

June 19, 1923.

1,459,119

S. G. TATE

FEEDING MECHANISM FOR SEWING MACHINES

Filed May 6, 1918

4 Sheets-Sheet 1

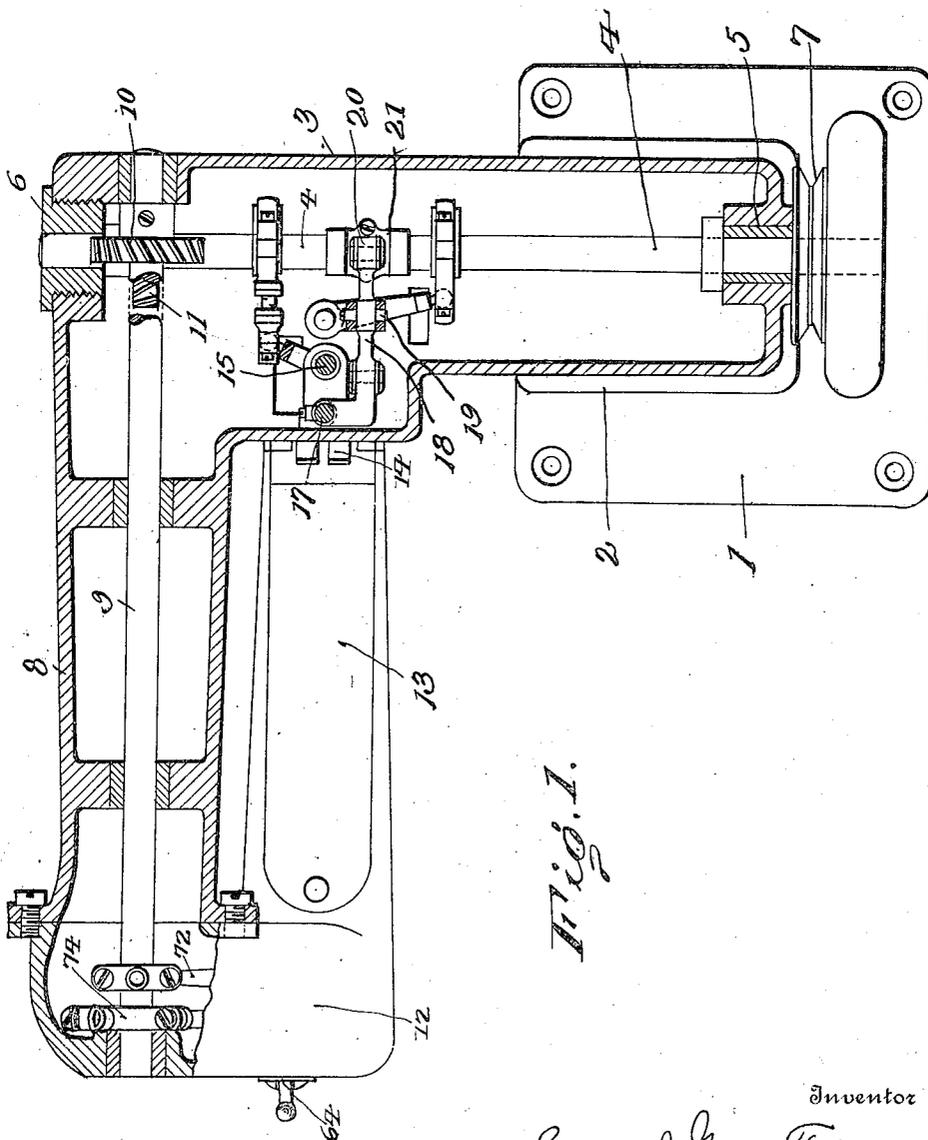


Fig. 1.

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4 Sheets-Sheet 2

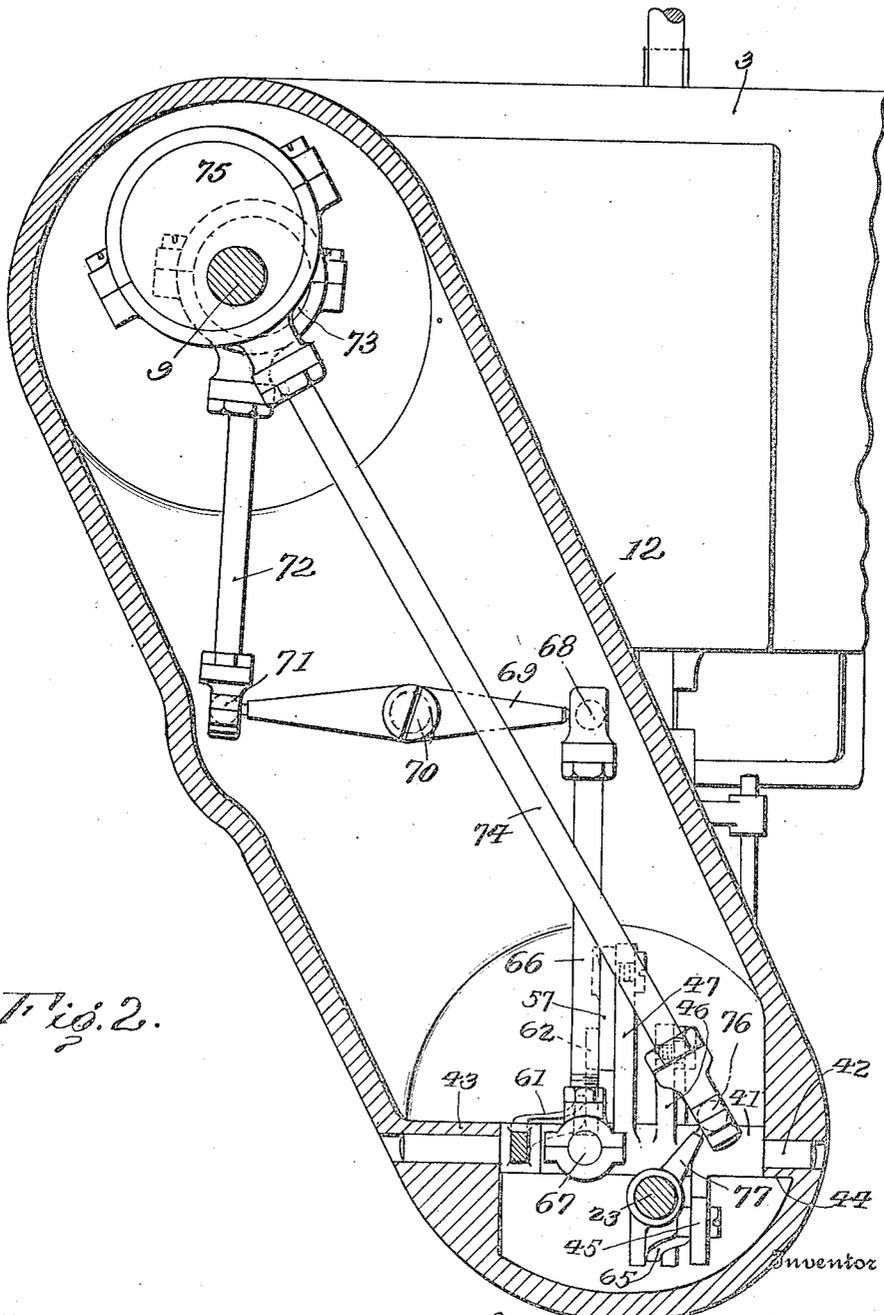


Fig. 2.

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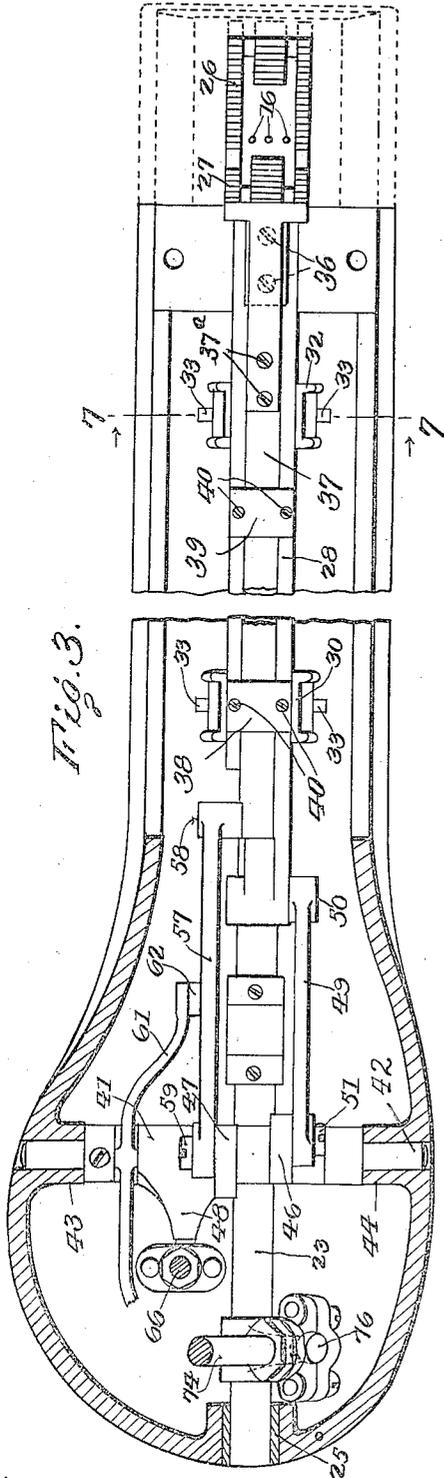


Fig. 3.

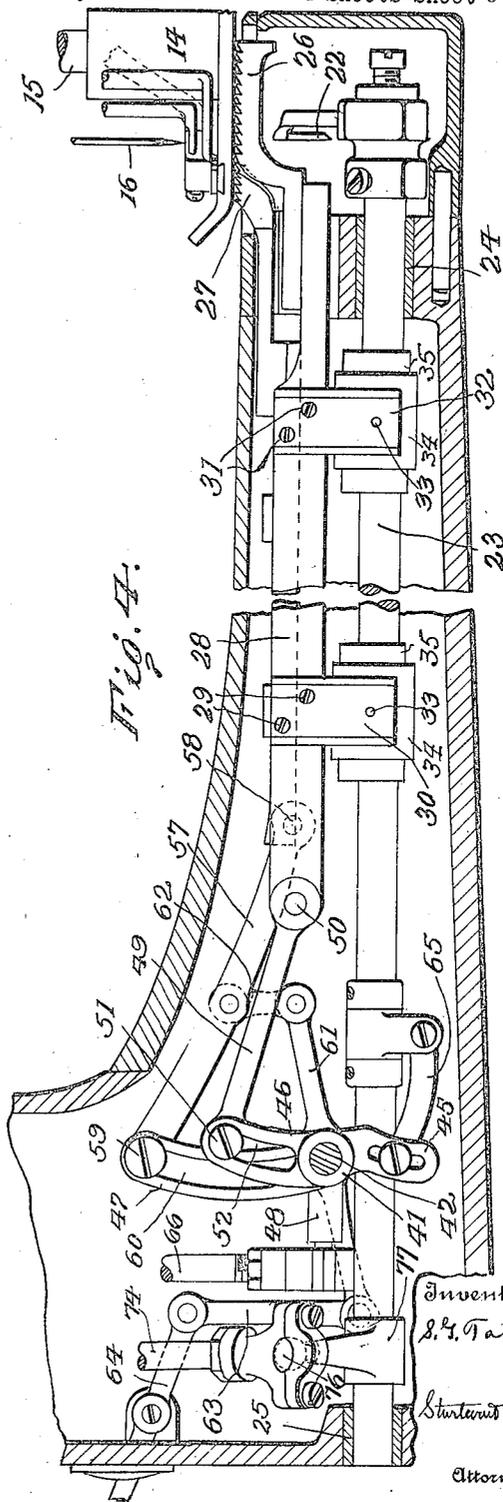


Fig. 4.

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4 Sheets-Sheet 4

Fig. 5.

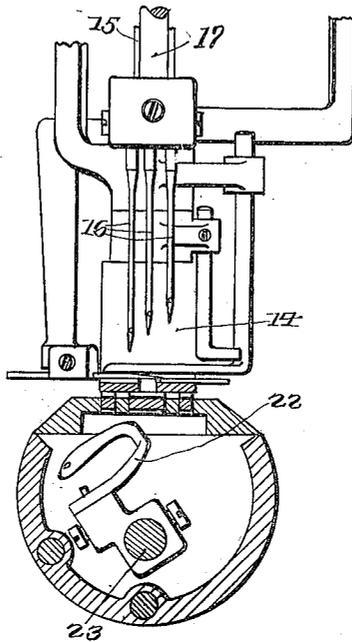


Fig. 7.

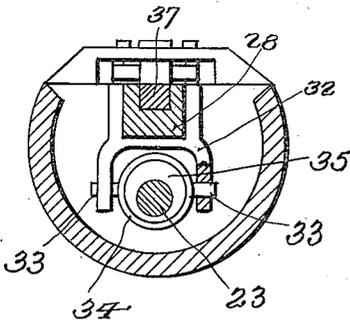
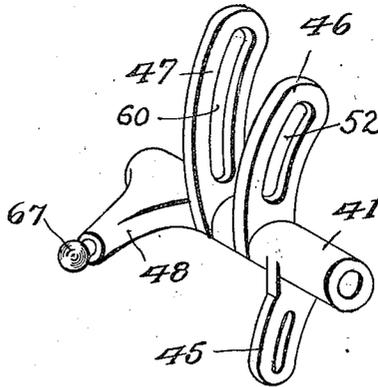


Fig. 6.



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UNITED STATES PATENT OFFICE.

SAMUEL GEORGE TATE, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNION SPECIAL MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

FEEDING MECHANISM FOR SEWING MACHINES.

Application filed May 6, 1918. Serial No. 232,899.

To all whom it may concern:

Be it known that I, SAMUEL GEORGE TATE, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Feeding Mechanisms for Sewing Machines, of which the following is a description, reference being had to the accompanying drawing and to the figures of reference marked thereon.

The invention relates to new and useful improvements in feeding mechanisms for sewing machines, and more particularly to a feeding mechanism which is located and operates in a cylindrical work supporting arm.

An object of the invention is to provide a feeding mechanism for feeding a fabric lengthwise of a work supporting arm, which feeding mechanism includes a feed dog, a feed bar supporting the same and located in the work supporting arm and extending lengthwise thereof, with means for operating the feed bar whereby the feeding surface of said feed dog will be maintained in a horizontal plane during the entire movement in each cycle.

A further object of the invention is to provide a feeding mechanism for a work supporting arm wherein the feed bar is moved back and forth by a rocking frame at the opposite end of the supporting arm from the feed dog and wherein the feed bar is bodily raised and lowered.

A still further object of the invention is to provide a differential feeding mechanism for a sewing machine having a work supporting arm wherein the feed dogs are carried by independent feed bars disposed in said arm, which bars are simultaneously raised and lowered and wherein the feed bars are moved back and forth by independent connections with a single rocking frame disposed at the opposite end of the work supporting arm from the feed dogs.

A still further object of the invention is to provide a sewing machine having a work supporting arm containing a looper shaft and feed bars, each of which bars carries a feed dog and containing a three armed rocking frame and adjustable connections therefrom to the looper supporting shaft and the feed bars respectively.

A still further object of the invention is to provide a sewing machine having a horizontal arm containing a shaft and an in-

clined depending supporting member carrying a work supporting arm with a train of devices for operating a feeding mechanism from said shaft, which includes a horizontally disposed lever located intermediate the ends of the depending portion, a horizontally pivoted rocking frame at the lower end of said depending portion, and a vertical link connection between the rocking frame and the lever so as to avoid endwise thrust on the pivot of the rocking frame.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show by way of illustration, one embodiment of the invention:

Figure 1 is a view partly in plan and partly in section showing the arrangement of the work supporting arm and the driving connections which are directly connected to the main shaft;

Fig. 2 is a view partly in front elevation and partly in section showing particularly the connections between the actuating shaft in the supporting arm and the rocking frame at the lower end of the depending arm, which rocking frame moves the feed bars back and forth, and also showing the connection for oscillating the loopers;

Fig. 3 is a view partly in top plan and partly in section showing the feeding devices in the work supporting arm and the connections for operating the same;

Fig. 4 is a longitudinal section through the work supporting arm and the lower end of the depending support therefor, also showing the presser foot and the needles;

Fig. 5 is a view partly in section and partly in end elevation, showing the work support, the looper, the presser foot, the needles and the parts adjacent the needles;

Fig. 6 is a perspective view of the rocking frame for moving the feed bar back and forth and for giving the needle avoiding movement to the looper; and

Fig. 7 is a sectional view on the line 7-7 of Figure 3.

My invention is particularly adapted to a machine having a work supporting arm which is suspended so that the material being stitched may be passed underneath the arm and brought up around the sides of the arm, for stitching the material to the form

of a tube, such as the sleeve of a garment or the tubular parts of a union suit. In the present embodiment of the invention, the machine includes a supporting base 1, having a standard 2 rising therefrom which carries a laterally projecting arm 3 at its upper end. The main shaft 4 is journaled at 5 in the standard and at 6 in the laterally projecting arm 3. This main shaft is operated by a belt wheel 7. Projecting at right angles to the laterally projecting arm and from the free end thereof is an arm 8 in which is journaled a shaft 9. The shaft 9 carries a spiral gear 10 which meshes with a spiral gear 11 on the main shaft 4. Depending from the free end of the arm 8 is a supporting member 12 and extending from the lower end of the supporting member 12 is a work supporting arm 13. The work supporting arm 13 extends underneath the laterally projecting arm 3 and is spaced from the standard 2 so as to provide suitable clearance to permit the material being stitched to be fed off from the end of the work supporting arm and by the standard. This particular form of frame carrying the work supporting arm is shown, described and claimed in my Patent No. 1,370,164, dated March 1, 1921.

At the free end of the work supporting arm is a presser foot 14 carried by a presser bar 15. The machine as illustrated in the drawings, includes three needles indicated at 16. These needles are carried by a needle bar 17 which reciprocates in suitable bearings in the arm 3. The needle bar 17 is actuated by a lever 18 which is fulcrumed at 19 and which is connected at its rear end to a link 20 co-operating with a crank 21 in the main shaft 4.

Co-operating with the needles beneath the work support is a single threaded looper 22. This looper is fixed to a looper supporting shaft 23 which is mounted to oscillate in bearings 24 and 25, (see Figs. 3 and 4). The material is fed off the work supporting arm by my improved feeding mechanism which, as herein shown, consists of two feed dogs, a main feed dog 26 and an auxiliary feed dog 27. The main feed dog 26 is carried by a main feed bar 28. The main feed bar 28 is secured by screws 29 to a yoke 30 and by screws 31 to a yoke 32. These two yokes 30 and 32 are similar in construction. Each yoke is pivotally attached to pivot pins 33 carried by and projecting from a sleeve 34 co-operating with an eccentric 35 on the looper supporting shaft 23. The pivot holds the yoke and sleeve together, and while there may be little or no pivotal action between these parts, at the same time the pivot prevents any possible binding of the parts as the sleeve moves endwise on the looper shaft. It is understood of course, that there are two eccentrics 35 and that these eccentrics are

timed so as to operate together so as to bodily lift and lower the feed bar 31 and this bodily raises and lowers the feed dog 26 which is rigidly secured to the main feed bar by means of screws 36. Inasmuch as the feed bar has two points of support which move up and down in unison, the feed dog may be set in horizontal position and will maintain its horizontal position without tilting as it is raised and lowered and moved back and forth so that all the teeth of the feed dog will come into play in feeding the material. The sleeves 34 are free to slide endwise on the eccentrics with which they co-operate, which permits of free movements of the feed bar back and forth and also of free endwise movements of the looper shaft when the looper is moved laterally.

The auxiliary feed dog 27 is carried by an auxiliary feed bar 37 and is secured thereto by screws 37^a. The main feed bar has a recess or channel extending from end to end thereof, in which the auxiliary feed bar is located. The auxiliary feed bar is held in this recess or channel by cover plates 38 and 39 which are secured to the main feed bar by suitable screws 40. The auxiliary feed bar is free to move endwise in the main feed bar but moves up and down in unison with the main feed bar, so that the auxiliary feed dog will be lifted without tilting into engagement with the material. Mounted at the opposite end of the work supporting arm 13 from the feed dogs is a rocking frame 41. This rocking frame is in the form of a sleeve which is mounted on a transverse supporting shaft 42 fixed in suitable lugs 43 and 44 formed in the frame. This rocking frame is shown in detail in Figure 6 of the drawings and it will be noted that it has four arms which are indicated at 45, 46, 47 and 48. The arm 46 is connected by a link 49 to the main feed bar. Said link is pivoted at 50 to the feed bar and is also connected at its other end to a stud screw 51 which is adjustable in a segmental slot 52 formed in the arm 46. As the rocking frame is oscillated, the link 49 will cause the main feed bar to move endwise back and forth. Each sleeve 34 has a free movement on the eccentric with which it co-operates as above noted, so as to permit this movement. By adjusting the link connection to the supplemental slot 52 the length of throw of the feed dog may be varied. The arm 47 is connected by a link 57 to the auxiliary feed bar 37. Said link 57 is pivoted at 58 to the auxiliary feed bar and the other end of the link is connected to a screw stud 59. This screw stud moves freely in a segmental slot 60 in the arm 47. The screw stud 59 is shifted by means of a lever 61 which is connected by a link 62 to the link 57 intermediate the ends of said link 57, the lever 61 being fulcrumed on the

cross shaft 42. The lever 61 at its other end is connected by a link 63 with a hand adjusting lever 64 which may be shifted and held in shifted positions by any suitable means. As the rocking frame 41 oscillates, this link 57 will move the auxiliary feed dog endwise, thus imparting feed movements to this auxiliary feed dog. The endwise movements of this auxiliary feed dog are entirely independent of the endwise movements of the main feed bar and may be made longer or shorter as desired. By adjusting the link 57 along the slot 60 of the arm 47, the length of throw of the auxiliary feed dog will be varied. The slot 60 in the arm 47 is concentric to the pivotal connection 58 between the link 57 and the auxiliary feed bar when the auxiliary feed bar is at the extreme end of its feed stroke. As a consequence, the adjustment of the link 57 to vary the throw of the auxiliary feed dog, will cause the auxiliary feed dog to engage the material at different points at the beginning of the feed stroke, depending upon the length of the feed stroke. In other words, no matter what may be the length of the stroke of the auxiliary feed dog, said stroke always terminates at the same point relative to the presser foot and the needle. The slot 52 in the arm 46 is curved concentric to the pivotal point 50 between the link 49 and the main feed bar when the main feed dog is at the forward end of its stroke. As a consequence, any adjustment in the stroke of the main feed bar will vary the point at which the main dog finishes its stroke, so that regardless of the length of the throw of the main feed dog, it will always begin its feed stroke at the same point relative to the presser foot and needle. By this arrangement of the slots for adjusting the strokes of the feed dogs, I am able to set the feed dogs so that they will work very close together. If the feed dogs are moving in the same timing relative to each other and without any differential movement of one relative to the other, they may be set so that the rear end of the auxiliary dog is very close to the front end of the main dog and when the feeding mechanisms are adjusted so that either one has a longer stroke than the other, there will be no interference of one feed dog with the other.

The looper supporting shaft 23 is moved endwise in its bearings by a link 65 which is connected to the arm 45 of the rocking frame 41. This link has an adjustable connection with said arm so that the extent of lateral movement of the looper may be varied. This gives the needle avoiding movement to the looper. The rocking frame 41 is oscillated by means of a vertical link 66 which is connected to a ball stud 67 on the end of the arm 48. The other end of the link 66 is connected to a ball stud 68 on the

end of a lever 69. The lever 69 is fulcrumed at 70 at a point intermediate the ends of the lever. This fulcrum 70 is located at a point intermediate the ends of the vertical member 12 of the frame. The other end of the lever 69 carries a ball stud 71 which is engaged by an eccentric strap 72 and the eccentric strap 72 co-operates with an eccentric 73 on the shaft 9. As the shaft 9 rotates, the lever 69 will be oscillated and this will oscillate the rocking frame 41. As above noted, the depending support 12 for the work supporting arm is inclined to the vertical. The rocking frame 41 is oscillated about a horizontal axis which is at right angles to the longitudinal axis of the work supporting arm. The arms of the lever 69 are of sufficient length so that the eccentric strap 72 and also the link 66 are vertical and therefore the movements of the link 66 will be in substantially a vertical line at right angles to the axis of the rocking frame so that there is no endwise thrust on the rocking frame, nor on the arm 48 thereof, although this rocking frame is actuated by a shaft which is not vertically over said connection to the rocking frame but at one side thereof. The looper shaft 23 is oscillated by an eccentric strap 74 which co-operates with an eccentric 75 on the shaft 9. The lower end of this eccentric strap is connected to a ball stud 76 at the end of an arm 77, which arm is secured to the looper supporting shaft 23. The looper supporting shaft 23 oscillates about an axis parallel with the axis of the shaft 9 and, therefore, there is no objectionable side thrust through the action of the inclined eccentric strap 74.

From the above description it will be apparent that I have provided a feeding mechanism for a work supporting arm, which feeding mechanism includes a feed bar which is bodily raised and lowered without tilting so as to bring the feed dog into engagement with the material or move the feed dog out of engagement with the material while maintaining the feeding surface thereof in a horizontal position. It will be further noted that all the operating parts for moving the feed bars back and forth are at the rear end of the work supporting arm, so that the work supporting arm may be relatively small. It will also be noted that both of the feed bars are moved back and forth by the same rocking frame but through separate connections therewith and that the strokes of the feed bars may be varied independently. It will be still further noted that I have provided a means for operating the feed bar and the looper shaft in the work supporting arm, which is very simple in construction and which includes an arrangement of parts wherein there is little or no objectionable side thrust on the actuating rocking frame.

It is obvious that minor changes in the details of construction and arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A sewing machine including in combination a work supporting arm, a main feed dog and an auxiliary feed dog disposed at one end of said work supporting arm, a main feed bar extending lengthwise of the arm and carrying said main feed dog, an auxiliary feed bar extending lengthwise of the arm and carrying said auxiliary feed dog, means for bodily raising and lowering the feed bars, a rocking frame at the opposite end of the work supporting arm from the feed dogs, means for oscillating the rocking frame, an arm carried by the rocking frame and having a connection with the main feed bar and a second arm carried by the rocking frame and having an independent connection with the auxiliary feed bar.

2. A sewing machine including in combination a work supporting arm, a main feed dog and an auxiliary feed dog disposed at one end of said work supporting arm, a main feed bar extending lengthwise of the arm and carrying said main feed dog, an auxiliary feed bar extending lengthwise of the arm and carrying said auxiliary feed dog, means for bodily raising and lowering the feed bars, a rocking frame at the opposite end of the work supporting arm from the feed dogs, means for oscillating the rocking frame, an arm carried by the rocking frame and having a connection with the main feed bar and a second arm carried by the rocking frame and having an independent connection with the auxiliary feed bar, said connections between the arms on the rocking frame and the feed bars being adjustable whereby the stroke of the feed dogs may be independently adjusted.

3. A sewing machine including in combination a work supporting arm, a main feed dog and an auxiliary feed dog disposed at one end of said work supporting arm, a main feed bar extending lengthwise of the arm and carrying said main feed dog, an auxiliary feed bar extending lengthwise of the arm and carrying said auxiliary feed dog, means for bodily raising and lowering the feed bars, a rocking frame at the opposite end of the work supporting arm from the feed dogs, means for oscillating the rocking frame, an arm carried by the rocking frame and having a connection with the main feed bar and a second arm carried by the rocking frame and having an independent connection with the auxiliary feed bar, said connections between the arms on

the rocking frame and the feed bars being adjustable whereby the stroke of the feed dogs may be independently adjusted, and a manually operable lever and devices controlled thereby for shifting the connection with the auxiliary feed bar for varying the throw thereof.

4. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried at the lower end of said depending support, a shaft in the arm carrying said depending support, an eccentric on said shaft, a rocking frame at the lower end of the depending support and devices operated by said eccentric for oscillating said rocking frame, a main feed bar extending lengthwise of said work supporting arm, a main feed dog carried thereby, devices for moving said main feed bar endwise from said rocking frame, a second eccentric on the shaft in the arm projecting from the standard, and devices actuated thereby and extending through said depending support for raising and lowering the feed bar.

5. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of said depending support, a shaft in the arm carrying said depending support, an eccentric on said shaft, a rocking frame in the lower end of the depending support and devices operated by said eccentric for oscillating said rocking frame, a main feed bar extending lengthwise of said work supporting arm, a main feed dog carried thereby, devices for moving said main feed bar endwise from said rocking frame, a second eccentric on the shaft in the arm projecting from the standard, and devices actuated thereby and extending through said depending support for raising and lowering the feed bar, said last named devices including means for bodily raising and lowering the feed bar whereby the feeding surface of the feed dog is maintained in a horizontal position during all its movements.

6. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of the depending support, an actuating shaft in the arm carried by the standard, a main feed dog and an auxiliary feed dog disposed at the free end of the work supporting arm, a rocking frame at the opposite end of the work supporting arm from the feed dog, a main feed bar carrying the main feed dog, an auxiliary feed bar carrying the auxiliary feed dog, connections between the feed bars and the rocking frame whereby the feed bars are moved endwise

as the rocking frame oscillates, an eccentric on said actuating shaft, devices operated by said eccentric for oscillating the rocking frame, a second eccentric on said actuating shaft, and devices actuated thereby for raising and lowering the feed dogs.

7. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of the depending support, an actuating shaft in the arm carried by the standard, a main feed dog and an auxiliary feed dog disposed at the free end of the work supporting arm, a rocking frame at the opposite end of the work support from the feed dogs, a main feed bar carrying the main feed dog, an auxiliary feed bar carrying the auxiliary feed dog, connections between the feed bars and the rocking frame whereby said bars are moved endwise, means actuated by said actuating shaft and extending through said depending support for oscillating said rocking frame, and means extending through said depending support for raising and lowering the feed dogs, said last named means including devices for bodily raising and lowering the feed bars whereby the feeding surfaces of the feed dogs are maintained in a horizontal position during all their movements.

8. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of the depending support, an actuating shaft in the arm carried by the standard, a main feed dog and an auxiliary feed dog disposed at the free end of the work supporting arm, a rocking frame at the opposite end of the work supporting arm from the feed dogs, a main feed bar carrying the main feed dog, an auxiliary feed bar carrying the auxiliary feed dog, connections between the feed bars and the rocking frame whereby the feed bars are moved endwise as the rocking frame oscillates, an eccentric on said actuating shaft, devices operated by said eccentric for oscillating the rocking frame, a second eccentric on said actuating shaft and devices actuated thereby for raising and lowering the feed dogs, said last named devices including means for bodily raising and lowering the feed bars without tilting the same, whereby the feeding surfaces of the feed dogs are maintained in horizontal position during all their movements.

9. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of the depending support, said depending support being inclined to the vertical, a feed dog at the free end of the work

supporting arm, a feed bar extending lengthwise of the work supporting arm and carrying said feed bar, a rocking frame at the lower end of the depending support, said rocking frame being disposed with its axis horizontal and at right angles to the work supporting arm, an actuating shaft in the arm projecting from the standard, a horizontal lever disposed intermediate the ends of the depending support, means connected to one end of said lever for oscillating the same from the said shaft, the other end of said lever being substantially over the rocking frame, and a vertical link connecting said end of the lever with the rocking frame for oscillating the same.

10. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of said depending support, said depending support being inclined to the vertical, a main feed dog at the end of the work supporting arm, a main feed bar carrying said main feed dog, an auxiliary feed dog at the free end of said work supporting arm, an auxiliary feed bar carrying said feed dog, a rocking frame at the lower end of said depending support and connections between the rocking frame and the feed bars for moving said bars back and forth, an actuating shaft in said arm projecting from the standard, a horizontal lever disposed intermediate the ends of said depending support and means for oscillating said lever from said shaft, said horizontal lever having a vertical link connection with the rocking frame for oscillating the same.

11. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of said depending support, said depending support being inclined to the vertical, a feed dog at the free end of the work supporting arm, a feed bar carrying said feed dog, a rocking frame at the lower end of said depending support and connections therefrom to the feed bar for moving the same back and forth, an actuating shaft in said arm projecting from the standard, a horizontal lever disposed intermediate the ends of said depending support, and means for oscillating said lever from said shaft, said horizontal lever having a vertically arranged link connection with the rocking frame for oscillating the same.

12. A sewing machine including in combination a standard, an arm projecting therefrom, a depending support carried by said arm, a work supporting arm carried by the lower end of said depending support, said depending support being inclined to the vertical, a feed dog at the free end of the work supporting arm, a feed bar carrying said

feed dog, a rocking frame at the lower end of said depending support and connections therefrom to the feed bar for moving the same back and forth, an actuating shaft in
5 said arm projecting from the standard, an eccentric thereon, a horizontal lever disposed intermediate the ends of said depending support, said horizontal lever having a vertically arranged link connection with the
10 rocking frame for oscillating the same, means for oscillating the lever from said eccentric, a second eccentric on the actuating shaft, an oscillating shaft extending lengthwise of the work supporting arm, and an eccentric strap co-operating with the second 15 eccentric and connected to said shaft in the work supporting arm for oscillating the same, said oscillating shaft having spaced eccentrics and devices whereby said spaced eccentrics operate to bodily raise and lower 20 the feed bar.

In testimony whereof, I affix my signature.

SAMUEL GEORGE TATE.