

March 30, 1937.

S. ZONIS

2,075,598

SEWING MACHINE

Filed Jan. 25, 1936

4 Sheets-Sheet 1

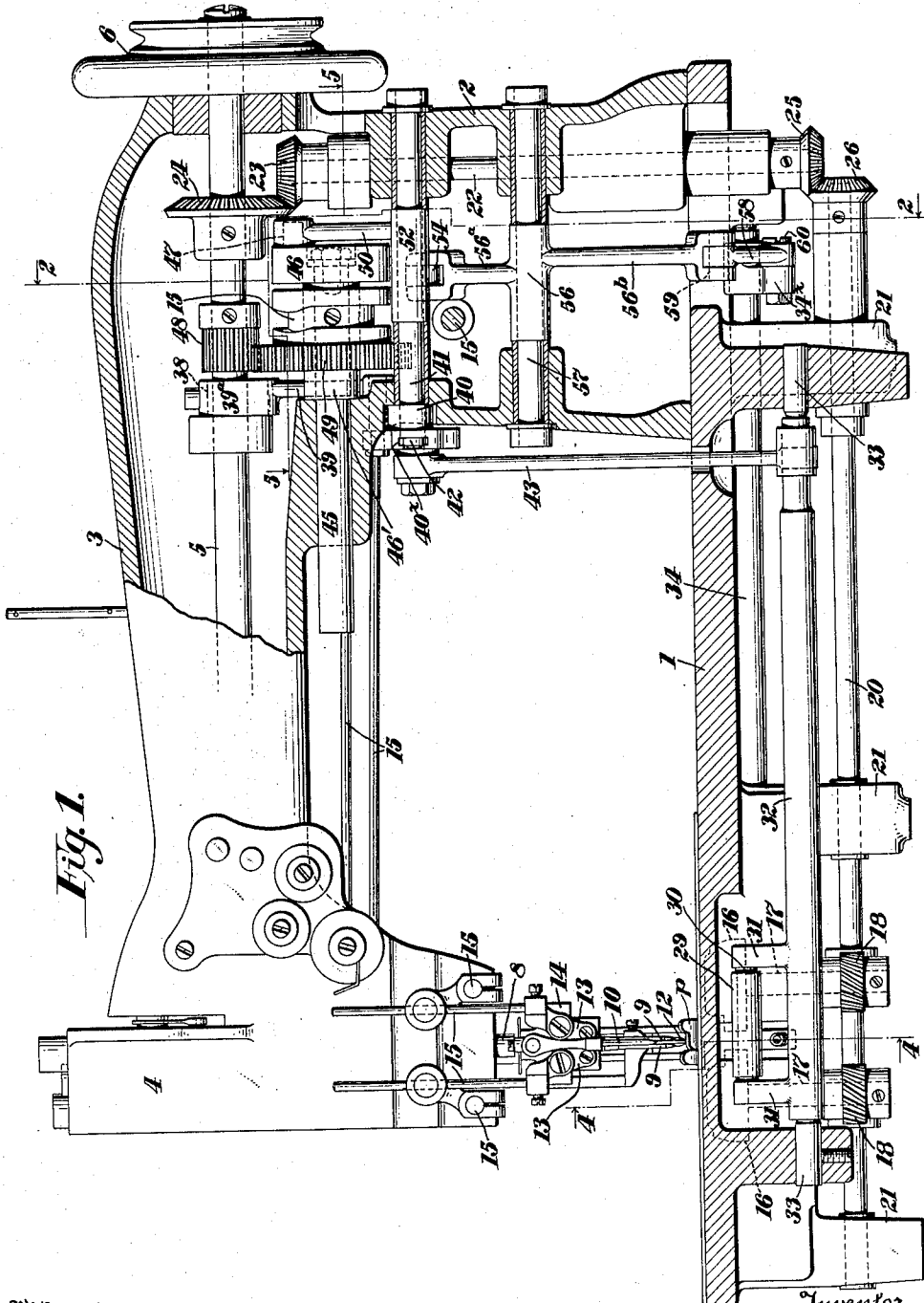


Fig. 1.

Witness:

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SEWING MACHINE

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4 Sheets-Sheet 2

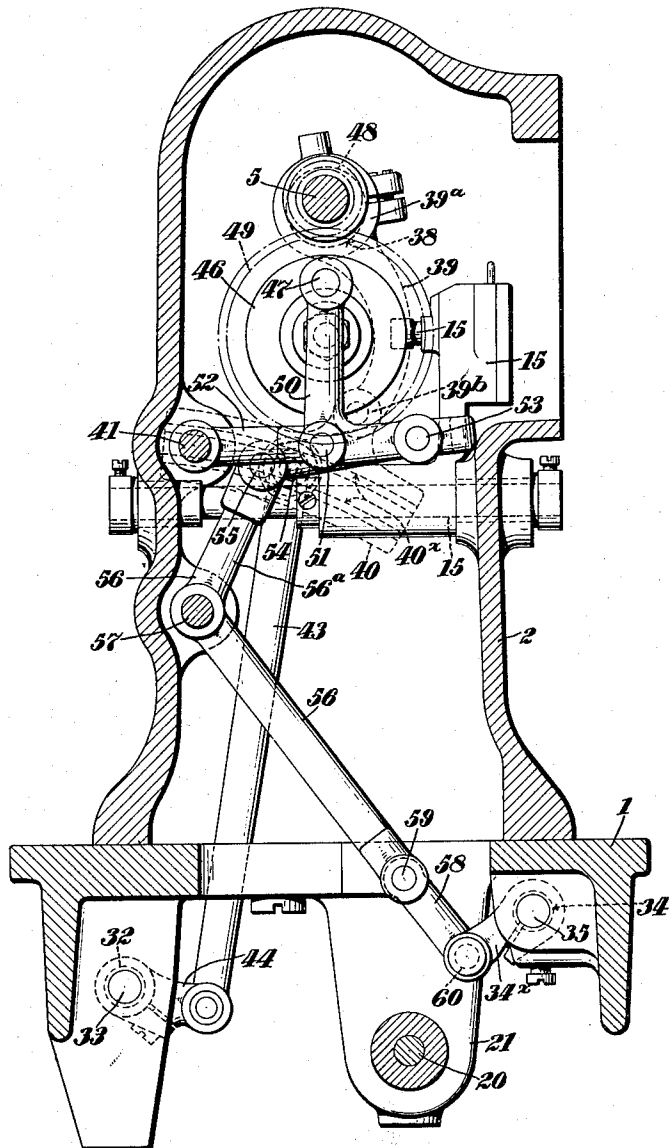


Fig. 2.

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SEWING MACHINE

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4 Sheets-Sheet 3

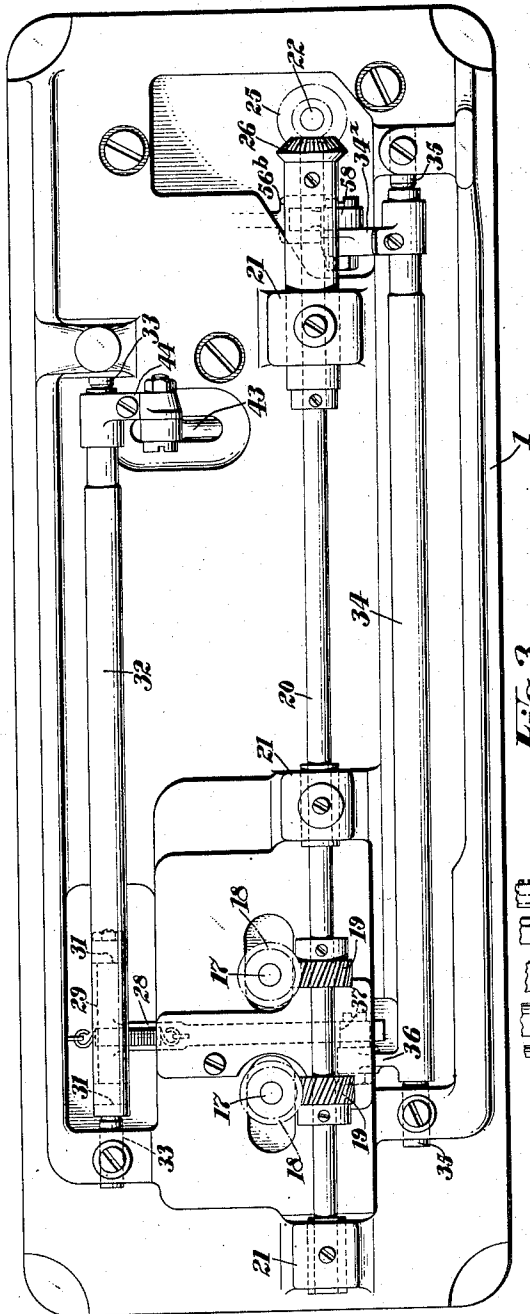


Fig. 3.

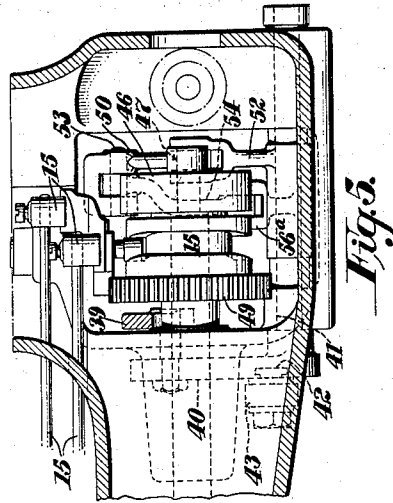


Fig. 5.

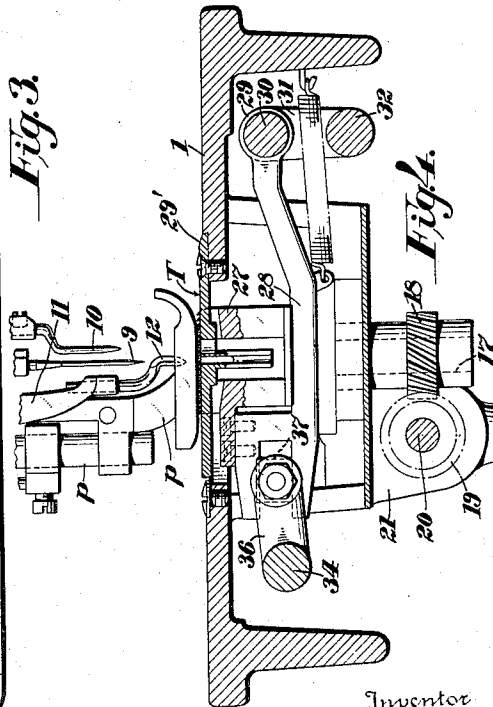


Fig. 4.

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2,075,598

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Fig. 10.

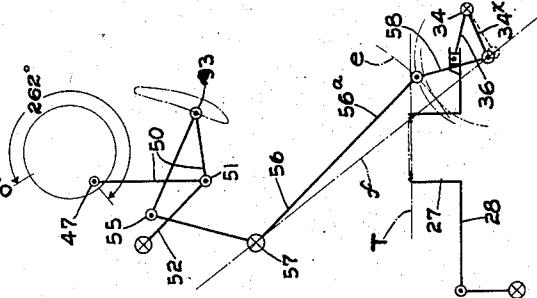


Fig. 9.

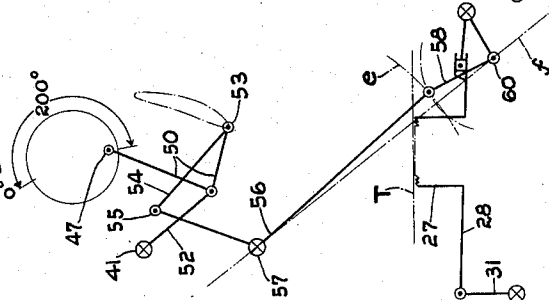


Fig. 8.

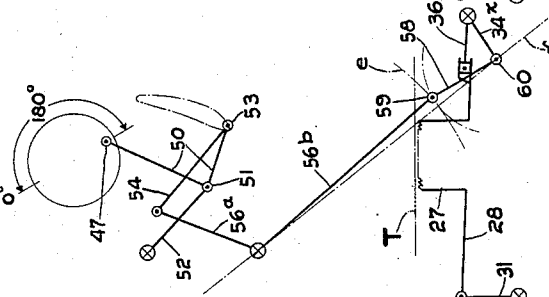


Fig. 7.

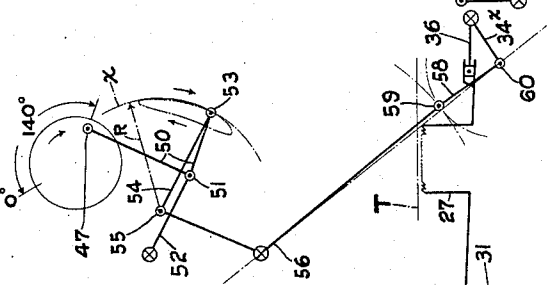
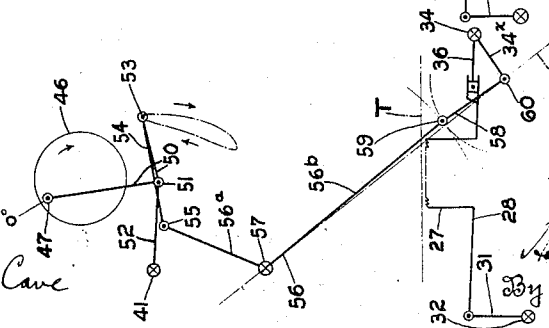


Fig. 6.



Witness:  
*John H. Cave*

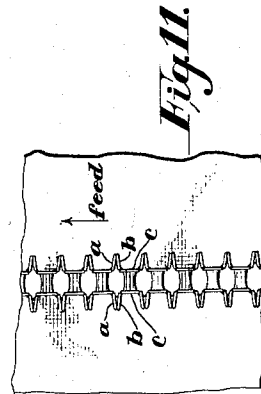


Fig. 11.

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# UNITED STATES PATENT OFFICE

2,075,598

## SEWING MACHINE

Sydney Zonis, Bridgeport, Conn., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application January 25, 1936, Serial No. 60,748

20 Claims. (Cl. 112—215)

This invention relates to sewing machines and more particularly to feeding mechanisms therefor.

A primary object of the invention is to provide an improved feed-mechanism for sewing machines which will effect a feeding movement of the work only after a plurality of stitches have been made.

A feeding mechanism of this nature is particularly useful in connection with that type of hemstitch sewing machine in which the work is given only one advancing movement for each three reciprocations and two lateral vibrations of the needle, thereby producing a hemstitch figure similar to that disclosed in U. S. Patent to Gegauf et al., No. 592,088, October 19, 1897.

Heretofore this intermittent feed of the work has been attained by the use of cams and mechanism actuated thereby.

The present invention has as an object to provide an intermittent feeding mechanism which shall be devoid of harsh, noisy or speed-limiting movements incident to prior constructions.

A further object of the invention is to provide a feeding mechanism of this nature which is comparatively inexpensive to manufacture and in which the motions are easy and the mechanism is therefore light-running, quiet in operation, and conducive to easy starting, high speed and minimum wear.

These and other objects have been attained, as hereinafter will appear, by the provision of a feeding mechanism, the elements of which are actuated by continuously rotating crank or eccentric devices having link and lever connections with the feed-dog carrying bar. Preferably the feed-bar is given its endwise reciprocations from an eccentric carried by the rotary needle-bar actuating shaft and therefore its movements are continuous, it making one forward and one return movement for each reciprocation of the needle-bar. The feed-lifting mechanism is actuated from a rotary crank which in turn is actuated from the needle-bar actuating shaft through a suitable three-to-one speed reduction gearing, whereby the feed-dog is lifted into contact with the work only once for each three reciprocations of the needle. To the end that the feed will be wholly ineffective to feed the work until after the third reciprocation of the needle, dwell-producing means, later to be described, is embodied in the feed-lifting mechanism intermediate the actuating crank and the usual feed-lift rock-shaft. This means renders the feed-lifting mechanism ineffective to lift the work-engaging teeth

of the feed-dog above the upper surface of the throat-plate until the needle-bar actuating shaft has been rotated approximately 240 degrees.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangement of parts hereinafter described and claimed.

Drawings depicting a preferred embodiment of the invention have been annexed as a part of this disclosure, and in such drawings, Figure 1 is a side elevation, partly in section, of a sewing machine, embodying the present invention. Fig. 2 represents a vertical section substantially on the line 2—2 of Fig. 1. Fig. 3 is a bottom view of the machine shown in Fig. 1. Fig. 4 represents a vertical section substantially on the line 4—4 of Fig. 1. Fig. 5 represents a horizontal section substantially on the line 5—5 of Fig. 1. Figs. 6, 7, 8, 9 and 10 are diagrammatic representations of the feed-lifting mechanism illustrating the action of the dwell-producing means therein, whereby the feed-dog is maintained below the upper surface of the throat-plate, and therefore ineffective to feed the work, until after the needle has made its third reciprocation in the formation of a three-stitch hemstitch figure, and Fig. 11 is a representation of a portion of a hemstitch seam comprising a plurality of the three-stitch hemstitch figures, in the making of which the work is given a feeding movement only after three reciprocations and two lateral vibrations of the needle (or needles).

Referring more specifically to the drawings, the invention is disclosed as embodied in a Singer Class 119 W hemstitch sewing machine comprising a bed 1, standard 2, bracket-arm 3 and bracket-arm head 4. Journaled lengthwise within the arm 3 is a drive-shaft 5 which carries, at its rear end, the usual belt and hand-wheel 6 by which rotation is transmitted to the shaft from any suitable source of power, not shown. At its forward end the shaft 5 is connected to reciprocate a needle-bar 8, carrying needles 9 and an auxiliary piercer 10. The shaft 5 also actuates, through suitable mechanism, a piercer-bar 11 carrying a main piercer 12. The needles 9 are held in carriers 13 pivotally mounted on a supporting plate 14 secured to the lower end of the needle-bar and suitable means, designated generally as 15, is provided for swinging the carriers on their pivots thereby to vibrate the needles laterally. A suitable presser mechanism *p*, adapted for cooperation with the needles and the feed mechanism, also is carried by the head 4. Inasmuch as the presser mechanism and the means for recipro-

cating the needles and piercers and for effecting lateral vibrations of the needles are conventional and form no part of the present invention detailed illustration and description thereof is deemed unnecessary.

Located beneath the bed-plate 1, for cooperation with the needles in the formation of stitches, are two rotary loop-takers 16, secured upon vertically disposed shafts 17 adapted to be driven through gears 18, 19 from a shaft 20 journaled in bearing lugs 21 depending from the bed-plate. As shown most clearly in Fig. 1, the shaft 20 is rotated from the main shaft 5, at a ratio of 2 to 1, through the medium of a vertically disposed shaft 22 journaled in the standard 2. The shaft 22 carries at its upper end a bevel gear 23, which is driven from a gear 24 on the shaft 5, and at its lower end a similar gear 25 which drives a bevel gear 26 on the shaft 20.

As above stated, this invention relates particularly to the means for feeding the work. This is effected by the action of a feed-dog 27 secured upon a vertically and endwise movable feed-bar 28. At certain times the feed-bar is lifted, thereby to project the teeth of the feed-dog above the upper surface T of a throat-plate 29, secured upon the cloth-plate, and to engage the work held down by the presser-foot. Endwise movement of the feed-bar then causes the work to be advanced one stitch length.

The feed-bar 28 is formed at one end as a sleeve 29 which is journaled upon a rod 30 carried by upstanding arms 31 formed on a feed-reciprocating rock-shaft 32 journaled on pintles 33 secured in lugs formed integral with the bed 1. Thus it will be understood that oscillation of the shaft 32 (by means later to be described) will effect endwise reciprocation of the feed-bar 28 and thereby advancing and retracting movement of the feed-dog 27.

The feed-bar 28 is adapted to be swung vertically about the rod 29, thereby to cause the teeth of the feed-dog to be raised above the surface T of the throat-plate so that it may effect a feeding movement of the work, or to lower the feed-dog wholly below the surface T so as to render the feed ineffective. This raising and lowering of the feed-bar is effected by the oscillations of a feed-lift rock-shaft 34 journaled on pintles 35 supported in lugs depending from the bed-plate. The shaft 34 is formed with an arm 36 which carries a swivel-block 37 embraced by the forked free end of the feed-bar 28. Thus oscillation of the shaft 34 will effect rising and falling movements of the free end of the feed-bar and the feed-dog carried thereby.

The means for oscillating the shaft 32, thereby to effect reciprocation of the feed-bar 28, preferably comprises an eccentric 38, secured on the main shaft 5, and embraced by the upper end 39<sup>a</sup> of a connecting rod 39. At its lower end, the connecting rod is secured at 39<sup>b</sup>, to a segment 40 fixed upon a shaft 41, journaled in the standard 2. The segment 40 is provided with an arcuate T-slot, 40<sup>x</sup>, within which is adjustably secured a slide-block 42 carried by the upper end of a link 43 which is connected at its lower end, to an arm 44 fixed to the feed-reciprocating rock-shaft 32. From the foregoing it will be perceived that each rotation of the main shaft 5 effects one forward and one backward endwise movement of the feed-bar 28 and the feed-dog 27 carried thereby. The extent of movement of the feed-bar is predetermined by the position of the slide-block 42 in the slot 40<sup>x</sup> of the segment 40.

As hereinbefore stated, the feed-dog is adapted to be lifted into engagement with the work only once for each three reciprocations of the needles, and the three corresponding reciprocations of the feed-bar. This is effected by means now to be described.

Rotatably journaled on a stub-shaft 45, fixed in the machine frame below and parallel with the main shaft 5, is a crank-disk 46 provided with a crank-pin 47. This disk is adapted to be rotated from the main shaft 5, at one-third the speed of the latter, by speed reduction gears comprising a driving pinion 48 secured to the main shaft and a gear 49 secured to the hub 46' of the disk 46, and driven by said pinion. Thus it will be understood that the crank-disk 46 and the crank-pin 47 carried thereby will be given but one complete rotation while the main shaft 5 is making three rotations and thereby effecting three reciprocations of the needles and three reciprocations of the feed-bar.

Rotation of the crank-pin 47 serves, through mechanism later to be described, to rock the feed-lift rock-shaft 34 thereby to raise and lower the continuously reciprocating feed-dog and cause it to engage the work, each complete rotation of the crank-pin effecting one elevation and one depression of the feed-dog. As hereinbefore stated, this invention proposes to maintain the feed-dog below the upper surface of the throat-plate during its first two reciprocations and then to lift it into engagement with the work so that the third reciprocation thereof will rapidly advance the work one stitch length; this feed of the work being effected after the first two stitches of a three-stitch hemstitch figure have been completed.

This has been attained by embodying in the connection between the constantly rotating crank-pin 47 and an arm 34<sup>x</sup> secured to the feed-lift rock-shaft 34, two serially arranged dwell-producing means which together produce sufficient dwell to permit the feed-dog to remain below the upper surface of the throat-plate while the crank-pin is rotated through approximately 240 degrees. Thereafter the feed-dog is lifted into engagement with the work. This connection comprises an elbow lever 50 fulcrumed on a pin 51 carried by the free end of a radius arm 52 pivotally mounted on the shaft 41, previously mentioned. One arm of the elbow lever 50 embraces the crank-pin 47 and the other arm is pivotally connected, by a pin 53, to one end of a bent link 54. The other end of the link 54 is pivotally connected, by a pin 55, to one arm 56<sup>a</sup> of an elbow lever 56, fulcrumed on a shaft 57, fixed in the machine standard.

As illustrated diagrammatically in Figs. 6, 7 and 8, the elbow lever 50, the radius arm 52 and the link 54, constitute a first dwell-producing means whereby, during approximately 140 degrees of rotation of the crank-pin 47, i. e., from the position indicated in Fig. 6 to that indicated in Fig. 7, the pivotal point 53, between the elbow lever 50 and the link 54, is moved substantially in the arc  $\alpha$ , the radius R of which corresponds to the distance between the axes of the pins 53 and 55. Thus during that 140 degrees of rotation of the crank-pin, the link 54 rotates idly about its pivot 55 and substantially no motion is transmitted to the elbow lever 56, and the feed-dog is maintained below the upper surface of the throat-plate.

During the next 40 degrees of rotation of the crank-pin 47, the pivotal point 53 travels in a path which approximates the said arc  $\alpha$  but which varies therefrom slightly. Thus during that

movement, as illustrated by Figs. 7 and 8 a slight movement is transmitted to the elbow lever 56, but that movement is not sufficient to lift the feed-dog above the upper surface of the throat-plate. From the foregoing it will be perceived that, due to the action of the first dwell-producing means, during 180 degrees of rotation of the crank-pin, during which the first stitch of a three-stitch hemstitch figure has been completed and the second started, the continuously reciprocating feed-dog is maintained below the throat-plate and out of contact with the work and therefore no feeding movement of the work is effected.

During the next 20 degrees of rotation of the crank-pin (i. e., in moving from the position represented by Fig. 8 to that represented by Fig. 9) the pivot 53 is moved laterally a small amount and therefore the link 54 moves endwise and transmits a counter-clockwise rotation to the elbow lever 56. This motion, however, is slight and does not oscillate the feed-lift rock-shaft 34 sufficiently to lift the feed-dog above the upper surface of the throat-plate. This is due to the action of a second dwell-producing means now to be described.

The elbow lever 56 includes a lower arm 56<sup>b</sup> which constitutes one element of a toggle, the other element of which consists of a link 58 pivotally connected at one end to a pin 59 carried by the arm 56<sup>b</sup> and at its other end it is pivoted, at 60, to the arm 34<sup>x</sup> secured upon the feed-lift rock-shaft 34. As the parts are moved from the position represented in Fig. 8 to that represented in Fig. 9 the lever 56 is rocked and the connecting pin 59 carried thereby is swung in an arc *e* about the axis of the shaft 57. This movement swings the link 58 about its pivot 60 and causes only a minor bodily endwise movement of the link. Inasmuch as the pin 59 is, at that time, moving adjacent a line *f* intersecting the axis of the shaft 57 and the pivot 60, the amount of endwise movement transmitted to the link 58 and the movement produced thereby in the arm 34<sup>x</sup> and the feed-lift rock-shaft 34 is insignificant and not sufficient to lift the teeth of the feed-dog above the upper surface of the throat-plate.

The next 62 degrees of rotation of the crank-pin cause the parts to be moved from the position represented in Fig. 9 to that represented in Fig. 10. This movement of the lever 56 moves the link 58 endwise a substantial amount, thereby rocking the shaft 34 which in turn lifts the feed-dog to bring the teeth thereof above the throat-plate so as to engage the work thereon preparatory to a feeding movement, which will be effected by the next endwise movement of the feed-bar.

Thus it will be apparent that, due to the combined actions of the two serially arranged dwell-producing means the feed-dog is maintained below the work-supporting surface of the throat-plate while the crank-pin is rotated approximately 240 degrees, during which the first two stitches *a* and *b* of the three-stitch hemstitch figure (Fig. 11) have been completed. During the final 120 degrees rotation of the crank-pin the third stitch *c* is formed, the feed-dog is brought into engagement with the work, the work is advanced and the feed-dog is lowered below the upper surface of the throat-plate, thus completing the cycle.

The amount of dwell afforded by the second dwell-producing means is predetermined by the initial position of the axis 59 relative to the line *f* intersecting the axes of the shaft 57 and the pivot 60. Therefore, by varying the angle be-

tween the arms 56<sup>a</sup> and 56<sup>b</sup> of the elbow lever 56, and thereby the initial position of the axis 59, the dwell may be made greater or less than that above described.

From the foregoing it will be perceived that I have provided a novel feeding mechanism for sewing machines, capable of attaining all the above mentioned objects and which is decidedly useful when embodied in that type of hemstitch sewing machine which produces the three-stitch hemstitch figure illustrated in Fig. 11.

While I have shown and described my invention as embodied in a three-stitch hemstitch sewing machine, with the dwell-producing means in the feed-lifting mechanism, it is to be understood that the invention is not limited to that embodiment and may be used to advantage in hemstitch sewing machines making other hemstitch figures, or in other types of sewing machines. Likewise the improved dwell-producing means may be embodied in the feed-driving mechanism or in the actuating mechanism of other work-manipulating elements of sewing machines.

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

1. In a sewing machine having a reciprocatory needle and a rotary shaft adapted to reciprocate said needle once for each rotation of the shaft, a feeding mechanism including an endwise reciprocable and vertically movable feeding element; means to reciprocate said element; and means to raise and lower said feeding element including a feed-lift rock-shaft; a rotary crank; speed reduction gears connecting said shaft and crank to rotate the crank from said needle-reciprocating shaft once for each three rotations of the shaft; and an operative connection between said crank and said rock-shaft including a plurality of serially arranged dwell-producing means adapted to delay the effective actuation of said rock-shaft until after two reciprocations of said needle.

2. In a sewing machine having a reciprocatory needle and a rotary shaft adapted to reciprocate said needle once for each rotation of the shaft, a feeding mechanism including an endwise reciprocable and vertically movable feeding element; means including an eccentric on said shaft for reciprocating said element once for each reciprocation of said needle; and means to raise and lower said feeding element including a feed-lift rock-shaft; a rotary crank; means to rotate said crank from said needle-reciprocating shaft once for a plurality of rotations of the shaft; and an operative connection between said crank and said rock-shaft including a plurality of serially arranged dwell-producing means adapted to delay the effective actuation of said rock-shaft until after two reciprocations of said needle.

3. In a sewing machine having a frame, a reciprocatory needle and a rotary shaft journaled in said frame and adapted to reciprocate said needle once for each rotation of the shaft, a feeding mechanism including a second shaft mounted in said frame; an endwise reciprocable and vertically movable feeding element; means to reciprocate said feeding element; and means to raise said feeding element into engagement with the work only once for a plurality of reciprocations of said needle, including a feed-lift rock-shaft; a rotary crank carried by said second shaft; means to rotate said crank from said needle-reciprocating shaft once for each three rotations of the shaft; and an operative connection between said crank and said rock-shaft including a first dwell-producing means adapted to delay the

effective actuation of said rock-shaft while said crank is rotated approximately 180 degrees, and a second dwell-producing means adapted to further delay the effective actuation of said rock-shaft while said crank is given a further rotary motion.

4. In a sewing machine having a reciprocating needle and a rotary shaft adapted to reciprocate said needle once for each rotation of the shaft, a feeding mechanism including an endwise reciprocable and vertically movable feeding element normally maintained below and out of contact with the work; means including an eccentric on said shaft and a connecting rod engaging said eccentric to reciprocate said element; and means to raise said feeding element into engagement with the work only once for each three reciprocations of said needle, said feed-lifting means including a feed-lift rock-shaft; a rotary crank; means including speed reduction gears to rotate said crank from said needle-reciprocating shaft once for a plurality of rotations of the shaft; and an operative connection between said crank and said rock-shaft including two connected and successively effective dwell-producing means adapted to delay the effective actuation of said rock-shaft until after two reciprocations of said needle.

5. A feeding mechanism for sewing machines having a frame, comprising an endwise reciprocable and vertically movable feeding element normally maintained below and out of contact with the work; means to reciprocate said feeding element; and means for periodically raising said feeding element into engagement with the work, comprising a feed-lift rock-shaft; an arm secured to said rock-shaft; a rotary crank; an elbow-lever having one arm engaging said crank; a radius arm pivoted to said frame and affording at its free end a pivot for said elbow-lever; a link connected at one end to the other arm of said elbow-lever; a second elbow-lever fulcrumed on said frame and having one arm connected to the other end of said link; and a link connection between the other arm of said second elbow-lever and the arm on said rock-shaft.

6. A feeding mechanism for sewing machines comprising an endwise reciprocable and vertically movable feeding element normally maintained below and out of contact with the work; means to reciprocate said feeding element; and means for periodically raising said feeding element into engagement with the work, comprising a feed-lift rock-shaft; a rotary crank; an operative connection between said crank and said rock-shaft including a first dwell producing means comprising an elbow-lever having one arm engaging said crank, a radius arm to which said elbow-lever is pivoted, and a link connected at one end to the other arm of said elbow-lever; and a second dwell-producing means connecting said link with said feed-lift rock-shaft.

7. A feeding mechanism for sewing machines comprising an endwise reciprocable and vertically movable feeding element normally maintained below and out of contact with the work; means to reciprocate said feeding element; and means for periodically raising said feeding element into engagement with the work, comprising a feed-lift rock-shaft; a rotary crank; an elbow-lever having one arm engaging said crank; a radius arm to which said elbow-lever is pivoted; a link connected at one end to the other arm of said elbow-lever; a second elbow-lever having one arm connected to the other end of said link;

and a toggle connection between said second elbow-lever and said rock-shaft.

8. In a feeding mechanism for sewing machines having an endwise reciprocable and vertically movable feeding element normally maintained below and out of contact with the work; means to reciprocate said feeding element; and means for periodically raising said feeding element into engagement with the work, comprising a feed-lift rock-shaft, an arm secured to said rock-shaft; a continuously rotating crank; an operative connection between said crank and said rock-shaft including two serially arranged dwell-producing means one comprising an elbow-lever having one arm engaging said crank, a radius arm to which said elbow-lever is pivoted, and a link connected at one end to the other arm of said elbow-lever, the other dwell-producing means comprising a second elbow-lever having one arm connected to the other end of said link, and a link connection between said second elbow-lever and the arm on said rock-shaft.

9. In a feeding mechanism for sewing machines, having an endwise reciprocable and vertically movable feeding element normally located below and out of contact with the work, means periodically to lift said feeding element into engagement with the work, comprising a continuously rotating crank, a feed-lift rock-shaft; an operative connection between said crank and said rock-shaft whereby each rotation of said crank effects one upward and one downward movement of said feeding element; and dwell-producing means embodied in said operative connection for maintaining said rock-shaft substantially stationary during the major portion of the rotation of said crank.

10. In a sewing machine, a work-feeding mechanism including a work-feeding element having work-engaging and work-feeding movements; means to give to said element its work-feeding movements; and means periodically to give to said element its work-engaging movements, comprising a continuously rotating crank; an operative connection between said crank and said work-feeding element, whereby each rotation of said crank effects one work-engaging movement of said element; and dwell-producing means embodied in said operative connection for delaying the work-engaging movement of said element until said crank has completed the major portion of its rotation.

11. In a sewing machine, a work-feeding mechanism including a work-feeding element having work-engaging and work-feeding movements; means to give to said element its work-engaging movements; and means to give to said element its work-feeding movements, one of said means including a continuously rotating crank; an operative connection between said crank and said work-feeding element, whereby each rotation of said crank effects one actuation of said element; and dwell-producing means embodied in said operative connection for delaying the effective action of said element until said crank has completed the major portion of its rotation.

12. In a sewing machine, a work-manipulating element; means, including a continuously rotating crank and an operative connection between said crank and said element, for actuating said element, said operative connection including dwell-producing means adapted to delay the effective action of said element until said crank has completed the major portion of its rotation.

13. A feeding mechanism for sewing machines having a reciprocatory needle and a work-support, comprising an endwise reciprocable and vertically movable work-feeding element normally maintained below the upper surface of the work-support; and means to reciprocate said feed element once for each reciprocation of the needle and to raise said element above said surface and into engagement with the work, only once for a plurality of reciprocations of said needle.

14. A feeding mechanism for sewing machines having a reciprocatory needle, comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby and normally maintained below and out of contact with the work; means to reciprocate said feed-bar once for each reciprocation of the needle; and other means for raising said feed-bar, thereby to cause the feed-dog to engage the work, only once for a plurality of reciprocations of said needle.

15. A feeding mechanism for sewing machines having a reciprocatory needle, comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby and normally maintained below and out of contact with the work; means to reciprocate said feed-bar; and means including a rotary crank and link and lever mechanism actuated therefrom, for raising said feed-bar, thereby to cause the feed-dog to engage the work, only once for a plurality of reciprocations of said needle.

16. In a sewing machine having a rotary needle-bar actuating shaft and a needle-bar reciprocated therefrom, a feeding mechanism comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby; means actuated by said shaft to reciprocate said feed-bar once for each reciprocation of the needle-bar; and other means actuated from said shaft at a reduced rate for raising said feed-bar, only once for a plurality of reciprocations of said needle-bar.

17. In a sewing machine having a rotary needle-bar actuating shaft and a needle-bar reciprocated therefrom, a feeding mechanism, comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby; means including an eccentric on said shaft and mechanism actuated thereby to reciprocate said feed-bar once

for each reciprocation of the needle-bar; and other means actuated from said shaft for raising said feed-bar, thereby to cause the feed-dog to engage the work, only once for a plurality of reciprocations of said needle-bar.

18. In a sewing machine having a rotary needle-bar actuating shaft and a needle-bar reciprocated therefrom, a feeding mechanism, comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby; means actuated by said shaft to reciprocate said feed-bar; and other means actuated from said shaft at a reduced rate and including a rotary crank and link and lever mechanism for raising said feed-bar, thereby to cause the feed-dog to engage the work, only once for a plurality of reciprocations of said needle-bar.

19. In a sewing machine having a rotary needle-bar actuating shaft and a needle-bar reciprocated therefrom, a feeding mechanism comprising an endwise reciprocable and vertically movable feed-bar; a feed-dog carried thereby; means including an eccentric on said shaft and mechanism actuated thereby to reciprocate said feed-bar; a crank rotated from said shaft at a reduced rate; and link and lever mechanism actuated from said crank and connected with said feed-bar for raising said feed-dog into engagement with the work only once for a plurality of reciprocations of said needle-bar.

20. In a sewing machine having a reciprocatory needle and a rotary shaft adapted to reciprocate said needle once for each rotation of the shaft, a feeding mechanism including an endwise reciprocable and vertically movable feeding element; means to reciprocate said element; and means to raise and lower said element only once for a plurality of reciprocations of said needle including a feed-lift rock-shaft; a rotary crank; means to rotate said crank from said needle-reciprocating shaft once for a plurality of rotations of the shaft; and an operative connection between said crank and said rock-shaft including dwell-producing means adapted to delay the actuation of said rock-shaft until after a plurality of reciprocations of said needle.

SYDNEY ZONIS.