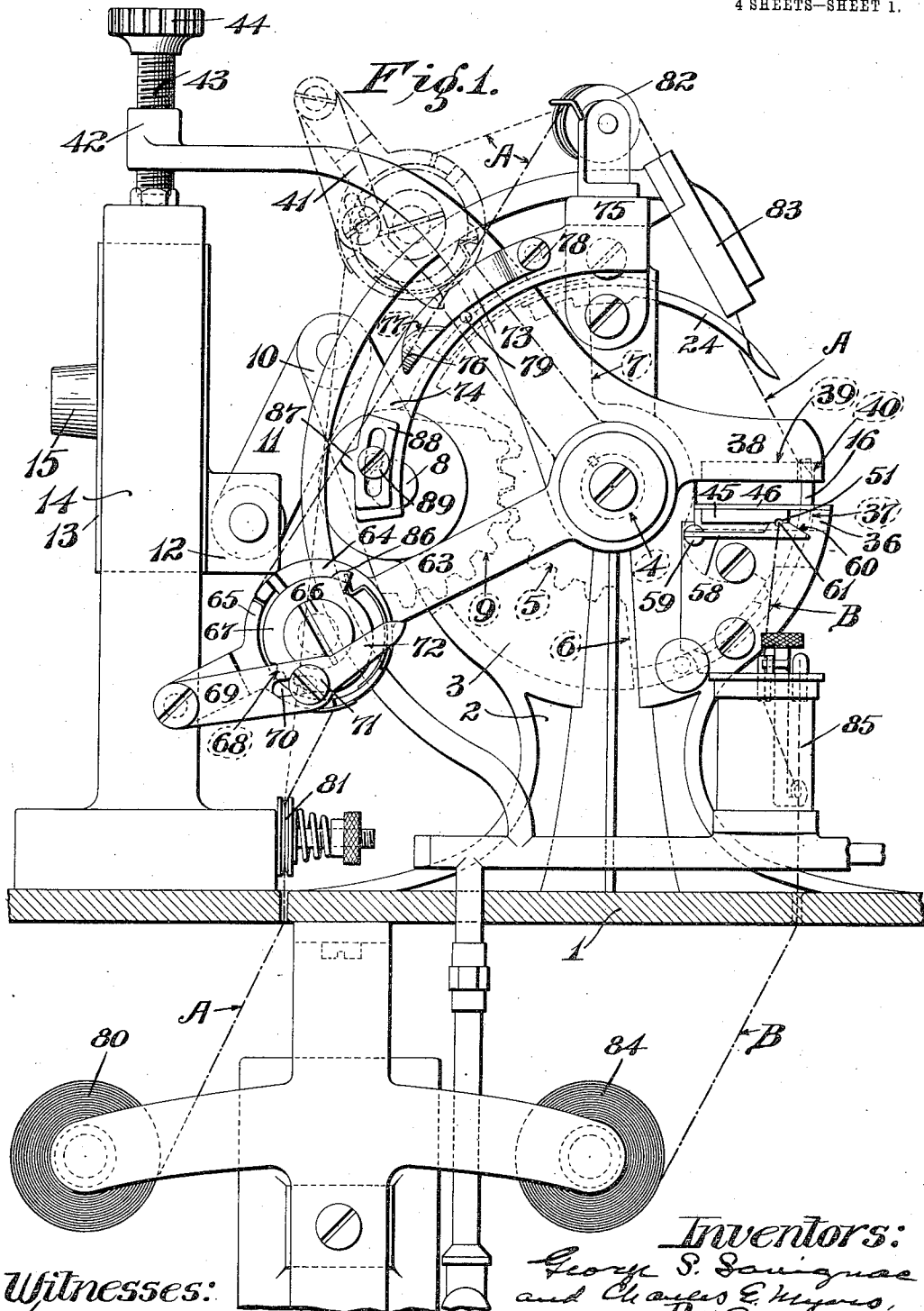


G. S. SAVIGNAC & C. E. MYERS.
 LOOP LOCK STITCH FORMING MECHANISM.
 APPLICATION FILED NOV. 19, 1909.

1,016,899.

Patented Feb. 6, 1912.

4 SHEETS—SHEET 1.



Witnesses:
 Edgar T. Farmer.
 E. A. Pennington

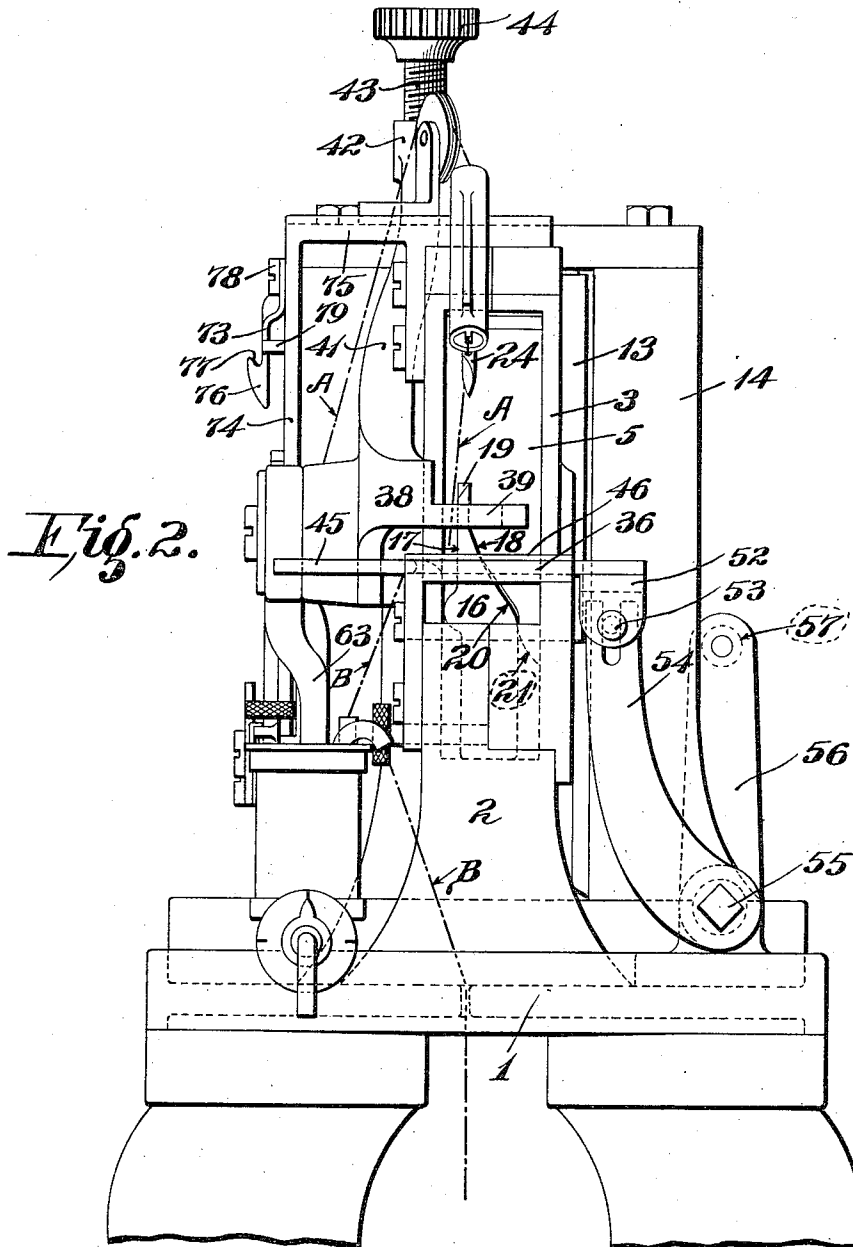
Inventors:
 George S. Savignac
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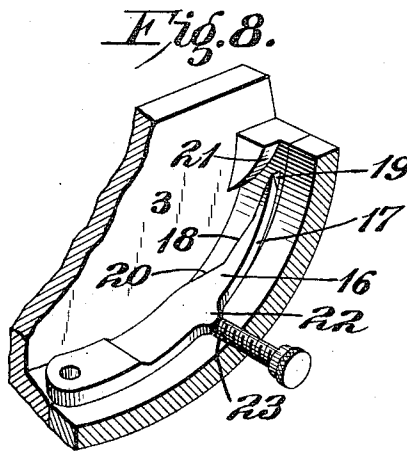
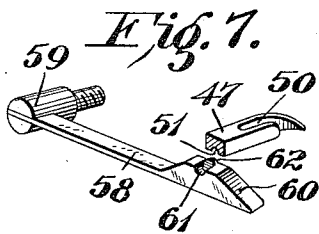
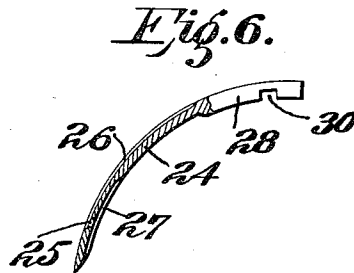
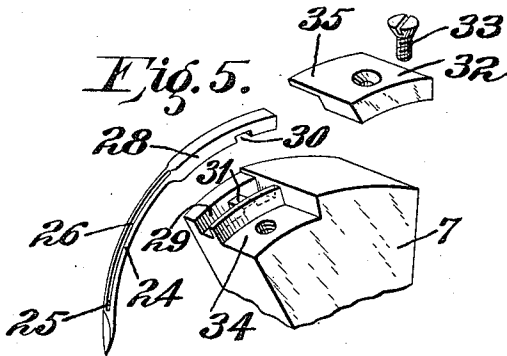
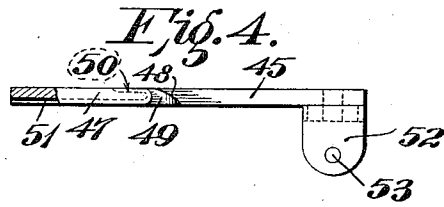
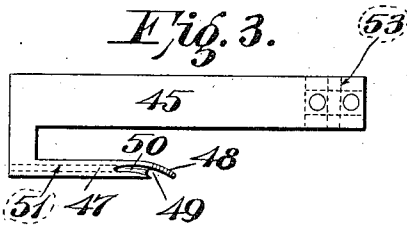
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4 SHEETS—SHEET 3.



Witnesses:

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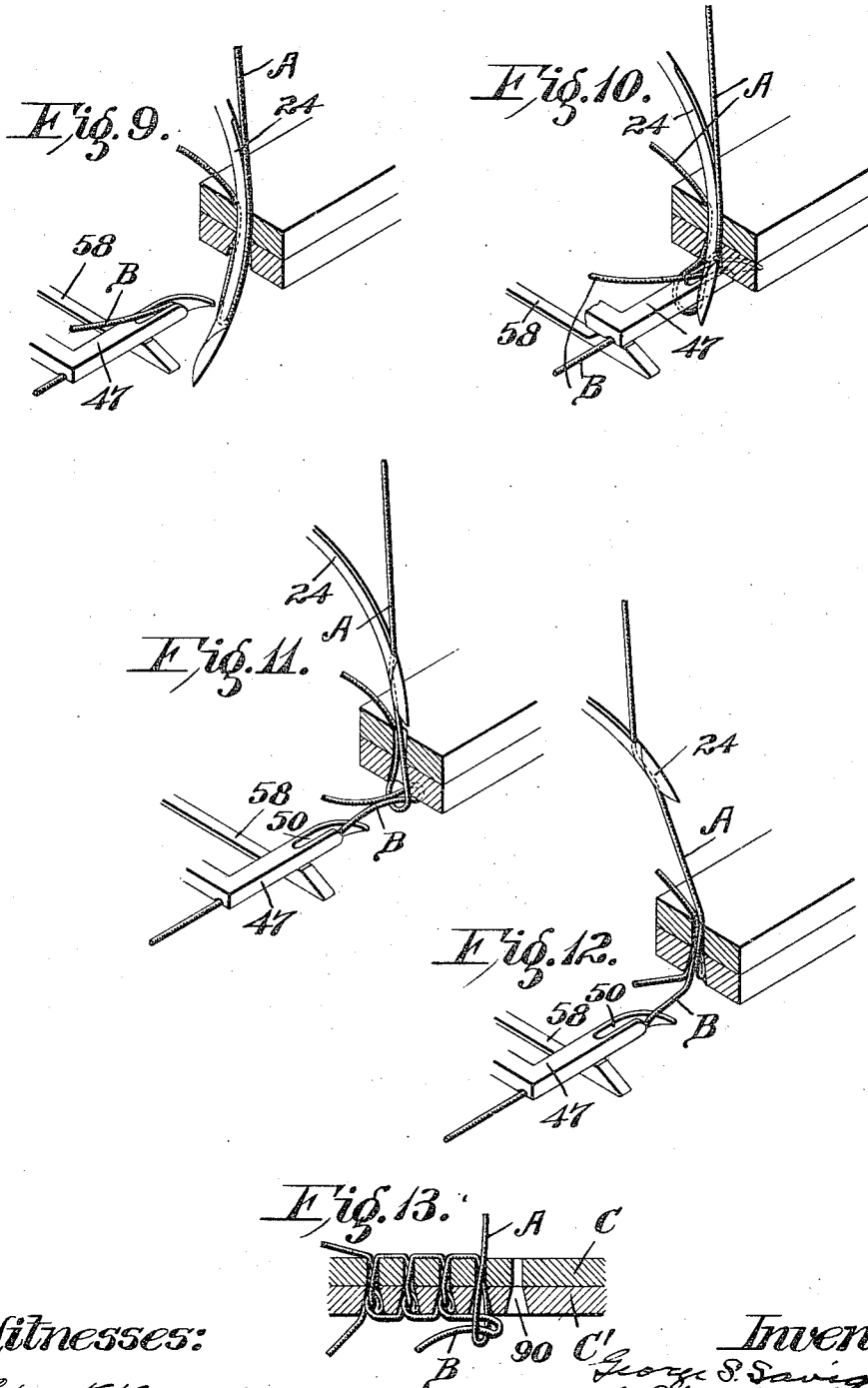
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4 SHEETS—SHEET 4.



Witnesses:

Edgar T. Farmer.

E. A. Pennington

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UNITED STATES PATENT OFFICE.

GEORGE S. SAVIGNAC AND CHARLES E. MYERS, OF ST. LOUIS, MISSOURI, ASSIGNORS TO
WALTER G. BATTLE, CYRUS E. CLARK, AND THOMAS W. FUQUA, ALL OF ST. LOUIS,
MISSOURI.

LOOP-LOCK-STITCH-FORMING MECHANISM.

1,016,899.

Specification of Letters Patent.

Patented Feb. 6, 1912.

Original application filed June 11, 1909, Serial No. 501,462. Divided and this application filed November 19, 1909. Serial No. 528,942.

To all whom it may concern:

Be it known that we, GEORGE S. SAVIGNAC and CHARLES E. MYERS, both citizens of the United States, and residents of the city of St. Louis and State of Missouri, have invented a certain new and useful Improvement in Loop-Lock-Stitch-Forming Mechanism, of which the following is a specification.

10 The subject matter of the present invention is divided out of an application for Letters Patent for an improvement in sewing machines, Serial No. 501,462, filed by us on June 11, 1909.

15 The present invention relates to stitch-forming mechanism for loop-lock-stitch sewing machines.

It has for its principal objects to simplify the construction, to facilitate the formation of the locking-loop and laying the same through the needle-loop, and to attain certain other advantages hereinafter more fully appearing.

20 The invention consists in the parts and in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings which form part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side elevation of a portion of a sewing machine embodying our invention; Fig. 2 is a front elevation; Fig. 3 is a top plan view of the carrier for the locking-loop; Fig. 4 is an edge view of the carrier partly in section; Fig. 5 is a fragmentary perspective view of a portion of the needle-carrying sector with the needle and securing devices detached; Fig. 6 is a view of the needle partly in side elevation and partly in longitudinal section; Fig. 7 is a detail view showing the tension device for coöperating with the locking-loop-carrier; Fig. 8 is a fragmentary view showing the correlation of the awl and the shifting devices; Figs. 9 to 12, inclusive, are fragmentary detail views showing the successive positions which the parts of the stitch-forming device assume in making a stitch; and, Fig. 13 is a diagrammatic section through two layers of work showing the positions of the loops before and after the take-up acts to set the stitch.

The general construction and arrangement

of the sewing machine is fully set forth in our application for Letters Patent, Serial No. 501,462, hereinbefore referred to. Therefore, only the parts of the machine which are directly associated with the present invention will be herein set forth.

As shown in the accompanying drawings, 60 the machine comprises a base 1 having a standard 2 thereon. On this standard is a circular housing 3 having flattened side walls. Extending transversely through the center of the housing is a shaft 4. On this shaft 4 is fixedly mounted a segment gear 5 having two oppositely disposed segmental extensions 6, 7. The segment gear 5 meshes with a second segment gear 9 which is journaled on a transverse shaft 8, in the rear portion of the housing. The segment gear 9 has a lever-arm or extension 10 which is pivotally connected to one end of a link or bar 11 whose opposite end is pivotally connected to a lug or ear 12 on a vertically movable member or block 13. The block 13 is slidably mounted in a vertical frame 14 which is secured on the base 1. The block is provided with a laterally projecting stud or roller 15 which is adapted to coöperate with a cam groove in a rotatory disk (not shown), whereby a reciprocatory motion is imparted to the block when the disk is rotated. The segment gears 5 and 9 are thereby oscillated, owing to the link connection between the end of the lever-arm 10 and said block 13. Pivotally mounted on the curved end face of the segmental extension 6 of said segment gear 5 is an awl 16 which is curved in a circular arc concentric with the rock shaft 4. The awl works close to the circular inner face of the bottom of the housing 3; and the portion of the awl which enters the work is of substantially the same thickness throughout. One side, 17, of the awl (see Fig. 8) is in a plane close to the pivot but the opposite side 18 is inclined away from said first-mentioned side for a considerable distance rearwardly from the piercing end thereof. The piercing end of the awl is beveled to a straight diagonally disposed sharp cutting edge 19. The base portion of the awl has, on the inclined side 18, a cam face 20 or portion of increased inclination, which cam face is adapted to coöperate with the inclined lug or cam pro-

jection 21 provided therefor on the inside of the housing. When the awl is carried forward by the segment gear 5, the cam face 20 of the awl is moved against the stationary cam face 21, with the result that said awl is swung laterally on its pivot. The cam faces 21, 20, are so positioned that this swinging of the awl is effected just after the awl pierces the work and while it is still in engagement therewith. By this arrangement, the awl moves or feeds the work intermittently a predetermined distance into position to be again pierced for the next succeeding stitch. On the side 17 of the awl is formed a cam projection 22 which is adapted to cooperate with an adjustable projection or screw stud 23 provided therefor on the side of the housing 3 adjacent thereto. By this arrangement, the awl is swung laterally on its pivot toward the projection 21, during its downward or rearward stroke and after it has been backed out of the work. By adjusting this projection or screw stud 23 toward or away from the awl, the length of the stitch may be varied; that is, the cam projection 21 on the casing being fixed, the awl is always shifted laterally in one direction to a certain common position, and by varying the position of the inwardly projecting end of the stud 23, the distance that the awl is shifted toward said cam projection 21 can be varied. Therefore, as the awl is always shifted to a common point in the direction the work is fed, the length of the stitches may be varied at will by merely adjusting the projection or stud 23.

On the upper segmental extension 7 of the segment gear 5 is mounted a needle 24. The needle is curved in a circular arc of the same radius and center as the curvature of the awl and it is located in position to enter the hole pierced in the work by the awl, and after the work has been shifted by the awl. The needle is provided with an eye 25; with an elongated groove 26 on its outer side which extends from the eye, to or nearly to the shank; and with a groove 27 on its inner side which extends from the point of the needle for a short distance rearwardly beyond the eye. These grooves are designed to accommodate the loop of the needle thread A when it is carried by the needle through the hole in the work in the manner hereinafter more fully appearing. The shank 28 of the needle is preferably square in cross-section so as to fit in a counterpart pocket or seat 29 in the end of the segmental extension 7. Preferably, the shank 28 is notched as at 30 so as to fit over a lug 31 in the seat or pocket 29. The needle is firmly held in place by a segmental securing plate 32 which is fastened in position by a screw 33. This securing plate 32 is fitted into a seat 34 provided therefor in

the segmental extension 7 and it has a reduced portion 35 adapted to overlies the shank of the needle.

The upper front portion of the housing 3 is cut away to provide a space for a work-table or shelf 36. The work-table or shelf is provided with a slot 37 through which the needle and awl work. Pivotaly sleeved on the rock-shaft 4, outside of the housing 3, is a presser-foot or work-holder 38. The front end portion of this presser-foot has a lateral extension 39 which projects over the work-table and is slotted as at 40 to permit the awl and needle to work therethrough. The presser-foot has a rearwardly and upwardly curved arm 41 which is provided at its end with a boss or enlargement 42. The boss 42 is provided with a vertical hole therethrough which is threaded to receive an adjusting screw 43. A knob 44 is provided on the upper end of the screw 43 whereby the same may be conveniently manipulated. The lower end of the screw bears against the top of the guide frame 14 so that by adjusting the screw, the presser-foot may be raised and lowered to accommodate different thicknesses of work. In practice, the presser-foot is adjusted at such a distance above the work-table that the work thereon will be held firmly against vertical movement but may be moved ahead by the awl for each succeeding stitch without intermittently raising the presser-foot therefrom. The upper end portion of the arm 41 of the presser-foot or work-holder 38 is preferably a strong spring so that the work may be held close to the work-table and yet the presser-foot will yield sufficiently to compensate for any unevenness in the thickness of the work.

The locking-loop-forming mechanism comprises a reciprocatory loop-former and carrier 45. This device comprises an elongated body portion which is slidably mounted in a transverse horizontal groove or guideway provided therefor in the work-table, and it is retained therein by a cover-plate 46. The member 45 has a laterally disposed extension or hook 47 spaced therefrom and arranged to travel therewith across the table close to the inner side of the needle. The end portion of this hook is pointed or curved downwardly and outwardly as at 48 and has a notch or recess 49 in its outer side (see Figs. 3 and 4). A short longitudinal groove 50 is provided in the upper face of the hook 47 and it communicates with the notch or recess 49 whose edges are rounded so that the locking-loop thread B may be passed over them without cutting or fraying. On the under side of the hook 47 is a groove 51 which extends the entire length thereof. This groove 51 is provided so as to accommodate the locking-loop thread B which is fed through a

notched opening in the side wall of the work-table. Said notched opening spans the groove 51 and the locking-loop thread B is inserted through the opening and passed along the groove. It is then carried up through the notch 49 of the hook 47 and laid in the groove 50. The part of the thread B thus looped around the hook constitutes the locking-loop, which is carried through the loop of the needle thread A in a manner hereinafter more fully appearing. The end of the loop-carrier 45 opposite to the hook end is provided with a pair of downturned lugs or ears 52 on which is mounted a cross-pin 53. This pin engages the bifurcated or slotted end portion of a rock-arm 54 which is fixedly secured on the forward end of a longitudinally arranged horizontal rock-shaft 55. This rock-shaft 55 is journaled in suitable bearings which are provided therefor on the base 1 of the machine. On the rear end of the rock-shaft is secured a lever or rock-arm 56. The rock-arm 56 is provided with a stud or projection 57 which is adapted to cooperate with a cam groove in the rotatory disk hereinbefore referred to, but not shown, which contains the cam groove for driving the reciprocatory block 13. The actuation of the locking-loop-carrier mechanism is so timed with respect to the actuation of the awl and needle mechanism that the locking-loop-carrier is moved across the inner side of the needle as the needle is starting on its upward stroke. By reason of the pressure of the material of the work upon the thread in the groove on the inner side of the needle, the loop of the needle thread A opens inwardly as the needle backs out of the work. Therefore, the locking-loop-carrier moves through the loop thus opened.

The operation of the stitch-forming mechanism is as follows: The work is placed upon the work-table and the presser-foot is adjusted to hold the work to the table; the awl, of course, being in its lowermost position or below the work-table. Assuming the parts to be in the positions just described, the awl will first be carried upwardly to pierce the work. Near the end of the upward stroke of the awl, the cam face 20 rides over the cam projection 21 of the housing 3 and the awl is shifted laterally to feed the work and thereby bring the puncture therein into position to receive the needle after the awl shall have backed out of the work. As the awl approaches the end of its downward stroke, the cam projection 22 thereon rides over the end of the screw stud 23 and the awl is shifted laterally back into position to pierce the work for the next stitch. The needle, on its downward stroke, carries a loop of its thread A through the work, and as the needle backs out of the work, the loop of its thread is opened as shown in Fig. 10.

While the loop of the needle thread A is opening, the carrier or hook 47 carries the locking-loop thread B through the same and then backs quickly out, leaving the locking-loop extending through the needle-loop as shown in Fig. 11. The stitch is then drawn tight or set by pulling upon the needle thread A which operation is accomplished by a take-up device, which will presently be described. When the locking-loop-carrier backs out of the needle-loop, the locking-loop is kept from following the carrier by the tension thereon of the needle thread which, at this stage of the operation, is starting to pull under the carrier. To prevent that portion of the locking-loop thread which lies in the groove 51 in the under side of the carrier, from pulling the locking-loop out of the needle-loop, it is preferable to provide a resilient thread escapement device or pawl 58 which is mounted in cooperative relation to the thread carrier 45. Preferably, this thread escapement is mounted on the outside of the housing or casing 3, for convenience in manipulation. The escapement device, as shown in Fig. 7, is provided with a spring shank portion which is preferably attached to a stud 59 or other suitable device adapted to secure the same to the machine. The other end portion of the member 58 is thickened and beveled as at 60 and it is provided with a notch 61 in its upper face. At the inner end of the notch 61 is provided a projection or lug 62 whose top edge portion is curved to correspond substantially to the groove 51 in the under side of the carrier hook 47. The lug 62 normally projects into the groove 51 so as to bear upon the locking-loop-thread as the same is pulled through the groove. The outer face of the lug 62 is preferably beveled or inclined toward the bottom of the notch. In practice, the tension of the device is just sufficient to permit the thread to be readily drawn therethrough when the hook 47 moves to carry the locking-loop into the needle-loop, but it will prevent the thread, which has been pulled by the hook, from following the hook on its return stroke.

The take up device for the needle-thread comprises an arm 63 which is fixed tightly on the end portion of the rock shaft 4 outside of the housing 3. This arm 63 is set with respect to the segmental extensions 6, 7 of the segment gear 5 so that it is in its lowermost position when the needle and the awl are in their uppermost positions. The arm is provided near its outer end with a circular portion 64 having a curved marginal flange or rib 65 on its outer side. The inner side of the flange or rib 65 is curved eccentrically with respect to the center of the circular portion of said arm. Pivotaly mounted on a stud 66 which is located at the center of the circular portion 64, is a cam

disk 67 whose high side, or portion which coöperates with the eccentric side of the rib 65, is preferably serrated or scalloped as at 68. Pivottally mounted on the end of the arm 63 is a lever arm 69 which has a slot 70 therein through which a stud 71 on the cam disk 67 projects. The free end portion of the lever-arm 69 is, for convenience, turned at an angle as at 72 and it is pointed or rounded at its end so as to coöperate with a resilient latch member 73. This latch member is mounted on an arcuate extension 74 of a bracket 75 which is mounted on the top of the housing 3. The bracket extension 74 is suspended laterally from the housing so as to be in convenient position relative to the arm 63. On the free end of the latch member 73 is provided a lug having a tapered or beveled side cam face 76 and a curved or grooved top cam face 77. The opposite end of the latch member is secured to the bracket extension by a screw or rivet 78 and it is additionally supported by a pin 79 upon which its intermediate free portion slidably rests.

As shown in Fig. 1 of the drawings, the needle thread A is taken from a supply roll or spool 80 which is mounted below the base 1 of the machine. The thread is carried through a tension device 81, thence through the take up device, thence over an idler 82, and thence through a waxing device or thread guide 83 to the eye of the needle through which it is threaded. The locking-loop thread B is taken from a roll or spool 84 which is mounted beneath the base 1 of the machine in a manner similar to the spool 80 for the needle thread. The thread B is carried through a waxing device 85 and thence over the tension device 58 which coöperates with the loop-carrier 45 hereinbefore referred to.

Assuming the parts of the machine to be in the positions shown in Fig. 1: When the awl and needle are swung downwardly, the take-up arm 63 being fixed to the rock-shaft 4 will, of course, swing upwardly and simultaneously with the movement of the awl and needle. As the arm 63 swings upwardly, the end portion 72 of the lever-arm 69 rides over the cam face 76 on the lug at the end of the resilient latch member 73, thereby pressing said member inwardly until said lever-arm has passed free of said lug. During the upward movement of the take-up arm, the thread A is free to pass through the device. As the arm 63 swings downwardly on its return stroke, the portion 72 of the lever-arm 69 contacts with and rides over the grooved cam portion 77 of the latch member whereby said lever-arm 69 is shifted and, owing to the slot-and-pin connection with the cam disk 67, the disk is turned until its high side con-

65. At this time the thread A is gripped tightly and it is pulled until the projection 86 on the cam disk 67 contacts with the projection 87 on the bracket extension 74, whereby the cam disk 67 is turned and restored to open or inoperative position, with respect to the thread A, the lever-arm 69, of course, being also restored to normal position.

The projection 87 is preferably provided on a slotted plate 88 which is secured in adjusted position on the bracket extension 74 by a screw 89 or other suitable securing devices. By adjusting the projection 87 to different positions peripherally of the arcuate bracket extension 74, the cam disk 67 may be made to move out of contact with the rib 65 at different intervals from the tripping lug on the end of the latch member 73, and thereby the amount of the needle thread taken up in the stitch may be varied.

In Fig. 13 of the drawings, two layers C, C', of leather or similar material, are shown stitched together according to this invention. As shown at the right hand side of said Fig. 13, the puncture in the lower layer C' is tapered or outwardly flared as at 90, while the puncture in the upper layer C is straight and of a width corresponding to the inner end of the puncture in the lower layer. In practice, for stitching shoe soles to welts and similar work, it is preferable to use a linen thread for the upper or needle thread and a cotton thread which is heavier and has a greater number of strands for the bottom or locking-loop thread. In the finished work, there will be four strands of the locking-loop thread and two of the needle thread pulled into a knot in the wedge shaped or flaring puncture in the lower layer C', while there will be only two strands of the needle thread lying in the puncture in the upper layer C. As the thread is usually waxed or treated with a solution of a wax or cementitious material which hardens or sets, the hardened knot forms substantially a tapered head or peg which will not pull through the puncture in the upper layer when the locking-loop thread is cut or broken between the stitches.

A shoe sole stitched according to this invention can be worn close down to the welt without the stitches ripping, and the sole is more flexible than the ordinary lock-stitched and loop-lock-stitched soles. Moreover, it is not necessary to channel the bottom of the sole to accommodate the bottom thread between the stitches. The sole may be sand-papered or scraped and the bottom threads between the stitches obliterated from the surface, if desired, in which case the sole will not readily rip loose from the welt. As above stated, a linen thread is needed for the upper or needle thread only

and a much cheaper cotton thread may be used for the locking-loop thread. Hence, there is a saving in cost without sacrificing the quality and durability of the work. In practice, as the tapered portion of the awl is forming the wedge shaped puncture in the lower or sole layer C', the material surrounding the knot formed in the preceding stitch is pressed and closed tightly about the knot, thus adding further to the advantages of the peculiar form of stitch.

Obviously, the machine and peculiar form of stitch can be used for purposes other than sewing shoe soles to welts. They may be used for sewing heavy leather generally, in shoe making, harness making, and for many other uses, and for repair work. So, too, the mechanism admits of considerable modification without departing from this invention, and, therefore, we do not wish to be limited to the specific construction and arrangement shown.

What we claim as our invention and desire to secure by Letters Patent is:

1. A sewing machine comprising means for carrying a loop of thread through the work, a reciprocatory member arranged and adapted to carry a locking loop of thread through said first-mentioned loop, and an escapement device bearing resiliently against said reciprocatory member and engaging the thread thereon for preventing the locking loop from following the reciprocatory member on its reverse stroke.

2. A sewing machine comprising a work-table, means for holding the work thereon, means for puncturing the work, means for intermittently carrying a bight of thread through the punctures in the work, means for intermittently feeding the work, and a reciprocatory locking-loop-carrier adapted to lay a bight of thread successively through each of said first-mentioned bights of thread after the same are passed through the work, and a resilient device coöperating with said locking-loop-carrier and engaging the thread on said carrier for preventing the locking-loop thread from following the carrier on its reverse stroke.

3. A sewing machine comprising a work-table, means for holding the work upon the table, means for puncturing the work, means for intermittently carrying a bight of thread through the punctures in the work, means for intermittently feeding the work, and a reciprocatory locking-loop-carrier adapted to lay a bight of thread successively through each of said first-mentioned bights of thread after the same are passed through the work, said locking-loop-carrier comprising an elongated hook member having a longitudinal groove through which the locking-loop thread passes, and a resilient device arranged to bear against the thread in said groove to

prevent the thread from following the hook member on its reverse stroke.

4. In a sewing machine, a locking-loop-carrier comprising a reciprocatory member having an elongated hook extension over which the locking-loop thread is looped, said hook extension having a longitudinal groove therein through which the locking-loop thread passes, and a resilient device having a projection arranged to coöperate with the grooved portion of said hook extension to engage the thread and prevent the same from following the carrier on its reverse stroke.

5. In a sewing machine, a locking-loop-carrier comprising a reciprocatory member having a hook extension over which the locking-loop thread is looped, the inner end portion of said hook extension having a notch therein which communicates with longitudinal grooves in the top and bottom of the hook extension, the bottom groove extending to the outer end of said hook extension, and the inner end of said hook extension being curved downwardly and laterally to form a spreader for the stitching-thread loop through which the locking-loop is laid, and a resilient tension device having a projection arranged to coöperate with the groove in the bottom of said hook extension to engage the locking-loop thread therein to prevent the same from following the carrier on its reverse stroke.

6. A sewing machine comprising a work-table, means for holding the work thereon, an oscillatory awl and needle carrier, a segment gear on said carrier, and a second segment gear meshing with said first mentioned segment gear, a lever-arm on said second-mentioned segment gear, means for oscillating said lever-arm, an arcuate needle mounted on said carrier, an arcuate awl pivotally mounted on said carrier, and adapted to puncture the work, means for shifting said awl laterally while it is in the work, means for restoring the awl to puncturing position after it has backed out of the work, whereby said awl intermittently feeds the work to bring the punctures successively into the path of the needle, and said needle being adapted to carry a bight of thread successively through the puncture, and an intermittently movable locking-loop-carrier adapted to carry a loop of thread successively through the needle-loops, said locking-loop-carrier comprising a reciprocatory member having an elongated hook extension around which the locking-loop thread is looped, and means for actuating said locking-loop-carrier comprising a rock-arm which is operatively connected with said locking-loop-carrier and mounted on a rock-shaft.

7. A sewing machine comprising a support for the work, means holding the work

on the support, an awl adapted to puncture
the work, said awl having a portion adapted
to enlarge a portion of the puncture, means
for shifting the awl laterally while it is in
5 the work to effect the feeding of the work, a
needle adapted to carry a loop of thread suc-
cessively through the punctures and beyond
the enlarged portion thereof, means for lay-
ing a locking-loop of thread successively
10 through the first-mentioned loops, and means
for intermittently pulling the needle thread

taut to successively interlock the two loops
and draw the same into the larger portion of
the punctures.

In testimony whereof we have signed our 15
names to this specification in the presence of
two subscribing witnesses.

GEORGE S. SAVIGNAC.
CHARLES E. MYERS.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
