

C. A. DEARBORN.
 STITCH FORMING MECHANISM FOR SEWING MACHINES.
 APPLICATION FILED AUG. 12, 1910.

1,018,885.

Patented Feb. 27, 1912.

4 SHEETS—SHEET 1.

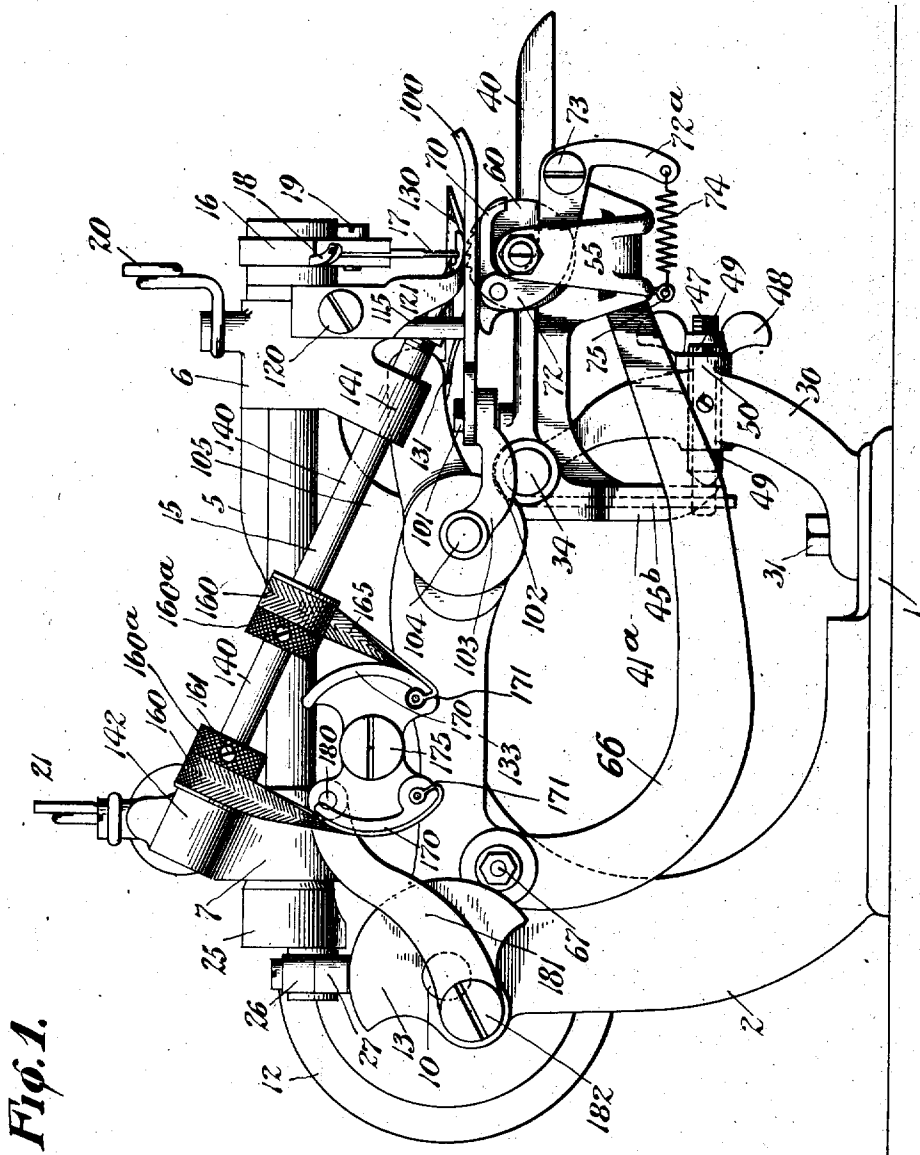


Fig. 1.

Witnesses:
 Clara Kohnstein
 Ray J. Enst.

Charles A. Dearborn
 Inventor.
 By his Attorney, *Smith & Wadsworth*

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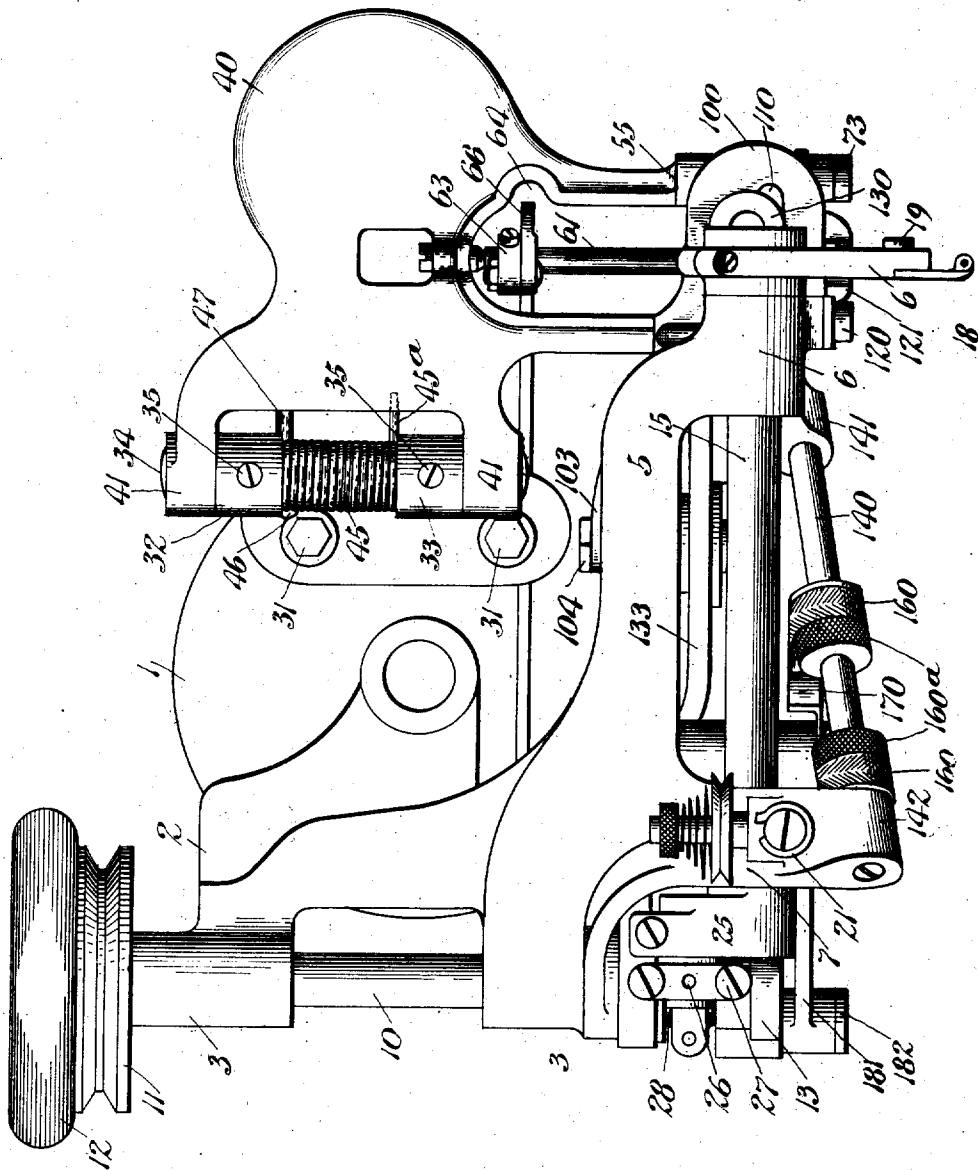


Fig. 2.

Witnesses:
 Clara Hohenstein
 Ray J. Anst,

Charles A. Dearborn
 Inventor,
 By his Attorneys *Smith & Wicks*

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Fig. 3.

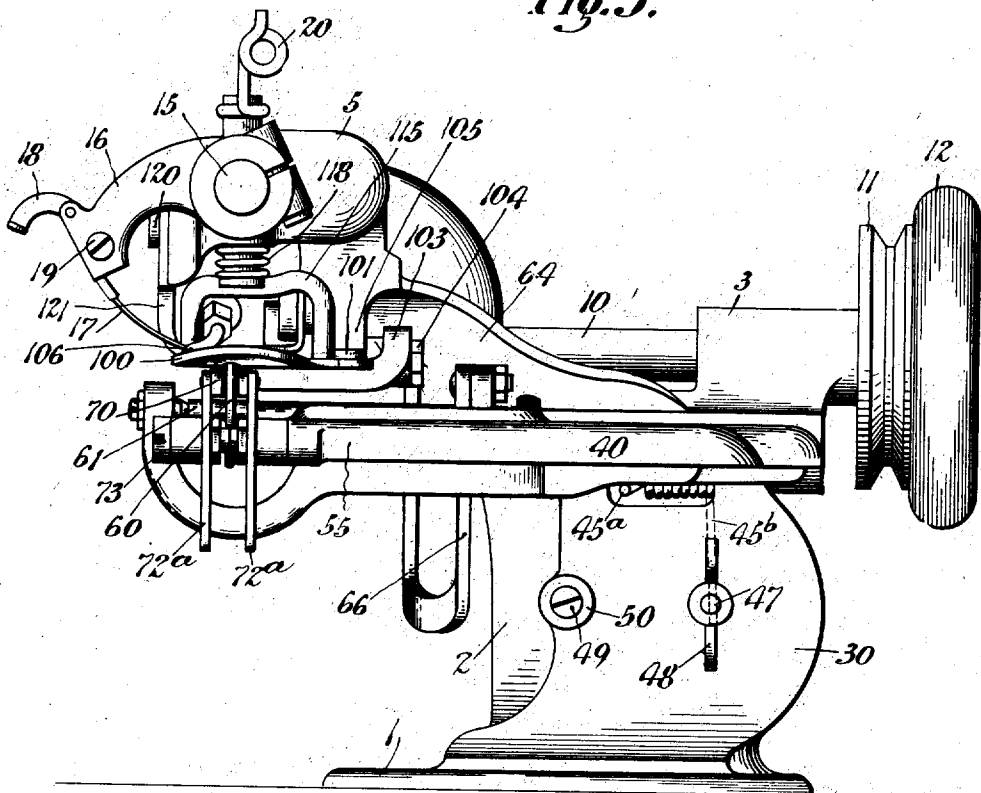


Fig. 4.

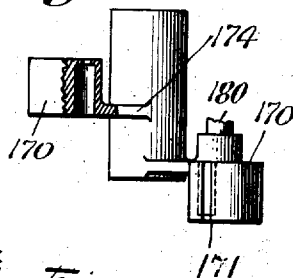


Fig. 5.

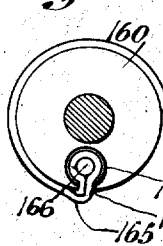
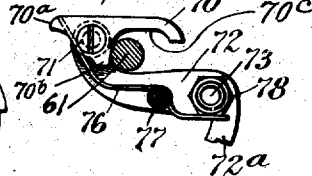


Fig. 6.



Witnesses:
 Clara Sokenstein
 R. U. Enst.

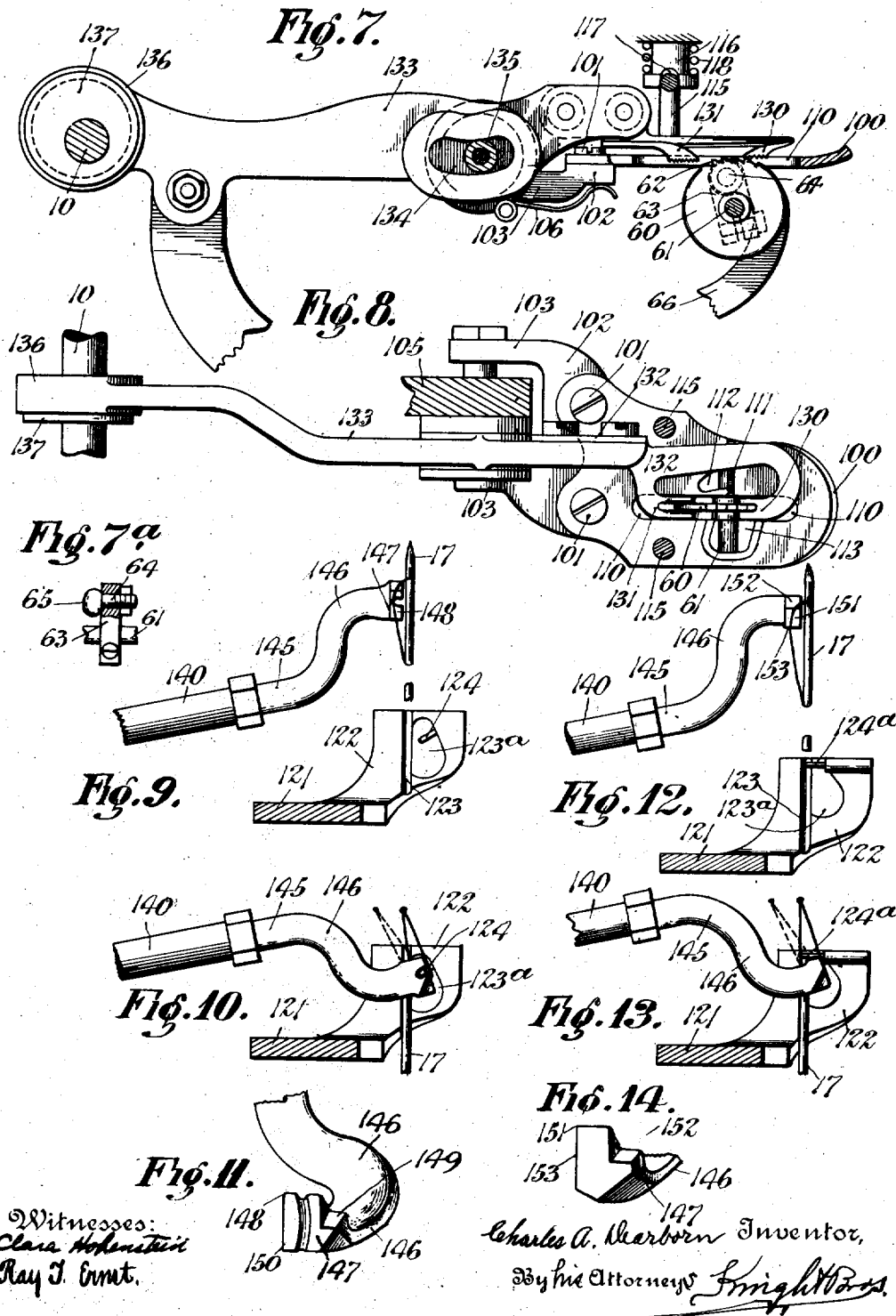
Charles A. Dearborn
 Inventor,
 By his Attorneys *Smith Bros.*

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4 SHEETS—SHEET 4.



Witnesses:
 Clara Holmsten
 Ray J. Ernst.

Charles A. Dearborn Inventor,
 By his Attorneys *Smith & Wess*

UNITED STATES PATENT OFFICE.

CHARLES A. DEARBORN, OF NEW YORK, N. Y., ASSIGNOR TO DAVID J. NEWLAND, OF NEW YORK, N. Y.

STITCH-FORMING MECHANISM FOR SEWING-MACHINES.

1,018,885.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed August 12, 1910, Serial No. 576,793.

To all whom it may concern:

Be it known that I, CHARLES A. DEARBORN, a citizen of the United States, and a resident of the borough of Manhattan, city, 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 invention relates to improvements in stitch-forming mechanism for sewing machines for over-seaming blind stitch work of the power driven type such as illustrated in Patent No. 814,025 granted to me March 6th, 1906.

The stitch forming mechanism of my present invention includes the usual needle arranged to rock or oscillate transversely of the line of feed, and a looper of peculiar construction both as to its form and mode of coöperation with the needle.

The improved looper comprises a looper rod mounted in the machine frame at an incline to the horizontal plane of feed of the work and at an incline to the needle rock-shaft. The looper proper is offset from the forward end of the looper rod and peculiarly shaped to take the loop of thread from the needle at one side of the line of stitching and carry it across the line of stitching and deliver it to the needle at the opposite side. The needle and looper operate in intersecting planes transverse to the line of feed, so that the looper will take a loop from the inner or rear face of the needle at one side of the line of stitching, and the needle will take the loop from the inner or rear face of the looper at the opposite side of the line of stitches. Unlike the looper of my above named patent, the improved looper of the present invention has a simple oscillating motion about its longitudinal axis, there being no movement of the looper parallel with the axis of the looper rod. The oscillation of the looper is preferably slightly more than half a circle in extent. For imparting the oscillations to the looper, I mount upon the looper rod two small tape wheels or pulleys to which are secured the ends of two driving tapes which extend from the wheels or pulleys to oppositely arranged pulley segments mounted upon a rocking frame journaled approximately at a right angle to the axis of the looper rod. The rocking segmental frame

is driven by a crank and pitman connection with the driving shaft of the machine. The driving tapes connecting the looper wheels or pulleys and driving segments are secured at their ends to the pulleys and segments by means of a novel arrangement of interlocking sockets and keys so as to facilitate the adjustment of parts and the renewal of the tapes. This looper operating mechanism involves a novel mechanical movement which I desire to claim in a broad sense in the present application.

In addition to the novel movement of the improved looper, the stitch forming mechanism preferably includes a stationary stitch and needle guide having a pin or projection extending into the path of the loop to engage and spread the loop upon the looper as the point of attachment of the loop with the work is advanced by the feed of the work, to insure the entrance of the needle into the loop. Said guide is also preferably formed with a groove for determining the exact path of the needle. The looper proper is formed with a tapered nose which enters the loop carried by the needle as the needle starts its backward movement after penetrating the work, and a shoulder for engaging the loop and carrying it across the line of stitches into engagement with the loop spreading projection of the stitch and needle guide. The looper may be provided with a slotted heel for the reception of the loop spreading projection or it may be so arranged with relation to said projection that one of the side faces will work over said projection for throwing the loop thread into engagement therewith.

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 more particularly in the annexed claims.

In said drawings: Figure 1 is a side elevation of my improved sewing machine. Fig. 2 is a plan view of the same. Fig. 3 is a front elevation of the same. Figs. 4 and 5 are detail views illustrating parts of the looper driving mechanism. Fig. 6 is a detail side elevation of one of the work supporting platens. Fig. 7 is a detail vertical longitudinal sectional view illustrating the improved construction of the ridge-forming rib and the presser foot. Fig. 7* is a detail view illustrating the adjustable driving con-

nection for the oscillating ridge-forming rib. Fig. 8 is a plan view of the parts shown in Fig. 7. Figs. 9 and 10 are detail plan views showing different positions of the looper and needle with relation to the stationary stitch and needle guide. Fig. 11 is an end view of the form of looper shown in Figs. 9 and 10. Figs. 12 and 13 are views similar to Figs. 9 and 10 of a modified form of looper. Fig. 14 is an end view of the form of looper shown in Figs. 12 and 13.

The main frame of the machine of the type to which my improvements are particularly applicable is formed of a single casting comprising a rigid central base 1, the upwardly extending arm 2 terminating in sleeves or shaft bearings, 3, and a forwardly extending arm 5 having bearings for the needle rocker shaft 15 and for the looper and operating mechanism.

10 is the main driving shaft of the machine journaled in the bearings 3 of the rear arm 2 and having secured at one end the driving pulley 11 and fly wheel 12.

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 my 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 jour-

naled 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 the threaded rod 47, which passes freely through an opening formed in the arm 30 and is engaged at its forward threaded end by a butter-fly 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 (viewing the machine from the front, as shown in Fig. 3) into a work supporting horn 55 which is shaped to receive the ridge-forming disk and the independently-yielding work-supporting plates, which will now be explained.

60 is the ridge-forming disk fixed upon a shaft 61 journaled in horizontal position in suitable bearings upon the horn 55. This disk 60 is preferably formed with a series of forwardly presented inclined cloth-engaging teeth 62 for the purpose hereinafter explained. Adjustably secured to the shaft 61 is a rock arm 63 carrying at its upper end an adjustable crank pin 64. This crank pin 64 is formed with a spherical head 65 mounted eccentrically with relation to the axis of the crank pin. This crank head can be adjusted upon its axis in the bearing formed in the arm 63 to adjust the length of the crank.

66 is a link pivotally connected with the spherical crank head 65 and extending therefrom rearwardly of the machine to a point 67 where it is pivotally connected with the upper feed arm 133 hereinafter referred to. By this means the shaft 61 is given a back and forth oscillatory motion for oscillating the disk 60 in unison with the upper feed devices hereinafter referred to.

Two independently yielding work supporting plates or platens are mounted adjacent to the ridge-forming rib 60, one being on each side of the rib. The work supporting plates or platens are both of the same

construction so that a description of one will suffice for both. Each plate or platen 70 is pivotally mounted at 71 on the upper end of a curved arm or lever 72 which is journaled upon a pin 73 mounted upon the horn 55 of the work supporting frame 40. The arm or lever 72 curves around the shaft 61 for presenting the plate 70 in proper position. A curved arm 72^a extends from the bearing hub of the arm 72 and has connected with it a spring 74 attached at 75 to the horn of the work supporting frame for the purpose of yieldingly holding the arm or lever 72 in normal position. A spring 76 mounted upon a pin 77 projecting from one face of lever 72 has one arm in engagement with a nut or collar 78 and its other end in engagement with the slotted heel 70^a of the plate or platen 70. This spring 76 yieldingly supports the plate or platen 70 in its normal position upon the arm or lever 72 and allows the plate or platen to move downwardly at its forward end upon its pivot 71. Each plate 70 is formed with an integral lug 70^b projecting from it in rear of the shaft 61 so as to engage said shaft and limit the movement of plate or platen 70 upon pin 71 in the opposite direction. It will be observed that each plate or platen 70 is pivoted at a point near its heel or rear end to the arm 72 and that the forwardly projecting portion of each plate or platen is cut out as shown at 70^c to give freedom of motion either when the platen is moved upon its pivot or moves with supporting arm 72. From this construction it will be clear that the rear end or heel of each platen will move downwardly toward arm 72 only in conjunction with the downward movement of arm 72 under the action of an extra thickness of material.

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 torsion spring secured at one end to lug 105 of the machine arm and engaging at its other end the under surface of the yoke 102. This spring 106 tends to move the presser foot upwardly and to support it in normal approximately horizontal position when the cloth supporting frame is depressed.

Mounted upon the upper face of the presser foot 100 is a yoke 115 formed with a central depression which rests in a transverse slot 117 formed in a headed guide pin or stud 116 secured to the machine arm 5 beneath the forward bearing for the needle rock shaft. This headed pin or stud 116 confines between its head and the sewing machine arm an expansion spring 118, the

lower end of which projects across the slot 117 and engages the yoke 115. The spring 106 above referred to holds the pivotally mounted presser foot with its yoke 115 in engagement with the spring 118 and since the spring 118 is stronger than the spring 106, said spring 118 will not be compressed when the presser foot is in its normal position, but is capable of being compressed to allow a slight further upward movement of the presser foot when the presser foot is subjected to a greater upward pressure. The limit of upward movement of the presser foot may be the limit of the compression of spring 118 or it may be limited by the depth of the slot 117. The spring 118 is of less strength than the spring 45 above referred to so that when an unusual thickness of work passes between the presser foot and the work supporting parts upon the supporting frame 40, the presser foot will move upward slightly to permit the passage of the excess of thickness, and if the permitted upward movement of the presser foot is not sufficient to allow the extra thickness of material to pass beneath it, then the work supporting frame will yield downwardly sufficiently to allow the passage of the extra thickness in the work.

The presser foot 100 is formed with the main longitudinal slot 110 through which the ridge of the work is pressed by the work supporting plates 70 and the ridge-forming disk 60, and in which the upper feed member hereinafter referred to operates. The presser foot 100 is also formed at one side of the slot 110 with a needle guiding groove 111 and in rear of this groove is an opening 112 into which the looper is depressed just prior to taking the loop from the needle. At its opposite side, the presser foot 100 is formed with an opening 113 alongside of the main longitudinal slot 110 for the purpose of receiving the lower end of the stitch and needle guide presently to be explained.

Secured to the sewing machine arm 5 at 120 adjacent to the forward bearing of the needle rock shaft is the stitch and needle guide 121. This needle guide has inwardly projecting flat portion 122 at its lower end in the upper face of which is formed a transverse needle guiding groove 123, which is in alinement with the groove 111 of the presser foot. This stitch and needle guiding plate member is also formed with a slot 123^a extending through it to receive the nose of the looper, and a short thread-engaging pin 124 projecting into the slot 123^a. The stitch and needle guiding member 121 is rigidly supported as explained so as to be presented in a constant relation to the needle and looper without regard to the varying thicknesses in the work and the changing positions of the presser foot, the slot or opening 113 of the presser foot being of proper size

to receive the lower end of the stitch and needle guide and thereby permit the movement of the presser foot as above explained.

Coöperating with the work supporting devices described above, I prefer to employ an upper feeding device of the construction covered by Patent No. 814,026 granted to me March 6th, 1906. This feed device comprises 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 anti-friction 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 of 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 anti-friction 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 70 above referred to.

The work supporting and feeding devices above described are not claimed in my present case but form the subject matter of my divisional application Serial No. 598,752, filed December 22nd, 1910.

140 is a looper rod journaled in the bearings 141 and 142 projecting from the bearings of the needle rock shaft above referred to. These bearings support the looper rod 140 adjacent to the needle rock shaft and inclined downwardly and inwardly with relation thereto. At the forward end of the looper rod is the adjustably mounted looper proper which is formed with shank 145 adapted to be clamped in the end of the looper rod and

a crank arm 146 having at its end a foot 147 extending approximately at a right angle to the crank arm, and approximately perpendicular to the axis of rotation of the looper. In the form of looper shown in Figs. 9, 10 and 11, the foot 147 is formed with a toe 148 beveled or tapered to a sharp edge and cut away at one side to provide a thread engaging shoulder 149. In this form of looper, the end face of the foot 147 is formed with a deep groove 150 extending in a plane approximately concentric with the axis of the looper rod. This groove 150 in this form of looper is designed to receive the thread engaging pin 124 of the guide 121 above referred to when the looper is in the act of delivering the loop to the needle.

In the form of looper shown in Figs. 12, 13 and 14, the groove 150 is omitted and the looper thereby provided with a single tapered toe 151 having a thread engaging shoulder 152. In other respects this modified form of looper is the same as the preferred form described in connection with Figs. 9, 10 and 11. In the operation of this modified form of looper, the adjustment of the parts is such that the edge face 153 of the looper foot will move over the thread engaging pin 124 of the stationary guide when the looper delivers the loop to the needle. To properly coöperate with this modified form of looper, the thread engaging pin 124 is arranged in a slightly different position as shown in Figs. 12 and 13. The operation of the looper mechanism in forming the stitch will be hereinafter explained.

In performing its work, the looper has a simple oscillating or rocking motion about the axis of the looper rod, there being no movement of the looper parallel with said axis. To cause this oscillating motion of the looper I employ a simple, inexpensive and efficient mechanism which will now be explained.

Between the bearings 141 and 142 the looper rod is provided with two tape wheels or pulleys 160, both of which are adjustably secured upon the looper rod by means of set screws 161. Each tape wheel or pulley 160 is formed in its periphery with an undercut slot or groove 162 extending parallel with the looper rod 140 and of circular cross section. A driving tape or belt 165 operates upon each of the tape wheels or pulleys 160 and is secured at its end by means of a keying device illustrated in Fig. 5 of the drawings. This keying device comprises the central rod or wire 166 around which the end of the driving tape is folded, and a short section of a split tube 167 confining the end of the tape around said rod or wire 166. The section of split tube is of proper size to fit snugly in the undercut slot 162 of the tape wheels or pulleys. The

wheels or pulleys 160 are preferably formed with milled surfaces 160^a to facilitate their adjustment upon the looper rod. Each driving tape 165 extends from a wheel or pulley 160 to a pulley segment 170, each of which segments is provided with transverse undercut slots 171 adapted to receive the securing key attached to the opposite end of the driving tape, said securing key being constructed exactly as described in connection with Fig. 5 of the drawings. These pulley segments 170 are formed integral with a rocking frame 174 journaled upon the pin 175 extending from the sewing machine arm 5 transversely of the axis of the looper rod, the two segments being arranged in parallel vertical planes extending approximately at right angles to the planes in which the tape wheels or pulleys 160 operate. These pulley segments are separated sufficiently to permit the convenient arrangement of the tapes between the wheels or pulleys 160 and said pulley segments, it being understood that the tapes extend in opposite directions around the tape wheels or pulleys so as to be alternately wound and unwound upon the wheels or pulleys under the action of the rocking frame carrying the pulley segments.

The rocking frame 174 comprises a hub journaled as explained and web portions extending from the hub and supporting the pulley segments. One of said web portions is provided with a crank pin 180 to which is journaled the end of a link 181 journaled at its opposite end upon a crank pin 182 extending from the crank disk 13 keyed to the end of the main shaft 10 of the machine by which the pulley segments are oscillated for imparting the oscillating movements to the looper.

The operation of the novel parts of the improved sewing machine will be understood from the following explanation. The movements of the needle and the upper feed device are the same as explained in my above named patents and need not be further described. The work to be sewed is inserted as in the former type of my machine by depressing the work plate 40 and placing the work beneath the presser foot 100 and above the ridge-forming disk 60 and work supporting plates or platens 70. The work supporting plate 40 is then allowed to move up into its normal position which causes the disk 60 to press a ridge of work up into the main longitudinal slot 110 of the presser foot, the plates 70 firmly supporting the work upon opposite sides of the ridge-forming disk and yielding independently of each other to permit inequalities in the work to pass beneath the presser foot under the action of the feeding devices. Since the toothed ridge-forming disk 60 has a to and fro motion imparted to it

simultaneously with the movements of the upper feeding device, the under layer of the work will be "worked in" or "fulled in." In accommodating the varying thickness of the work passing between the presser foot and work supporting devices, the plates or platens 70 are capable of yielding either upon their pivots 71 or upon the pivotal supports of levers 72. In case an unusual thickness in the work passes over the disk 60 so that additional space must be afforded between the disk and the presser foot, the spring 118 will yield to permit the presser foot to move upward slightly, said upward movement of the presser foot not interfering in any way with the movements of the stitch forming mechanism.

The needle is guided in its movements by engagement with the transverse groove 123 of the guide 121 and groove 111 of the presser foot. The needle passes through the ridge of work above the disk 60 and presents a loop at the opposite side of the ridge in position for the toe of the looper to enter as the looper starts to rock from its position on the right of the line of stitching back to its position on the left. The moment of engaging the loop from the needle is illustrated in Fig. 9 for the preferred form of looper and in Fig. 12 for the modified form of looper. The loop is caught upon the toe of the looper and thrown into engagement with the shoulder 149 or 152 and carried by the looper across the line of stitching and moved downwardly above the plate 122 to cause the upper thread of the loop to engage pin 124 for spreading the loop prior to the succeeding penetrating stroke of the needle. As the looper is carrying the loop across the line of stitching as explained, the feeding device operates to move the point of attachment of the loop with the work so as to present the loop in proper position for the entrance of the needle.

In the form of looper shown in Figs. 9, 10 and 11, the loop thread is thrown into engagement with the pin 124 by reason of the movement of the looper over said pin which projects into the groove 150 of the looper, during this movement, whereas in the modified form of looper shown in Figs. 12, 13 and 14, the pin 124^a is caused to engage the loop thread by reason of the movement of the inner edge or face 153 of the looper foot over the pin 124^a.

The mechanism produces a chain stitch the same as in the machines of my prior patents.

In causing the looper to rock back and forth upon its longitudinal axis, it will be clear that the rotary movement of the crank upon the main shaft 10 causes the rocking frame 174 to rock upon its bearing and this alternately pulls down upon the two driving

tapes which operate upon the tape wheels or pulleys secured to the looper rod.

I am aware that it has been proposed to construct a stitch forming mechanism for sewing machines with the needle and looper operating in intersecting planes transverse to the line of feed of the work, but in the only form of such mechanism known to me, the looper rod has been arranged approximately vertical or slightly inclined from the vertical with relation to the plane of feed. Such an arrangement necessitates some provision for an expensive lifting movement upon the longitudinal axis of the looper rod to obtain sufficient clearance between the looper and the work in rocking the looper from one side of the line of stitches to the other. In my improved stitch forming mechanism, the inclination of the looper rod to the horizontal plane of feed affords the proper clearance between the looper and the work without the necessity of a longitudinal movement of the looper upon its rocking axis. I am able to produce with my invention a very simple and effective looper movement for producing a single chain stitch.

I claim:

1. In a sewing machine, the combination of suitable work supporting and feeding devices, and suitable stitch forming mechanism, with a stationary thread and needle guide formed with a needle guiding groove and a thread engaging pin.

2. In a sewing machine, the combination of suitable work supporting devices, and work feeding devices, with a needle operating transversely of the line of feed, a looper mounted upon an axis inclined to the plane of feed and oscillating in a plane inclined to the plane of movement of the needle, and a thread engaging pin mounted transversely of and adjacent to the paths of the needle and looper, whereby the looper will take the loop from the needle at one side of the line of stitches and carry it to the other side of the line of stitches into engagement with said thread engaging pin to spread the loop for the entrance of the needle.

3. In a sewing machine, the combination of suitable work supporting devices, and work feeding devices, with a needle operating transversely of the line of feed, a looper oscillating in a plane inclined to the plane of movement of the needle, and a thread engaging pin mounted transversely of and adjacent to the paths of the needle and looper, said looper being formed with a slot extending concentric with the axis of movement of the looper and adapted to receive said thread engaging pin, whereby the looper will take the loop from the needle at one side of the line of stitches and carry it to the other side of the line of stitches into engagement

with said thread engaging pin to spread the loop for the entrance of the needle.

4. In a sewing machine, the combination of suitable work supporting devices, suitable feeding devices, and a needle operating transversely of the line of feed, with a looper mounted to oscillate in a plane transverse to the line of stitches upon an axis inclined to the plane of feed and the plane of movement of the needle, said looper including an arm extending eccentrically with relation to its axis of movement and having a loop-engaging foot extending approximately at right angles to said arm and formed with a slot concentric with the axis of movement, and a loop spreading pin mounted transversely of and adjacent to the paths of the needle and looper and adapted to enter the slot of said looper foot.

5. In a sewing machine, the combination of suitable feed mechanism, and a needle and operating mechanism, with a looper, an oscillating looper rod carrying the looper, a rocking frame mounted upon an axis extending transversely of the axis of the looper rod, and flexible connections attached to the looper rod and rocking frame, said flexible connections extending from opposite sides of the axis of the rocking frame and winding oppositely upon the looper rod.

6. In a sewing machine, the combination of suitable feeding mechanism, and a needle, with a looper cooperating with the needle, a looper rod upon which the looper is mounted, pulleys secured to the looper rod, a rocking frame mounted upon an axis extending transversely of the axis of the looper rod, means for rocking said frame, and flexible driving connections secured at their opposite ends to the rocking frame and pulleys.

7. In a sewing machine, the combination of suitable feeding mechanism, and a needle, with a looper cooperating with the needle, a looper rod upon which the looper is mounted, pulleys secured to the looper rod, and a rocking frame having oppositely arranged pulley segments, a bearing for said rocking frame extending transversely of the axis of said looper rod, means for rocking said frame, and flexible driving connections connected at their opposite ends with the pulley segments and looper rod pulleys.

8. In a sewing machine, the combination of a suitable frame, a main shaft extending transversely of said frame, a suitable feeding mechanism, a needle and operating member, a looper cooperating with said needle, a looper rod mounted longitudinally in said frame inclined to the plane of feed, pulleys secured to said looper rod, a rocking frame having pulley segments, a bearing pin for said rocking frame mounted in the machine frame transversely of the axis of said looper rod, a crank and pitman connection between

said main shaft and said rocking frame, and flexible bands connected at their opposite ends with said pulley segments and looper rod pulleys.

5 9. In a sewing machine, the combination of suitable feeding mechanism, and a needle, with a looper cooperating with the needle, a looper rod upon which the looper is mounted, pulleys secured to the looper rod and
10 formed with undercut slots in their peripheries, and a rocking frame having oppositely arranged pulley segments formed with undercut slots in their peripheries, means for rocking said frame, flexible driv-
15 ing tapes or bands, and keying devices securing the ends of said tapes or bands in said undercut slots of said pulleys and pulley segments.

10. In a sewing machine, the combination

of suitable feeding mechanism, and a needle, 20 with a looper cooperating with the needle, a looper rod upon which the looper is mounted, pulleys secured to the looper rod and formed with undercut slots in their periph- 25 eries, and a rocking frame, having oppositely arranged pulley segments formed with undercut slots in their peripheries, means for rocking said frame, flexible driving tapes or bands, and keying devices comprising split tubes and rods secured upon 30 the ends of said tapes or bands and fitting said undercut slots of the pulleys and pulley segments.

CHARLES A. DEARBORN.

Witnesses:

WM. E. KNIGHT,
M. G. CRAWFORD.

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