F. H. RICHARDS.

SEWING MACHINE.

APPLICATION FILED JAN. 24, 1901. RENEWED FEB. 18, 1916.

1,191,233.

Patented July 18, 1916.

3 SHEETS—SHEET 1.

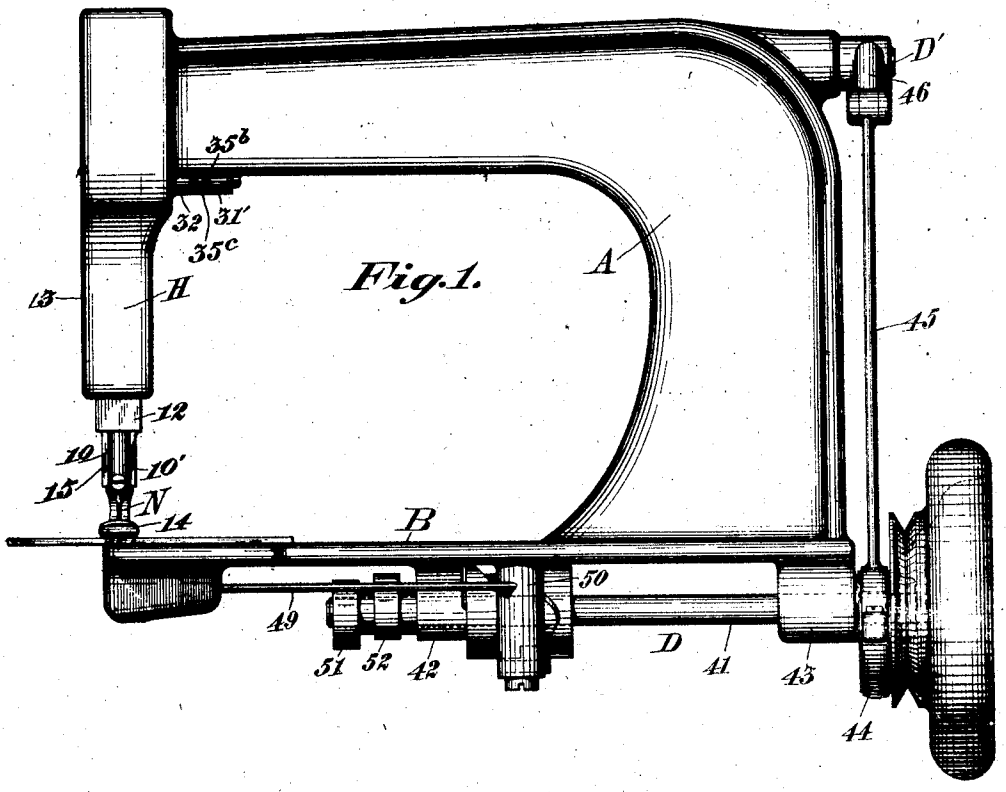


Fig. 1.

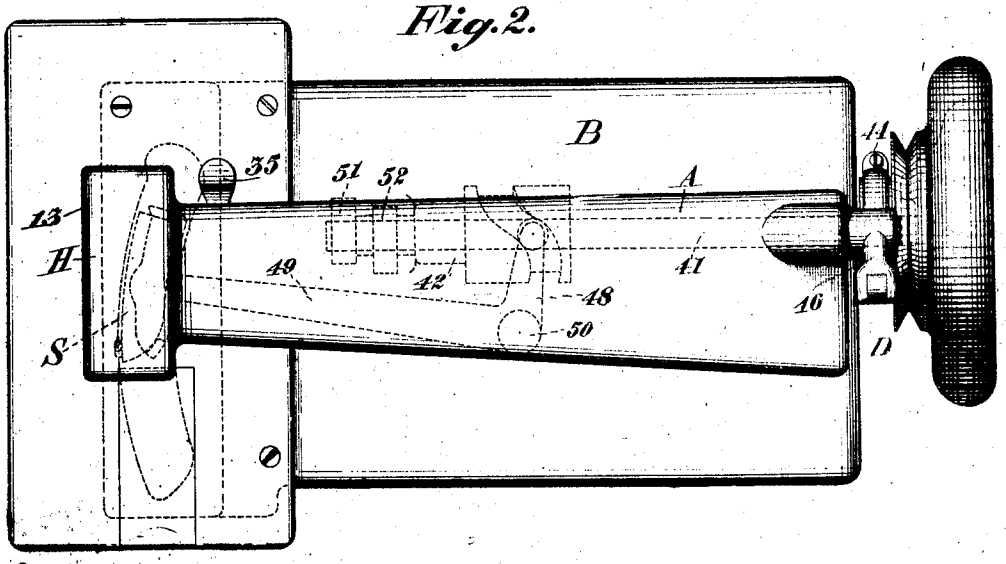


Fig. 2.

Witnesses
C. C. Bridgs
F. H. Nardaud

Inventor
F. H. Richards.

F. H. RICHARDS.

SEWING MACHINE.

APPLICATION FILED JAN. 24, 1901. RENEWED FEB. 18, 1916.

1,191,233.

Patented July 18, 1916.

3 SHEETS—SHEET 2.

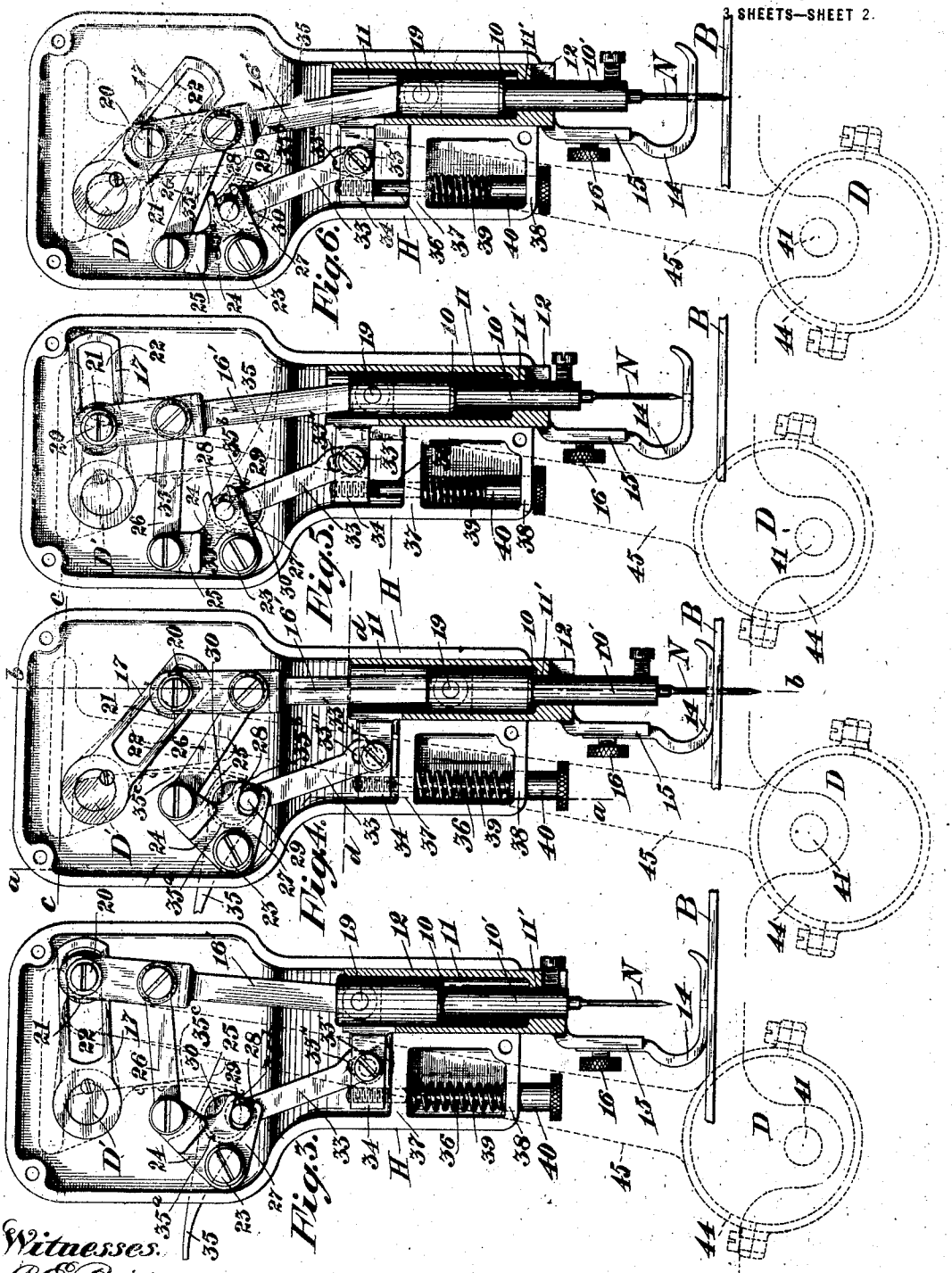


Fig. 6.

Fig. 5.

Fig. 4.

Fig. 3.

Witnesses.
C. C. Bridge
F. H. Haviland

Inventor
F. H. Richards.

F. H. RICHARDS.

SEWING MACHINE.

APPLICATION FILED JAN. 24, 1901. RENEWED FEB. 18, 1916.

1,191,233.

Patented July 18, 1916.

3 SHEETS—SHEET 3.

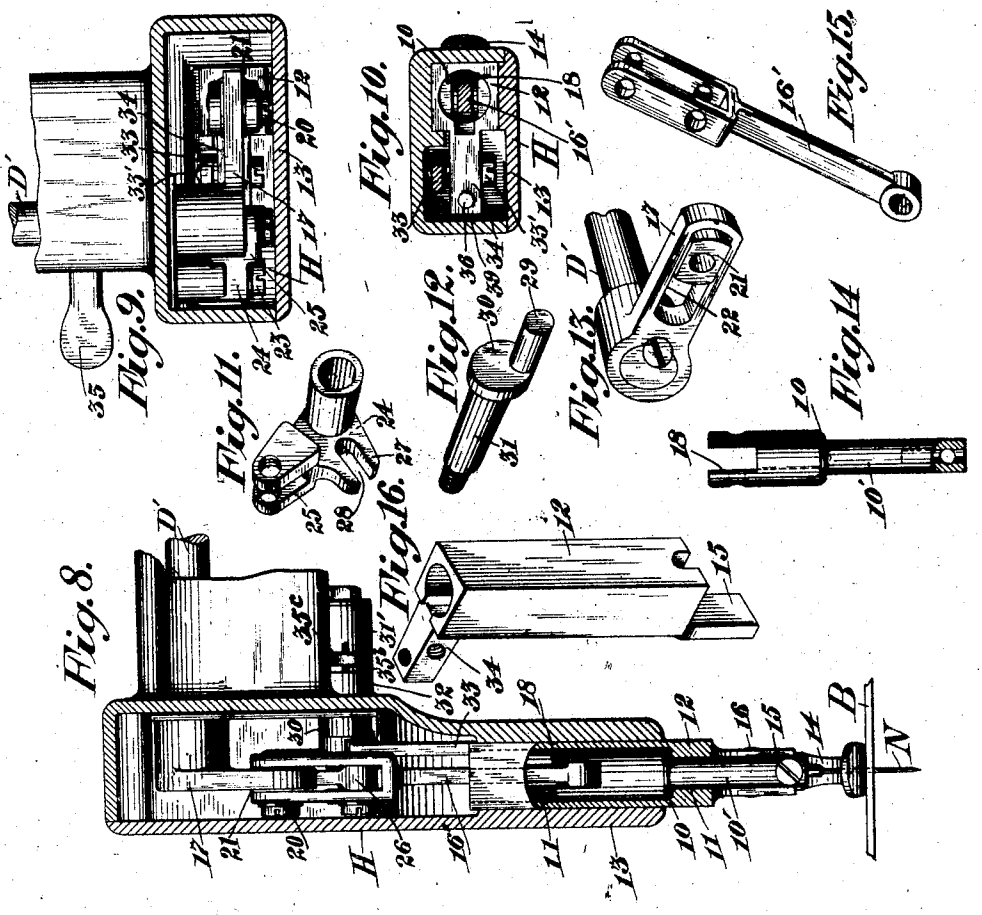


Fig. 9.

Fig. 10.

Fig. 15.

Fig. 12.

Fig. 13.

Fig. 14

Fig. 11.

Fig. 16.

Fig. 8.

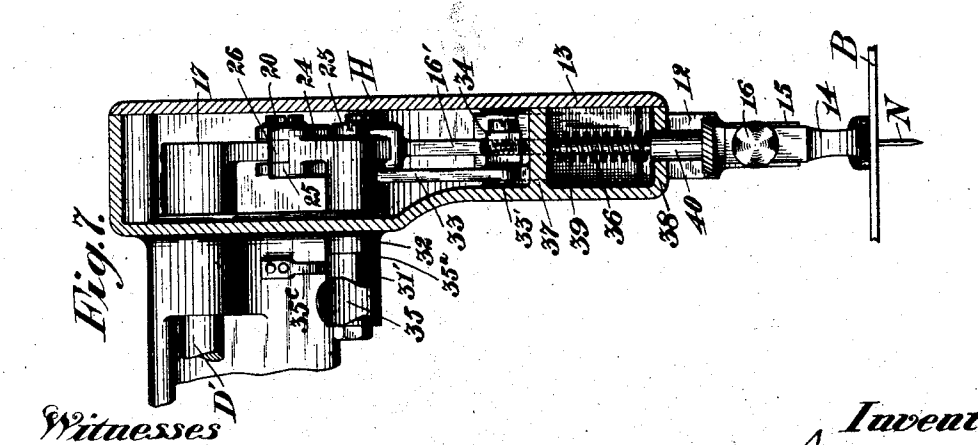


Fig. 7.

Witnesses

C. E. Bridge

F. H. Markland

Inventor.

F. H. Richards

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

SEWING-MACHINE.

1,191,233. Specification of Letters Patent. Patented July 18, 1916.

Application filed January 24, 1901, Serial No. 44,549. Renewed February 18, 1916. Serial No. 79,220.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

This invention relates to sewing machines, and especially to the parts thereof which form the stitches and control the fabric; and its principal object is to facilitate the manipulation of the machine and the insertion, adjustment and removal of the fabric.

I show an improved organization whereby the necessity of stopping the machine, when it is desired to stop the stitch-forming and feeding operations, is avoided. In this instance the needle, upon being thrown off, continues to reciprocate, but does not descend far enough to coöperate with the looper. At the termination of its down-stroke, however, it reaches the cloth plate, so as to serve as a pivot upon which the work may be turned.

In the accompanying drawings, Figure 1 is a front elevation of a sewing-machine embodying one form of my invention. Fig. 2 is a top plan view of the machine. Figs. 3 and 4 are end elevations looking from the left in Fig. 1, with the outer plate of the head removed showing the needle and presser in their operative position, Fig. 3 with the needle at the highest, and Fig. 4 with it at the lowest point. Figs. 5 and 6 are similar views, but with the needle and presser raised from their operative position. Fig. 7 is a vertical section on the line *a*—*a* of Fig. 4, looking from the left. Fig. 8 is a vertical section on line *b*—*b*, Fig. 4, looking from the right. Fig. 9 is a horizontal section on the line *c*—*c* of Fig. 4. Fig. 10 is a similar view on the line *d*—*d*. Fig. 11 is a perspective detail showing a part of the shifting or throw off device. Fig. 12 is a similar view of another part thereof. Fig. 13 is a similar view of the needle-actuating shaft and crank-arm with its sliding block in place. Fig. 14 is a detail in side elevation of the needle-bar. Fig. 15 is a perspective detail of the connecting link; and Fig. 16 is a similar view of a vertical bar for guiding the needle-bar carrying a presser-foot.

Similar characters designate like parts throughout the several figures of the drawings.

The sewing-machine in connection with which one embodiment of my invention is shown may consist of a suitable bed-plate B, upright and arm A carrying head H, shuttle or looper S, an actuating mechanism D for the shuttle and a needle N. This needle may be carried by any suitable means, as a needle-bar 10, which, in this instance, is mounted to reciprocate in the vertical bore 11 of the hollow presser bar 12, which may be rectangular in cross-section as illustrated, and is itself movable up and down in guides provided in the head. The needle-bar is shown as of reduced diameter at its lower end at 10′ and this portion extends through a contracted guide opening 11′ at the end of the bore. The head may be of irregular box-shape closed by a removable cover-plate 13, the inner side of which contacts with the outer face of the presser bar or slide 12 to retain it in its chamber. The bar 12 carries a presser-foot 14, this being shown as attached to a downward extension 15 by a binding screw 16.

Through the arm A extends an actuating shaft D′ of the general actuating mechanism, and attached to the end of this shaft within the head is an actuating crank arm 17. The oscillation of this crank-arm imparts to the needle-bar and its needle a reciprocating movement to form the stitch in connection with the shuttle. The arm and needle-bar in this instance are connected by a link 16′, which may be pivoted within a recess 18 in the upper end of the latter by the pin 19. Since after the parts of the machine are assembled this pin travels within the slide, its ends being in contact with, or in proximity to, the walls of the bore or hollow 11, the contact therewith will retain it in engagement with the connected parts without other fastening. The upper end of the link is pivoted by a pin or stud 20 to a member variable in position along the actuating arm 17. This movable member is here shown as a block or slide 21, seated in a slot 22, extending longitudinally of the arm. The link is preferably bifurcated, and extending on both sides of the block and arm retains the former in place in the slot.

Disposed within the head and preferably turning about a stud 23 projecting from the

inner wall thereof, is one member 24 of a shifting or throw-off mechanism. This member, in this instance is in the form of a bell crank, one arm 25 whereof extends upwardly from its fulcrum and is directly connected by means of a forwardly extending link 26 to the needle-driving link 16′, at a point between the articulations of the latter to the needle bar and to the slide 21, which is adjustable along the actuating arm 17. The other arm 27 of the bell crank extends forwardly and is preferably provided with an operating slot 28. In this slot engages a wrist or crank pin 29 projecting from a disk-like head 30 carried upon the inner end of a short transverse horizontal adjustment shaft 31 journaled in a boss 32 upon the machine head. Pivoted at its upper end upon the same wrist pin 29 is a link 33, which at its lower end is loosely pivoted or connected to a lug 34 provided upon the presser bar or slide, preferably at the top thereof, the connection between said link and lug being effected by a pin or screw 33′ upon the lug which engages a slot 33″ in the link. To the outer end of said adjustment shaft is secured the hub 31′ of a finger lever 35. Said hub is provided with opposite notches or depressions 35^a and 35^b, either of which may be engaged by a spring detent 35^c, so as to hold the shaft and the parts controlled thereby in either of two positions, in one of which the needle mechanism is effective and in the other of which it is ineffective. A depending vertical rod 36 is also threaded into the lug 34 of the presser bar, and passes through horizontal walls 37 and 38 of the head. Around said rod is coiled a compression spring 39, working between the under side of the wall 37 and a head 40 of the rod, thereby to draw the presser foot toward the bed plate and against the fabric to be sewed.

When the needle and presser are in their operative position the elements are located as shown in Figs. 3 and 4. The manually adjustable crank-pin 29 is then at its lowest position and the parts are retained by the engagement of the spring detent 35^c with the depression 35^a. The slide 21 is held at or near the outer end of the slot in the actuating arm 17 by means of the bell crank 25 and the links 26 and 16′, so that there is transmitted from the actuating arm 17 through the link 16′ a full working stroke to the needle. It will be seen on inspection of Figs. 3 and 4 of the drawing that in this instance the two pivotal connections of the link 26, together with that of the link 16′ with its actuator and the axis of the actuator shaft D′ lie at approximately the corners of a parallelogram in all positions of the needle, and therefore there will be little or no play of the slide 21 in the slot while the machine is at work and but slight resulting wear. At the same time the position of the link 33 is such that the presser-foot is drawn down by its spring 39 toward the plate or upon the fabric thereon, while being free to yield upwardly against the tension of said spring without affecting the throw-off mechanism, by virtue of the pin-and-slot connection 33′—33″.

When it is desired to stop the stitch-forming and work-feeding operations of the machine the lever 35 is swung downwardly and forwardly until the depression 35^a in the sleeve is engaged by the detent. This turns the bell crank 24 away from the axis of the needle, and through the link connection 26 and 16′ adjusts the block or slide 21 along the slot in the actuating arm 17 to a point at or near the inner end of the latter and adjacent to the axis of the shaft D′. This shortens the effective length of the arm 17 and therefore shortens the needle stroke. The parts are preferably so proportioned and positioned that after each adjustment is made the needle when at its lowest point will be above the under side of the plate and therefore out of coaction with the shuttle or looper, while it is still not above the upper surface of the plate, so that the needle may serve as a pivot which the operator may turn the work about to change the direction of the line of stitching. Simultaneously with this raising of the needle the turning of the crank-pin 29 to its highest position raises, through the link 33, the presser 14 to the desired height from the work.

It will be seen that the withdrawal of the needle from the work with the presser-foot makes it possible to stop the stitching and feeding operations of the machine and change the position of the work while the driving mechanism continues in operation without any danger of tangling the thread, and the shortening of the needle stroke when thrown off permits the construction of the parts with the minimum projection of the needle slide below its guides, thereby reducing the lateral variation in the position of the needle which would be caused by any given amount of play in the fitting of the parts.

As a convenient means for operating the needle-actuating rocker-shaft D′, and for properly operating the reciprocating shuttle in proper timing with the needle, I have illustrated a driving mechanism, hereinbefore designated in a general way by D, which, in the form herein shown, comprises a driving-shaft 41 mounted in bearings 42 and 43 formed on or secured to the frame work of the machine, which shaft 41 carries an eccentric 44 connecting through a rod 45 with an arm 46 of said needle-actuating shaft D′. Said primary driving-shaft 41 is also shown provided with a cam which connects with a roll on the short end 48 of a

shuttle actuating-lever 49, said lever being shown pivoted to the frame work of the machine at 50. Said primary driving-shaft is also shown provided in Figs. 1 and 2 with a pair of cams or like devices designated by 51 and 52, respectively, from which a suitable feed mechanism not herein shown may be operated in connection with the shuttle and with the needle mechanism. It will, however, be understood that other suitable driving mechanism may be employed in connection with my present improvements in the machine herein illustrated.

It will be seen that when making one kind of movement, as at Figs. 3 and 4, the needle coöperates with the shuttle or looper, and while making another kind of movement as at Figs. 5 and 6, it does not so cooperate, but descends only far enough to enable the work to be swung or swiveled thereon, the needle strokes in the first instance being long and in the second instance short, although my present improvements are not limited to a short stroke of the needle when it is thrown off; that the link 26, extends transversely from the needle-link 16′ and vibrates therewith during the stitching operation; that a finger-piece 25, pivoted upon the framing, is connected to the lever 24 and the fore-and-aft link 26 so as to effect therethrough adjustments of the up-and-down link 16′ relatively to the vibratory or crank-like actuator 17, the connection between 26 and 16′ being remote from the upper end of the latter, that said finger piece is connected to said link 26 through the bell crank or lever 24, means 35ᶜ being provided for detaining said lever 24 in a plurality of positions; and that said link 16′ extends between the head of the needle slide and the vibrating arm 17. It will also be observed that a connection 33 is provided between the presser 12 and the means which regulate the stroke or movement of the needle, so that when the needle is thrown off the presser is likewise lifted, said presser being connected through said link and the wrist 29 to the finger piece 35; and that the connection effected by said link is of a loose nature, so as to permit upward movement of the presser during the usual feeding of the work, independently of said wrist 29 and lever 24.

Certain features herein described are set forth and claimed in my other pending applications filed simultaneously herewith and numbered 44,546 and 44,547.

Having described my invention, I claim—

1. In a sewing-machine, the combination, with a presser and a needle, of a shifting or throw-off device for simultaneously lifting the presser and moving the needle said elements being so organized that in its lowest position after the throw-off operation the point of the needle reaches a point at or near the bed-plate and below the top surface thereof but out of operative relation with the looper.

2. In a sewing machine embodying a looper, the combination with a presser and a needle, of presser lifting device and needle-stroke-changing device located and connected for lifting the presser and shortening the needle stroke so that the needle does not coöperate with the looper; said elements being so organized that when so prevented from coöperation the stroke of the needle may extend to the bed plate so as to enable the work to swivel upon the needle.

3. The combination, with a presser, of a needle, a rock arm constituting an actuator for said needle, of a slide-and-link connection between the actuator and needle, and a shifting device joined to said link by a pivoted link and also adapted to move the presser.

4. The combination, with a presser, a needle and an actuator for said needle embodying a pivoted body provided with ways, of a slide-and-link connection between the actuator and needle, and a shifting device comprising two crank portions which are joined to said link and to the presser by pivoted links.

5. The combination with a presser, a needle and an actuating member for said needle embodying a pivoted member provided with slideways, of a slide shiftable on said ways, a link connecting said slide and needle, a pair of connected cranks, a link connecting one of these to said slide and needle connecting link and a link connecting the other to the presser.

6. In a sewing-machine, the combination, with a slide having a guideway therein, of a presser-foot carried by said slide, a needle-bar moving in said guideway, an actuator for the needle-bar, a pivotal connection between the actuator and said bar, one of the pivots of the latter working within the said guideway and having its ends in contact with the walls thereof.

7. In a sewing machine having a guideway, the combination with a presser bar reciprocatorily mounted in the guideway and provided with a slideway parallel with its path of reciprocation, of a needle bar mounted in the slideway, means for reciprocating the needle bar, means independent of the reciprocating means for shifting the presser bar in the guideway, and means of connection between the presser shifting means and the needle bar reciprocating means affecting the needle bar reciprocations upon the shifting of the presser.

8. In a sewing-machine, the combination, with a slide provided with a bore having a contracted opening at one end, of a needle-bar having a portion fitting the bore and a smaller portion passing through the con-

tracted opening; an actuator for the needle-bar; a pivotal connection between the actuator and said bar, one of the pivots of the latter having its path of movement within the bore; and a presser-foot carried by the slide.

9. In a sewing machine, the combination with a needle bar, of a member to reciprocate the needle bar vertically, a link between said needle bar and the said member, a second link connected to the first link and extending transversely therefrom and vibrating therewith during the stitching operation, and a finger-piece connected to said second link so as to effect thereby adjustments of the first link relatively to the said member.

10. In a sewing machine, a stitch forming mechanism including a needle bar, of a crank member to reciprocate the needle bar, a connection between said needle bar and said crank member and in engagement with each of these, a link engaging said connection between its points of engagement with the needle bar and crank member, and a finger piece connected to said link for effecting adjustments of said connection.

11. In a sewing machine embodying a bed plate and a looper below the bed plate, the combination with a vibrating arm, a needle bar mounted above the bed plate for reciprocatory movement toward and from the bed plate and looper, a link between the needle bar and the vibrating arm, a second link connected at one end to the first link and extending longitudinally of the vibrating arm, and means for longitudinally shifting the second link for shifting the point of connection of the first link with the vibrating arm for varying the amplitude of the excursions of the needle bar toward the bed plate and looper.

12. In a sewing machine, the combination of a finger piece pivoted upon the framing; a lever connected to said finger piece; a link connected at one end to said lever; a link to which the other end of said first link is connected; a needle slide connected at the lower end of said second link; a member with which the upper end of said second link is variably connected, and a looper mechanism.

13. In a sewing machine, the combination with a needle bar, means to reciprocate the same and a looper device of means for effecting different amplitude of reciprocation of the needle; the needle while making reciprocations of one amplitude coöperating with said looper, and while making reciprocations of another amplitude not coöperating therewith but descending far enough to enable the work to be swung thereon; a presser; and a connection between said presser and the means which regulate the stroke of the needle.

14. In a sewing machine, the combination with a needle device and a looper device of means for effecting long strokes and short strokes of said needle device; the needle when making long strokes coöperating with said looper to form stitches, but when making short strokes not coöperating with said looper but descending sufficiently to enable the work to be swung thereon; and a presser connected to the needle regulating means so as to be lifted from the work when the needle mechanism is set for short strokes.

15. In a sewing machine, the combination with looper mechanism and a needle bar of a crank constituting an actuator to reciprocate the needle bar; a link between said needle bar and said actuator; a second link connected to the first link and extending transversely therefrom and vibrating therewith during the stitching operation; a finger piece connected to said second link so as to effect thereby adjustments of the first link relatively to said actuator; and a presser also operatively connected to said finger piece.

16. In a sewing machine, the combination with looper mechanism and a needle bar, of a crank constituting an actuator for the needle bar; and connection between said needle bar and said actuator; a link engaging said connection between its ends; and a finger piece connected to said link so as to effect thereby adjustments of said connection; said first link engaging at one end said actuator and at its other end said needle bar; a presser; and a link connecting said presser to said finger piece.

17. In a sewing machine, the combination with a needle bar, of an actuator comprising a rock shaft, a link between said needle bar and said actuator, a lever, a second link connecting said lever to said first link, a finger piece for said lever, means for detaining said lever in any one of a plurality of positions, a presser, and a connection between said presser and said lever for bringing the bar or the presser respectively into inoperative position.

18. In a sewing machine, the combination with looper mechanism and a needle device of an actuator; a link between said needle device and said actuator; a lever; a second link connecting said lever to said first link; a finger piece for said lever; means for detaining said lever in a plurality of positions; a presser; and a link loosely connecting said presser to said lever, so as to permit the upward movement of the presser independently of said lever during the feeding of the work but to be lifted upon the throwing of the lever.

19. In a sewing machine, the combination with a needle device an actuator and a looper, of means for shortening the stroke of the needle at will, and a presser operatively

connected to said stroke regulating means so as to be elevated or depressed thereby; and a detent for holding the stroke-regulating means in either of two set positions.

20. In a sewing machine, the combination with looper mechanism of a vibrating arm; a needle bar; a link between the head of said needle bar and said vibrating arm; a second link connected at one end to said first link and extending longitudinally of said vibrating arm; means for moving said second link so as to render the needle either operative or inoperative; and a presser connected to said link-moving means so as to be either elevated or depressed thereby.

21. In a sewing machine, the combination with looper mechanism of a finger piece pivoted upon the framing; a lever connected to said finger piece; a link connected at one end to said lever; a link to which the other end of said first link is connected; a needle slide connected at the lower end of said second link; a journaled arm with which the upper end of said second link is adjustably connected; and a presser also connected to said finger piece.

22. In a sewing machine, the combination with looper mechanism of a finger piece pivoted upon the framing; a wrist rigid with said finger; a lever connected to said wrist; a link connected at one end to said lever; a link to which the other end of said first link is connected; a needle slide connected to the lower end of said second link; a crank with which the upper end of said second link is adjustably connected; a presser; and a link loosely connecting said presser to said wrist.

FRANCIS H. RICHARDS.

Witnesses:

FRED J. DOLE,

C. E. VOSS.