Dec. 17, 1935. G. M. EAMES 2,024,434

FEEDING MECHANISM FOR SEWING MACHINES

Original Filed Oct. 3, 1933 4 Sheets-Sheet 1

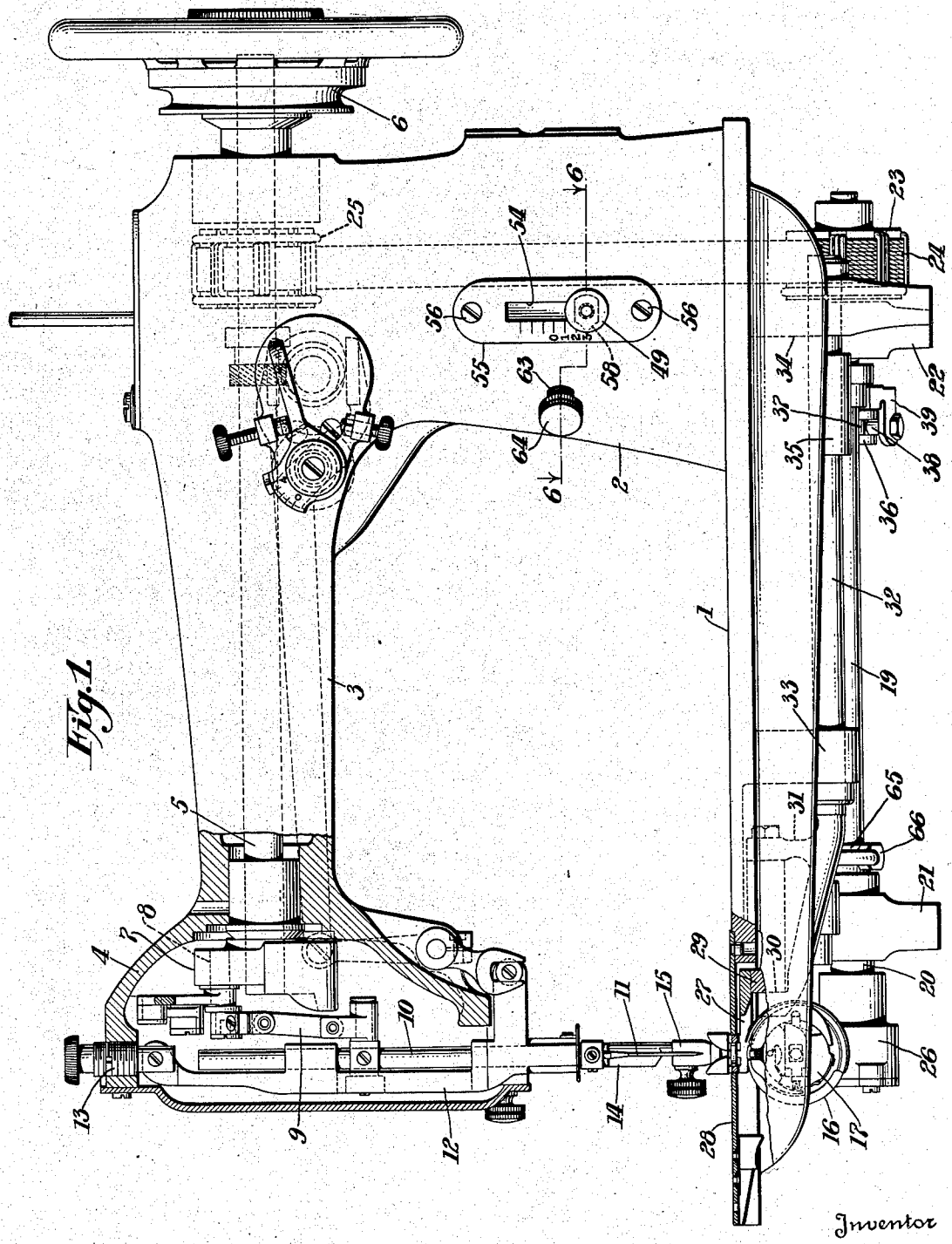

Fig. 1

Inventor

George M. Eames

Witness:

Godfrey Peering

By Henry J. Miller

Attorney

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Original Filed Oct. 3, 1933 4 Sheets-Sheet 2

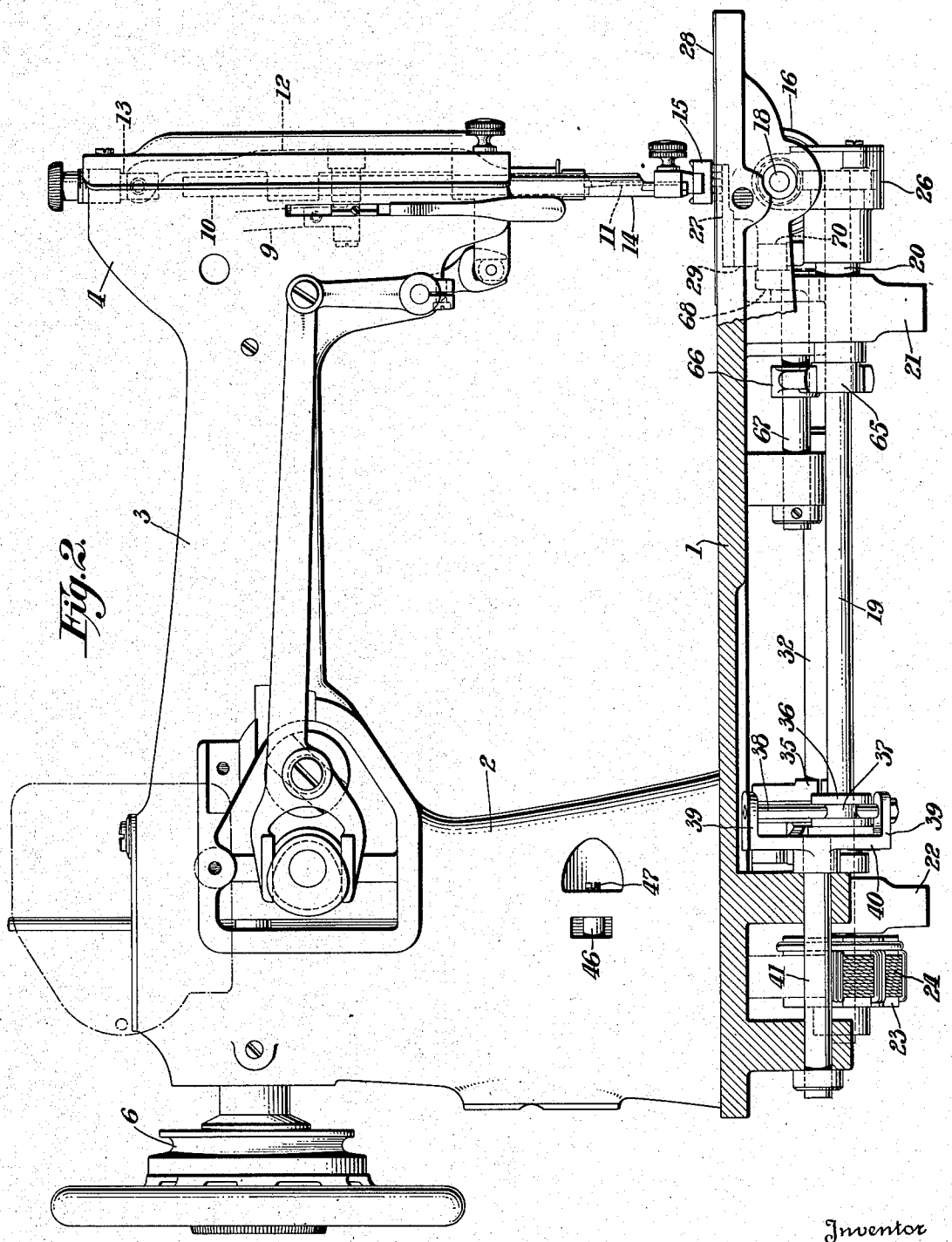

Fig. 2.

Inventor
George M. Eames

Witness:
Godfrey Peirce

By Henry J. Miller
Attorney

Dec. 17, 1935. G. M. EAMES 2,024,434

FEEDING MECHANISM FOR SEWING MACHINES

Original Filed Oct. 3, 1933 4 Sheets-Sheet 3

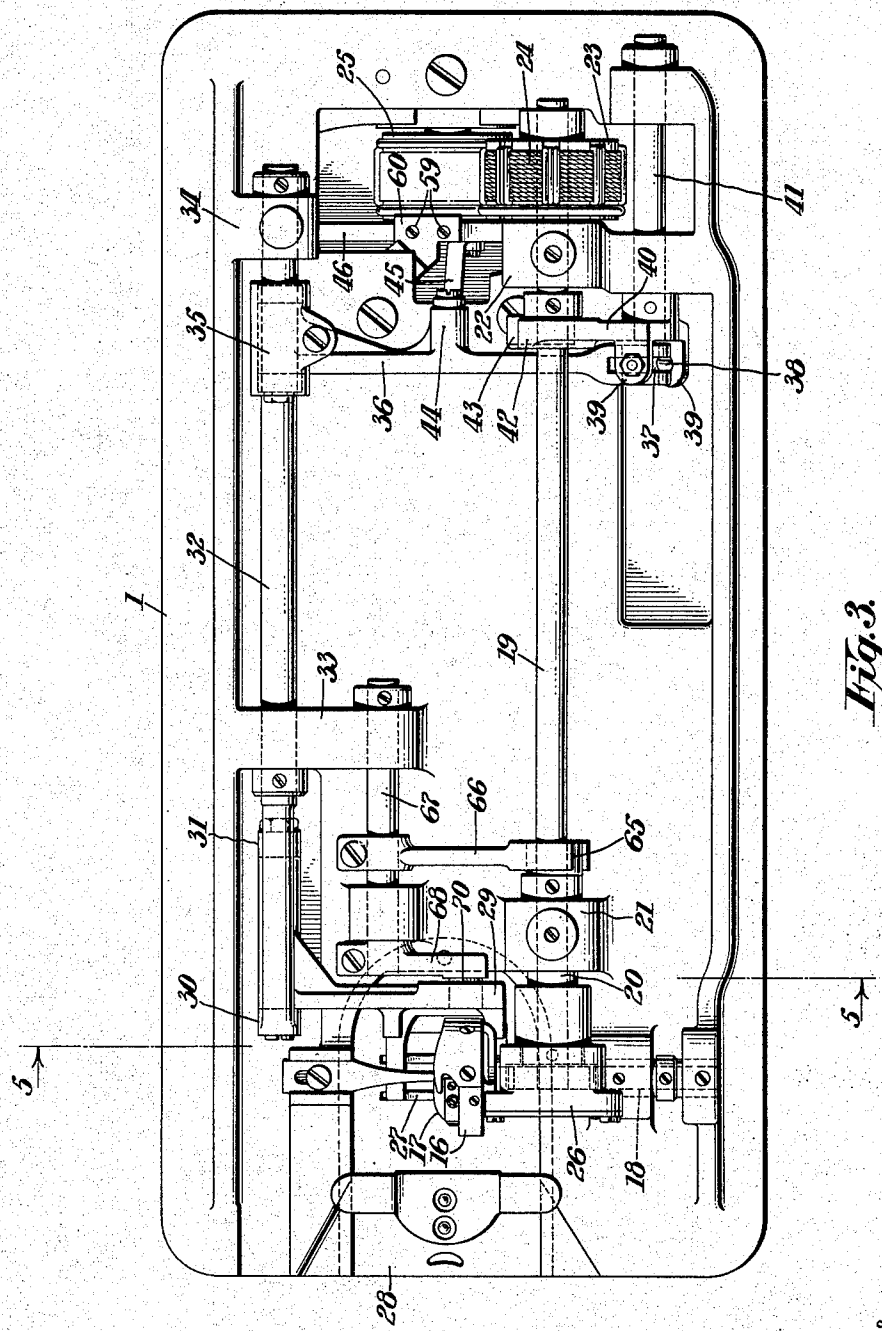

Fig. 3.

Inventor

George M. Eames

Witness:

Godfrey Peirce

By Henry J. Miller

Attorney

Dec. 17, 1935. G. M. EAMES 2,024,434

FEEDING MECHANISM FOR SEWING MACHINES

Original Filed Oct. 3, 1933 4 Sheets-Sheet 4

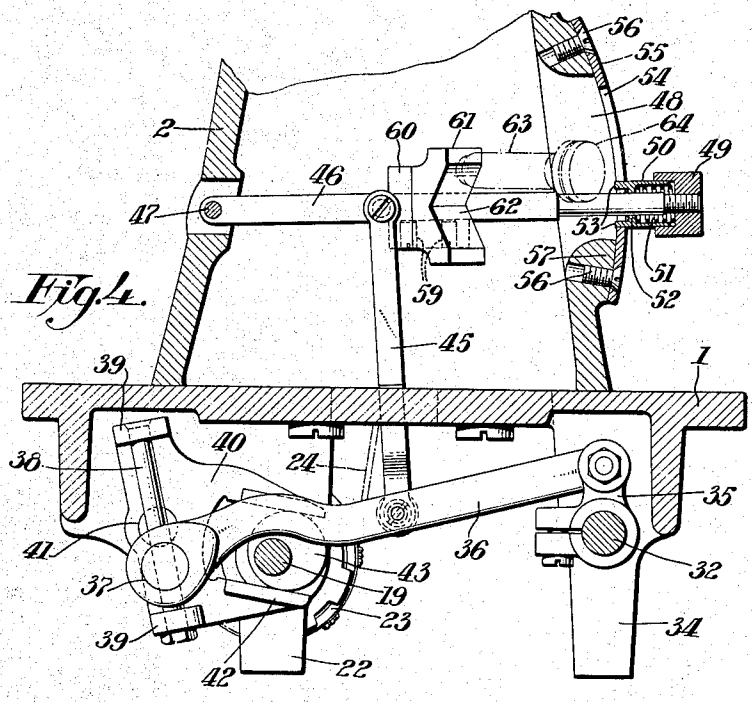

Fig. 4.

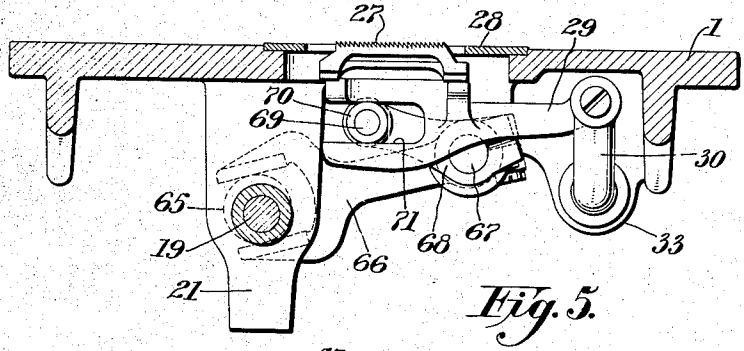

Fig. 5.

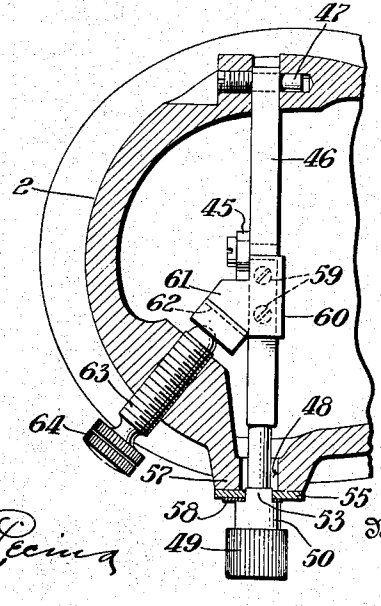

Fig. 6.

Inventor

George M. Eames

Witness:

Godfrey Peering

By Henry J. Miller

Attorney

Patented Dec. 17, 1935 2,024,434

UNITED STATES PATENT OFFICE

2,024,434

FEEDING MECHANISM FOR SEWING MACHINES

George M. Eames, Bridgeport, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Original application October 3, 1933, Serial No. 691,938. Divided and this application March 13, 1934, Serial No. 715,269

7 Claims. (Cl. 112—210)

This invention relates to improvements in work-feeding mechanisms for sewing machines and has for an object to provide a reversible feed mechanism of simple construction and adapted to be readily assembled. Another object of the invention is to provide a feeding mechanism adapted for embodiment in a sewing machine having a loop-taker rotatable about an axis substantially parallel to the line of feed. A still further object of the invention is to provide improved means for controlling the direction and amplitude of feed of the work past the stitch-forming mechanism of a sewing machine.

With the above and other more specific objects in view, the invention comprises the devices, combinations and arrangements of parts hereinafter described in connection with the accompanying drawings which illustrate a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

This application is a division of my prior patent application Serial No. 691,938, filed Oct. 3, 1933.

In the accompanying drawings, Fig. 1 is a front side elevation, partly in section, of a sewing machine containing the present improved feeding mechanism. Fig. 2 is a rear side elevation, partly in section, of the sewing machine. Fig. 3 is a bottom plan view of the sewing machine. Fig. 4 is a vertical section of a portion of the bracket-arm standard and of the machine bed-plate, taken transversely of the length of said bed-plate and illustrating the reverse-feed actuating and controlling mechanism. Fig. 5 represents a transverse section of the machine bed-plate taken substantially on the line 5—5, of Fig. 3 and illustrating the feed-bar connections. Fig. 6 represents a fragmentary section of the bracket-arm standard taken substantially on the line 6—6 of Fig. 1.

Referring to the drawings, the present improvements have been embodied in a sewing machine having a flat bed-plate 1, affording a work-support, and from one end of which rises the hollow standard 2 of a bent bracket-arm 3, overhanging the bed-plate and terminating in a head 4.

Rotatably journaled in suitable bearings provided in said bracket-arm 3 is a horizontally disposed main-shaft 5, extending lengthwise of the bracket-arm and carrying at one end a driving pulley 6. At its opposite end, the main-shaft 5 carries a crank 7 provided with a crank-pin 8 connected by a jointed link 9 to a vertically disposed needle-bar 10 carrying at its lower end a needle 11. The needle-bar 10 is journaled for endwise reciprocation in suitable bearings provided upon a vibratory gate 12, disposed within the bracket-arm head 4. The upper end of the gate 12 is pivotally hung upon a supporting member 13 adjustably threaded vertically into the upper wall of the head 4, the pivotal axis of the gate 12 being in the present case transverse to the axis of rotation of the main-shaft 5. The lower end of the gate 12 is slidably disposed in a suitable guideway provided in the head 4 and is operatively connected to actuating mechanism adapted to vibrate said gate in suitably timed relation to the vertically reciprocatory movements of the needle-bar 10. The needle-vibrating mechanism is described and claimed in my prior patent application Serial No. 691,938, before mentioned.

The usual spring-depressed presser-bar 14 is journaled for vertical movement in the bracket-arm head 4, said presser-bar carrying at its lower end a presser-foot 15.

Cooperating with the needle 11 below the work-support is a loop-taker 16 of the horizontal-axis rotary hook type, in which hook is journaled a thread-case 17 containing a bobbin or mass of under thread around which the needle-thread loops are cast in the formation of lock-stitches. To better accommodate cooperation with the needle 11 in different paths of reciprocation of the latter, the loop-taker 16 is supported for rotation in a vertical plane rearwardly of and parallel to the plane of needle-vibration, the open side of said loop-taker being directed forwardly. The loop-taker 16 is secured upon a loop-taker shaft 18 extending horizontally rearwardly from the loop-taker transversely of the plane of needle-vibration, said shaft 18 being journaled in suitable bearing lugs depending from the bed-plate 1.

Disposed below and extending transversely of the loop-taker shaft 18 is one end of a horizontal loop-taker actuating shaft 19, connected by spiral gears to the shaft 18 to rotate the loop-taker 16 twice for each needle reciprocation. The spiral-gear carrying end of the loop-taker actuating shaft 19 is rotatably journaled in a bearing-bushing 20 fixed in a lug 21 depending from the bed-plate 1. Adjacent to its other end, the loop-taker actuating shaft 19 is suitably journaled in a bearing lug 22 and carries a belt-pulley 23 connected by a clip-belt 24, with a pulley 25 upon the main-shaft 5. The shafts 5 and 19 rotate in one-to-one relationship.

Because of the gear connections between the shafts 18 and 19, and the described arrangement of the loop-taker 16, the loop-taker actuating shaft 19 is spaced substantially below the work-support and rearwardly of the median width thereof, i. e., the loop-taker actuating shaft is disposed rearwardly of a vertical plane containing the axis of rotation of the main-shaft 5. The spiral gears connecting the shafts 18 and 19 are preferably housed in a gear casing 26 detachably secured upon the bearing bushing 20.

Embodied in the machine is a reversible feed mechanism adapted to advance the work, selectively in either of opposite directions, in a line transverse to the plane of needle-vibration. This feeding mechanism includes a feed-dog 27 of the lower four-motion type and operating through suitable feed-slots provided in a throat-plate 28. The throat-plate employed is of special construction and forms the subject of a separate application filed Mar. 13, 1934, with Serial No. 715,270.

The feed-dog 27 overhangs the loop-taker 16 and is secured upon a feed-bar 29 pivotally secured to a feed-rocker comprising spaced upstanding arms 30 and 31 of a horizontally disposed feed-advance rock-shaft 32. The rock-shaft 32 is substantially parallel to the loop-taker actuating shaft 19, being journaled beneath the work-support 1 adjacent to the front edge thereof and in suitable bearing lugs 33 and 34. The rock-shaft 32 is disposed entirely at one side of a vertical plane containing the axis of rotation of the loop-taker shaft 18 and is bent upwardly at its end carrying the feed-rocker arms 30 and 31 to thereby provide hand clearance for more conveniently replenishing the lower thread-supply.

Adjacent to the bearing lug 34, the feed-advance rock-shaft 32 carries an upwardly extending crank-arm 35 to which is pivotally connected one end of a radius-bar 36 of which the forked opposite end pivotally carries a stud 37. The pivot-stud 37 is apertured transversely of its pivotal axis to slidably engage an upright guide in the form of a rod 38 secured at its opposite ends to spaced ears 39 bent laterally from a rocking frame 40 disposed entirely below the horizontal plane of the work-support 1. The rocking frame 40 is secured upon a short rock-shaft 41 to provide for said frame a fulcrum axis passing transversely through the guide-rod at substantially the middle point of the length of said rod, said rock-shaft 41 being journaled in suitable bearing lugs below the work-support 1 so as to be disposed in parallelism with the feed-advance rock-shaft 32 and at the side of a vertical plane through the axis of the loop-taker actuating shaft 19 opposite to that of the rock-shaft 32. The rocking frame 40 has a fork 42 embracing a cam or eccentric 43 carried by the loop-taker actuating shaft 19 to impart the feed advance and return movements to the feed-dog.

The radius-bar 36, intermediate its ends, is provided with a laterally extending boss 44 to which is pivotally connected the lower end of a link 45 extending upwardly through an opening in the bed-plate 1 and into the bracket-arm standard 2. At its upper end, the link 45 is pivotally connected to a feed-adjusting lever 46 extending transversely of the standard 2 from rear to front and being fulcrumed upon a pivot-screw 47 in the rear wall of the standard 2. The front end of the feed-adjusting lever extends through a slot 48 in the front wall of the standard 2 and is threaded to receive a nut or manipulating head 49. The head 49 is socketed in its inner face to slidably receive a sleeve 50 within which is disposed a coil-spring 51 reacting against the head 49 and a transverse web 52 within the sleeve 50. The inner end of the sleeve 50 is partly cut away to provide vertically spaced guide-lugs 53 slidably disposed in a vertical slot 54 formed in a graduated segment-plate 55, said segment-plate being secured by screws 56 to a boss 57 upon the front wall of the arm-standard 2. A pointer 58 is carried by the sleeve 50 to overlie the graduations of the segment-plate 55. The frictional engagement of the sleeve 50 with the front face of the segment-plate 55 permits of manually shifting the feed-adjusting lever 46 vertically, but is effective to hold said lever in adjusted position without requiring tightening of any securing nuts heretofore commonly employed.

Secured by screws 59 upon the feed-adjusting lever 46 within the standard 2 is a block 60 carrying at one side thereof a projection 61 provided with a recess 62 of horizontal V-shape disposed in a vertical plane inclined to the feed-adjusting lever 46 and open toward the front of the bracket-arm. Adjustably entering the V-shaped recess 62 is the rounded end of a stop-screw 63 threaded through the front wall of the arm-standard 2 and having a manipulating head 64 at the outer side of the arm-standard.

From the foregoing description, it will be understood that in the zero or median position of throw of the feed-adjusting lever, the axis of the radius-bar pivot-stud 37 coincides with the fulcrum-axis 41 of the rocking frame 40 and accordingly the feed-dog 27 is then stationary as to work-advancing movements during the operation of the machine. Movement of the feed-adjusting lever out of its zero position in either direction is adjustably limited by the stop-screw 63, it being understood that in any set position of the stop-screw 63 the feed-adjusting lever is definitely limited to movements of equal extent in opposite directions from its zero position. As the pivot-stud 37 of the radius-bar 36 is shifted either above or below the fulcrum-axis 41 of the rocking frame 40 according to the direction of movement of the feed-adjusting lever out of its zero position, it is apparent that the direction and amplitude of work-advancing movements of the feed-dog may be readily controlled.

Rising and falling movements are imparted to the feed-dog 27 from a feed-lift cam 65 carried by the loop-taker actuating shaft 19 adjacent to the bed-plate lug 21, said cam 65 being embraced by the forked end of a rock-arm 66 extending forwardly from said cam. The other end of the rock-arm 66 is suitably secured upon a short feed-lift rock-shaft 67 journaled beneath the work-support 1 in parallelism with the feed-advance rock-shaft 32 and between said rock-shaft 32 and the loop-taker actuating shaft 19. Extending rearwardly from the feed-lift rock-shaft 67, adjacent to the feed-bar 29, is a feed-lift arm 68 provided at one side thereof with a stud 69 carrying a roller 70 received in a horizontal slot 71 provided in the feed-bar 29.

The arrangement of the reverse-feed actuating mechanism entirely below the work-support not only minimizes vibration during the operation of the machine, but very materially facilitates assembly and adjustment of the parts. Furthermore, the disposition of the feed-lift rock-shaft 67 at the same side of the loop-taker actuating shaft 19 as the feed-advance rock-shaft 32 pro-

vides for employing a comparatively short and therefore rigid feed-lift rock-arm 68 and a comparatively large feed-lift cam 65 upon the loop-taker actuating shaft 19, said large cam 65 minimizing inaccuracies due to wear, and the short rock-arm 68 insuring a positive unyielding lift of the feed-bar. As will be evident, the described construction is particularly favorable in combination with the loop-taker mechanism described, because it permits of the disposition of the bearing lug 21 close to the vertical plane containing the axis of rotation of the loop-taker shaft 18, thereby affording a firm support for the gear-carrying end of the shaft 19 and also providing supporting means for the gear casing 26 secured upon the bushing 20, all without interfering with the feeding mechanism and ready assembly of the parts. The location of the fulcrum shaft 41 of the feed-actuating rocking frame 40 at the side of the shaft 19 opposite to the feed-advance rock-shaft 32 permits of employing a comparatively long radius-bar 36 which facilitates adjustment of the direction and amplitude of feed-advance movement of the feed-dog. It will therefore be apparent that the present feeding mechanism is simple in construction and that it is particularly well adapted for employment in a machine having a loop-taker mechanism as hereinbefore described.

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

1. A sewing machine having a work-support and a bracket-arm rising therefrom, a main-shaft journaled in said bracket-arm, a reciprocatory needle, a rotary loop-taker, a loop-taker actuating shaft journaled for rotation below said work-support and disposed substantially parallel to said main-shaft, driving connections between said shafts, feed-advance and feed-lift rock-shafts journaled below said work-support, said rock-shafts being disposed substantially parallel to and both at the same side of a vertical plane containing the axis of rotation of said loop-taker actuating shaft, a feed-dog, a feed-bar carrying said feed-dog and operatively connected to said rock-shafts, and feed-cams carried by said loop-taker actuating shaft for imparting operative movements to said rock-shafts.

2. In feeding mechanism for sewing machines, a frame including a work-support and a bracket-arm rising therefrom, a main-shaft journaled in said bracket-arm, a reciprocatory and laterally vibratory needle actuated by said main-shaft, a lower rotary shaft journaled below said work-support at one side of a vertical plane passing through the longitudinal center line thereof and connected to be driven by said main-shaft, a rotary loop-taker operating in a plane parallel to said vertical plane, a loop-taker supporting shaft transverse to and geared to said lower rotary shaft, a feed-bar, a feed-dog mounted on one end of said feed-bar, a feed-rocker to which the other end of the feed-bar is pivotally connected, a feed-advance rock-shaft carrying said feed-rocker, a feed-lift rock-shaft connected to impart rising and falling movements to said feed-bar, said feed-advance and feed-lift rock-shaft being mounted below said bed at the same side of the lower rotary shaft, and means for actuating said rock-shafts.

3. A sewing machine having a work-support and a hollow bracket-arm standard rising therefrom, stitch-forming mechanism, a feed-dog, a feed-bar carrying said feed-dog, feed-advance and feed-lift actuating connections with said feed-bar, said feed-advance connections including a feed-advance rock-shaft, a rocking frame journaled beneath said work-support, means for rocking said frame, a radius-bar having one end operatively connected to said feed-advance rock-shaft and its other end slidably connected to said rocking frame for movement from one side to the other of the fulcrum-axis of said frame, a feed-adjusting lever pivotally mounted upon said bracket-arm standard, a link connecting said feed-adjusting lever and the radius-bar to shift said radius-bar upon said rocking frame upon movement of the feed-adjusting lever, whereby to control the direction and amplitude of the work-advancing movements imparted to the feed-dog, a block carried by said feed-adjusting lever within the bracket-arm standard and having a horizontal V-shaped recess, and a stop-screw threaded into said standard in position to enter said recess and thereby limit adjustment in opposite directions of said feed-adjusting lever.

4. A sewing machine having a work-support and a bracket-arm overhanging the work-support, a reciprocatory needle, a rotary needle-reciprocating shaft journaled in said bracket-arm, a loop-taker, a rotary loop-taker actuating shaft journaled beneath said work-support, driving connections between said shafts, a work-advancing feed-dog, a feed-bar carrying said feed-dog, a feed-advance rock-shaft journaled beneath said work-support and operatively connected to said feed-bar, said feed-advance rock-shaft being disposed at one side of and in parallelism with said loop-taker actuating shaft, a rocking frame beneath said work-support and having its fulcrum-axis disposed in parallelism with and at the side of the loop-taker actuating shaft opposite to that of the feed-advance rock-shaft, a cam upon said loop-taker actuating shaft for rocking said frame, a radius-bar extending across said loop-taker actuating shaft and having one end operatively connected to said feed-advance rock-shaft, the other end of said radius-bar being slidably connected to said rocking frame for movement from one side to the other of the fulcrum-axis of said frame, manually operable connections with said radius-bar for shifting said bar upon said rocking frame to thereby control the direction and amplitude of the work-advancing movements imparted to said feed-dog, a feed-lift rock-shaft journaled beneath said work-support in parallelism with and at the feed-advance rock-shaft side of said loop-taker actuating shaft, means for actuating said feed-lift rock-shaft from said loop-taker actuating shaft, and a rock-arm carried by said feed-lift rock-shaft adjacent and connected to said feed-bar.

5. A sewing machine having a member provided with a slot, a pivotally supported adjusting-lever extending through the slot of said member and provided adjacent thereto with a manipulating head, said head having a socket in the side thereof proximate to said member, a sleeve slidably disposed within the socket of said head for engagement with said member, and a spring housed within said head for effecting frictional engagement of said sleeve with said member, whereby said adjusting-lever is frictionally held in different adjusted positions thereof lengthwise of said slot.

6. A sewing machine having a member provided with a segmental slot, a pivotally supported adjusting-lever having one end extending through said slot, a lever-manipulating head detachably secured upon said end of the adjusting lever

and having a socket in the side thereof proximate to said member, a sleeve slidably disposed within the socket of said head and having at one end thereof spaced guide-lugs disposed in the slot of said member, and a spring housed within said head for effecting frictional engagement of said sleeve with said member, whereby said adjusting-lever is frictionally held in different adjusted positions thereof lengthwise of the slot of said member.

7. A sewing machine having a work-support and a bracket-arm rising therefrom, a vertically reciprocatory needle, a horizontally disposed needle-reciprocating shaft journaled in said bracket-arm, a rotary loop-taker carrying shaft disposed horizontally below said work-support with its axis transverse to the axis of rotation of said needle-reciprocating shaft, a rotary loop-taker actuating shaft journaled horizontally below and transverse to said loop-taker carrying shaft, driving connections between said loop-taker carrying and actuating shafts, connections for rotating said loop-taker actuating and needle-reciprocating shafts in one-to-one relation, a feed-dog, feed-advance and feed-lift cams carried by said loop-taker actuating shaft, and means for imparting operative work-feeding movements to said feed-dog from said cams, including manually controllable connections for reversing the direction of feed.

GEORGE M. EAMES.