To all whom it may concern:

Be it known that I, ALFRED R. MORRILL, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Inseam-Sewing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains, to make and use the same.

This invention relates to chain stitch inseam sewing machines which employ curved hook needles and which are used in sewing the inseams of turned or welted shoes.

After the inseam has been sewn, on a machine of this class, and before the shoe can be removed from the machine, the last loop of thread drawn through the work by the needle must be freed from the needle hook and the needle must be brought to rest, out of engagement with the shoe. One object of the present invention is to provide novel and efficient means for freeing the thread from the needle at the completion of the sewing. To this end the invention contemplates freeing the thread by so shifting the position of the looper that it will be ineffective to lay the thread in the needle hook during the last cycle of operations of the machines. With the looper thus inactively operating during the last cycle, the needle will be retracted with its hook empty and therefore the last loop of thread will be drawn through the work by the needle during the preceding cycle. This loop will be freed from the needle hook by the final advance of the needle which will then be retracted free of the thread. The invention contemplates the shifting of the looper in any manner or direction which will render its operation ineffective to lay the thread in the needle hook. It is preferred, however, to so shift the looper that its movement will take place entirely at one side of the needle during the last cycle of operations.

Any suitable construction of looper and looper actuating mechanism may be utilized in the practical application of the above feature of the invention. It is preferred, however, to utilize a novel looper construction which forms a further feature of the present invention and which may be used to advantage either with or without the features relating to the freeing of the thread from the needle.

The various features of the invention will be readily understood from an inspection of the accompanying drawings, and the following detailed description of the mechanism illustrated therein.

In the drawings, Figure 1 is a side elevation of the head of an inseam sewing machine embodying the invention in its preferred form, portions of the casing being broken away and parts of the mechanism shown in section; Fig. 2 is a plan view thereof with parts broken away or shown in section for clearness of illustration; Fig. 3 is a detail plan view illustrating the sidewise shifting of the looper during the last cycle of operations; Fig. 4 is a detail sectional view on line X of Fig. 1, indicating the normal movement of the looper about the needle hook; and Fig. 5 is a similar view indicating the movement of the looper relatively to the needle during the last cycle.

In the drawings the invention is shown as embodied in a welt sewing machine in which the curved hook needle is indicated at 2, the thread finger at 4, and the welt guide at 6. These parts are adapted to be operated in any usual manner. The looper is indicated at 8, and is operated by mechanism hereinafter described. During the sewing operation the cam shaft 10 is driven continuously in the direction of the arrow in Fig. 1 by means of a pulley 12 and suitable driving mechanism, not shown, which may be controlled by a foot treadle in any well known or usual manner so as to keep the machine connected with the driving power while the treadle is kept depressed and to cause it to be disconnected therefrom by the release of the treadle.

When the treadle is released to stop the machine, stopping mechanism, which is similar in construction to that shown and described in the patent to Topham, No. 1,191,747, dated July 18, 1916, acts to continue the forward movement of the cam shaft and bring the machine to rest with the needle in retracted position free of the work. The movement of a part of the stopping mechanism is utilized to operate the looper shifting mechanism to prevent the laying of the thread in the needle hook by the looper, the result being that during the last revolu-
tion of the cam shaft, the needle advances and casts off the loop of thread drawn through the work and is then retracted with its hook empty and is brought to rest out of engagement with the work, and where it will not interfere with the ready removal of the shoe.

The stopping mechanism, as indicated in the drawings, comprises a continuously slowly rotating clutch member 14 loosely mounted on the cam shaft and cooperating with a clutch member 16 mounted to rotate with the cam shaft and movable thereon toward and away from the clutch member 14. To cause the clutch member 16 to be moved into and out of engagement with the clutch member 14, the hub of the member 16 is provided with a cam groove which is engaged by a roll on one end of a bell crank lever 18 pivotally mounted on the frame of the machine. The other end of the bell crank is provided with a hole adapted to receive a locking pin 20. The pin is mounted in the end of a slide 22 and is held in normal position by a spring 24 which surrounds a bolt 26, extending from the rear end of the slide, and is held compressed between a shoulder on the slide and a sleeve 28 by a nut 30 which is carried by the bolt and bears against a lug projecting from the frame. The locking pin is normally held out of engagement with the bell crank lever by the treacle with which the pin is connected by a rod 32, the connection being made through a latch lever 34 pivoted to the lower end of the locking pin and adapted to bear against the slide 22. While the treacle is depressed and the machine is in operation, the latch is held against the end of the slide 22 below a shoulder 39, and the locking bolt is held out of engagement with the bell crank lever, against the tension of a spring 38, as indicated in Fig. 1. The bell crank lever will therefore be oscillated idly by the cam groove in the hub of the clutch member 16, and the clutch members will remain out of engagement. When the treacle is released to stop the machine the latch 34 will engage the shoulder 39 preventing upward movement of the locking pin until the treacle has moved upward sufficiently to enable the pin to snap into the hole in the bell crank lever when the hole registers with the pin. When this occurs, the continued forward rotation of the cam shaft, under momentum, causes the cam groove in the hub of the clutch member 16 to move the clutch members into engagement so that the cam shaft will be slowed down to the speed of the clutch member 14. In order to quickly check the momentum of the cam shaft, the cam groove, after moving the clutch members into engagement, acts to rock the bell crank lever and thereby move the slide to which the lever is then connected by the locking pin, and compress the spring 24 so that its force will be exerted to press the clutch members together. The cam shaft is then driven forward at reduced speed until the cam groove acting on the bell crank lever, moves the clutch member 16 out of engagement with the clutch member 14, thus bringing the machine to rest with the needle in retracted position. The movement of the slide above referred to is utilized to operate the mechanism for shifting the looper as will be hereinafter explained.

The looper 8 is in the form of a lever which is tubular in whole or in part to form a passage for the thread and which is connected with a projection 42 on the frame by a universal or ball joint 40 so that the thread carrying end of the lever may readily and easily swing in any direction. The looper operating mechanism comprises two independently movable actuators and a link connection through which the actuators impart a movement to the looper, which is a resultant of the independent movements of the actuators. As shown the actuators comprise two cam operated levers 48 and 50 and the link connection comprises a single three-cornered link 62, the forward end of which is connected to the looper lever by the ball and socket joint 64 and the rear ends of which are connected to the actuator levers by the ball and socket joints 58 and 60 respectively. The actuator levers are mounted to oscillate freely upon a rock shaft 52 and are operated by two grooved cams 44 and 46 secured to the cam shaft 10 and engaging rolls 54 and 56 on the levers. As shown in Figs. 2 and 3 the link 62 is provided with two rearwardly diverging arms, to the ends of which the actuator levers are connected, and is provided with a forwardly extending arm, the end of which is connected to the looper. The link receives forward and rearward movement from the actuator levers, and inasmuch as the levers are not moved in unison the link is also oscillated about one or the other of its rear ends so that the movement of the forward end of the link, and consequently of the looper, is a resultant of the forward and rearward, and of the sidewise movements imparted to the forward end of the link. By properly shaping the cams 44 and 46 and properly proportioning the link and levers the lower end of the looper may be swung in the proper path to lay the thread in the hook of the needle.

In order to interrupt the action of the looper and cause the needle to miss loop during the last cycle of operations of the machine provision is made for swinging the looper actuating link about its left rear end by imparting to the right end of the link an abnormal forward movement, which shifts the looper toward the left side of the ma-
machine and into the position where it is ineffective to lay the thread in the needle hook. To accomplish this the actuator lever 50, on the right hand side of the machine, is mounted on an eccentric 68 keyed to the rockshaft 52 so that by rocking the shaft and shifting the eccentric bearing 66 forward the rear right end of the looper actuating link may be moved forwardly to swing the link about its rear left end and to cause its forward end which is connected with the looper to be shifted toward the left. The means for rocking the rockshaft comprises a segment lever 68 pivotally mounted at 70 on the frame of the machine and having its teeth meshing with the teeth of a gear segment 72 formed on the adjacent end of the rockshaft. The segment lever receives its movements from the bolt 26 carried by the slide 22 of the stopping mechanism. The outer screw-threaded end of this bolt projects through an aperture in the thickened upper portion of the segment lever. Segmental bearing faces are formed on opposite sides of the upper portion of the segment lever, one of which is engaged by the nut 30 on the bolt 26 while the other is engaged by a nut 74 on the outer end of the bolt 26. When the treadle is released to stop the machine, and the stopping mechanism is thrown into operation, the resulting movement of the slide 22 is transmitted to the segment lever which rocks the rockshaft through the gear segment 72, thereby effecting the shifting of the looper toward the left as above described. The position of the link and the looper after being shifted is shown in Fig. 3. With the looper starting from this position the path of movement which it will describe during the last cycle of operations will lie entirely to the left of the needle. The shifting of the looper occurs before the needle has reached its advanced position and in time to prevent the laying of the thread in the needle hook and the looper will be permitted to complete its ineffective operation before the return movement of the slide acts to bring the looper back to its normal position, since the slide does not return until the needle has been retracted from the work at the end of the last cycle.

During the last revolution of the cam shaft, therefore the rockshaft will be rocked as the needle advances, thereby shifting the bearing or fulcrum 66, about which the bell crank 50 swings, to effect the oscillation of the link 62 and the shifting of the looper out of effective relation with the needle so that the thread will not be laid in the needle hook. The hook of the needle will therefore be emptied during its return movement and will be free of the thread when it comes to rest in its retracted position. The machine is stopped with the mechanism for rocking the rockshaft in its normal position and consequently with the looper in its proper relation to the path of the needle to lay the thread in the needle hook as the needle advances.

While it is preferred to employ the specific construction and arrangement of parts herein shown and described, it will be understood that this construction and arrangement is not essential to the broader features of the invention, and may be varied or modified as found desirable or best suited to the construction of the machine in which the invention is to be embodied.

Having explained the nature and object of the invention, and described the preferred embodiment thereof, what is claimed is:

1. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper, and means acting automatically as the machine is stopped to bring the needle to rest out of engagement with the work, and the looper to be shifted during that cycle so as to render its operation ineffective to lay the thread in the needle hook.

2. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper and mechanism for shifting the looper to such a position relatively to the needle that its operation during a cycle of operations of the machine will be ineffective to lay the thread in the needle hook.

3. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper, and mechanism acting automatically as the machine is stopped for shifting the looper to prevent the laying of the thread in the needle hook by the looper.

4. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper, and mechanism acting during the last cycle of operations of the machine for shifting the looper to prevent the laying of the thread in the needle hook by the looper and for returning the looper to its normal position.

5. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper, and mechanism for causing the looper to perform its complete cycle of loop forming movements at one side of the needle during a cycle of operations so as to render said movement ineffective to lay the thread in the needle hook.

6. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper mounted with provision for oscillatory movement in two planes, means for oscillating the looper to effect the laying of the
thread in the needle hook, and means for shifting the looper so that its oscillation will not effect the laying of the thread in the needle hook during a cycle of operations.

7. A chain stitch inseam sewing machine having, in combination, stitch forming mechanism including a hook needle and a looper, the latter being mounted to oscillate in two planes, a pair of levers, means for independently oscillating said levers, a link connecting said levers with the looper so that the resultant of the motion transmitted to said link by said levers will be transmitted to the looper to effect the laying of the thread in the needle hook, and mechanism acting automatically as the machine is stopped to shift the fulcrum of one of said levers to cause the looper to be angularly displaced so that the motion transmitted to it during the last cycle of operations will be ineffective to lay the thread in the needle hook.

8. Looper mechanism for sewing machines having, in combination, a looper arm mounted to oscillate in two planes, a pair of levers, means for independently oscillating said levers, and a link connecting said levers with said looper arm so that the resultant of the motion transmitted to said link by said levers will be transmitted to said looper arm to cause its oscillation in two planes.

9. Looper mechanism for sewing machines having, in combination, a looper arm mounted to oscillate in two planes, a pair of levers, means for independently oscillating said levers, and a three cornered link having one of its corners connected with said looper arm, and having one of its remaining corners connected with one of said levers and the other of said remaining corners connected with the other of said levers so that the resultant of the motion transmitted to said link by said levers will be transmitted to said looper arm to cause its oscillation in two planes.

10. Looper mechanism for sewing machines having, in combination, a looper, two independently operated actuators, and link connection between the actuators and looper for moving the looper in an orbital path connected directly to the looper.

11. Looper mechanism for sewing machines having, in combination, a looper, two actuators, mounted for reciprocation in parallel planes and connecting means between the actuators and looper connected directly to the looper through which forward, backward and sidewise movements are imparted to the looper by forward, backward and differential movement of the actuators.

12. Looper mechanism for sewing machines having, in combination, a looper mounted on a universal joint, the axes of which are substantially at right angles to the plane of movement of the thread carrying end of the looper, two independently operated actuators, and link connection between the actuators and looper.

13. Looper mechanism for sewing machines having, in combination, a looper mounted on a universal joint, two independently operated actuators, and a three-cornered link connection between the actuators and looper.

14. An inseam sewing machine, having, in combination, stitch forming mechanism including a hook needle and a looper consisting of a tubular lever, a ball and socket joint supporting the looper, and mechanism for swinging the looper to move its thread carrying end about the needle.

15. Looper mechanism for sewing machines having, in combination, a looper suspended on a universal joint about which the lower thread carrying end of the looper may swing in any direction, two independently operated actuators and link connection between the actuators and looper through which movement of the actuators together in either direction imparts like movement to the end of the looper while differential movement of the actuators imparts transverse movement to the end of the looper.

16. An inseam sewing machine having, in combination, stitch forming mechanism including a hook needle, a tubular looper lever provided with a ball shaped bearing, a cooperating fixed socket, and means for swinging the free end of the looper lever in an orbital path.

17. An inseam sewing machine having, in combination, stitch forming mechanism including a hook needle, a tubular looper lever provided with a ball shaped bearing, a cooperating fixed socket, and means connected directly to the lever for swinging its free end in an orbital path.

18. An inseam sewing machine having, in combination, stitch forming mechanism including a hook needle, a looper mounted on a universal joint, the axes of which are substantially at right angles to the plane of movement of the thread carrying end of the looper, and cams and connections for swinging the looper to move its thread carrying end about the needle.

19. An inseam sewing machine having, in combination, stitch forming mechanism including a hook needle, a looper mounted on a universal joint, the axes of which are substantially at right angles to the plane of movement of the thread carrying end of the looper, and two actuators connected to swing the looper to move its thread carrying end about the needle.

ALFRED R. MORRILL.
Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,543,265, granted June 23, 1925, upon the application of Alfred R. Morrill, of Swampscott, Massachusetts, for an improvement in "Inseam-Sewing Machines," an error appears in the printed specification requiring correction as follows: Page 4, lines 50 and 51, claim 10, for "for moving the looper in an orbital path connected directly to the looper" read connected directly to the looper for moving the looper in an orbital path; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of July, A. D. 1925.

KARL FENNING,
Acting Commissioner of Patents.