No. 814,642. PATENTED MAR. 6, 1906.

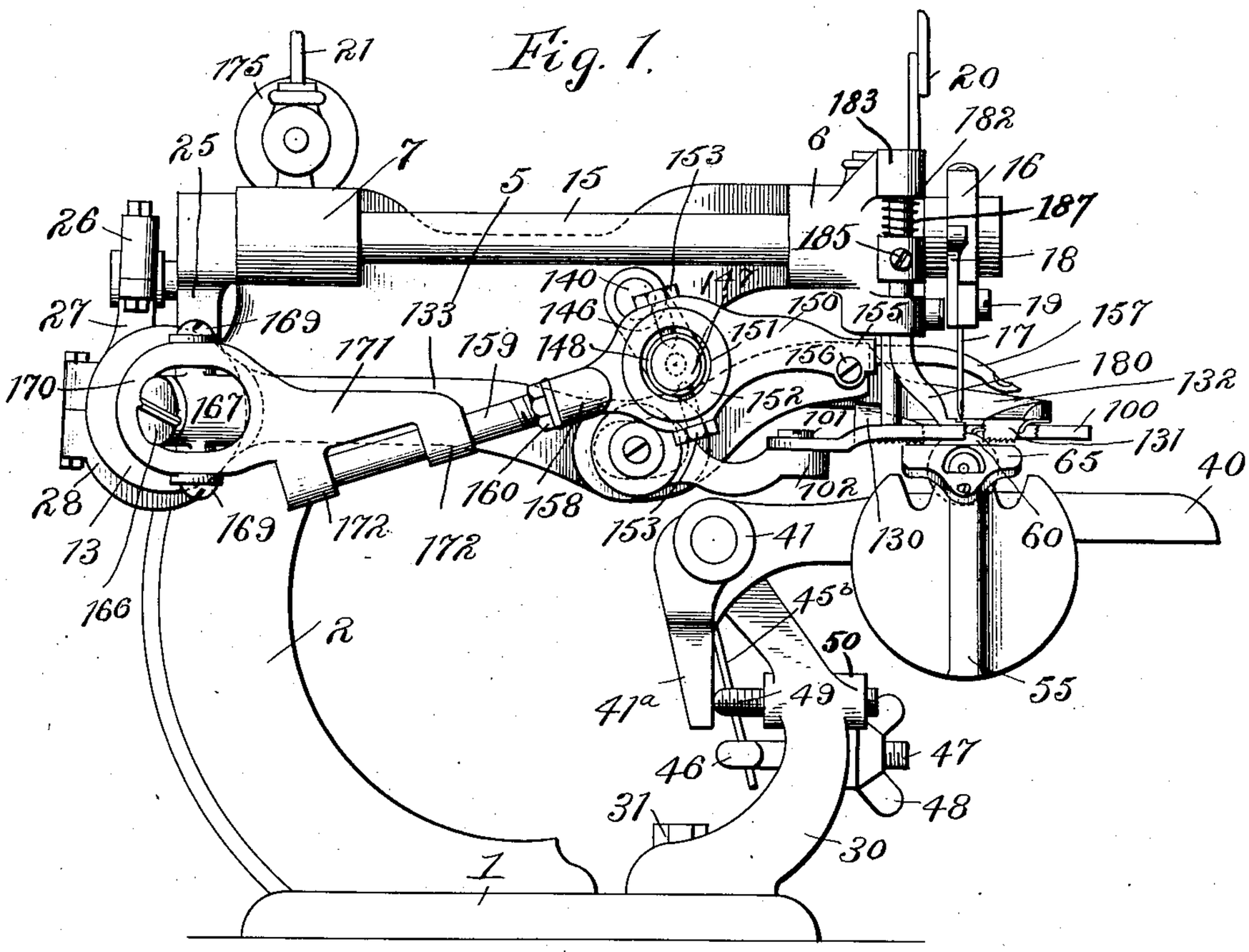
C. A. DEARBORN.

STITCH FORMING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED SEPT. 29, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

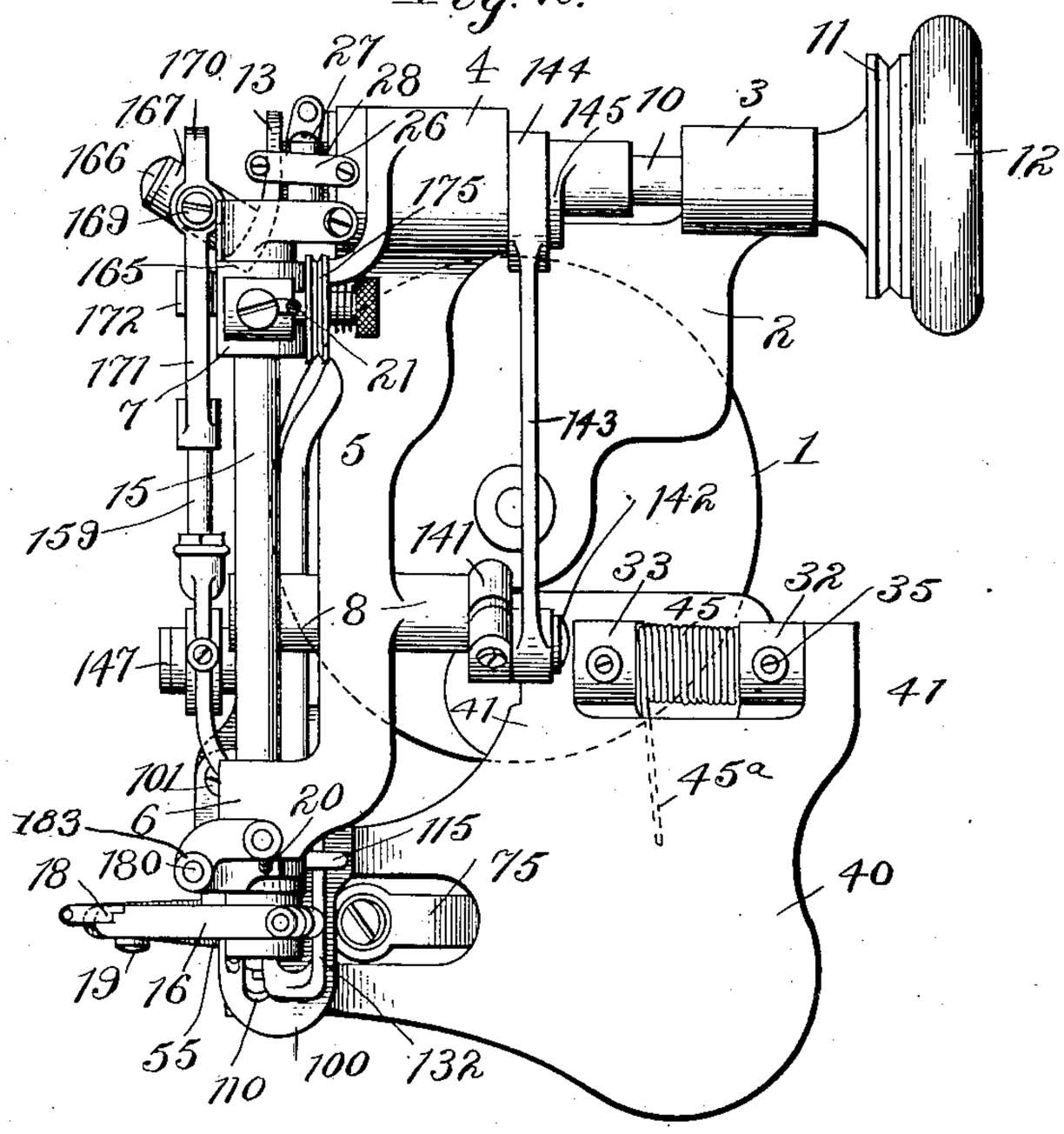


Fig. 3.

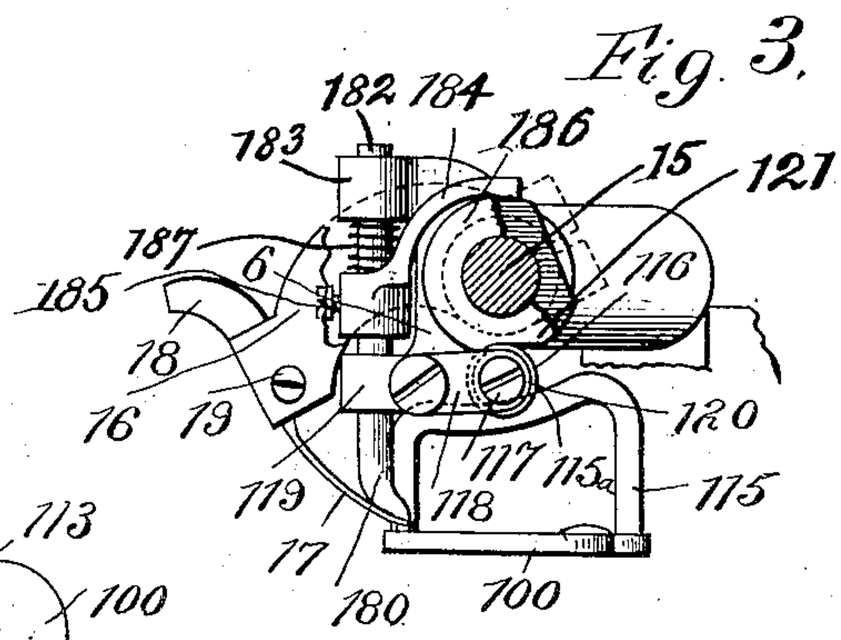
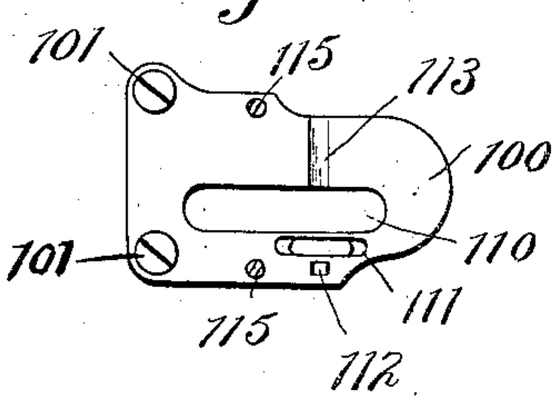


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

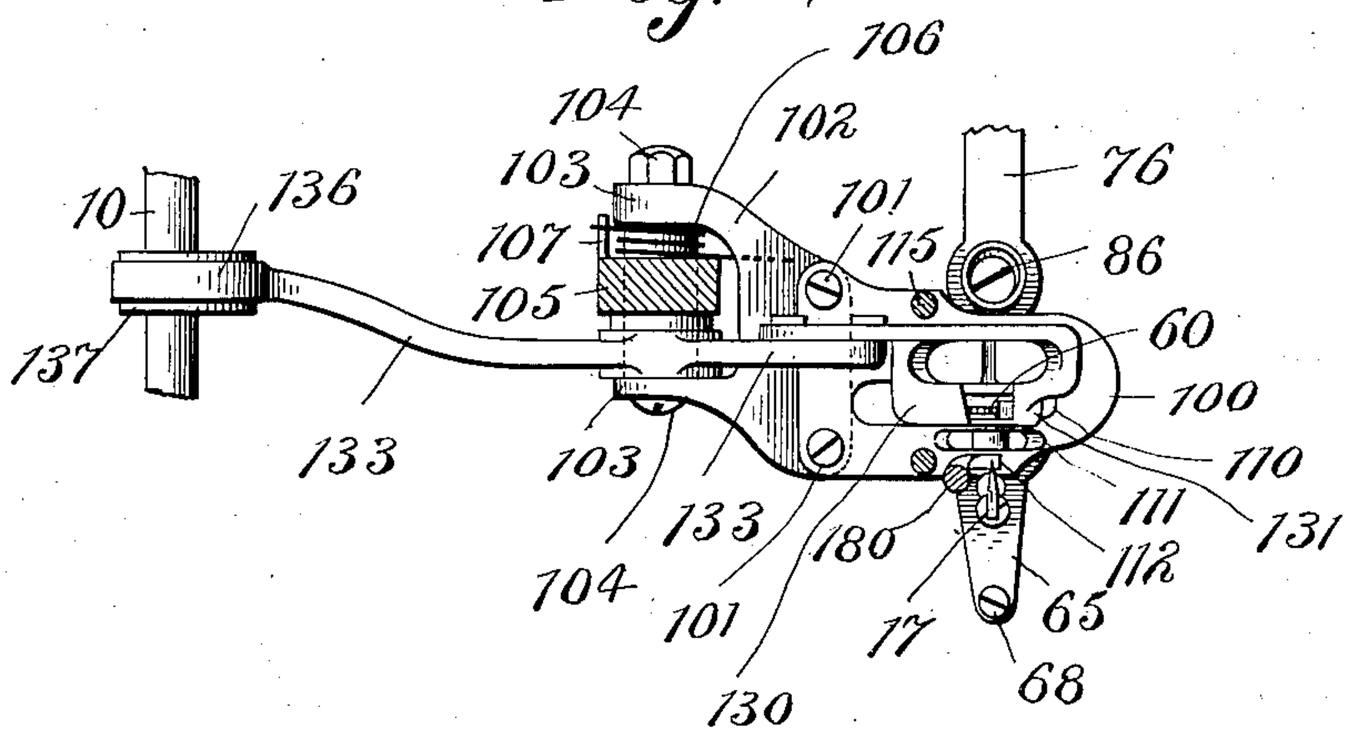
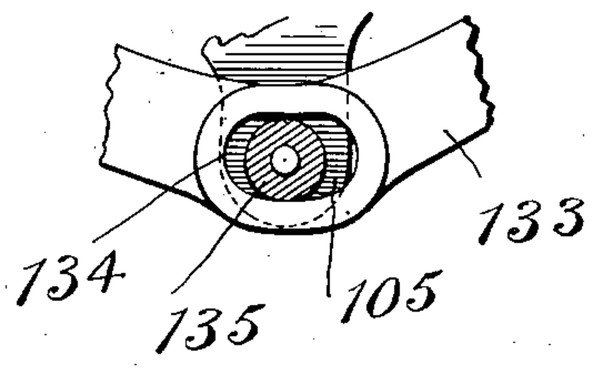


Fig. 6.



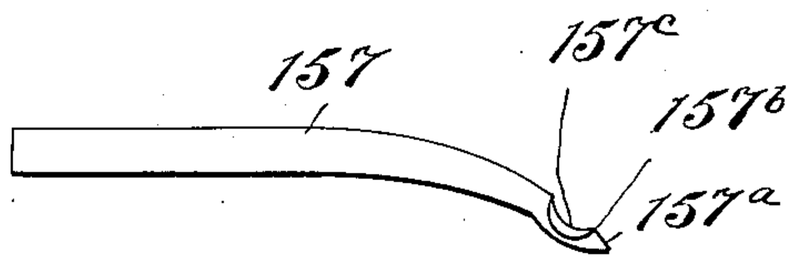


Fig. 7.

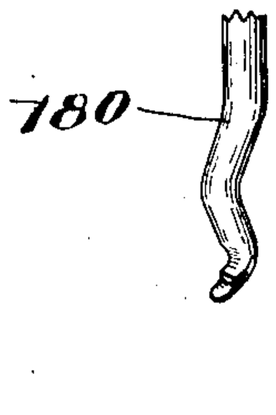


Fig. 8.

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UNITED STATES PATENT OFFICE.

CHARLES A. DEARBORN, OF NEW YORK, N. Y.

STITCH-FORMING MECHANISM FOR SEWING-MACHINES.

No. 814,642. Specification of Letters Patent. Patented March 6, 1906.

Original application filed July 21, 1904, Serial No. 217,474. Divided and this application filed September 29, 1904. Serial No. 226,548.

To all whom it may concern:

Be it known that I, CHARLES A. DEARBORN, a citizen of the United States, and a resident of New York, in the borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Stitch-Forming Mechanism for Sewing-Machines, of which the following is a specification.

The present application is a division of my original application, Serial No. 217,474, filed July 21, 1904, for improvements in sewing-machines, and the invention covered by the present case relates to improvements in stitch-forming mechanism which are applicable to sewing-machines in general, but are particularly designed for overseaming blind-stitch sewing-machines, such as illustrated in Patents No. 639,669, dated December 19, 1899, No. 679,553, dated July 30, 1901, No. 705,325, dated July 22, 1902, and No. 705,326 dated July 22, 1902, heretofore granted to me.

In machines covered by my above-named patents the feeding mechanism is in the form of intermittently-actuated rotating feed-rolls mounted upon a spring-sustained work support or frame and engaging the work from beneath and holding it up against a rigid presser-foot in proper position for the action of the stitch-forming mechanism.

In the old forms of my machine the needle operating transversely of the line of feed penetrates successive parts of the work, which passes over a ridge-forming rib, (also mounted upon the spring-sustained work support or frame,) which in some cases is a part of one of the rotary feed-rolls and in other cases is an independent part projecting between the feed-rolls into engagement with the under surface of the work. The looper, which coöperates with the needle in the old forms of my machine, is arranged to be actuated from the rear end of the looper-rod by an eccentric universal-crank mechanism which imparts to the looper a forward motion on one side of the line of stitching, an axial motion to throw it to the other side of the line of stitching, a rearward motion on the other side of the line of stiching, and finally a second axial motion to throw it back to the position of starting, the looper taking the loop from the needle on one side of the line of stitching and giving up the loop to the needle on the other side of the line of stitching.

The looping mechanism of my improved machine accomplishes the same purposes as the looping mechanism in the old forms of the mechine, but is of a greatly changed and improved construction. The improved looper is formed with a single prong or finger having the necessary shoulders for engaging and carrying the loop to take the loop off of the needle at one side of the line of stitching and carrying it over to the other side of the line of stitching and deliver it again to the needle. The looper is adjustably mounted in the forward end of the looper-bar, which is formed between its ends with a journal opening loosely, inclosing a journal-sleeve upon which the looper moves. This journal-sleeve is freely journaled upon a stud projecting laterally from the free end of a suspended rock-arm, which rock-arm is keyed to the end of a rock-shaft suitably journaled in the machine-arm and having a connected rock-arm and link at its opposite end, which link extends rearwardly to the main driving-shaft and engages an actuating-eccentric upon said shaft by which the suspended rock-arm supporting the journal-sleeve is given a to-and-fro rocking motion for carrying the looper forward and back toward and away from the path of the needle. The looper-bar has two diametrically opposite center screws which pass through the walls of the journal-opening and are journaled in diametrically opposite sockets formed in the sleeve. By reason of this connection of the looper-bar with the sleeve journaled upon the rock-arm it is possible for the looper to rotate in a vertical plane or move on its pivots in a transverse plane, so that the looper can move toward and away from the work and transversely to the line of stitching. Unlike the looper mechanism in the old form of my machine, the forward and back movements of the looper are caused by the movement of the suspended rock-arm, which is actuated by the independent eccentric mechanism just referred to. This suspended rock-arm also gives the looper a slight rise and fall in moving forward and backward. For increasing the rise and fall of the looper at the end of its forward and back strokes and to move the looper from one side of the line of stitching to the other side of the line of stitching I provide an eccentric universal crank mechanism upon the main driving-shaft which actuates a laterally-swinging floating bearing with which the rear end of

the looper-rod has a free rotary and sliding engagement. This eccentric crank mechanism is similar to the same mechanism employed in the old forms of my machine; but in place of directly and positively connecting the rear end of the looper-rod with the said crank mechanism I have provided in the new machine a universally-jointed laterally-swinging floating bearing-frame having a loop at its rear end, through which center screws pass and engage the sleeve journaled upon the eccentric inclined crank-pin, said floating bearing-frame being formed upon its lower edge with two alined socket-bearings in which the cylindrical rear extension of the looper is freely journaled, so as to have free rotary and longitudinal movements therein. By reason of this construction it will be observed that the forward and back movements of the looper are caused entirely by the suspended rock-arm, the looper-rod riding freely in the floating bearing of the guiding crank mechanism justi described, while the inward and outward vibrations of the said floating bearing produced by the rotation of said inclined crank-pin cause the looper to move from one side of the line of stitching to the other.

In order that my invention may be fully understood, I will first describe the same with reference to the accompanying drawings and afterward point out the novelty with more particularity in the annexed claims.

In said drawings, Figure 1 is a side elevation of a sewing-machine embodying the improved stitch-forming mechanism. Fig. 2 is a plan view of the same. Fig. 3 is a detail end view, partly in section, of the stitch-forming mechanism. Fig. 4 is a detail plan view of the presser-foot. Fig. 5 is a detail sectional plan view of the feeding and work-supporting mechanisms. Fig. 6 is a detail sectional elevation showing the support for the feeding-bar. Fig. 7 is a detail side elevation of the looper removed from the looper-bar. Fig. 8 is a detail perspective view of the needle-guide.

The main frame of the machine is formed of a single casting comprising a rigid central base 1, the upwardly-extending rear arm 2, terminating in the sleeves or shaft-bearings 3 4, and a forwardly-extending arm 5, having the needle-shaft bearings 6 7 and the looper-rock-shaft bearing 8.

10 is the main driving-shaft of the machine, journaled in the sleeves or bearings 3 4 of the rear arm 2 and having keyed to one end a driving-pulley 11 and fly-wheel 12 and at its opposite end a crank-disk 13 hereinafter referred to.

15 is the forwardly-extending needle rock-shaft, journaled in the bearings 6 and 7 and having rigidly mounted upon its forward end a needle-carrying rock-arm 16, in which is mounted a curved needle 17.

18 is the usual thread-guide and needle-clamp mounted upon the rock-arm 16 by means of the set-screw 19.

20 and 21 are ordinary thread-guides.

Secured to the rear end of the needle rock-shaft 15 is a rock-arm 25, having universal-joint connection 26 with a link 27, which encircles an eccentric 28, mounted upon the main power-shaft 10 just inside of the crank-disk 13. The link 27 and the eccentric 28 are formed with spheroidal engaging surfaces to allow free lateral play of the link in the transmission of the rotary motion of the main shaft 10 into the oscillatory motion of the needle-shaft 15. By this needle-operating mechanism (which is the same as in the prior patents) the needle is given a reciprocatory motion in an arc transverse to the path of the work which is passed through the machine by the mechanisms now to be described.

Projecting up from the forward edge of the base 1 is an auxiliary arm 30, which is rigidly and adjustably secured to the base by means of set-screws or bolts 31. The auxiliary arm 30 is formed at its upper end with two sleeves 32 and 33, in which is mounted a pivot-shaft 34, projecting a little beyond each of the sleeves 32 and 33. Set-screws 35 pass through the sleeves 32 and 33 and engage the pivot-shaft 34 for holding it rigidly in position.

40 is a horizontal forwardly-extending spring-sustained work-supporting frame. This frame 40 has the rearwardly-presented integral journal-sleeves 41, which are journaled upon the projecting ends of the pivot-shaft 34 and rest snugly against the frame-sleeves 32 and 33, by which the work-support 40 is accurately held in position, said support being allowed to move vertically upon its pivot. Surrounding the pivot-shaft 34 between the sleeves 32 and 33 is a torsion-spring 45, one end 45^a of which is extended beneath the work-supporting plate 40 to hold said plate upward with a yielding pressure, while the other end 45^b of said spring is extended down behind the auxiliary frame-arm 30 and is engaged by a hook 46, formed on the rear end of a threaded rod 47, which passes freely through an opening formed in the arm 30 and is engaged at its forward threaded end by a butterfly-nut 48, by which the tension of the spring 45 can be increased or decreased at will. The work-support 40 is also formed with an integral downwardly-projecting arm 41^a, extending below the left-hand bearing 41 in position to engage an adjustable stop in the form of a screw 49, which is threaded through an integral post 50 of the auxiliary arm 30. By adjusting the screw-stop 49 the limit of the normally raised position of the work-supporting plate 40 under the action of the spring 45 can be adjusted to a nicety.

The work-supporting plate 40 is extended to the left into a work-supporting horn 55 of

approximately cylindrical shape, which horn 55 is cut out upon its upper face to receive the ridge-forming disk 60 and the independently-yielding work-supporting plates 65 and 75. The specific structure of the ridge-forming disk and the independently-yielding work-supporting plates form no part of my present application and will not be further described here. These parts are fully described and claimed in my above-named original application, Serial No. 217,474, above referred to, of which the present case is a division.

100 is the presser-foot removably secured by screws 101 to the forward web portion of a yoke 102, which is formed with rearwardly-presented lugs 103, which are pivoted upon set-screws 104, mounted in the downwardly-projecting lug 105, formed integral with the machine-arm 5.

106 is a torsional spring coiled around a reduced portion or hub of the lug 105 and engaging at one end a pin 107, projecting from lug 105 and at its other end beneath the rocking yoke 102, thereby giving the presser-foot a spring tendency to rise away from the work-supporting plate just described.

The presser-foot is formed with a main longitudinal slot 110, through which the ridge of the work is pressed by the work-supporting plates and ridge-forming disk for the operation of the feed and needle, and an auxiliary longitudinal groove 111 to allow for the movement of the looper in moving rearwardly to deliver the loop to the needle. The presser-foot plate also has a small perforation 112 to allow for the depression of the needle-guide 180 when the needle penetrates the goods and also to receive the lower end of the needle-guide and allow for the elevation of the presser-foot during the feeding stroke.

113 is the transverse needle-groove cut in the upper face of the presser-foot.

The spring 106 acting upon the pivotally-mounted presser-foot normally tends to raise the presser-foot away from the work-support. To force the presser-foot down against the work on the supporting-plates and disk, I provide a yoke 115, projecting from the upper face of the presser-foot and formed with a central dip or depression at 115^a, which yoke is engaged by a grooved antifriction-roller 116, mounted upon a pin 117, projecting from a short rock-arm 118, journaled upon a lug 119, projecting beneath and formed integral with the bearing 6 on the arm 5. The pin 117 also carries an antifriction-roller 120, which runs upon the periphery of a cam 121, keyed to the forward end of the needle rock-shaft 15 between the bearing 6 and the needle-carrying rock-arm 16. This cam 121 is so positioned upon the needle rock-shaft that the high portion of the cam will depress rock-arm 118 and through it the presser-foot just prior to the penetration of the needle into the work, and the low portion of the cam will allow the presser-foot to be raised by the action of its spring just at the commencement of the feeding stroke of the feeding-dog. The presser-foot and means for operating and controlling it are claimed in my original application, Serial No. 217,474, above referred to.

In place of the under roller-feed mechanism heretofore employed in my machine I have arranged an effective reciprocating feeding device, which engages the work upon its upper face. This feeding device forms no part of my present application, but is the subject of a copending divisional application, Serial No. 226,547, filed of even date herewith. This device will now be described.

I employ a two-part feed-dog 130 131, each part of which is formed with two parallel rows of serrations or teeth on its under surface and arranged to engage the work in front and in rear of the path of the needle. This two-part feed-dog is preferably formed integral with and projects laterally from a supporting-arm 132, which is secured by means of screws to the forward end of a longitudinally-movable rocking arm or bar 133. This arm or bar 133 is formed between its ends with an elongated slot or opening 134, inclined slightly from the horizontal. An antifriction-roller 135 is supported upon one of the set-screws 104 from the machine-frame lug 105 and engages in the inclined elongated slot or opening 134 for supporting the arm or bar 133, with the feed-dog in operative position. The rear end or bar 133 is formed with a yoke 136, which embraces an eccentric 137, keyed to the main driving-shaft 10 of the machine by which the feed mechanism is operated. This eccentric will cause the arm or bar 133 to reciprocate forwardly and backwardly and rock slightly upon its pivot-roller 135 to raise and lower the feed-dog. The inclined slot 134, moving over the antifriction-roller 135 during the reciprocation of arm or bar 133, serves to counteract the lifting of the dog on its feeding stroke and increasing the lifting action on its return stroke. The movement of the feed-dog under the action of the eccentric as modified by the inclined slot and roller-support will be a feeding stroke in a straight line in a horizontal plane and a return stroke in an arc. The two rows of teeth upon the feed-dog 130 and 131 engage the work in slot 110 of the presser-foot directly above the independently-yielding work-supporting plates 65 and 75, above referred to.

Freely journaled in the bearing 8 of the machine-arm 5 is a rock-shaft 140, carrying at its inner end a depending rock-arm 141, to the lower end of which is pivoted at 142 the forward end of the link 143, which is formed at its rear end with a yoke 144, embracing an eccentric 145, keyed to the main shaft 10. At the outer end of the rock-shaft 140 is keyed

the depending rock-arm 146, upon which the looper is journaled and by which the looper is operated. The rock-arm 146 carries at its lower end an outwardly-projecting journal-stud 147, which preferably has a threaded inner end to provide a convenient means for attaching it to the rock-arm. Freely journaled upon the stud 147 is a journal-sleeve 148, which is confined upon the stud between the rock-arm 146 and the head of the stud.

150 is the main body portion of the looper-rod. This body portion 150 is formed with a central circular opening 151, which loosely surrounds the bearing-sleeve 148. The looper-rod body is pivotally mounted upon said sleeve by means of the diametrically opposite cone-pointed center screws 152, which are threaded through the lower and upper walls of the central portion of the looper-rod body 150 and are seated in diametrically opposite cone-shaped recesses formed in the journal-sleeve 148. These center screws 152 are preferably provided at their outer ends with small lock-nuts 153 for securing them in the desired adjusted position in engagement with the sleeve 148. By reason of the pivotal connection between the looper-rod body 150 and the journal-sleeve 148 it will be observed that the looper can be rocked upon its pivots in an approximately horizontal plane in addition to its vertical oscillatory movements upon the journal-stud 147, as just described. The looper-rod body portion 150 is also formed with an inwardly-curved forwardly-projecting arm 155, formed at its front end with a socket, which receives the shank of the looper proper, 157, the looper being secured in the socket by means of set-screw 156 passing through suitably-threaded ears of the under split portion of the socket. The looper proper is formed of a single prong 157^a, having the thread-engaging shoulder 157^b and a curved cut-out or depressed portion 157^c behind said shoulder to allow for the passage of the needle. The looper-rod body portion 150 is also formed with a rearwardly-presented socket-arm 158, into the socket of which is threaded the forward end of the tail-rod 159. A locking-nut 160 is also threaded upon said tail-rod 159 to clamp it in position upon the body portion.

As above explained, a crank-disk 13 is mounted upon the end of the driving-shaft 10. This crank-disk 13 has projecting from it at an angle of about forty-five degrees an arm 165, which supports a crank-pin 166, extending at right angles from the arm 165. Journaled upon the crank-pin 166 is a sleeve 167, having diametrically opposite cone-shaped bearing-sockets, in which are seated the cone-pointed center screws 169, which are threaded through the side walls of the loop or yoke 170 for pivotally connecting said yoke with the journal-sleeve 167. The loop or yoke 170 has formed integral with it and extending forwardly from it adjacent to its lower edge a bracket-arm 171, formed with the integral journal-sockets 172, in which the guiding tail-rod of the looper is freely journaled, so as to reciprocate longitudinally and oscillate therein. The integral yoke 170, bracket-arm 171, and bearing-sockets 172 constitute what I term a "floating bearing" for imparting the lateral and a part of the vertical movements to the looper proper, said floating bearing being operated by the universal-joint connection and crank-pin above referred to.

175 is the usual thread-tension device.

180 is a vertically-movable needle-guide formed with an inwardly and forwardly curved finger having a needle-groove in its face. The lower end of this needle-guide rests directly above the opening 112 in the presser-foot and is adapted to intermittently rise and fall into guiding contact with the needle and away from the needle. This needle-guide has an upwardly-projecting guide-stem 182, which is supported in the integral socket-bearing lugs 119 and 183 of the sewing-machine arm and carries an inwardly-curved arm 184, secured to it by screw 185 and projecting over above a controlling-cam 186, which is keyed to the needle rock-shaft 15 and formed integral with the cam 121, above referred to, which controls the elevation of the presser-foot. The spiral spring 187 is confined between the hub of arm 184 and the upper bearing 183 to give the needle-guide 180 a normal tendency to move downwardly and holding the arm 184 in contact with the controlling-cam 186.

The operation of the improved machine may be briefly described as follows: The machine is primarily intended to accomplish what is known as "overseaming blindstitching" work, which style of stitching is most commonly employed in seaming the lower edges of trousers-legs, skirts, and other garments of tubular form. The material to be sewed is first folded at one edge to form a hem of the desired depth and by depressing the spring-sustained work-supporting frame is then inserted in the machine above the work-supporting plates 65 and 75 and the ridge-forming disk 60, the turned-up portion or hem of the material (that is, the double thickness of the work) being placed to the right just above the work-supporting plate 75. When the pressure is removed from the work-supporting frame, said frame returns to its normal horizontal or raised position and causes the yielding work-supporting plates and the freely-journaled ridge-forming rib 60 to force a ridge of the material up into the main longitudinal slot 110 of the presser-foot, the disk 60, which engages the work directly beneath the turned-over edge of the hem, forcing the material directly above it slightly beyond the parts of the material sup-

ported by the yielding plates. The needle oscillating transversely of the line of feed penetrates the raised portion or ridge of the material just above the rib 67 at one side and passes through the material supported on the ridge-forming disk 60 and emerges at a point just above the plate 75 and carries the loop of the thread to the right of the point from which the needle emerges. As the needle starts to return through the material the looper moving forward on the right-hand side of the line of stitching takes the loop from the needle and while the needle is completing its return movement in withdrawing from the material carries the loop across the line of stitching to the left and starts to recede and move downwardly to present the loop in open position directly in the path of the needle, which at the proper moment again moves forwardly, entering the loop and again piercing the material, as just explained, for another stitch, which is accomplished in the same manner. While the looper is moving across the line of stitching from right to left to present the loop to the needle the presser-foot is raised from the work-supporting plates and the feed-dog is given its feeding stroke, the material being freed from the pressure of the presser-foot during the time that the feed-dog is making its active stroke. Immediately after the completion of the working stroke of the feed-dog the presser-foot is again clamped securely upon the material to hold it firmly while the needle penetrates the work. After the looper has delivered the loop to the needle it is moved from the left-hand side of the line of stitching over to the right-hand side of the line of stitching in readiness for another forward stroke, as explained, and during this same time the feed-dog is making its return stroke out of engagement with the work in readiness for another feeding stroke. As the needle starts forward to penetrate the material the needle-guide is raised by its cam, so that the grooved guiding-finger engages and guides the needle until its point has completely penetrated the work, when the needle-guide is automatically lowered out of contact with the needle by the action of its spring when released by the cam to allow the needle rock-arm to accomplish its full upward stroke.

As stated above, the forward and backward movements of the looper and partly its vertical vibration are caused by the oscillations of the suspended rock-arm, on which the looper-body is journaled, while the transverse movements of the looper from one side of the line of stitching to the other and partly the vertical vibrations are caused by the laterally-swinging floating bearing actuated by the eccentric crank mechanism.

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

1. In a sewing-machine, the combination with suitable stitch-forming mechanism including a needle, means for supporting the work which is to be operated upon, a suitable feed device, a reciprocating stem carrying a needle-guide and having lifting means, bearings in which said stem is mounted, a spring arranged to lower the stem so as to move the needle-guide away from the needle, and a cam arranged to engage said lifting means and intermittently raise the stem, so as to move the needle-guide into guiding position.

2. In a sewing-machine, the combination with suitable stitch-forming mechanism, including a needle, means for supporting the work to be operated upon, a suitable feed device, a vertically-reciprocating needle-guide, bearings in which said needle-guide is mounted, an arm mounted upon the needle-guide, an oscillatory cam engaging said arm for raising the guide into active position, and a spring engaging the needle-guide for lowering it into inactive position under the control of the cam, substantially as set forth.

3. In a sewing-machine, the combination with a work-support, a suitable feed device, and a needle, of a looper-bar carrying a looper at its forward end and a guide-rod at its rear end, a suspended rock-arm on which the looper-bar is journaled, means for actuating the rock-arm for imparting forward and backward movement to the looper, and a bearing-frame movable laterally and up and down, the guide-rod of the looper-bar being journaled in the bearing-frame and by which the looper is made to move laterally and up and down, substantially as set forth.

4. In a sewing-machine, the combination with a suitable support for work, a suitable feed device, and a needle, of a looper-bar carrying a looper at its forward end and a guide-rod at its rear end, a suspended rock-arm on which the looper-bar is journaled, means for operating said rock-arm for imparting forward and backward movements to the looper, an eccentric crank mechanism, and a laterally-swinging floating bearing having universal-joint connection with said crank mechanism and bearings engaging the guide-rod of the looper, substantially as set forth.

5. In a sewing-machine, the combination of a suitable support for work, a suitable feed device, and a needle and operating mechanism, with a looper-bar carrying a looper at its forward end and a guide-rod at its rear end, a suspended rock-arm carrying a stud, a sleeve freely journaled upon said stud, an opening formed through the looper-bar and loosely surrounding said sleeve, center screws passing through the looper-body and seated in the sleeve, means for operating said suspended rock-arm, and a laterally-swinging floating bearing having bearings which engage the guide-rod of the looper, substantially as set forth.

6. In a sewing-machine, the combination with a suitable support for work, a suitable feed device, and a needle, of a looper-bar carrying a looper at its forward end and a guide-rod at its rear end, a suspended rock-arm carrying a stud, a sleeve freely journaled upon said stud, an opening formed through the looper-bar and loosely surrounding said sleeve, center screws passing through the looper-body and seated in the sleeve, a rock-shaft upon which said suspended rock-arm is mounted, means for operating said rock-shaft, eccentric crank mechanism, and a laterally-swinging floating bearing having universal-joint connection with said crank mechanism and formed with bearings which engage the guide-rod of the looper, substantially as set forth.

7. In a sewing-machine, the combination with a suitable support for work, a suitable feed device, and a needle, of a looper-bar carrying a looper at its forward end and a guide-rod at its rear end, a suspended rock-arm on which the looper-bar is journaled, means for operating said rock-arm for imparting forward and backward movements to the looper, an eccentric crank mechanism, including an inclined crank-pin, a laterally-swinging floating bearing, comprising a loop or yoke surrounding said crank-pin and having universal-joint connection therewith, and alined bearing-sockets integral with said loop or yoke, the guide-rod of the looper-bar being freely journaled in said alined bearing-sockets, substantially as set forth.

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