

Jan. 12, 1932.

G. M. EAMES

1,840,571

STITCH FORMING MECHANISM FOR SEWING MACHINES

Filed Nov. 9, 1928

3 Sheets-Sheet 1

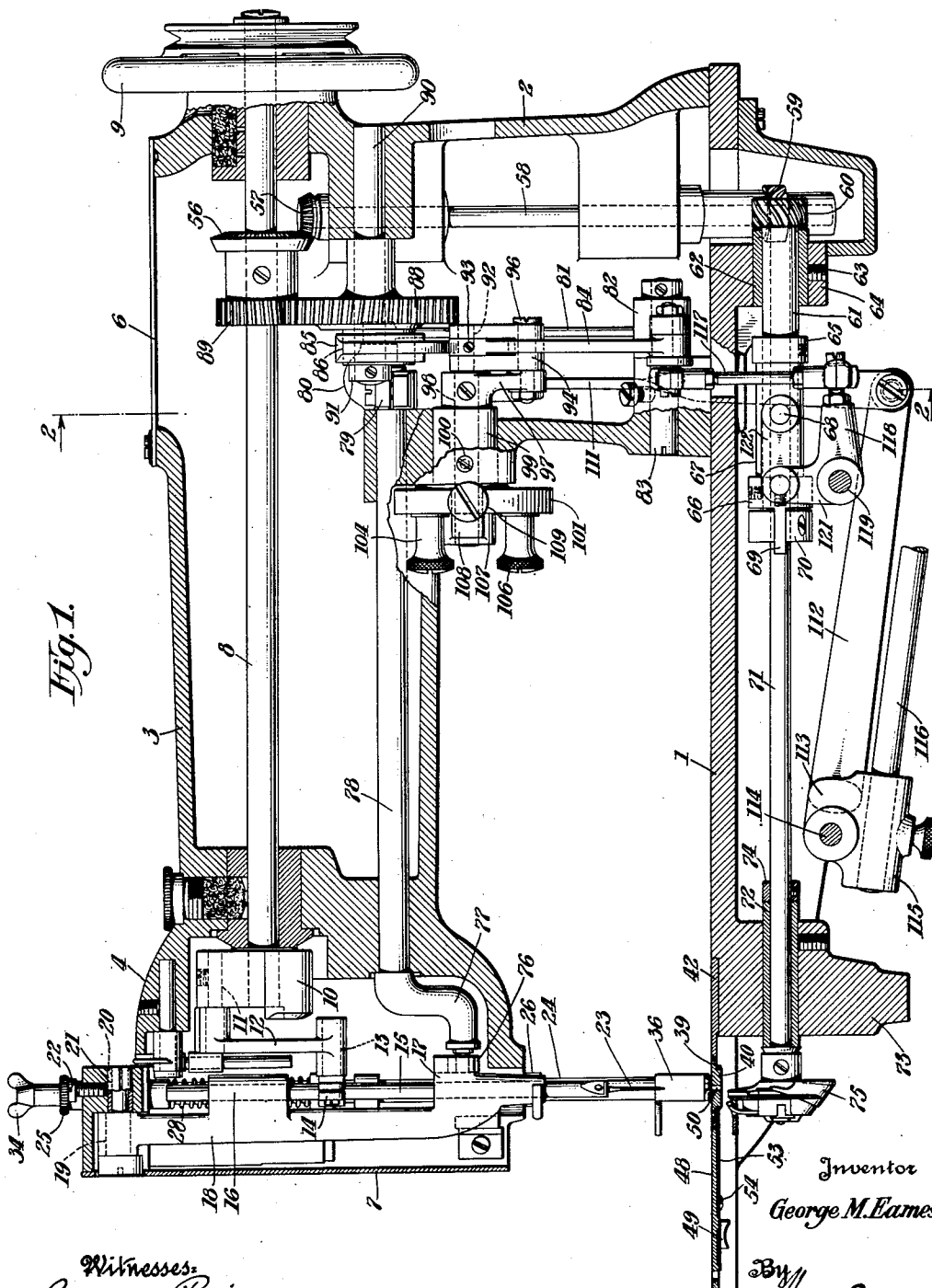


Fig. 1.

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3 Sheets-Sheet 2

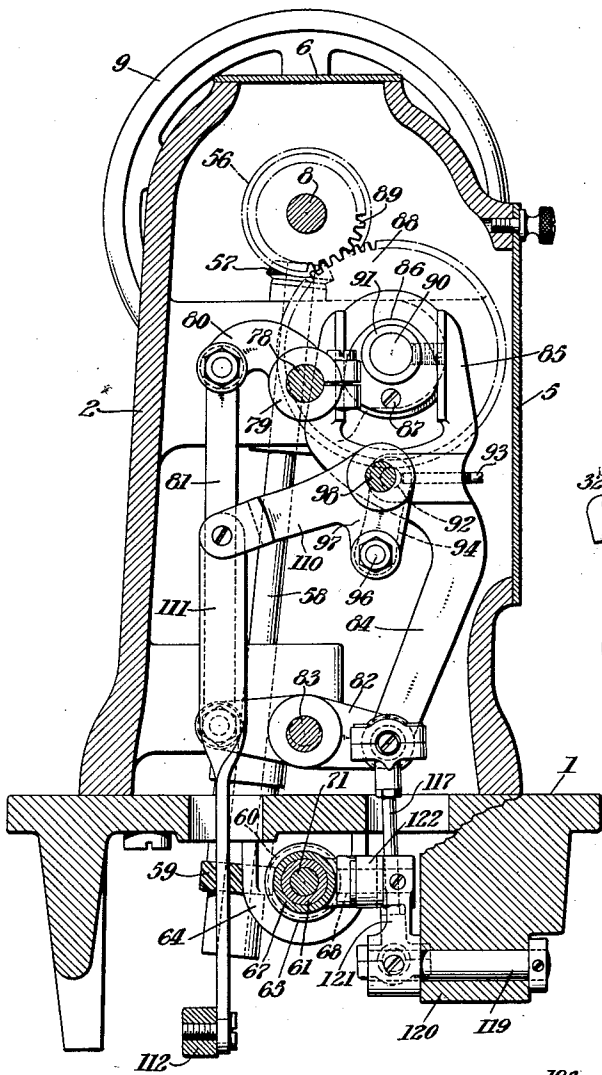


Fig. 2.

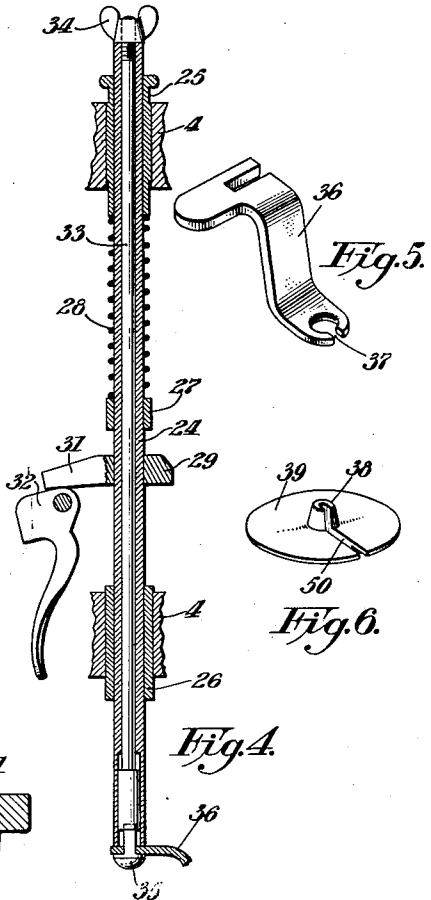


Fig. 4.

Fig. 8.

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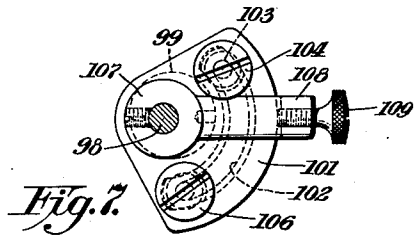


Fig. 7.

Fig. 5.

Fig. 6.

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STITCH FORMING MECHANISM FOR SEWING MACHINES

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3 Sheets-Sheet 3

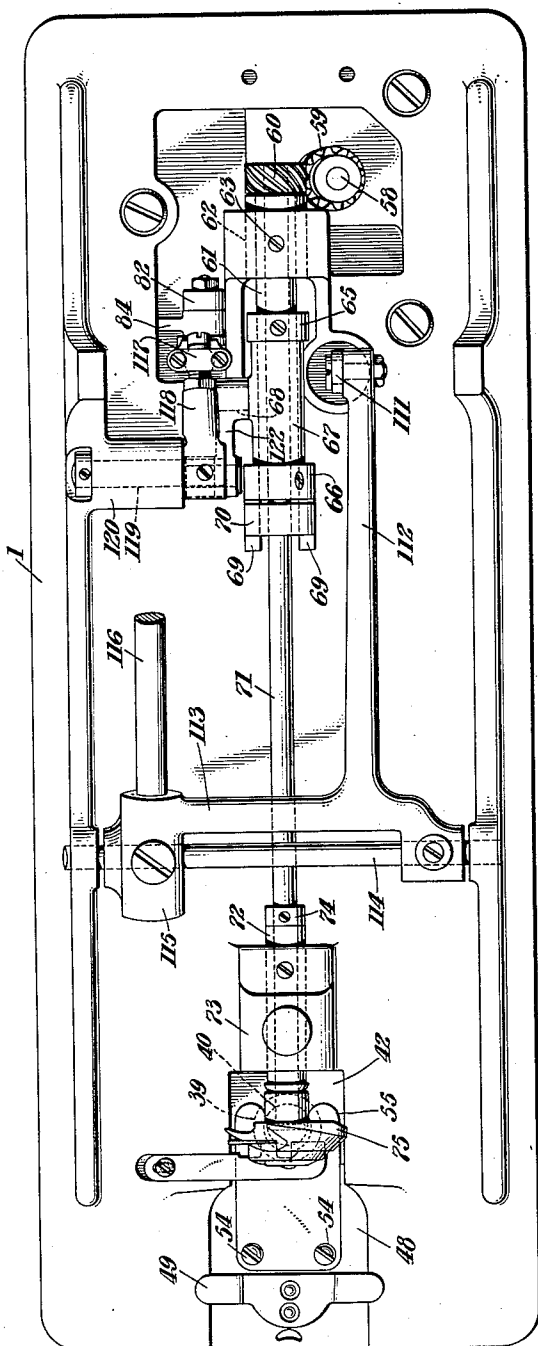


Fig. 3.

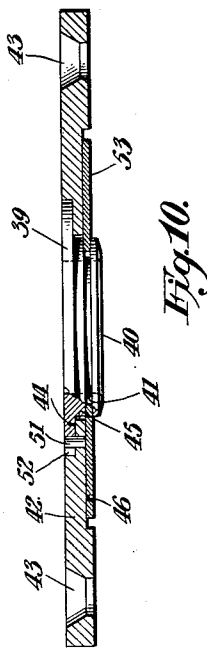


Fig. 10.

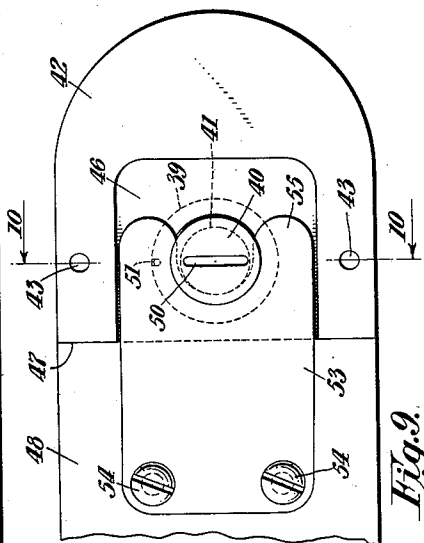


Fig. 9.

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STITCH-FORMING MECHANISM FOR SEWING MACHINES

Application filed November 9, 1928. Serial No. 318,174.

This invention relates to improvements in sewing machines adapted more particularly for embroidering and has for its object to provide an improved actuating mechanism for the stitch-forming elements of machines of this type.

In a preferred embodiment of the invention, the needle-carrying bar is journaled for endwise reciprocation in a laterally swinging frame which is suitably connected with a crank-arm upon the forward end of a needle-vibrating rock-shaft journaled lengthwise in the usual overhanging bracket-arm of a sewing machine. This rock-shaft carries another crank-arm connected by means of a link with a lever disposed within and fulcrumed upon the bracket-arm standard. Pivotally connected to said lever is a pitman-bar having a fork straddling a rotatable cam suitably timed to impart to said pitman-bar uniform lateral movements about its pivot of which one in each direction is effected for every complete reciprocation of the needle. Pivotally connected to the pitman-bar is a link which is fulcrumed upon the crank-arm of a short rock-shaft eccentrically journaled in a bushing which is adjustably secured upon the machine bracket-arm. By means of suitable treadle connections, the link fulcrum may be swung in opposite directions transversely of the pitman-bar into positions wherein lateral movements of the pitman-bar are resolved into endwise movements thereof, said endwise movements of the pitman-bar being transmitted to the needle-vibrating rock-shaft through the described connections.

The link-fulcrum carrying shaft is limited in its rocking movements by adjustable stops, whereby the extent of lateral vibration of the needle may be definitely determined under treadle control. Means are also provided for securing the link-fulcrum in a predetermined position adjustably selected according to the extent or absence of vibration of the needle, as may be desired. By adjustment of the bushing which affords the eccentric journal for the link-fulcrum rock-shaft, the field of vibration of the needle may be changed, means being provided for obtaining

a substantially vertical path of reciprocation of the needle in its position of non-vibration, regardless of the selected field.

In order to accelerate and retard the rotation of the loop-taker, employed for cooperation with the needle, whereby to compensate for the lateral movements of the needle, the endwise movements of the pitman-bar are transmitted to a sleeve shiftable endwise upon and rotatable with the loop-taker carrying shaft, which is fixed against endwise movement. This sleeve carries a spiral gear in mesh with a similar driving gear therefor, the endwise movements of the sleeve carrying the driven gear across the face of its driving gear and thereby effecting the required acceleration and retardation of the loop-taker.

In the accompanying drawings, Fig. 1 is a longitudinal section of a sewing machine embodying the present improvements. Fig. 2 is a sectional view substantially on the line 2—2 of Fig. 1. Fig. 3 is a bottom plan view of the sewing machine. Fig. 4 is a longitudinal section of the presser bar of the machine. Fig. 5 is a perspective view of a presserfoot employed for eyeleting. Fig. 6 is a perspective view of a spur throat-plate employed for eyeleting. Fig. 7 is a face view of the needle-throw adjusting device. Fig. 8 is a detail sectional view of one of the stops of said adjusting device. Fig. 9 is a bottom plan view of the detachable parts of the cloth-plate, including the throat-plate and slide-plate. Fig. 10 is a sectional view substantially on the line 10—10 of Fig. 9.

Referring to the drawings, the sewing machine comprises a cloth-plate 1, from which rises the hollow standard 2 of a tubular, overhanging bracket-arm 3, which terminates at its free end in a head 4. The front side of the bracket-arm standard 2 is formed with an enlarged opening closed by a detachable cover-plate 5 to provide for ready access to the mechanism within the bracket-arm, the top of the bracket-arm and the free end thereof being as usual, provided with the cover-plate 6 and the face-plate 7.

Suitably journaled in the bracket-arm 3 is the main actuating shaft 8, carrying at one

end the combined balance-wheel and belt-pulley 9. At its opposite end, the shaft 8 carries a crank-disk 10, in which is secured a crank-pin 11 connected by means of a link 12 with a pin 13 extending laterally from a collar 14 rigidly clamped upon a needle-bar 15. The needle-bar 15 is journaled for endwise reciprocation in vertically aligned apertures provided in spaced bearing lugs 16 and 17 upon a vibratory frame 18, journaled at its upper end upon a fulcrum-pin for swinging movements in directions substantially transverse to the axis of rotation of the shaft 8, i. e., substantially transverse to the longitudinal direction of the cloth-plate 1. The fulcrum-pin 19 has a reduced extension 20 which is eccentric to the journal-axis of the frame 18 and is adjustably secured within a split bushing 21 in an aperture in the head 4, by means of a screw 22. At its lower end, the needle-bar 15 carries a needle 23.

Journaled for vertically directed movements in the head 4 is a tubular presser-bar 24, guided at its upper end within a bushing 25 adjustably threaded into the machine head and at its lower end by a bushing 26 fixed in said head. Interposed between the lower end of the bushing 25 and a collar 27 secured upon the presser-bar is a coil-spring 28, which functions to depress the presser-bar with a pressure determined by adjustment of the bushing 25. The downward movement of the presser-bar may be adjustably limited by a collar 29 suitably secured upon the presser-bar and having a lateral extension 31 overlying the cam portion of a manually operated lifter lever 32 suitably fulcrumed upon the rear side of the head 4.

The presser-feet employed vary in accordance with different kinds of work produced by the machine. For instance in eyeleting, the work-engaging portion of the presser-foot employed conforms with the size of the eyelets to be produced and the eyeleting presser-feet differ from the type employed for flat stitch embroidering. Therefore means are provided for interchangeably securing the required different kinds of presser-feet to the presser-bar with great facility.

To this end, it is preferred to employ presser-foot securing means substantially as disclosed in the prior U. S. patent to W. Myers, No. 1,135,959, April 13, 1915. This securing means comprises, in general, a clamp-rod 33 disposed lengthwise within the tubular presser-bar 24. This clamp-rod 33 is threaded at its upper end to receive a thumb-nut 34 overlying the upper end of the presser-bar and at its lower end has a clamp-head 35 adapted to clamp the shank of a presser-foot against the lower end of the presser-bar. To accommodate this securing means, the presser-feet, as 36, employed are preferably constructed substantially as disclosed in said

prior Patent No. 1,135,959, with the needle-slots, as 37, extending in the direction of the length of the tread portion of each foot, instead of crosswise thereof, to correspond with the direction of vibration of the needle in the present machine.

Likewise, the throat-plates employed are constructed substantially like the throat-plates disclosed in said Patent No. 1,135,959, Fig. 6 of the present drawings illustrating an eyeleting throat-plate provided with the spur 38, and Figs. 1, 9 and 10 the flat-faced throat-plate employed for progressive embroidering. Each of these throat-plates, whether for eyeleting or progressive embroidering, comprises a circular plate 39 having its margin extending beyond a centrally disposed depending hub 40, whereby the margin of the plate 39 constitutes in effect a flange. The hub 40 is provided, as before, with a peripheral groove 41. In the present instance, the throat-plate is sustained by a supporting plate 42 secured upon the machine cloth-plate by screws (not shown) passing through supporting-plate apertures, as 43. The supporting-plate 42 is provided in its upper face with a recessed seat 44 for the throat-plate flange and with a central aperture 45 to receive the throat-plate hub which extends below the recessed lower face 46 of the supporting plate. The supporting-plate 42 terminates in a straight edge 47 directly adjacent to the throat-plate, and adapted to abut against said edge 47 is the end of a retractible slide-plate 48, disposed in a suitable guideway in the upper face of the cloth-plate 1 and yieldingly held in position by the usual slide-plate spring 49 engaging the under side of the cloth-plate.

In order to position the throat-plate upon the supporting plate 42 to definitely align the needle-slot 50 thereof with the direction of needle-vibration, the supporting plate is provided with a locating pin 51 adapted to enter the needle-slot of an eyeleting throat-plate and to enter a notch 52 formed in the periphery of a flat-faced throat-plate. After a throat-plate has been correctly positioned upon its supporting plate, it is locked in this position by a latch-plate 53 secured by screws, as 54 upon the under side of the slide-plate 48, said latch-plate having a bifurcated extension 55 disposed to slide on the face 46 of the supporting plate and to enter the peripheral groove 41 of the throat-plate hub. The present throat-plate securing means therefore not only provides for readily interchanging throat-plates, but also permits of access to the loop-taker below the throat-plate in the accustomed manner of merely retracting the usual slide-plate and without requiring removal of the throat-plate supporting plate.

Fixed upon the main shaft 8 is a bevel-

gear 56 in mesh with a similar gear 57 of one half the size of its driving gear and carried by the upper end of a connecting shaft 58. The shaft 58 is journaled in suitable bearings provided within the standard 2 so as to be disposed slightly inclined to a vertical line and carries at its lower end a spiral-gear 59 in mesh with a spiral-gear 60 upon the rearward end of a primary sleeve 61. The sleeve 61 is journaled for rotation and endwise reciprocation in a bushing 62 secured by means of a set screw 63 in an apertured lug 64 depending from the cloth-plate 1. Secured upon the sleeve 61 are spaced collars 65 and 66 confining a shifting sleeve 67, loosely disposed upon the primary sleeve 61 and carrying a laterally extending pin 68.

Projecting from the collar 66 are the spaced driving keys, as 69, slidably fitted into a grooved collar 70 secured upon a loop-taker shaft 71. The shaft 71 is journaled at its rearward end within the primary sleeve 61 and at its forward end in a bushing 72 fixed in a suitably apertured lug 73 depending from the cloth-plate 1. The shaft 71 is held against endwise movement by a collar 74 fixed upon said shaft at one end of the bushing 72 and by the hub of a loop-taker 75 secured upon the shaft at the other end of said bushing. The loop-taker 75 is in the present instance of the rotary hook type, carrying a mass of under thread around which the needle-thread loops are cast in the formation of lock-stitches.

For the purpose of laterally vibrating the needle, the inner face of the needle-bar frame bearing-lug 17 is grooved to receive a slide-block 76 suitably connected with a crank-arm 77 upon the forward end of a rock-shaft 78, journaled in bearing apertures provided in the bracket-arm 3 below and substantially parallel to the main-shaft 8. Clamped upon the rearward end of said rock-shaft is the split hub 79 of a crank-arm 80 pivotally connected with the upper end of a link 81 of which the lower end is joined in like manner to one arm of a two-armed lever 82. The lever 82 is journaled upon an eccentric fulcrum-pin 83 disposed substantially parallel with the rock-shaft 78 and adjustably secured upon the standard 2 primarily for facilitating in obtaining correct positioning of the parts. The lever 82 is therefore supported for rocking movements upon an axis transverse to the path of needle endwise reciprocation. The other arm of said lever 82 is pivotally connected with the lower end of a pitman-bar 84 having at its upper end a fork 85 straddling a triangular cam 86.

The cam 86 is secured by a screw 87 upon the side of a gear-wheel 88 driven by a gear-wheel 89, fixed upon the main shaft 8 and preferably integral with the securing hub of the bevel-gear 56. The gear-wheel 88 is journaled upon a fulcrum-shaft 90 suitably

fixed in an aperture in the standard 2, said gear-wheel 88 being held against sidewise movement in a direction away from the frame 2, by means of a collar 91 secured upon the end of the fulcrum-shaft 90.

Directly below its fork, the pitman-bar 84 carries a pivot-pin 92, secured by an elongated screw 93 and projecting from opposite sides of the pitman-bar. Pivotally supported by said pivot-pin 92 is a bifurcated link 94 of which the spaced members are disposed upon opposite sides of the pitman-bar, the lower end of said link receiving a pivot-bolt 96, secured upon the free end of a depending lever-arm 97 and constituting the fulcrum of the pitman-bar 84. The hub of the lever-arm 97 is fixed upon a short rock-shaft 98, disposed substantially parallel to the rock-shaft 78 and eccentrically journaled in a bushing 99 rotatably adjustable in a suitable aperture in the standard 2, said bushing being secured in adjusted position, as by means of a screw 100. The provision of a link connection with opposite sides of the pitman-bar 84, as by means of the bifurcated link 94, obviates any tendency toward cramping of the parts.

Preferably integral with the bushing 99 is a segment-plate 101 disposed at the outside of the standard 2 and partly under the bracket-arm 3. This segment-plate 101 is provided with a segmental T-shaped slot 102 in which is slidably disposed an adjustable stop comprising a headed pin 103 having a threaded shank receiving a stop-nut 104 between which and the segment-plate 101 is disposed a washer 105. Adjustably disposed upon the segment-plate is a second stop 106 corresponding in structure to the described stop. Upon the outer end of the rock-shaft 98 is secured the hub 107 of an arm 108 carrying at its overhanging free end a securing screw 109 adapted to engage the periphery of the segment-plate 101 to thereby provide for adjustably securing the rock-shaft 98 against movement.

When the screw 109 is released from engagement with the segment-plate 101, the fulcrum 96 of the pitman-bar is free to be swung about the axis of the rock-shaft 98 in directions substantially transverse to the axis of the needle-vibrating rock-shaft 78. To provide for readily shifting said fulcrum 96 during the operation of the machine, the lever-arm 97 is constructed as one arm of a bell-crank lever, of which the other arm 110 is pivotally connected with the upper end of a twisted link 111. The lower end of the link 111 is pivoted to an arm 112 of a yolk 113 secured upon a transverse rock-shaft 114 journaled in suitable bearings provided therefor at the under side of the cloth-plate 1. The yolk 113 has a socketed boss 115 in which is fixed a knee-shift lever 116 suitably shaped to provide for convenient operation.

The rotation of the loop-taker is accelerated and retarded to compensate for the needle vibration. To this end, an arm of the lever 82 has a ball-joint connection with an extensible link 117 of which the lower end has a similar connection with a horizontally directed arm 118 of a bell-crank lever. This lever is suitably secured upon a short rock-shaft 119 journaled in an apertured lug 120 at the under side of the cloth-plate, said lever having an upwardly directed arm 121 connected by means of a link 122 with the lateral pin 68 of the shifting sleeve 67.

In the operation of the machine, the rock-shaft 78 imparts vibratory movements to the needle-bar frame 18 upon the fulcrum-pin 19. The rock-shaft 78 is actuated by the cam 86 which imparts lateral vibratory movements of uniform extent to the forked pitman-bar 84 about its pivotal connection with the lever 82. It is evident that when the pitman-bar fulcrum 96 intersects an imaginary line through the axis of the cam 86 and the pitman-bar connection with the lever 82, said pitman-bar has no endwise movements and that as a result the needle reciprocates in a constant path. This zero position of the pitman-bar fulcrum, in the present machine, corresponds with the extreme forward path of reciprocation of the needle and is obtained by swinging the arm 108, of the rock-shaft 98 carrying the pitman-bar fulcrum, into engagement with the upper segment-plate stop 104 when the latter occupies its limit of upward movement in the segment-plate slot. The lateral throw of the needle is therefore always in a direction rearward of its zero position, i. e., of its position of reciprocation in a constant path.

However, lateral vibrations of the pitman-bar 84 are resolved into endwise movements thereof by shifting the fulcrum-pin 96 crosswise of the pitman-bar 84, the endwise component of movement depending of course upon the extent that the fulcrum-pin is shifted laterally. A selected extent of throw or lateral vibration of the needle may be fixed by securing the arm 108 to the segment-plate 101 by means of the screw 109. By releasing said screw 109, the extent of vibration of the needle may be varied at will between limits determined by the positions of the stops 104, 106 and by manipulation of a knee-shift through the described connections.

As will be understood from the foregoing description, any endwise movement of the forked pitman-bar 84 will impart rocking movements to the lever 82, which movements are transmitted to the needle-vibrating rock-shaft 78 through the link 81 and crank-arm 80. The rocking movements of the lever 82 are also transmitted to the bell-crank lever 118, 121 by means of the link 117, thereby reciprocating the sleeve 61 endwise and causing the spiral gear 60 to slightly travel across the face of its driving gear 59, resulting in accelerated or retarded rotation of the loop-taker dependent upon the direction of movement of the sleeve 61.

By circularly adjusting the bushing 99, the field of vibration of the needle may be varied, because the rock-shaft 98 which is eccentrically journaled in said bushing is thereby carried laterally in a direction crosswise of the pitman-bar 84. As any change in the field of vibration of the needle is effected through the needle-frame vibrating connections, it is apparent that the direction of the paths of endwise reciprocation of the needle is thereby altered. In order to compensate for this change in the direction of the paths of needle-reciprocation, the fulcrum axis of the needle-frame 18 may be shifted by adjustment of the eccentric fulcrum-stud 19, 20. Preferably the adjustment of this fulcrum-stud is employed for obtaining a substantially vertical path of reciprocation of the needle in its zero position, i. e., in its position of non-vibration, in any selected field of vibration.

While the present machine includes no work-feeding mechanism, it is to be understood that the needle and loop-taker actuating mechanism herein described is not limited to a machine in which the feed of the work is manually effected, as it is obvious that any suitable feeding mechanism might be employed to advance the work.

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

1. In a sewing machine, a reciprocatory needle-carrying bar, a rotary actuating shaft, operative connections with said shaft for reciprocating said bar, a laterally movable needle-bar frame, a support for said frame, a rock-shaft disposed substantially parallel with said actuating shaft, operative connections between the rock-shaft and said frame, a pitman-bar, means for imparting lateral movements to said pitman-bar, a swinging link connected with said pitman-bar, a support for said link shiftable into positions whereby lateral movements of the pitman-bar are resolved into endwise movements thereof, and operative connections with said pitman-bar for transmitting the endwise movements thereof to said rock-shaft.
2. In a sewing machine, a reciprocatory needle-carrying bar, a rotary actuating shaft, operative connections with said shaft for reciprocating said bar, a laterally movable needle-bar frame, a support for said frame, a rock-shaft disposed substantially parallel with said actuating shaft, operative connections between the rock-shaft and said frame, a pitman-bar, means for imparting lateral movements to said pitman-bar, a swinging link connected with said pitman-bar, a crank-arm connected with said link, a support for said crank-arm permitting swinging move-

ments thereof, means for swinging said crank-arm into positions causing resolution of lateral movements of said pitman-bar into endwise movements thereof, and means for transmitting the endwise movements of the pitman-bar to said rock-shaft.

3. In a sewing machine, a reciprocatory needle-carrying bar, a rotary actuating shaft, operative connections with said shaft for reciprocating said bar, a laterally movable needle-bar frame, a support for said frame, a rock-shaft disposed substantially parallel with said actuating shaft, operative connections between the rock-shaft and said frame, a forked pitman-bar, a cam engaging the fork of said pitman-bar, a swinging link connected with said pitman-bar, a shiftable fulcrum for said link, and operative connections with the pitman-bar for transmitting rocking movements to said rock-shaft.

4. In a sewing machine, a reciprocatory needle-carrying bar, means for reciprocating said bar, a laterally movable needle-bar frame, a rock-shaft, operative connections between the rock-shaft and said frame, a pitman-bar, means for imparting uniform lateral movements to said pitman-bar, a swinging link connected with said pitman-bar, a crank-arm pivotally supporting said link, a pivotal support for the crank-arm, adjustable means for limiting the swinging movements of said crank-arm, treadle connections for swinging said crank-arm into positions favorable for resolution of lateral movements of said pitman-bar into endwise movements thereof, and means for transmitting the endwise movements of the pitman-bar to said rock-shaft.

5. In a sewing machine, a reciprocatory needle-carrying-bar, means for reciprocating said bar, a laterally movable needle-bar frame, a needle-bar vibrating rock-shaft operatively connected with said frame, a pitman-bar, means for imparting lateral movements to said pitman-bar, a swinging link connected with said pitman-bar, a crank-arm having a pivotal connection with said link affording a fulcrum for said pitman-bar, a crank-arm carrying rock-shaft, a stationary segment-plate provided with a guide-slot, a stop adjustably shiftable in the segment-plate slot, an arm carried by the crank-arm rock-shaft limited in its swinging movement in one direction by said stop, treadle connections for swinging said crank-arm into positions limited by said stop whereby the lateral movements of said pitman-bar are resolved into endwise movements thereof, and means for transmitting the endwise movements of the pitman-bar to said needle-bar vibrating rock-shaft.

6. In a sewing machine, an endwise reciprocatory and laterally vibratory needle-carrying bar, means for reciprocating said needle-bar, a forked pitman-bar, a rotary cam

for laterally vibrating said pitman-bar, a swinging link connected with said pitman-bar, a crank-arm pivotally supporting said link, a rock-shaft carrying said crank-arm, a bushing having a bearing aperture eccentric to its periphery in which said rock-shaft is journaled, a segment-plate carried by said bushing, spaced stops adjustably secured upon said segment-plate, a stop-arm carried by said rock-shaft having a range of movement limited by said stops, means for adjustably securing said stop-arm to said segment-plate, means for shifting said crank-arm in the released condition of the stop-arm to resolve lateral movements of said pitman-bar into endwise reciprocatory movements, operative connections for laterally vibrating the needle-bar by the endwise movements of the pitman-bar, and means permitting adjustment of said bushing to bodily shift said crank-arm rock-shaft and thereby change the field of vibration of the needle.

7. In a sewing machine, the combination with stitch-forming mechanism comprising a needle, an endwise reciprocatory and laterally vibratory needle-bar carrying said needle, a needle-bar frame, means for reciprocating said needle-bar, a lever supported for rocking movements upon an axis transverse to the path of needle endwise reciprocation, a pitman-bar pivotally connected with said lever, means for vibrating said pitman-bar about its pivotal connection with the lever, a swinging link connected with said pitman-bar, a fulcrum for said link shiftable crosswise of said pitman-bar into positions favorable for resolution of lateral movements of the pitman-bar into endwise reciprocations thereof, and operative connections for transmitting endwise movements of said pitman-bar from the lever to said needle-bar frame.

8. In a sewing machine, an endwise reciprocatory and laterally vibratory needle-bar, means for reciprocating said needle-bar, a needle-bar vibrating rock-shaft, a pitman-bar, means for imparting uniform lateral movements to said pitman-bar, a link pivotally connected with said pitman-bar, a crank-arm pivotally connected with said link, crank-arm supporting means, means for swinging said crank-arm into positions favorable for resolution of lateral movements of said pitman-bar into endwise movements thereof, operative connections with said pitman-bar for transmitting its endwise movements to the needle-vibrating rock-shaft, and adjustable means for bodily shifting said crank-arm supporting means to thereby change the field of vibration of the needle-bar.

9. In a sewing machine, an endwise reciprocatory and laterally vibratory needle-bar, means for reciprocating said needle-bar, a needle-bar vibrating rock-shaft a pitman-bar, means for laterally vibrating said pit-

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- man-bar, a link pivotally connected with said pitman-bar, a crank-arm pivotally connected with said link, a crank-arm supporting rock-shaft, means for swinging said crank-arm into positions favorable for resolution of lateral vibrations of said pitman-bar into endwise movements thereof, operative connections with said pitman-bar for transmitting its endwise movements to the needle-vibrating rock-shaft, a bushing providing an eccentric journal for the crank-arm supporting rock-shaft, and means permitting adjustment of said bushing to bodily shift the rock-shaft journaled therein and thereby change the field of vibration of the needle-bar.
10. In a sewing machine, the combination with stitch-forming mechanism comprising a needle, an endwise reciprocatory and laterally vibratory needle-bar carrying said needle, means for reciprocating said needle-bar, a cooperating loop-taker, and actuating means for said loop-taker, of a laterally movable needle-bar frame, a two-armed lever, a pitman-bar pivotally connected with one arm of said lever, operative connections between the other arm of said lever and the needle-bar frame, means for imparting to said pitman-bar uniform lateral movements about its pivot of which one in each direction is effected for every complete reciprocation of the needle, a swinging link pivotally connected to said pitman-bar, supporting means for said link shiftable into positions causing endwise reciprocations of said pitman-bar by the lateral movements thereof to thereby rock said lever, and operative connections between said lever and the loop-taker actuating means for compensating the loop-taker movements in accordance with the extent of lateral vibrations of the needle.
11. In a sewing machine having a cloth-plate and a bracket-arm overhanging the cloth-plate, the combination with an actuating shaft, a needle-carrying bar operatively connected with said shaft to derive endwise reciprocations therefrom, a loop-taker, and a rotary loop-taker actuating shaft, of a laterally movable needle-bar frame, a rock-shaft disposed lengthwise of said bracket-arm, operative connections between the rock-shaft and said needle-bar frame, a two-armed lever, operative connections between one arm of said lever and said rock-shaft, a pitman-bar pivotally connected with the other arm of said lever, means for imparting lateral vibratory movements to said pitman-bar about its pivotal connection with said two-armed lever, a swinging link connected with said pitman-bar, a crank-arm connected with said link, means for swinging said crank-arm into positions favorable for resolution of lateral movements of the pitman-bar into endwise movements thereof, a bell-crank lever, a link connection between the bell-crank lever and said two-armed lever, a sleeve shiftable lengthwise upon and rotatable with said loop-taker actuating-shaft, a spiral driven-gear carried by said sleeve, a spiral driving-gear in mesh with said driven gear, and operative connections between said bell-crank lever and the shiftable sleeve for carrying said driven gear across the face of its driving gear and thereby accelerating and retarding the rotations of the loop-taker.
12. In a sewing machine, a needle, actuating mechanism for reciprocating said needle, actuating mechanism for laterally vibrating said needle, a loop-taker cooperating with said needle, a rotary loop-taker carrying shaft fixed against endwise movement, a sleeve slidable endwise upon and rotating with said shaft, a driven spiral-gear carried by said sleeve, a driving spiral-gear in mesh with said driven gear, and operative connections between said sleeve and the needle vibrating-mechanism for reciprocating said sleeve to carry the driven spiral gear across the face of its driving gear and thereby accelerate and retard the rotations of the loop-taker in accordance with the extent and direction of lateral vibration of the needle.
13. In a sewing machine having a cloth-plate and a bracket-arm overhanging the cloth-plate, a rotary actuating shaft journaled in said bracket-arm, a needle-carrying bar, means for reciprocating the needle-bar from said shaft, actuating mechanism for laterally vibrating said needle-bar, a loop-taker, a rotary shaft carrying said loop-taker fixed against endwise movement, a sleeve slidable endwise upon and rotatable with the loop-taker carrying shaft, a driven gear-member carried by said sleeve, a driving gear-member in mesh with said driven gear-member, a vertically directed intermediate shaft carrying said driving gear, connections for rotating said intermediate shaft from the actuating shaft journaled in said bracket-arm, and operative connections with the needle-vibrating mechanism for reciprocating said sleeve to carry said driven gear-member across the face of its driving gear-member to thereby effect acceleration and retardation of the loop-taker in accordance with the extent and direction of lateral vibration of the needle.
14. In a sewing machine, a needle-bar, a swinging frame in which said needle-bar is journaled for endwise reciprocation, actuating mechanism operatively connected with said frame for imparting swinging movements thereto, and a support providing a pivotal axis for said frame disposed substantially transverse to the needle-bar and shiftable independently of the frame-swinging connections for adjustably determining the direction of the paths of endwise reciprocation of the needle-bar.
15. In a sewing machine, a needle-bar, a

5 swinging frame in which said needle-bar is
journalled for endwise reciprocation, actuat-
ing mechanism operatively connected with
said frame for imparting swinging move-
ments thereto, a support providing a pivotal
10 axis for said frame substantially transverse
to the needle-bar and shiftable independently
of the frame-swinging connections for ad-
justably determining the direction of the
paths of endwise reciprocation of the needle-
bar in any selected field of vibration of said
needle-bar, and means for adjustably deter-
15 mining the field of lateral vibration of the
needle-bar.

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

GEORGE M. EAMES.

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