A. F. PRESTON.

SHOE SEWING MACHINE.

APPLICATION FILED JUNE 21, 1901.

929,707. Patented Aug. 3, 1909.

5 SHEETS—SHEET 1.

Fig. 1.

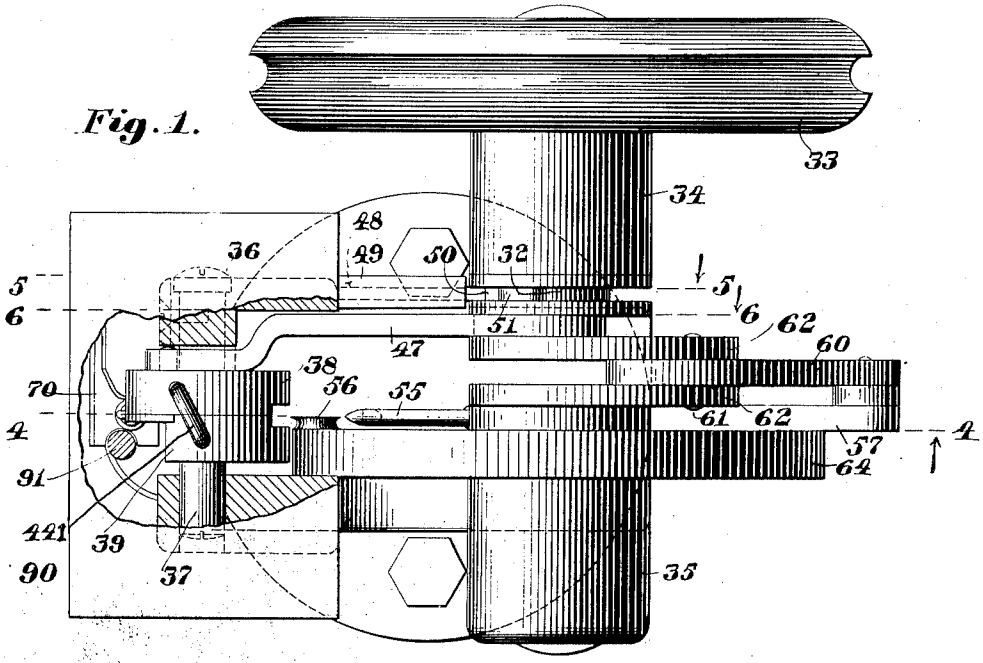
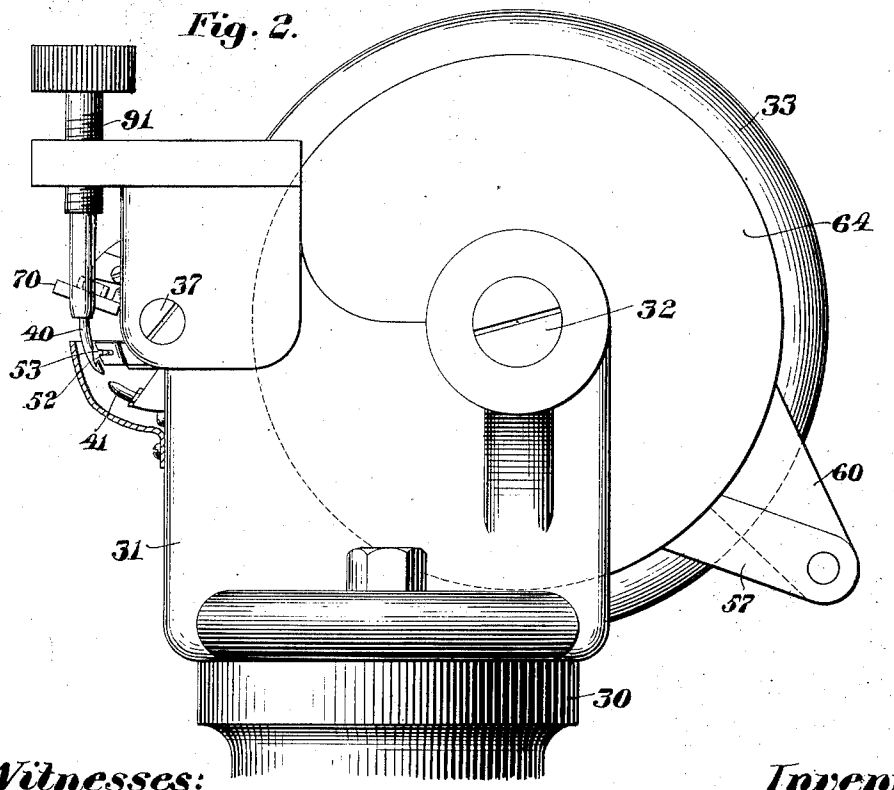


Fig. 2.



Witnesses:

Walter E. Lombard

George Ozzetti.

Inventor:

A. F. Preston

by Albright Brown & Dunlop

his Attys

A. F. PRESTON.

SHOE SEWING MACHINE.

APPLICATION FILED JUNE 21, 1901.

929,707. Patented Aug. 3, 1909.

5 SHEETS—SHEET 2.

Fig. 3.

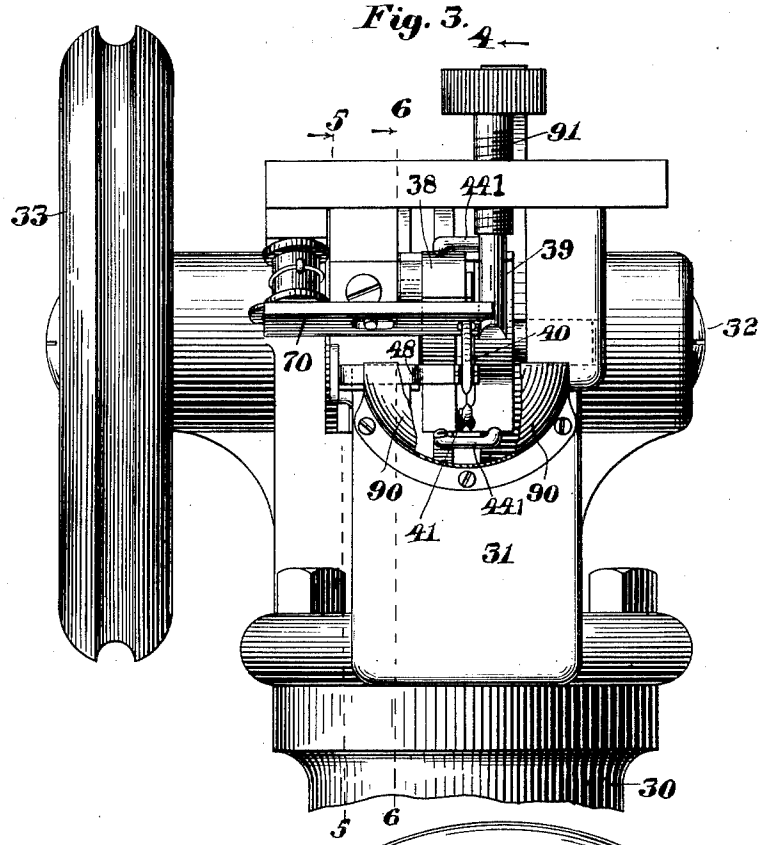
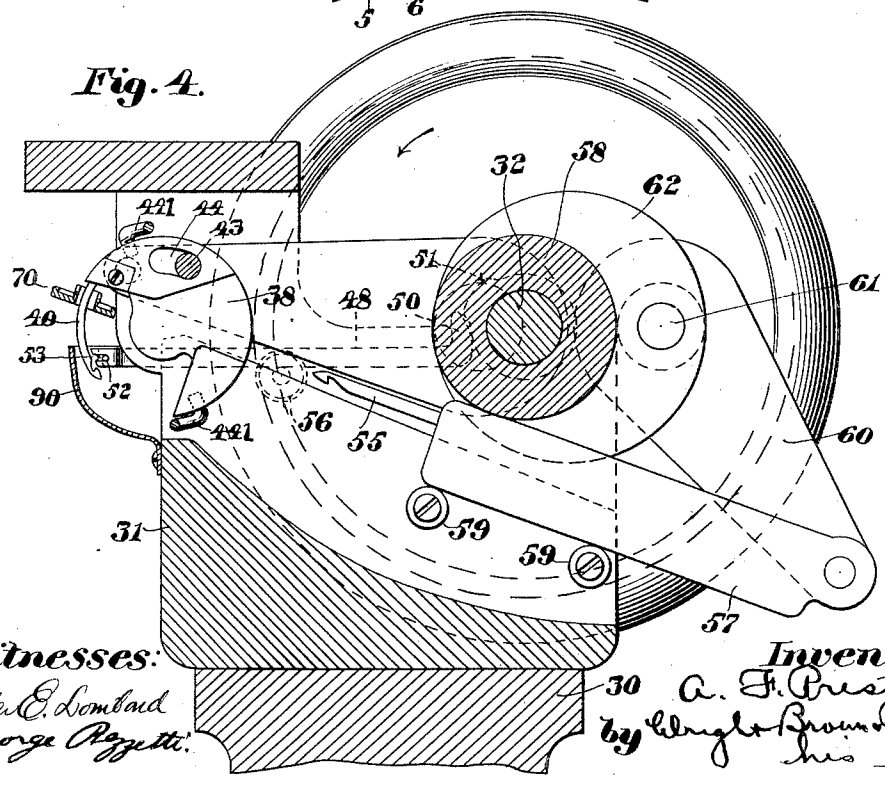


Fig. 4.



Witnesses:
Walter E. Lombard
George Azzetti.

Inventor:
A. F. Preston
by Dingley Brown Reinhey
his Attys.

A. F. PRESTON.

SHOE SEWING MACHINE.

APPLICATION FILED JUNE 21, 1901.

929,707. Patented Aug. 3, 1909.

5 SHEETS—SHEET 3.

Fig. 6.

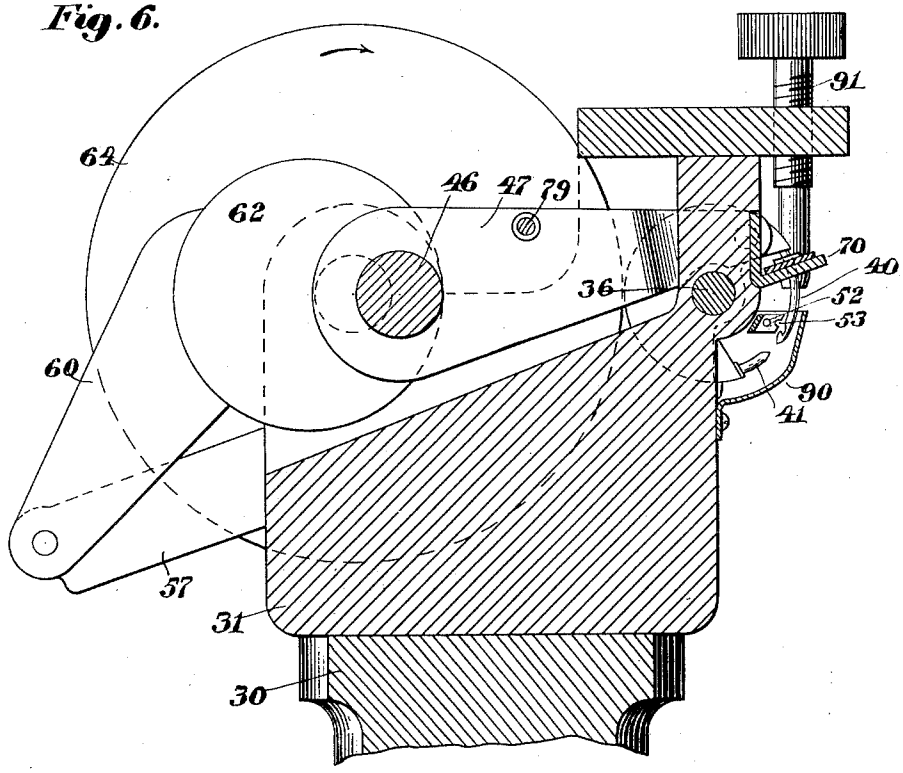
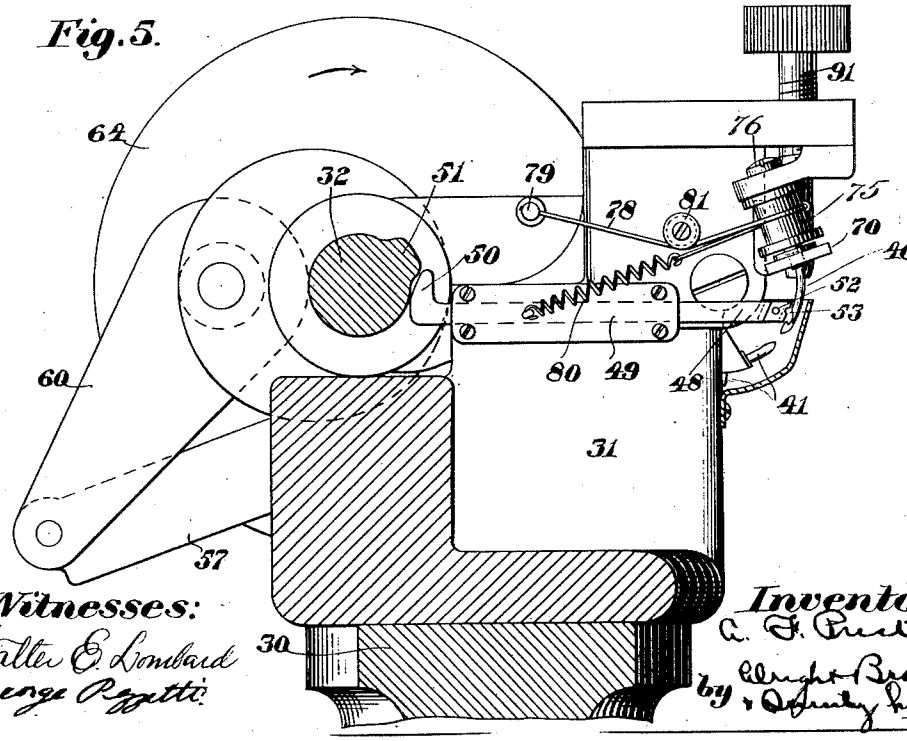


Fig. 5.



Witnesses:

Walter E. Lombard

George Ogatti

Inventor:

A. F. Preston

by Albright Brown, Donnelly & Allys

A. F. PRESTON.

SHOE SEWING MACHINE.

APPLICATION FILED JUNE 21, 1901.

929,707. Patented Aug. 3, 1909.

5 SHEETS—SHEET 4.

Fig. 7.

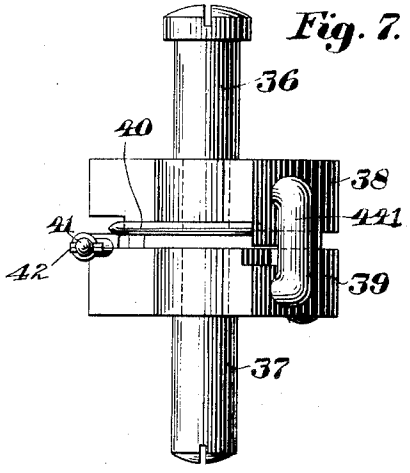


Fig. 16.

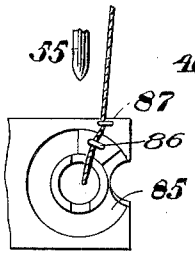


Fig. 9.

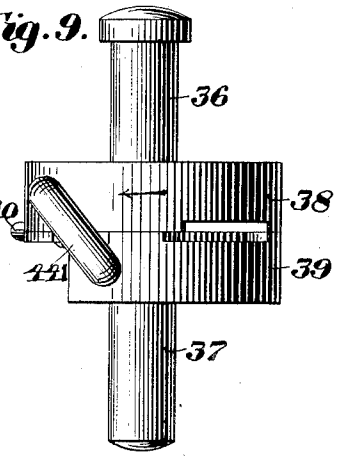


Fig. 17.

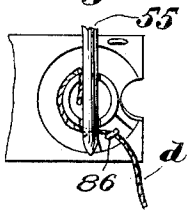


Fig. 8.

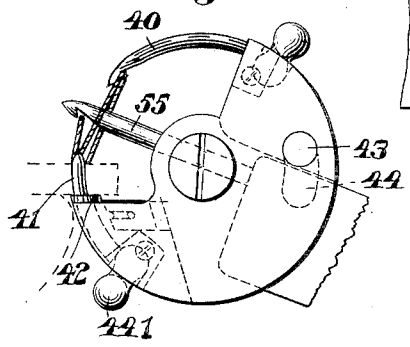


Fig. 10.

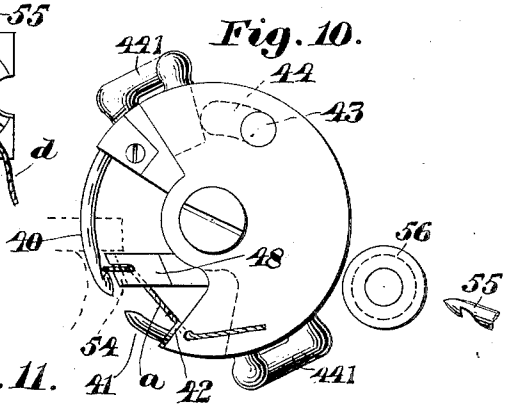


Fig. 11.

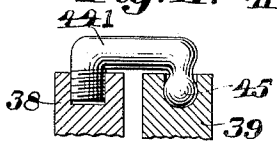


Fig. 12.

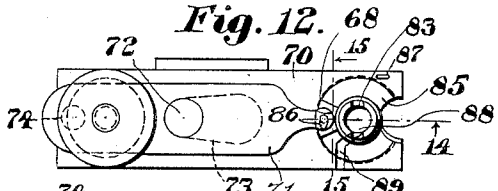


Fig. 14.

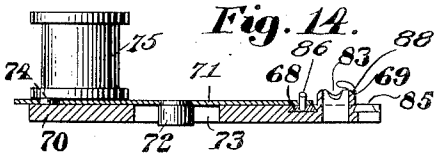


Fig. 13.

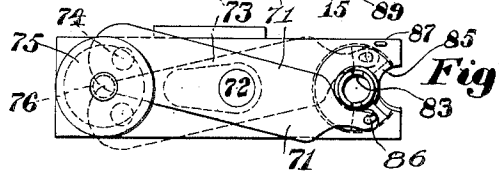
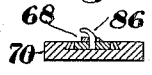


Fig. 15.



Witnesses:

Walter E. Lombard

George Pezzetti

Inventor:

A. F. Preston

by Pelton, Brown & Donnelly

his Attys.

A. F. PRESTON.

SHOE SEWING MACHINE.

APPLICATION FILED JUNE 21, 1901.

929,707.

Patented Aug. 3, 1909.

5 SHEETS—SHEET 5.

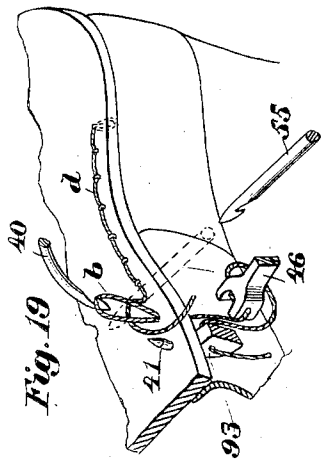


Fig. 19

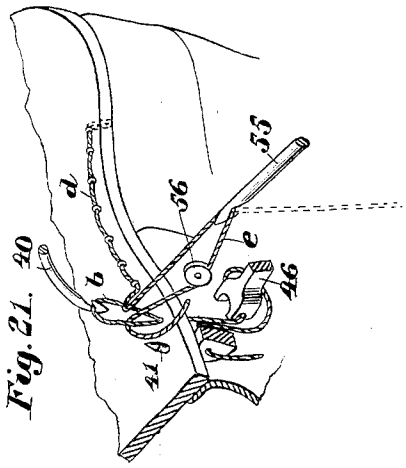


Fig. 21.

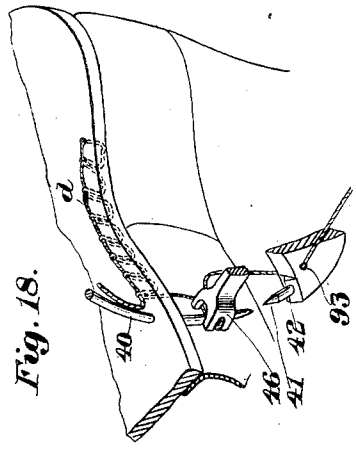


Fig. 18.

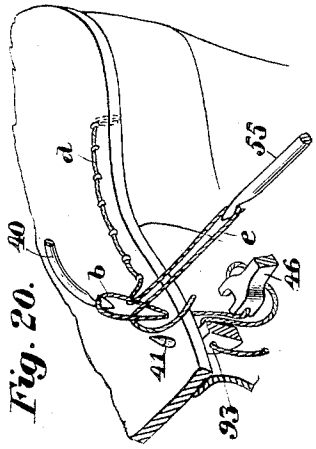


Fig. 20.

Witnesses:

Walter E. Lombard.

George Rezette.

Inventor:

A. F. Preston

by Albright Brown Quimby & Kis Attys.

UNITED STATES PATENT OFFICE.

ALBERT F. PRESTON, OF EAST BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHOE-SEWING MACHINE.

No. 929,707. Specification of Letters Patent. Patented Aug. 3, 1909.

Application filed June 21, 1901. Serial No. 65,406.

To all whom it may concern:

Be it known that I, ALBERT F. PRESTON, of East Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Shoe-Sewing Machines, of which the following is a specification.

This invention has relation to sewing machines, and it has for its object, (first) to provide a machine for making a "lock-stitch" in contradistinction to a "loop lock stitch", or other similar forms of stitches; and (second) to provide a construction characterized by the absence of a shuttle or equivalent part, whereby the loop which receives the locking thread may be relatively small, and the thread from which the loops are formed subjected to much less friction and wear than has hitherto been possible.

Still another object of the invention is to provide a shoe-sewing machine with the smallest possible number of parts, all of which shall be positively actuated, whereby the machine will be simple in construction and positive in operation.

As the invention is shown upon the accompanying drawings, it is embodied in a machine for uniting the edge of an outsole of a shoe with the welt, but I desire to have it understood at the outset, that the invention is not limited to such an embodiment, but may take the form of a welting machine, or any other variety of shoe-sewing machine.

Briefly speaking, the machine, as shown, is provided with an awl and a hooked needle, both of which are curved and which oscillate about a common axis, the upper and lower threads being drawn from a suitable source of supply, and the upper thread being laid along the surface of the sole and passed through each loop of the under thread. The awl penetrates the work and forms an opening for the curved needle which passes down through it and receives the under thread from a suitable looper. The needle then draws the thread in a loop up through the work, and a hook is passed through the loop and the upper thread is engaged with it, and subsequently drawn by said hook through the loop, the under thread being drawn taut by the formation of the next loop, so as to set the stitch. The end of the upper thread is loose and in starting to sew a shoe, a length of the upper thread equal to the lineal measurement of the line of stitches to be taken, is drawn out from the upper-thread spool, and each time the said upper thread is drawn through a loop, the whole loose end is drawn out so that I form a perfect lock-stitch without the aid of a shuttle,— a thing which I believe has never been done before. The loose end grows shorter and shorter as the stitching progresses, as will be readily understood, until the complete course has been sewed.

I provide mechanism for effecting the feeding of the work, this comprising the needle carrier, the awl carrier and devices between the two for causing a movement of one relatively to the other.

Referring to the accompanying drawings, which illustrate one form of the machine,— Figure 1 represents the machine in plan view with a part broken away so as to show the carriers for the awl and the needle. Fig. 2 represents an end elevation of the machine. Fig. 3 represents a front elevation. Fig. 4 represents a section on the line 4—4 of Fig. 1. Fig. 5 represents a section on line 5—5 of Fig. 1. Fig. 6 represents a section on line 6—6 of Fig. 1. Figs. 7, 8, 9, 10 and 11 illustrate the carriers for the awl and the needle and mechanism for causing the feeding of the shoe. Figs. 12 to 17, inclusive, show the looper for the upper thread. Figs. 18 to 21, inclusive, show the formation of the stitch.

Referring to the said drawings,—30 indicates a standard, provided at its top with the head 31. In the rear of the head is journaled a shaft 32, equipped with a belt-wheel 33, the bearings for the shaft being indicated at 34 35. From this shaft the various operative parts of the machine are actuated.

In the front of the machine are journaled the two trunnions or stud-shafts 36 37 for the needle carrier 38 and the awl carrier 39, respectively. The needle carrier is equipped with the curved barbed needle 40, and on the awl-carrier is the curved awl 41, and also a pricking tool 42. The stud-shaft for the awl-carrier is adapted to slide in its bearings to provide for feeding the work. The two carriers have a pin-and-slot connection, the pin being indicated at 43, and the slot at 44,— the one being secured to one of the carriers, and the other being formed in the other of

said carriers to permit a partial rotative movement of one relatively to the other. During this rotative or oscillatory movement, the awl-carrier is moved axially relatively to the needle carrier by means of an inclined connecting rod 441. There may be two of these rods, as indicated in Fig. 8, each of them being angular in form, as shown in Fig. 11, and being screwed in one carrier and having a knob 45 placed loosely in a socket in the other carrier. These connecting rods are normally arranged at an inclination to a plane at right angles to the axis of the trunnions 36 37, so that by moving one of the carriers relatively to the other, in one direction, the connecting rods will be caused to assume a position more and more nearly parallel to the said axis with the result that the carriers are forced apart, and by moving it in the opposite direction, the connecting rods will draw said carriers together.

The needle-carrier is actuated positively from the driving shaft, and it has a certain free movement in either direction before the awl-carrier is caused to move with it, and it is during this free movement that the awl carrier is moved axially relatively to the needle-carrier. When the needle-carrier is moved forwardly, so as to thrust the needle through the work, the awl-carrier is moved laterally toward it, so as to bring the point of the awl in the path of movement of the point of the needle, and when the needle-carrier is actuated in the reverse direction to draw the needle out of the work during the initial movement of the said carrier and before the awl carrier is moved with it about its axis, said awl carrier is thrust axially the length of a stitch, so that when it is actuated, it will engage the work at some distance from the last hole made.

To actuate the needle-carrier, the shaft 32 is provided with a crank or eccentric 46 and a connecting rod 47, actuated thereby, (see Fig. 6). The actuation of the connecting rod 47 by the crank or eccentric effects an oscillatory movement of the needle-carrier which imparts to the awl-carrier, not only an oscillatory movement, but also a vibratory movement in lines parallel to its axis, so that it has, as it were, four separate and distinct movements, to wit: downward, lateral in one direction, upward, and lateral in the other direction.

In order to lay the lower thread in the needle, said lower thread being indicated at *a*, I employ a looper which is indicated at 48. This looper, as shown in Figs. 5 and 10, consists of a slide mounted in a guide 49, and having a beveled portion 50 on its rear end to be engaged by a cam 51 on a shaft 32. The forward or operative end of the looper is provided with a transverse aperture 52 to receive the thread and with cross-slots 53 54, the latter being indicated in dotted lines in Fig. 10. The thread passes through the aperture 52 and is brought back so as to lie in the slot 53. When the needle has been passed through the work, as shown in Fig. 10, the looper is forced forward against it to lay the thread in the barb, and consequently, when the needle moves upward, the barb engages the thread which lies in the groove 53 and draws the thread upward with it through the work, as shown in Figs. 18 and 19. As soon as the loop is formed as shown at *b* in Fig. 19, the upper or locking thread *d* is drawn through it. This said thread *d*, as previously explained, is drawn out from a spool or source of supply so as to leave a long free end, and I provide a device which passes through the loop and engaging said thread, draws the whole end through the loop. Two separate devices are employed for accomplishing this, one of which is a hook 55, which initially engages the thread, and draws it part way through the loop, and the other of which is a roll 56 which engages one part of the loop formed by the hook and draws the free end clear through the loop, said roll being mounted upon a suitable rotary part of the machine. The hook 55 is mounted in the end of a carrier 57 which slides between a collar 58 on the shaft and two rolls 59 59, (see Fig. 4). The rear end of the carrier is connected by a rod 60 with a crank pin 61 secured in the two crank arms 62 on the shaft 32. The roll 56, as shown in Fig. 1, is mounted upon the face of a wheel 64 rigidly secured upon the shaft 32, said roll being mounted in such position that it will engage one strand *e* of the loop formed by the thread *d*, as shown in Fig. 21, the said strand being on the side of the loop adjacent the free end of the thread *d*. The result of this construction is that the hook enters the loop *b* and is engaged with the thread *d*, then, when the hook is withdrawn, a loop is formed and one strand of the loop is engaged by the roll 56, which pulls the thread off from the hook and draws the whole loose end through the loop *b* of the lower thread.

In order to engage the upper thread with the hook, I provide a looper such as shown in Figs. 12 to 17. This looper comprises an oscillatory member 68 movable in an annular guideway surrounding an annular flange 69 which is open for the reception of the needle, as shown in Fig. 4. This member is mounted in the said annular guideway 85 in the end of a support 70, secured to the head at an inclination, as shown in Fig. 3, and to oscillate said member 68, it is pivotally connected to a lever 71 having a fulcrum stud 72 projecting into a slot 73 in the support 70. The rear end of this lever is connected to a crank-pin 74 on the end of a drum 75, pivotally mounted upon a stud projecting downwardly from the top part of the head, said stud being indicated at 76. Around the

drum 75 is passed a flexible cord or band 78, one end of which is connected to a stud 79 on the actuator for the needle carrier, and the other end of which is yieldingly connected to the guide 49 by a spring 80. When the actuator for the needle is moved in one direction, the drum will be caused to move in that direction, and when the said actuator moves in the opposite direction, the spring 80 will cause the return of the drum to its initial position. The cord or band 78 passes under an idler 81 journaled on the head.

The annular flange 69 is provided in its upper end with a transverse groove 83 for the reception of the hook, as shown in Fig. 17. In order that the looper may carry the thread in position to be engaged by the hook when it is in the position shown in the last-mentioned figure, the member 68 is provided with a thread-engaging finger 86 (see Fig. 16) which is adapted to ride over the thread, as shown in Fig. 16, when the said part is moving in one direction, and to wind the thread around the annular flange 69 and lay it across the end of the groove 83, as shown in Fig. 17.

In order that the finger 86 may engage the thread and the latter be prevented from moving laterally at such a time, a finger 87 is placed on the support 70. When the hook 55 has engaged the thread, the looper 68 is moved in the opposite direction to permit the finger 86 to release the thread and the said loop slides up over the annular flange 69 which is cut away or beveled at 88 to permit it to do so. As the hook 55 moves rearward rapidly, it pulls the thread with a jerk so as to draw it taut under the last loop of needle thread.

In Fig. 12, it will be noted that in the support 70, there is formed an angular slot 89 in which the free end of the thread *d* may be placed, when it is desired to commence the stitching. The loose end, being placed in the groove, will be held frictionally during the formation of the first loop until the thread is drawn out by the hook.

In order to cover the parts of the sewing mechanism, and to also provide a support for the work, I employ a hollow shell 90 which is secured to the front of the head and which has its upper edge adapted to receive the work. I also provide a presser-foot or abutment 91 which consists of a screw passed downwardly through the top of the head and having on its lower end a smooth portion to engage the top of the work and resist the thrust of the awl. This presser-foot or abutment is adjustable as to height, so as to provide for different thicknesses of work and also to provide for depth of indentation formed by the tool on the awl carrier, for it will be understood that inasmuch as the awl carrier has a constant movement which always ends at the same point, by varying the position of the abutment, the indentations formed by the tool on the awl carrier will be varied in depth.

The operation of the machine is as follows:—The upper thread is drawn out to provide a loose end long enough for the entire course of stitches around the sole of the shoe. It is assumed that the upper thread has been passed through the aperture in the annular flange 69 in position to be engaged by the looper 68, and that the lower thread has been passed through the awl-carrier and through the looper 48, the awl-carrier being provided with an aperture 93 for its reception. The work is placed in the machine, with both the awl and the needle in an inoperative position. The upward movement of the awl causes it to penetrate the work, and the indenting tool 42 indents the work on the under side, which of course, when the shoe is turned over, will be the upper part of the welt. As the awl carrier is moved in the opposite direction by the needle-carrier moving forwardly, the awl carrier is moved axially to bring the point of the awl in alinement with the point of the needle. The needle then descends through the aperture formed by the awl, as shown in Fig. 18, and the looper 48 is forced forward to lay the under-thread in the barb of the needle, as clearly illustrated in Fig. 18. The needle then rises to the position shown in Fig. 19, and during this upward movement of the needle, the awl carrier is moved axially and then upwardly to penetrate the work at a short distance from the last aperture formed by it. When the needle is in the work, the looper 68 engages the upper thread and carries it around into the position shown in Fig. 17, bringing it there just in time for the hook 55 to project forward and engage it, as indicated in dotted lines in Fig. 19. The operation of the upper looper 68 is to always lay the thread on the inner side of the loop *b*, or on the side opposite the hook, so that when the hook moves rearward, it draws the upper thread partly through the loop *b*, forming a loop, as shown in Fig. 20. Just as the hook reaches the position shown in the last-mentioned figure, the roll 56 on the wheel or disk 64 engages one strand of the loop and draws the whole loose end through the loop *b*. As soon as this occurs, the parts are in position for the needle to move downwardly through the aperture caused by the awl, the partly downward movement of the needle occurring during the time the loose end is being pulled out. The loop *b* is cast off from the needle by the frictional engagement of the upper thread with it under tension from the hook, and as this occurs during the downward movement of the needle, the loop *b* is released or drawn off the barb of the needle. As the needle descends and the awl also moves backward

rearwardly to feed the work, the awl-carrier pulls upon the lower thread and draws a portion of that which forms the loop *b* downwardly. The next upward movement of the needle draws up the lower thread and pulls up the slack left in the last stitch so as to completely set the stitch. The purpose of leaving a certain amount of slack thread in each last stitch is to prevent the thread reeving through the barb of the needle when each loop *b* is formed thereby, and consequently there is no tendency to cut or injure the thread.

Having thus explained the nature of the invention, and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the modes of its use, I declare that what I claim is:—

1. A shoe-sewing machine comprising means for feeding the work with a step-by-step movement, means for successively forming loops in one thread through the work, and means for successively engaging and drawing entirely through each loop as it is made the unattached free end of a locking thread.

2. A shoe-sewing machine comprising mechanism for feeding the work with a step-by-step movement, means for successively drawing one thread through the work to form a succession of loops, and means for drawing through said loops successively, in the order of their formation, a locking thread located wholly on one side of the work and having an unattached free end, substantially as set forth.

3. A shoe-sewing machine comprising means for feeding the shoe with a step-by-step movement, a hooked needle for drawing one thread through the work in successive loops, means for laying the unattached end of a locking thread on one side of said loop, and a reciprocating hook adapted to carry said unattached end of the locking thread entirely through said loop.

4. A lock-stitch shoe-sewing machine comprising a hooked needle which forms a succession of loops in one thread, a hook adapted to pass through each loop, and means whereby said hook is caused to enter said loop and engage the free or unattached end of the locking thread and draw it through said loop, in combination with means for feeding the work, between the formation of the loops.

5. A lock-stitch shoe-sewing machine comprising a curved needle for forming a series of loops in one thread, a looper coacting with said needle, a hook which successively penetrates the loops and draws therethrough the free end of the locking thread, and a looper for coaction with said hook, in combination with means for successively feeding the work, one step for each loop.

6. A lock-stitch shoe-sewing machine comprising a mechanism for intermittently feeding the shoe, a hooked needle for drawing the thread through the work in successive loops, means for holding an unattached free end of a locking thread adjacent to the successive loops, and means for passing through each loop of the first-mentioned thread the unattached free end of the locking thread and then releasing the latter.

7. A shoe-sewing machine comprising a needle, means for causing said needle to draw a thread through the work in successive loops, a hook, means for causing said hook to enter and leave each loop, and means for successively placing in the hook the loose end of a locking thread whereby the locking thread is drawn through each loop prior to the formation of the next loop.

8. A shoe-sewing machine comprising means for forming a succession of loops in one thread, means for drawing the unattached end of a locking thread through each loop prior to the formation of the next successive loop, said locking thread being drawn through in the form of a loop, and means for subsequently engaging the loop of the locking thread and drawing the whole unattached end thereof through the loop of needle-thread.

9. A shoe-sewing machine comprising a needle, a looper for coaction therewith, means for causing said needle to draw a succession of thread loops through the work, a hook, means for causing the hook to pass into and out of the successive thread-loops, a looper for placing the loose end of the locking thread on said hook when it is in the thread-loop, and mechanism for drawing the whole loose end of the locking thread through said loop.

10. A shoe sewing machine comprising means for drawing a thread through the work to form a series of loops, and means for passing through said loops successively, in the order of their formation, an unattached end of a locking thread and then releasing the same.

11. A shoe sewing machine comprising a needle and means for operating the same to draw a loop of needle thread through the work, means for drawing a loop of a locking thread through the loop of needle thread, and means for subsequently engaging the loop of locking thread and drawing an unattached end of the same entirely through said first-mentioned loop.

12. A shoe-sewing machine comprising a needle, a needle-carrier, an awl, an awl carrier having a thread-eye for the needle-thread, a looper for the needle-thread, and mechanism for operating said looper and said carriers, whereby the awl-carrier will partially withdraw the loop, and the needle will set the stitch in forming a new loop.

13. A sewing machine having an awl, an awl-carrier, a needle, a needle-carrier, said carriers having a limited relative movement, and positive connections between said carriers whereby the actuation of one carrier effects a lateral translation of the other carrier.

14. A sewing machine having an awl, an awl-carrier, a needle, a needle-carrier, said carriers having a limited relative movement and a connecting rod connecting said carriers, to effect a lateral translation of one of the carriers relatively to the other, when one of said carriers is actuated.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ALBERT F. PRESTON.

Witnesses:
M. B. MAY,
GEORGE PEZZETTI.