June 21, 1932. J. A. KNOX 1,864,136

SEWING MACHINE

Filed May 17, 1929 2 Sheets-Sheet 1

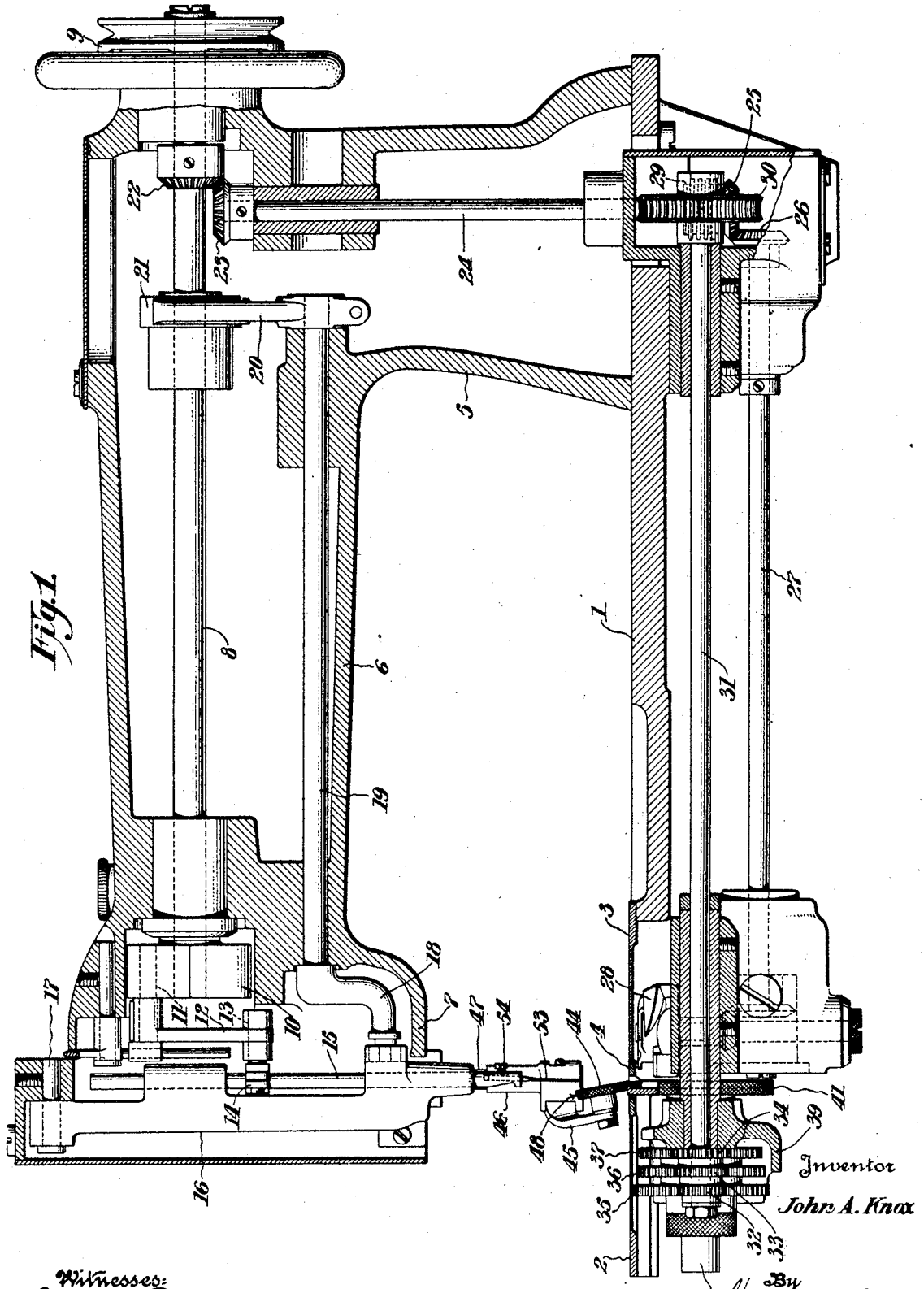


Fig. 1.

Witnesses:
Joseph Pecina.
E. J. Stewart

Inventor
John A. Knox
By Henry J. Miller
Attorney

June 21, 1932. J. A. KNOX 1,864,136

SEWING MACHINE

Filed May 17, 1929 2 Sheets-Sheet 2

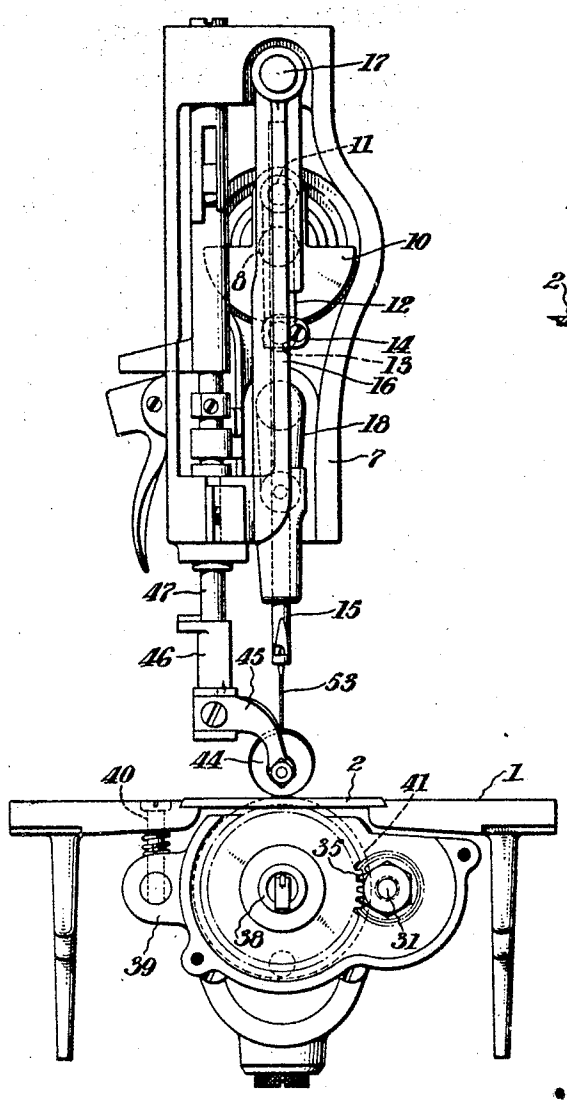


Fig. 2.

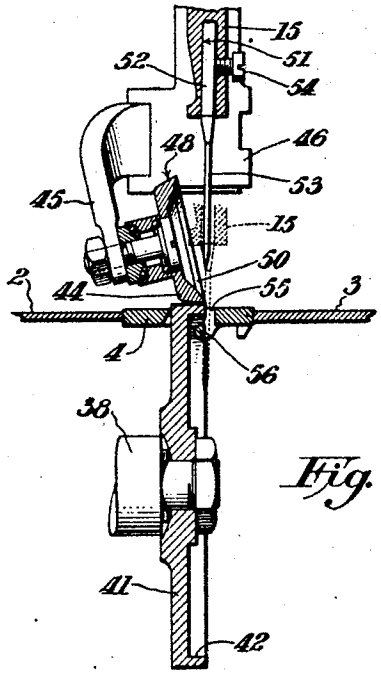


Fig. 3.

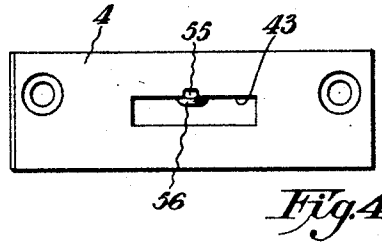


Fig. 4.

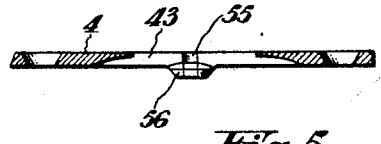


Fig. 5.

Inventor
John A. Knox

Witnesses:
Godfrey Peirce
E. P. Stewart

By Henry J. Miller
Attorney

Patented June 21, 1932 1,864,136

UNITED STATES PATENT OFFICE

JOHN A. KNOX, OF NEW YORK, N. Y., ASSIGNOR TO THE SINGER MANUFACTURING COMPANY, OF ELIZABETH, NEW JERSEY, A CORPORATION OF NEW JERSEY

SEWING MACHINE

Application filed May 17, 1929. Serial No. 363,832.

This invention relates to improvements in sewing machines in which the work is advanced past the stitch-forming mechanism by a feed-wheel which may be continuously or intermittently rotated for this purpose. The primary object of the invention is to improve the quality of the stitching produced by sewing machines having work-advancing feed-wheels and more particularly in effecting close edge stitching on fine shoes.

In prior constructions incorporating a rotary feed-wheel and a slender needle it has been the common practice to steady the needle by positioning the opposing presser-wheel so as to project beyond one edge of the feed-wheel and against the needle to an extent causing lateral deflection of the needle. The usual or a special loop-taker beak guard deflected the point end of the needle in the opposite direction to cause the needle-blade to occupy its proper position for presentation of the needle-thread loop for seizure by the loop-taker. This double bending of the needle, during each reciprocation thereof, of course caused frequent needle breakage. Because of the overhanging presser-wheel there was left a substantial space, adjacent the needle-penetration point, wherein the work was unsupported and was free to follow the descending and rising needle, thereby inducing the skipping of stitches. Further, in the stitching of very narrow strips, it was difficult to control the feeding of the work because only a small portion of the width of the strip was engaged by the feed-wheel.

In accordance with the present invention the presser-wheel, preferably having a beveled work-engaging periphery, is positioned with its lower edge adjacent to the needle substantially in the same vertical plane as the inner face of the feed-wheel. The needle is inclined with respect to the path of its vertically reciprocating carrying bar so that, in its descent, the needle engages the edge of the presser-wheel whereby the blade of the needle is slightly deflected by a guiding surface provided on the presser-wheel for this purpose. Consequently, provision is made for not only producing properly connected stitches because of the uniform penetration position of the needle, but also the work is firmly held between the feed- and presser-wheels directly at the point of penetration of the work by the needle, thereby obviating the before referred to cause of skipping of stitches and permitting stitching very close to the edge of the work now properly controlled by the feed-wheel.

The inclination of the needle toward the roller-presser is preferably such that the upper end of the needle blade is disposed in substantially a vertical line through the throat-plate needle-aperture. Consequently the slight deflection of the point of the needle by its engagement with the presser-wheel is such as to bring the entire needle into said vertical line, whereby the needle is in proper position for presentation of its loop to the loop-taker.

The throat-plate is preferably formed with a needle-aperture which opens into the feed-wheel slot in the throat-plate and is defined at one side by a web, projecting across said feed-wheel slot under the feed-wheel flange. This construction provides a closed needle-aperture very close to the line of feed to confine more particularly the lower thread and thereby prevent said thread from being carried between the feed-wheel and a wall of the feed-slot in the throat-plate. The aperture web referred to also serves as a guide for the needle below the work.

In the accompanying drawings, Fig. 1 is a longitudinal section, partly in front elevation, of a sewing machine embodying the present improvement. Fig. 2 is a front end elevation of the machine shown in Fig. 1, with the bracket-arm face-plate removed. Fig. 3 is an enlarged detail view showing the presser- and feed-wheels in a vertical section lengthwise of the cloth-plate and through the throat-plate needle-aperture. Fig. 4 is a top plan view of the throat-plate. Fig. 5 is a longitudinal section of the throat-plate.

The present improvement has been embodied in a sewing machine constructed substantially as disclosed in the U. S. patent to H. Corrall et al., No. 1,414,625, May 2, 1922.

Referring to the drawings, the machine frame comprises the bed- or cloth-plate 1

carrying the usual slide-plates 2 and 3, and a throat-plate 4 of special construction. Rising from the cloth-plate is the tubular standard 5 of the overhanging bracket-arm 6, terminating in the head 7.

Suitably journaled in the bracket-arm is the main or driving shaft 8 carrying at one end the belt-pulley 9 and at its opposite end the crank-disk 10 provided with the crank-pin 11. Embracing the crank-pin 11 is the apertured end of the link 12 of which the opposite end is connected in like manner with the stud 13 projecting from the collar 14 suitably secured upon the needle-bar 15. The needle-bar 15 is journaled for endwise reciprocation in vertically alined bearings provided in the swinging frame 16 supported at its upper end upon the pivot-pin 17, suitably fixed to the head 7 so that the pivotal axis of the frame 16 is substantially parallel with that of the main shaft 8.

In order to impart vibratory movements to the frame 16, it is suitably connected with the crank-arm 18 on one end of the rock-shaft 19, which is journaled in the bracket-arm 6 in substantially parallel relationship with the main-shaft 8. Secured upon the other end of the rock-shaft 19 is the forked arm 20 straddling the actuating eccentric 21 upon the main-shaft 8.

Adjacent to the eccentric 21, the main-shaft 8 carries the bevel-gear 22 meshing with the similar gear 23 upon the upper end of the vertically disposed, intermediate shaft 24 suitably journaled in the machine frame. At its lower end, the shaft 24 carries the bevel-gear 25 driving the similar gear 26 upon the rearward end of the loop-taker actuating shaft 27 journaled in bearings provided below the cloth-plate 1. The shaft 27 imparts to the loop-taker 28, in the usual manner, two rotations for each rotation of the main-shaft 8, said loop-taker carrying a mass of under thread around which needle-thread loops are cast in the formation of lock-stitches.

The shaft 24 also carries the worm-gear 29 driving the worm-wheel 30 upon the rearward end of the feed-wheel actuating shaft 31 journaled beneath the cloth-plate. At its forward end, the shaft 31 carries pinions 32, 33 and 34 of different sizes and constantly in mesh, respectively, with different size spur-gears 35, 36 and 37 which may be selectively keyed to the feed-wheel shaft 38. The feed-wheel shaft has its bearing in the frame 39, journaled coaxially with the shaft 31 and adjustable, about its journal axis, by means of the screw 40 supported by the cloth-plate 1.

Secured upon the reduced inner end of the shaft 38 is a feed-wheel 41 provided with a peripheral flange 42 on its side adjacent to the loop-taker. The feed-wheel preferably has a roughened periphery and projects through a feed-slot 43 provided in the throat-plate 4, whereby the upper portion of the feed-wheel is slightly higher than the upper side of the throat-plate.

Opposed to the feed-wheel 41 is a presser-wheel 44 having a ball-bearing journal upon an arm 45 projecting forwardly from a bracket 46 upon the lower end of the usual presser-bar 47, vertically movable in the head 7. The presser-wheel 44 has its work-engaging periphery 48 beveled so as to primarily exert its pressure upon the work above the free edge of the feed-wheel flange and to barely engage the work with the portion of said work-engaging periphery remote from the needle. This construction of the periphery 48 permits an operator to readily turn the work in the stitching of curved or angular seams. The lower edge of the presser-wheel, on the needle side thereof, is disposed in substantially the same vertical plane as the free edge of the feed-wheel flange 42, while the upper edge of the presser-wheel is spaced from said plane upon its side opposite to the loop-taker side thereof. The inner side face of the presser-wheel 44 is provided with an inclined needle-deflecting surface 50 terminating in the work-engaging face 48 of the presser-wheel.

The lower end of the needle-bar 15 is provided with a socket 51 which is inclined laterally downwardly toward the vertical plane containing the lower edge of the adjacent presser-wheel. Fitted in the socket 51 is the shank 52 of a needle having the usual blade 53, the needle-shank being fixed upon the needle-bar by a securing screw 54.

The throat-plate 4 is provided with a needle-aperture 55 which opens at one side thereof into the throat-plate feed-slot 43. The needle-aperture is defined at one side by a web 56 extending from the lower edge of one side of the feed-slot so as to underlie the upper portion of the feed-wheel flange 42. There is thus provided a needle-aperture which is disposed directly at the side of the feed-wheel, without losing the advantage of a closed aperture in the handling of the thread. The web 56 also functions as an additional guide for the needle blade 53, the inner or aperture side of said web 56 being in substantially the plane containing the free edge of the feed-wheel flange.

It will be understood, of course, from the foregoing description, that the needle is positively vibrated laterally so that, while in the work, said needle partakes of the work-advancing movements of the feed-wheel. It will also be apparent that the described construction provides for properly holding and feeding the work during the formation of the stitches and that the needle is so carefully guided as to insure the production of successively alined stitches which may now be successfully placed very close to the edge of the work.

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

1. In a sewing machine, a work-advancing feed-wheel, a presser opposed to said feed-wheel having a point in its edge on the needle side thereof in substantially the plane containing one edge of the feed-wheel, a vertically reciprocatory needle inclined to said plane, means for deflecting the point end of the inclined needle into substantially said plane before the needle enters the work, and a loop-taker cooperating with the needle in the formation of stitches.

2. In a sewing machine, a needle-bar, a needle carried by said bar, a work-advancing feed-wheel, a presser-wheel opposed to said feed-wheel having its lower edge on the needle side thereof in substantially the plane containing one edge of said feed-wheel and having a needle-deflecting surface terminating in said presser-wheel edge, said needle in its raised position having its point and its shank at opposite sides of said plane, and a loop-taker cooperating with the needle in the formation of stitches.

3. In a sewing machine, a vertically reciprocatory needle-bar, an inclined needle carried by said bar, a work-advancing feed-wheel continuously rotating during the operation of the machine, means for imparting lateral movements to said needle in the line of feed of the work, a presser-wheel opposed to said feed-wheel having a point in its edge on the needle side thereof in substantially the plane containing one edge of the feed-wheel, means for deflecting the point end of the inclined needle into substantially vertical alinement with the upper portion of its blade before the needle-point enters the work, and a loop-taker cooperating with the needle in the formation of stitches.

4. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar in a position inclined to the path of reciprocation of the bar, a work-advancing feed-wheel having a peripheral flange on the needle side thereof, a presser opposed to said feed-wheel having a point in its edge on the needle side thereof in substantially the plane containing the free edge of the feed-wheel flange, and a loop-taker cooperating with the needle in the formation of stitches.

5. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar, a work-advancing feed-wheel having a peripheral flange on the needle side thereof, a presser opposed to said feed-wheel, a needle-guide disposed under the work-engaging portion of the feed-wheel flange, and a loop-taker cooperating with the needle in the formation of stitches.

6. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar in a position inclined to the path of reciprocation of the bar, a work-advancing feed-wheel, a presser-wheel opposed to said feed-wheel having a needle-guiding surface, a fixed needle-guide independent of the feed-wheel below the work-engaging portion thereof, and a loop-taker cooperating with the needle in the formation of stitches.

7. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar, a work-advancing feed-wheel having a peripheral flange on the needle side thereof, a presser-wheel opposed to said feed-wheel having a needle guiding surface terminating at the lower portion of the presser-wheel in substantially the plane containing the free edge of the feed-wheel flange, a needle-guide below the work-engaging portion of the feed-wheel flange, and a loop-taker cooperating with the needle in the formation of stitches.

8. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar, a throat-plate provided with a feed-slot, a work-advancing feed-wheel having a peripheral flange on the needle side thereof projecting through said feed-slot, a presser opposed to said feed-wheel, and a needle guide upon said throat-plate extending under the portion of the feed-wheel flange within the throat-plate feed-slot.

9. In a sewing machine, a vertically reciprocatory needle-bar, a needle carried by said bar, a throat-plate provided with a feed-slot, a work-advancing feed-wheel having a peripheral flange on the needle side thereof projecting through said feed-slot, a presser opposed to said feed-wheel, and a needle-guide upon said throat-plate extending under the portion of the feed-wheel flange within the throat-plate feed-slot and presenting a needle guiding surface substantially in the plane containing the free edge of said flange.

10. In a sewing machine, a reciprocatory needle-bar, a needle carried by said bar, a feed-wheel having a peripheral flange on the needle side thereof, a presser opposed to said feed-wheel, a throat-plate having a feed-wheel slot and provided with a needle aperture defined at one side by a web underlying the portion of the feed-wheel flange within the throat-plate feed-slot, and a loop-taker cooperating with the needle in the formation of stitches.

11. In a sewing machine, a reciprocatory needle, a throat-plate having a feed-slot and provided with a needle-aperture defined at one side by a web disposed between the vertical planes through the sides of said feed-slot, and a feeding element operating through the feed-slot having a work-engaging surface overlying said web.

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

JOHN A. KNOX.