surface 38 adapted to engage the end of the pin 33, which in such case extends below the bottom of the slot 34 for that purpose.

It will be seen by referring to Fig. 3 that the cam surface 38 is cut away so as to not engage the pin 33 when the needle is in position to place the first stitch off the hem, but when the needle is moved forward by means of the actuating cam 25 to place the second stitch off the hem, as shown in Fig. 4, the needle is given an additional movement forward by the action of the pin 33 on the cam surface 38, which causes the needle-holder 29 to turn on the pivot pin 30 so that the needle will enter the material in advance of where it would otherwise enter. When the actuating cam 25 has moved the needle back to its third position, as shown in Fig. 5, to place the stitch on the hem the cam surface 38 will not engage the pin 33, as the cut away portion of the cam surface 38 will be in approximately the same position as that shown in Fig. 3 for the first position of the needle. The needle holder 29 is held in normal position by means of a spring 39 in a recess 40 in the needle holder and

adapted to bear against the bottom of the actuating cam 25.

The additional throw of the needle can be varied by adjusting the position of the pin 33 so that the same will extend to a greater or less distance below the bottom of the slot 34, or by varying the shape of the cam surface 38. The additional throw of the needle is only necessary when a comparatively few number of stitches to the inch are required, but ordinarily where more stitches to the inch are required the pin 33 is so adjusted as to not engage the cam surface 38. The throw of the needle can also be adjusted to vary the number of stitches to the inch by inserting different cylindrical blocks 21, in which the bearing 23 is set more or less off the center of the actuating shaft 4. Different needle holders 29 may also be provided in which the needle may be inserted at various distances off the center of the actuating cam 25.

When the movements of the needle are regulated as above described, it will be seen that the material remains stationary during the three successive reciprocations of the needle and is fed forward only after the needle has entered the hem and it is necessary to repeat the succession of stitches; the material in each instance being fed forward a distance equal to the distance between the holes  $a'$  and  $b'$ , so that the needle will in its second downward movement to place the second stitch off the hem, enter the hole  $a'$  of the preceding series of stitches making a series of stitches as shown in Fig. 13. A piercer 45 is provided which is secured to needle bar 1 in one of the holes 36, such piercer being adapted to puncture the material off the hem fold at every descent of the needle.

Any suitable means for feeding the material may be employed, although in the present instance it is constructed as follows: The needle bar actuating shaft C has, it will be supposed, two cranks, which actuate like connecting rods 50 and 51, engaging respectively two cranks on the under shaft 52, provided at its front end with a gear 53 which meshes with a gear 54, secured to one end of a short shaft 55, near the middle of which is secured a beveled gear 56 secured to a shaft 57, which meshes with gear 571, the rotation of which operates a suitable shuttle. Secured near the center of the under shaft 52 is a small gear 58 which meshes with a large gear 59 secured to a shaft 60. The gear 59 is rotated once for each three rotations of the shaft 52 and has connected to or forming part of it a cam 61 (as shown in Fig. 10), said cam having a cam groove 62, in which enters a stud 63 which is secured to an arm 64, secured to one end of a short shaft 65 the other end of which is secured to a feed rocker 66, provided with a groove 67

in which enters a shoe or block 68 secured to one end of a lever 69, the other end of which is secured to an arm 70 which actuates the rock shaft 71. Secured to the rock shaft 71 is an arm 72 provided with a stud 73 which engages the rear end of a bar 74 carrying a dog which is adapted to engage the under side of and move the material. The lever 69 has pivoted to its lower end a link 75, by which the lever 69 may be raised or lowered to vary the length of the stitch. The nearer the block 68 is to the center of oscillation of the shaft 65, the shorter the stitch. The shaft 60 has secured to its other end a cam 76 which operates an arm 77 secured to one end of a rock shaft 78 the other end of which is provided with an arm 79 which engages the forward end of the bar 74. It will be obvious that the feeding device may be so actuated that the same will feed the material forward once to every three revolutions of the needle bar actuating shaft.

What I claim is:—

1. A stitch forming mechanism for sewing machines comprising a reciprocating needle bar, an actuating shaft rotatably mounted therein, and means for continually rotating said actuating shaft without interruption, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

2. A stitch forming mechanism for sewing machines comprising a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve connected to actuating shaft and means for continually rotating said actuating sleeve, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

3. A stitch forming mechanism for sewing machines comprising a reciprocating needle bar, an actuating shaft rotatably mounted therein, and means for continually rotating said actuating shaft without interruption, a needle holder, and means for operatively connecting said needle holder to said actuating shaft, the means for rotating said actuating shaft being arranged to rotate said actuating shaft a part of a revolution for each reciprocation of the needle bar.

4. A stitch forming mechanism comprising a reciprocating needle bar, an actuating shaft rotatably mounted therein, means for continually rotating said shaft a third of a revolution for each reciprocation of the needle bar, a needle holder eccentrically mounted on said shaft and arranged to produce a series of stitches.

5. A stitch forming mechanism comprising a reciprocating needle bar, an actuating shaft rotatably mounted therein, means for continually rotating said shaft a third of a revolution for each reciprocation of the

needle bar, a needle holder eccentrically mounted on said shaft and arranged to produce a series of stitches, and means for feeding the material after the series of stitches have been produced.

6. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, a needle holder pivotally connected to said needle bar and arranged to be reciprocated thereby, a rotatable shaft and means operated thereby arranged to oscillate said needle holder, and means for continually rotating said shaft, arranged to rotate same through complete rotations in one direction.

7. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, a needle holder pivotally connected to said needle bar and arranged to be reciprocated thereby, a rotatable shaft and means operated thereby arranged to oscillate said needle holder, means for continually rotating said shaft, arranged to rotate same through complete rotations in one direction, and means for regulating the oscillations of said needle holder.

8. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve movably secured to said shaft, means for continually rotating said sleeve and means for reciprocating said needle bar, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

9. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve movably secured to said shaft and mounted on said needle bar, means for continually rotating said sleeve and means for reciprocating said needle bar, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

10. A stitch forming mechanism for sewing machines comprising in combination, a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve movably secured to said shaft, a gear on said sleeve and a pinion meshing with said gear for rotating said sleeve, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

11. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve movably secured to said shaft, a gear on said sleeve, a driving shaft, and a pinion meshing with said gear and connected to said driving shaft for rotating said sleeve

and said actuating shaft, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

12. A stitch forming mechanism for sewing machines comprising in combination a reciprocating needle bar, an actuating shaft rotatably mounted therein, an actuating sleeve movably secured to said shaft, a gear on said sleeve, a driving shaft, a pinion meshing with said gear and connected to said driving shaft for rotating said sleeve and said actuating shaft, and means con-

necting said needle bar and said driving shaft for reciprocating said needle bar, a needle holder, and means for operatively connecting said needle holder to said actuating shaft.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JAMES LEATHEM.

Witnesses:

LEO J. MATHY,

FRANCIS J. CRYSTAL.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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