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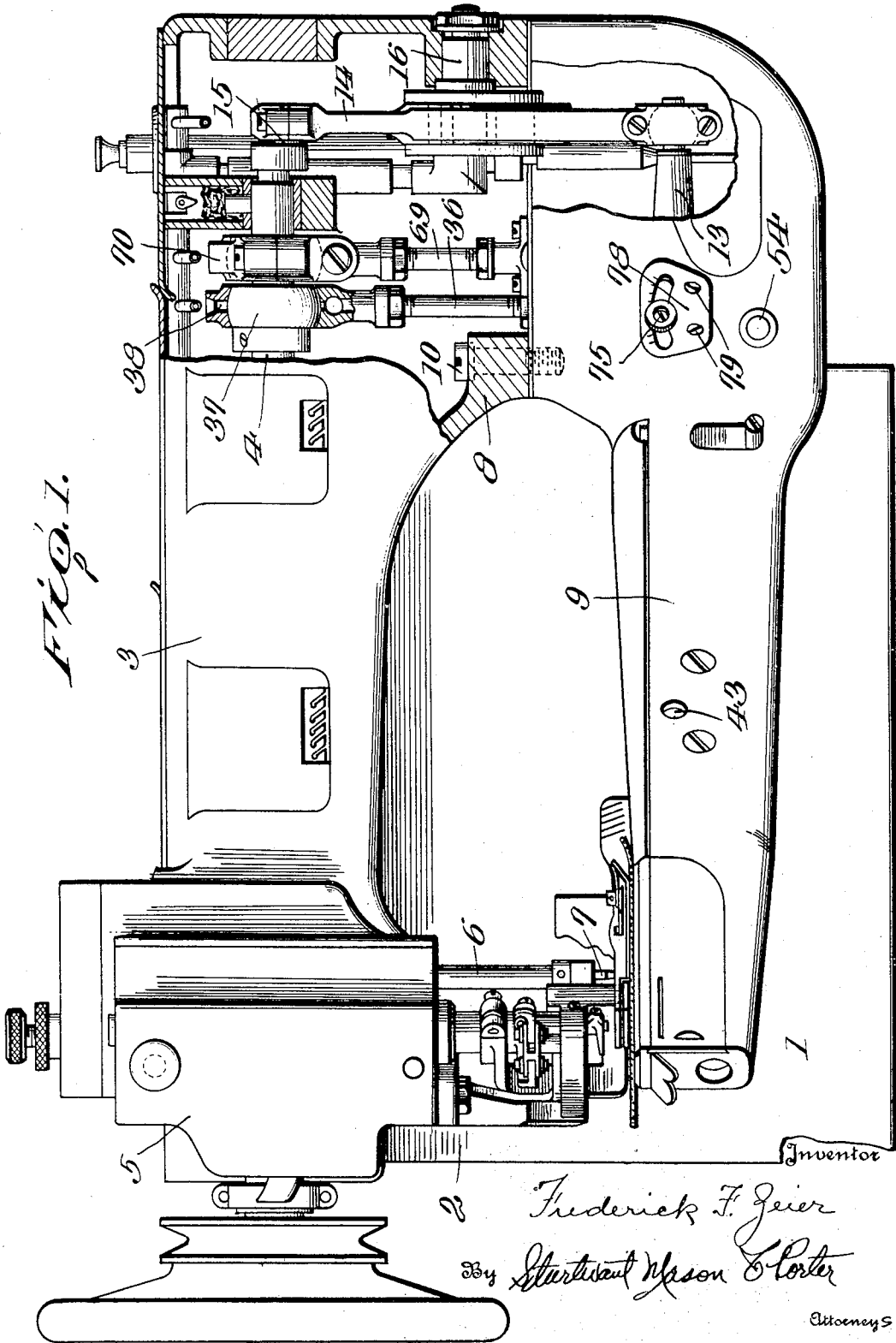
F. F. ZEIER

1,950,337

FEEDING MECHANISM FOR SEWING MACHINES

Filed April 10, 1931

3 Sheets-Sheet 1



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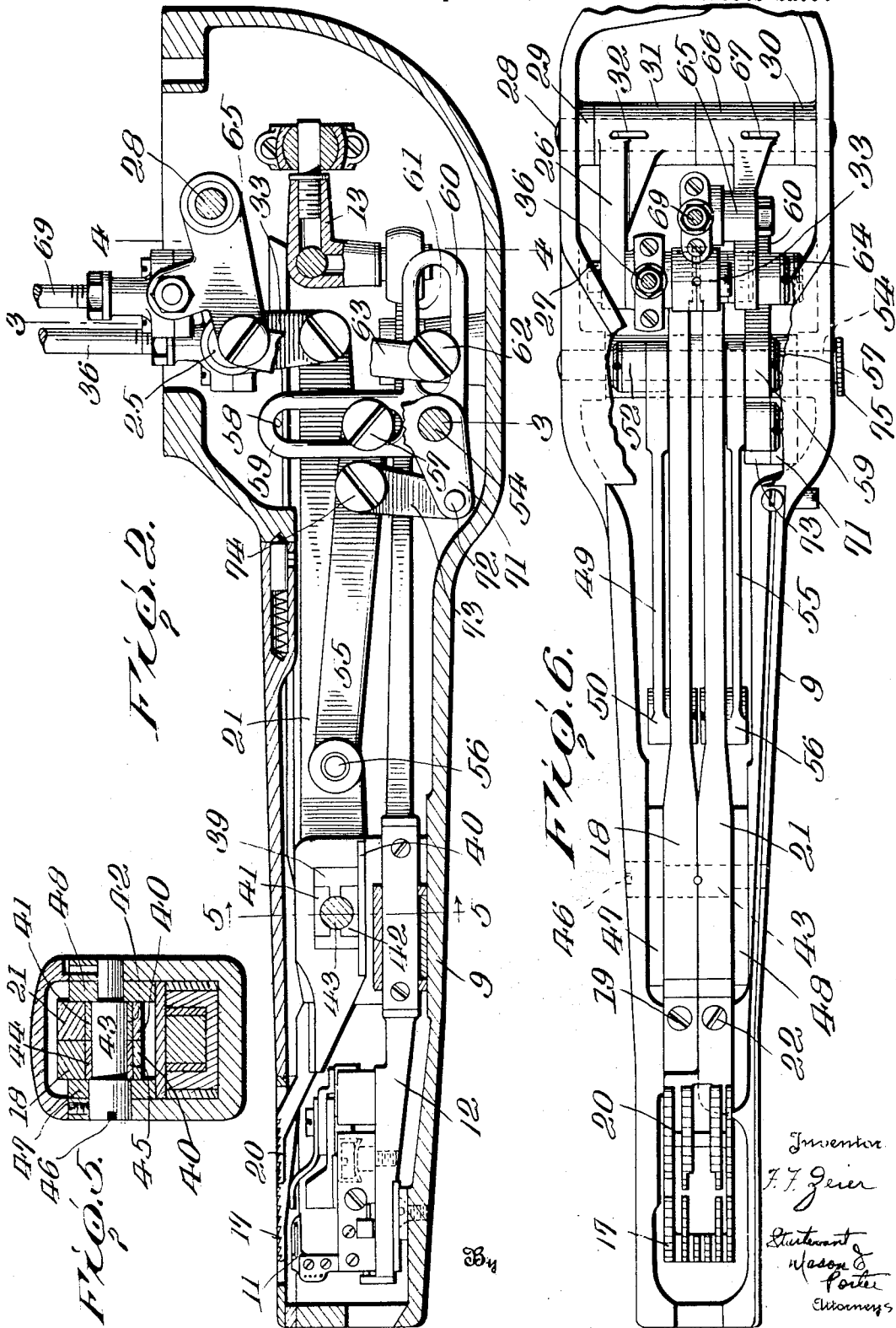
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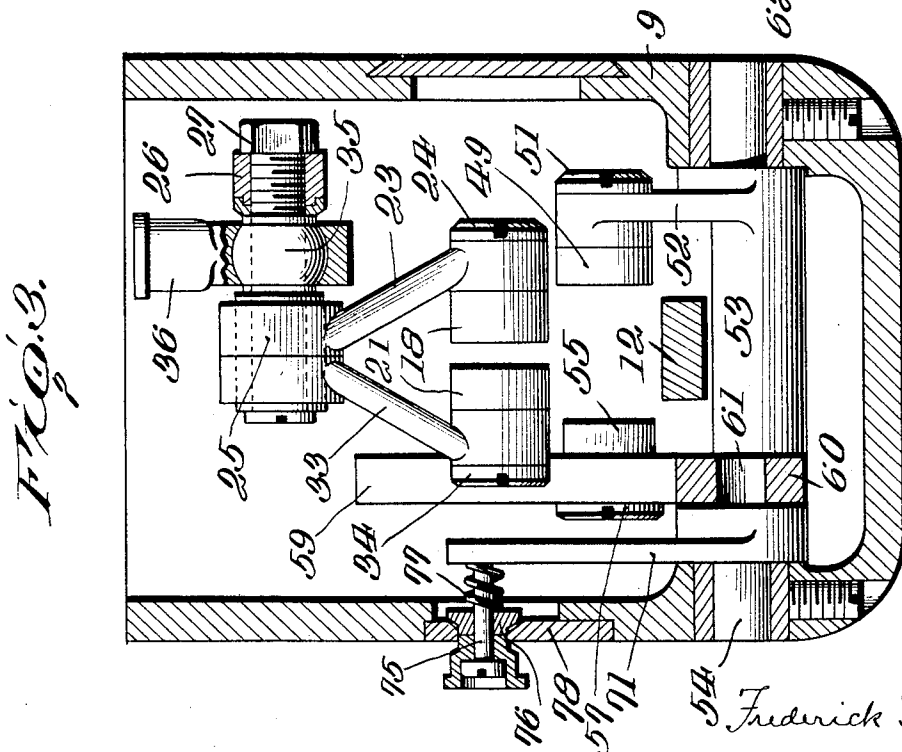
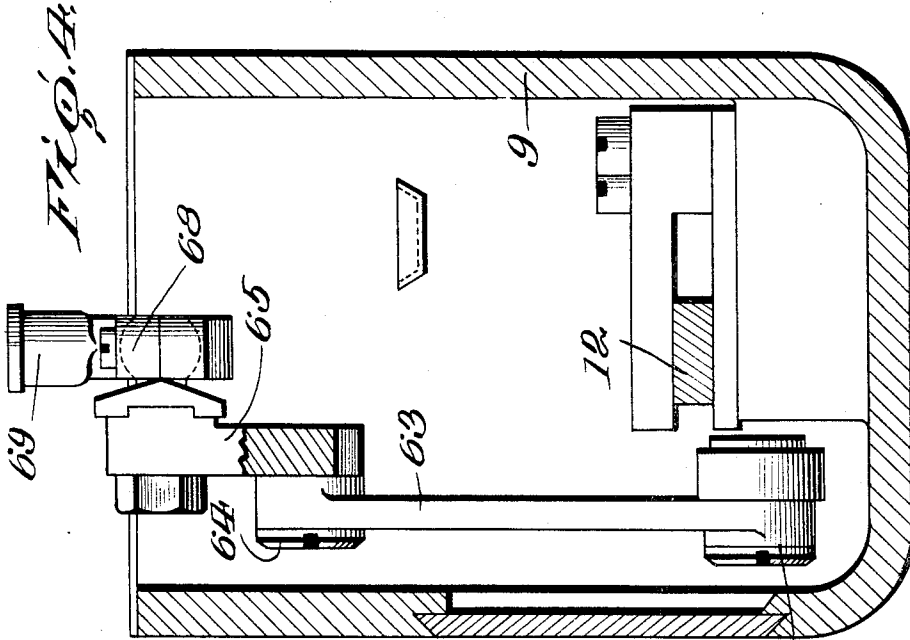
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FEEDING MECHANISM FOR SEWING MACHINES

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# UNITED STATES PATENT OFFICE

1,950,337

## FEEDING MECHANISM FOR SEWING MACHINES

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Application April 10, 1931, Serial No. 529,242

12 Claims. (Cl. 112—209)

The invention relates to new and useful improvements in feeding mechanism for sewing machines, and more particularly to a feeding mechanism for use in a suspended work arm.

An object of the invention is to provide a feeding mechanism for a machine of the above type, wherein feed bars extend longitudinally of the work arm and are moved back and forth by devices capable of adjustment for varying the stroke of both feed bars simultaneously, and capable of adjustment for varying the stroke of one feed bar independently of the other.

A further object of the invention is to provide a feeding mechanism of the above type wherein the feed bars are mounted for endwise oscillating movement on fulcrum blocks supported by means capable of adjustment for varying the vertical operating position of the feed dog.

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 showing partly in section and partly in side elevation a sewing machine embodying the improved feeding mechanism.

Figure 2 is a longitudinal sectional view through the work arm.

Figure 3 is a sectional view on the line 3—3 of Figure 2.

Figure 4 is a sectional view on the line 4—4 of Figure 2.

Figure 5 is a sectional view on the line 5—5 of Figure 2.

Figure 6 is a plan view of the work arm detached and showing only the feeding mechanism and the operating device therefor located therein.

The invention is shown applied to a sewing machine having a suspended work arm. The machine is preferably of the type shown in Patent #1,741,095, granted to Norman V. Christensen and Harold J. Le Vesconte December 24, 1929. In this machine there is a supporting standard having an overhanging bracket carrying a horizontal member in which is located the main actuating shaft. At one end of this horizontal member is a needle head, and at the other end there is a depending member carrying the work arm. The work arm is spaced from the standard so as to provide a clearance for the hand of the operator in guiding the material along the work arm. The present invention is directed particularly to the feeding mechanism for this machine. The feeding mechanism includes a main feed dog and an auxiliary feed dog. Each dog is carried by

a feed bar which extends lengthwise of the work arm. The feed bars are side by side, and at their inner ends are attached to links which are mounted on a common supporting pivot pin carried by a lever arm that is raised and lowered for raising and lowering the inner ends of the feed bars. The feed bars intermediate their ends are mounted on fulcrum blocks on which they slide and can oscillate in vertical planes. These links connected to the inner ends of the feed bars raise and lower the feed dogs. The lever arm supporting the links is raised and lowered by an eccentric strap disposed in the depending member carrying the work arm, and this eccentric strap cooperates with an eccentric member on the main shaft. There is a link connected to one of the feed bars for moving it endwise, and this link is connected to an arm carried by a sleeve which is oscillated by an eccentric strap cooperating with a second eccentric member on the main shaft. The other feed bar has a link connected thereto which has an adjustable connection with a second arm on this sleeve so that the extent of backward and forward movements may be varied. Means is provided for manually shifting this connection which is accessible from the outside of the work arm. The actuating link which oscillates the sleeve has an adjustable connection thereto so that the throw of the sleeve may be varied, and this will in turn vary the extent of movement imparted to both feed dogs.

The illustrated embodiment of the invention will be described in detail. The machine includes a supporting standard 1 carrying a bracket 2 which overhangs the one side of the standard, and the upper horizontal member 3 is mounted on this bracket 2. Located in this upper horizontal member is the main actuating shaft 4 which extends lengthwise of the upper horizontal member. At one end of the upper horizontal member is a needle head 5 carrying a needle bar 6 which is reciprocated by suitable means operated by the actuating shaft 4. This needle bar 6 carries a plurality of needles, one of which is indicated at 7. At the other end of this upper horizontal member 3 is a depending member 8 which is located beneath the main actuating shaft 4. This depending member 8 carries a work arm 9. The work arm 9 is secured to the lower open end of the depending member 8 by suitable bolts, one of which is indicated at 10.

Located in the work arm 9 are loopers 11 which cooperate with the needles 7. These loopers are carried by a looper lever 12 which is moved endwise and oscillated by means of a bell crank

member 13 which in turn is operated by a lever 14 cooperating with a crank pin 15 on the main actuating shaft 4. This lever 14 is mounted for oscillation and endwise movement on a fulcrum pin carried by a cylindrical member 16. The looper mechanism, per se, and as related to the feeding mechanism in this type of machine, form no part of the present invention, but are shown, described and claimed in a co-pending application, Serial No. 529,241 filed April 10, 1931.

The present invention is directed to the improvements in the feeding mechanism which feeds the material to the stitching mechanism. This feeding mechanism includes a main feed dog 17 which is secured to the feed bar 18 by a screw 19. The feeding mechanism also includes an auxiliary feed dog 20 which is located in advance of the main feed dog 17. This auxiliary feed dog is secured to a feed bar 21 by a screw 22. The feed bars 18 and 21 extend lengthwise of the work arm and terminate at the inner end of the work arm beneath the depending member 8. The feed bar 18 at its inner end is pivotally connected to a link 23 at 24. At the upper end this link is connected to a pivot pin 25. The pivot pin is threaded into the free end of an arm 26 and is secured therein by a nut 27. The arm 26 is mounted on a shaft 28 (see Fig. 6). This shaft 28 is in turn mounted in bearings 29 and 30 carried by the wall members of the work arm. Said arm 26 is integral with a sleeve 31 which is journaled on this shaft 28. An oil receiving slot 32 is formed in the sleeve.

The feed bar 21 is pivoted at its inner end to a link 33. The pivot bolt for connecting the link to the feed bar is indicated at 34 in Figure 3 of the drawings. This link is pivotally supported at its upper end by the pivot pin 25.

The pivot pin 25 is provided with a ball shaped member 35, and the lower end on an eccentric strap 36 engages this ball shaped member. The eccentric strap at its upper end cooperates with an eccentric 37 on the main actuating shaft 4. The eccentric strap has an oil receiving recess 38 in its upper end through which oil is supplied for lubricating the eccentric. The eccentric strap includes a link which has right and left-hand threads for connecting the link to the heads of the eccentric strap. These threads are shown in Fig. 1 of the drawings. The purpose of the right and left-hand threads is to enable the eccentric strap, as a whole, to be lengthened or shortened.

When the main shaft rotates the eccentric 37 through the eccentric strap 36 will raise and lower the arm 26, and this will raise and lower the inner ends of the feed bars.

The feed bars are mounted intermediate their ends on fulcrum blocks so that they can slide endwise thereon, and also oscillate thereon. Thus it is that the inner ends of the feed bars are raised and lowered which operates to lower and raise the feed dogs.

The feed bar 21 is provided with a recess 39 which is open at its lower side and the recess is closed by a plate 40 which is secured to the feed bar by suitable screws. Located in this closed recess are fulcrum blocks 41 and 42. These fulcrum blocks are carried on a pin 43. The feed bar 18 is provided with a similar recess and a similar plate 40 in which recess are located the fulcrum blocks 44 and 45 (see Fig. 5). These fulcrum blocks are mounted on the same pin 43. The pin 43 has a central cylindrical portion 75 which is eccentrically disposed on the pin. The

pin is journaled in the work arm and is provided with a slot 46 whereby it may be turned. A suitable set screw is provided for locking the pin in set positions. There is a plate 47 at the left of the feed bars, as viewed in Figure 5, and a plate 48 at the right thereof. These plates are mounted on the pin and serve to guide the feed bars which move back and forth in vertical planes and which can also oscillate on the pin as stated above.

It will be obvious from the above that means has been provided whereby the longitudinal axis of the path of travel of the feed dog may be adjusted bodily vertically, or the angle thereof changed to various set positions without changing the character of the path of movement of the feed dog. This is accomplished by adjusting the fulcrum pin 43 which is mounted on eccentric bearings, and by adjusting the length of the eccentric strap 36. When the fulcrum pin 43 is raised, the feed dog will be raised, and this will tilt slightly its path of movement. By shortening the length of the eccentric strap, the path of movement may again be restored to a horizontal position. By raising or lowering the fulcrum pin, and by shortening or lengthening the eccentric strap, various settings of the feed dog may be accomplished. Furthermore, by shifting the fulcrum pin 43 from the set position shown in Figure 6 through an angle of 180°, the axis of the pin will be moved toward the rear of the arm and therefore the fulcrum point of the feed bar will be shifted while the feed dog will operate at the same level. In other words this eccentric pin may be used also for varying the rising and falling movements of the feed dog as well as for varying the level at which the feed dog operates.

Connected to the feed bar 18 is a link 49. Said link is pivoted at 50 to the feed bar. The inner end of this link is pivoted at 51 to an upstanding arm 52 carried by a sleeve 53. This sleeve is mounted on a shaft 54.

A link 55 is pivoted at 56 to the feed bar 21. This link is provided at its inner end with a stud 57 which is capable of adjustment in a slot 58 in an arm 59 formed integral with the sleeve 53. There is also an arm 60 formed integral with the sleeve 53, which is provided with a slot 61. A pivot stud 62 is mounted for adjustment in this slot. A link 63 is connected to this pivot stud 62. The upper end of the link is connected to a pivot stud 64 mounted at the outer end of the lever arm 65. This lever arm 65 is formed integral with the sleeve 66, and the sleeve 66 is mounted on the shaft 28 alongside of the sleeve 31. There is an oil receiving recess 67 in the sleeve. Also carried by this lever arm 65 is a ball stud 68. An eccentric strap 69 cooperates with this ball stud 68 at its lower end, and at its upper end the eccentric strap engages an eccentric 70 on the main actuating shaft 4. The eccentric strap 69 includes a link having right and left-hand threads connecting the same to the heads of the strap, and by turning this link, the length of the strap can be increased or decreased. As the main actuating shaft is rotated the eccentric strap will raise and lower the lever arm 65 and through the link 63 will impart oscillations to the sleeve 53 and the rock lever attached thereto. The arm 59 through the link 55 will impart endwise movements to the feed bar 21. The arm 51 through the link 49 will impart endwise movements to the feed bar 18 as this sleeve 53 is oscillated. By shifting the pivot stud 62 in the slot 61 the extent of movement imparted to the sleeve

53 will be varied. Whatever increase or decrease of movement is given to this sleeve will be likewise given to both feed bars. In other words, the back and forth movements of both feed bars will be simultaneously changed by shifting the stud 62 in the slot 61.

The feeding mechanism is particularly designed for giving a differential feed movement to the feed dogs. When operating upon knit fabrics it is desirable to give the auxiliary feed dog a feeding movement of a slightly greater extent than the main feed dog, so as to prevent the stretching of the material. By adjusting the pivot stud 57 in the slot 58 the extent of movement imparted to the feed bar 21 carrying the auxiliary feed dog may be varied. This adjustment of the pivot stud 57 may be made from the outer face of the work arm. Freely mounted on the shaft 54 is a bell crank lever 71. One arm of this bell crank lever is pivoted at 72 to a link 73, which in turn is pivoted at 74 to a pivot stud attached to the link 55. When this bell crank lever is oscillated the pivot stud 57 will be shifted in the slot 58. The upstanding arm of the bell crank lever 71 carries a headed pin 75. Mounted on this headed pin is a locking button 76. A spring 77 normally forces the same outward. There is a slotted plate 78 secured to the outer wall of the work arm by means of screws 79, 79. The button extends through the slot in this plate and is provided with a flanged inner end having teeth adapted to engage corresponding teeth on the inner face of this plate 78. When the button is pressed inward it is released from the plate and then the rock lever may be readily turned from one position to another, and the release of the button will secure the rock lever 71 in its set position. By this arrangement the stroke of the feed bar carrying the differential feed dog may be changed as desired, without varying the stroke of the main feed dog. By lengthening or shortening the eccentric strap 69 which imparts back and forth movements to both of the feed dogs, the operating position of the feed dogs may be shifted and thus the feed dogs properly centered or positioned in the feed slots of the throat plate.

From the above description it will be apparent that a feeding mechanism has been provided which consists of comparatively few parts, all of which are pivotally connected to each other so as to enable the parts to be positively moved back and forth. The feed dogs are carried by feed bars which extend lengthwise of the work arm, and this enables the work arm to be made comparatively small in cross sectional area. The feed bars are raised and lowered by a lever arm directly connected thereto through links, which lever arm in turn is directly connected to an eccentric strap extending upwardly through the depending member and cooperating directly with an eccentric on the main actuating shaft. Although the work arm is suspended and is offset from the bracket carrying the same, the only connections between the actuating shaft and the feed bar for raising and lowering the feed dogs are the eccentric strap, the lever arm and the links. This is a very direct connection between the actuating shaft and the feed bars, whereby said feed bars may be operated at relatively high speed and be free from vibration. The feed bars are moved back and forth by link connections with a sleeve member mounted in the work arm, which in turn is oscillated by a link connected to a lever arm likewise mounted in the work arm and connected to an eccentric strap extending up

through the depending member and cooperating directly with an eccentric on the main actuating shaft. The connections therefor between the main actuating shaft and the feed bars for moving the same back and forth are very direct and positive, so that the parts may be rapidly operated with little resulting undesirable vibration. Notwithstanding that the mechanism is extremely simple, and the parts for operating the feed bar comparatively few in number, the stroke of the feed bars may be simultaneously adjusted and the stroke of one of the feed bars independently adjusted. After the stroke of the differential feed dog has been properly fixed relative to the main feed dog, the stroke of both feed dogs can readily be changed without varying this relative stroke of the differential to the main feed dog.

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

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

1. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, devices actuated by said shaft and extending through said depending member for raising and lowering said feed bars in unison, and devices actuated by said shaft and extending through said depending member for moving the feed bars back and forth, said devices including means whereby one of said feed bars may be given a differential movement relative to the other, and also including means whereby the stroke imparted to both of the feed dogs may be simultaneously varied and whereby the differential stroke imparted to one of the bars may be varied.

2. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, and devices actuated by said shaft and extending through said depending member for moving the feed bars back and forth.

3. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said

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needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, and devices actuated by said shaft and extending through said depending member for moving the feed bars back and forth, said devices including means whereby one of the feed bars may be given a differential movement relative to the other.

4. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, and devices actuated by said shaft and extending through said depending member for moving the feed bars back and forth, said devices including means whereby one of the feed bars may be given a differential movement relative to the other, and also including means whereby the stroke imparted to both of the feed dogs may be simultaneously varied and whereby the differential stroke imparted to one of the feed bars may be varied.

5. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, a second eccentric on said actuating shaft, an arm mounted in said depending member for vertical oscillations connected to said last named eccentric strap, a rock member oscillated by said arm, a link actuated by said rock member and connected to one of said feed bars for moving the same endwise, and a link connected to said rock member and to the other feed bar for moving the same endwise.

6. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said

depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, a second eccentric on said actuating shaft, an arm mounted in said depending member for vertical oscillations connected to said last named eccentric strap, a rock member oscillated by said arm, a link actuated by said rock member and connected to one of said feed bars for moving the same endwise, and a link connected to said rock member and to the other feed bar for moving the same endwise, the connection between one of said links and the rock member including means whereby the throw imparted to the feed bar may be varied.

7. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, a second eccentric on said actuating shaft, an arm mounted in said depending member for vertical oscillations connected to said last named eccentric strap, a rock member oscillated by said arm, a link actuated by said rock member and connected to one of said feed bars for moving the same endwise, and a link connected to said rock member and to the other feed bar for moving the same endwise, the connection between the arm and the rock member including means whereby the extent of oscillation imparted to the rock member may be varied.

8. A sewing machine including the combination, a supporting frame having an upper horizontal member carrying a needle head in one end thereof and a depending member at the other end thereof, a work arm suspended from said depending member and terminating beneath said needle head, a main actuating shaft in said upper member, feed bars extending lengthwise of said work arm, a main feed dog carried by one feed bar and an auxiliary feed dog carried by the other feed bar, an eccentric on said actuating shaft, an eccentric strap cooperating therewith, an arm mounted in said work arm at the lower end of said depending member for vertical oscillation connected to said eccentric strap, links connected to said arm and to the respective feed bars for raising and lowering the same, a second eccentric on said actuating shaft, an arm mounted in said depending member for vertical oscillations connected to said last named eccentric strap, a rock member oscillated by said arm, a link actuated by said rock member and connected to one of said feed bars for moving the same

endwise, and a link connected to said rock member and to the other feed bar for moving the same endwise, the connection between the arm and the rock member including means whereby the extent of oscillation imparted to the rock member may be varied, the connection between one of the links and the rock member including means whereby the throw imparted to the feed bar thereby may be varied.

9. In a sewing machine, a work arm, a feed bar extending lengthwise of the work arm, devices located intermediate the ends of the feed bar on which said feed bar may rock and move endwise, means whereby said devices may be raised and lowered, means for moving said feed bar endwise, a feed dog carried by one end of the feed bar, and means connected at the other end of the feed bar for oscillating said feed bar for giving the rising and falling movements to the feed dog, said last-named means including devices whereby the rising and falling positions of the feed dog may be shifted vertically.

10. In a sewing machine, a work arm, a feed bar extending lengthwise of the work arm, devices located intermediate the ends of the feed bar on which said feed bar may rock and move endwise, means whereby said devices may be raised and lowered, means for moving said feed bar endwise, a feed dog carried by one end of the feed bar, and means connected at the other end of said feed bar for raising and lowering the same, said means including an eccentric strap which may be lengthened or shortened for shifting vertically the rising and falling position of the feed dog.

11. In a sewing machine a work arm and a feed bar extending lengthwise of the work arm,

means located intermediate the ends of the feed bar on which said feed bar may rock and move endwise, said means including a fulcrum pin having an eccentric portion and fulcrum blocks carried by said pin, means for moving the feed bar endwise on the fulcrum blocks and means for rocking said feed bar and the fulcrum blocks on said fulcrum pin, said fulcrum pin being provided with means whereby it may be shifted from one set position to another for raising and lowering the working position of the feed bar and shifted from one set position to another relative to and lengthwise of said feed bar for shifting the fulcrum line support of the feed bar.

12. In a sewing machine a work arm, feed bars extending lengthwise of the work arm and located side by side therein, a main feed dog carried by one of said bars, an auxiliary feed dog carried by the other feed bar, a common fulcrum supporting means for both feed bars disposed intermediate the ends of the feed bars and including a fulcrum pin having an eccentric portion and fulcrum blocks carried by said pin on which both of said feed bars are mounted for endwise and rocking movements, means for rocking said feed bars and said fulcrum blocks on said fulcrum pin and means for imparting a differential endwise movement to the feed bars on said fulcrum blocks, said fulcrum pin being provided with means whereby it may be shifted from one set position to another for raising and lowering the working position of the feed bars and shifted from one set position to another relative to and lengthwise of the feed bars for shifting the fulcrum line support of the feed bars.

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