

No. 658,604.

Patented Sept. 25, 1900.

G. E. WARREN.
SHOE SEWING MACHINE.

(Application filed Oct. 12, 1896.)

(No Model.)

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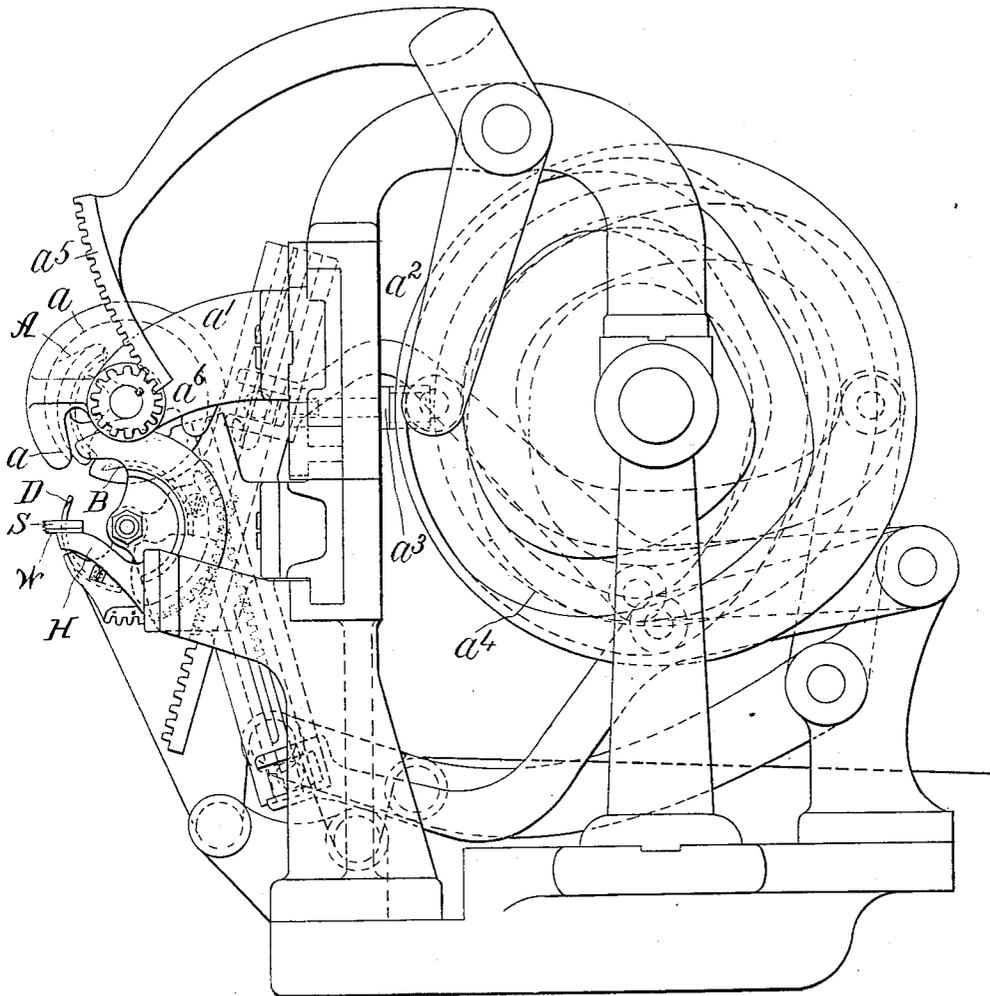


Fig. 1.

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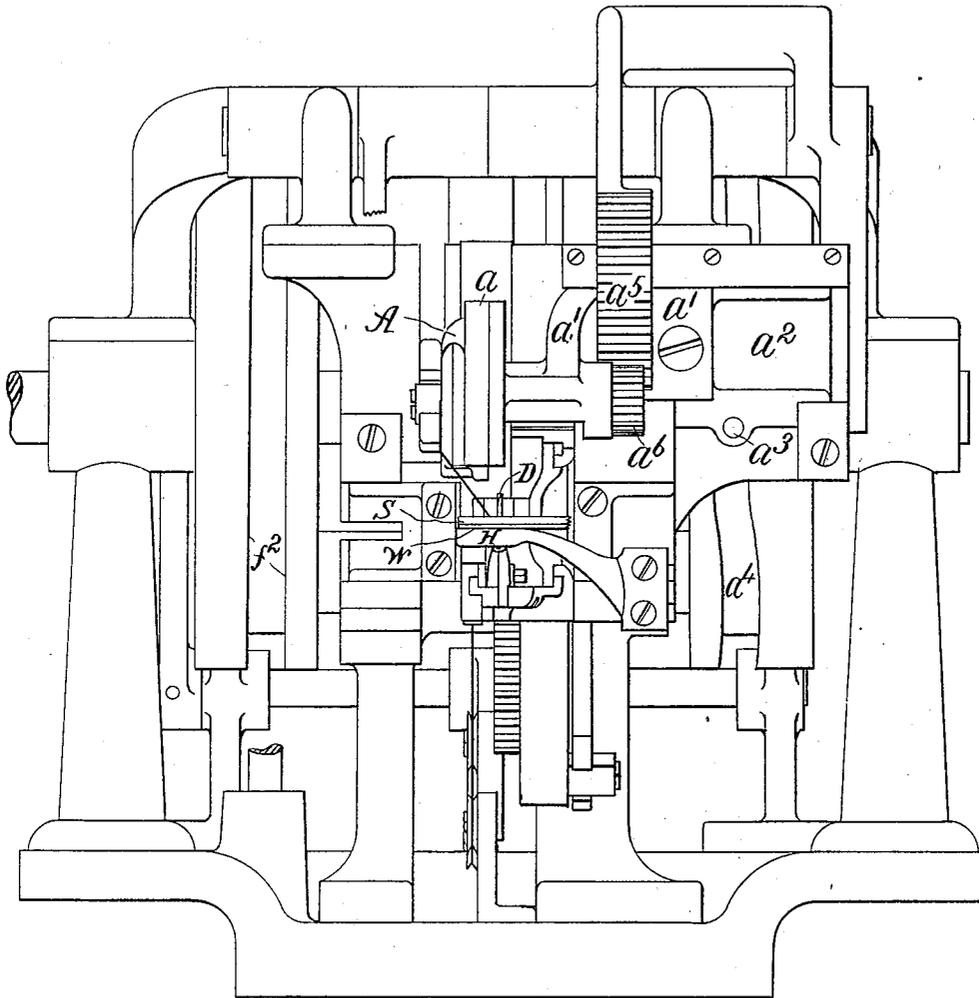
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Fig. 2.



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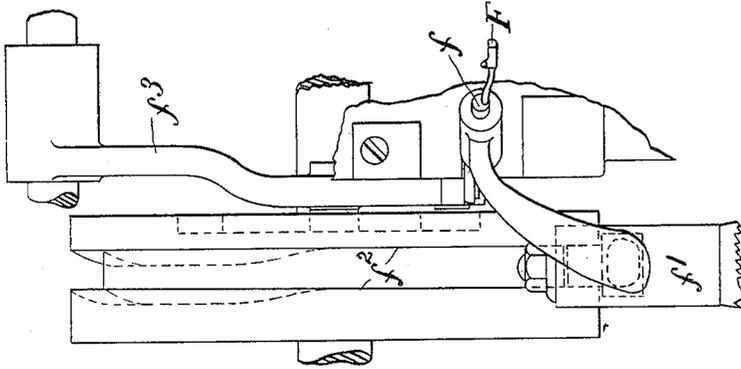


FIG. 4.

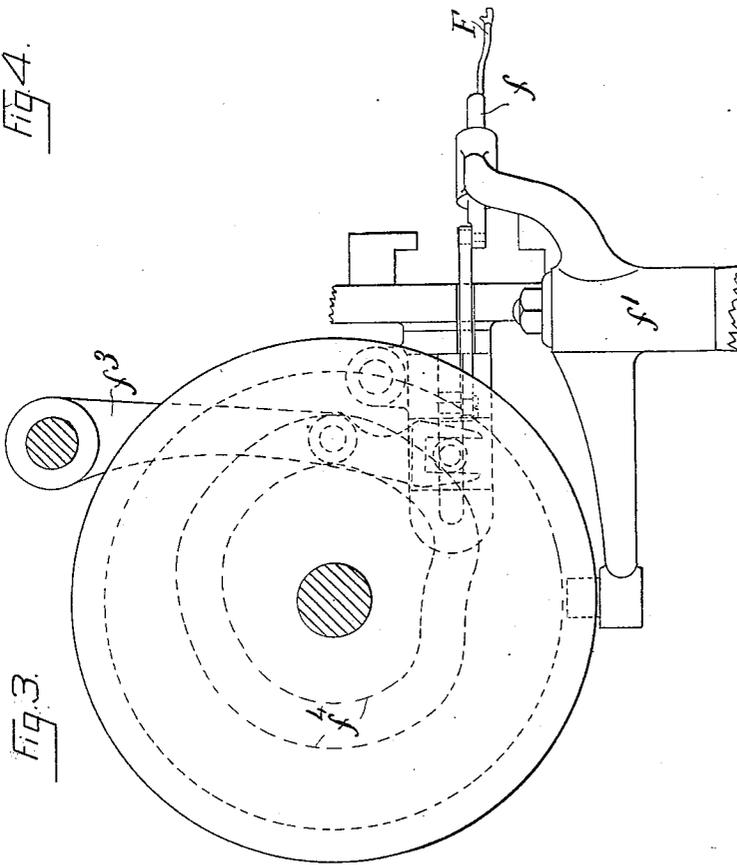


FIG. 3.

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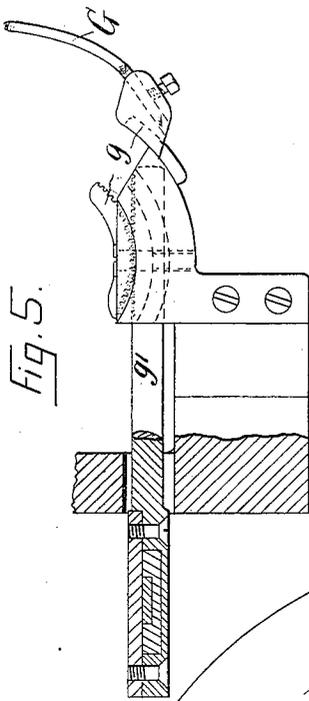


Fig. 5.

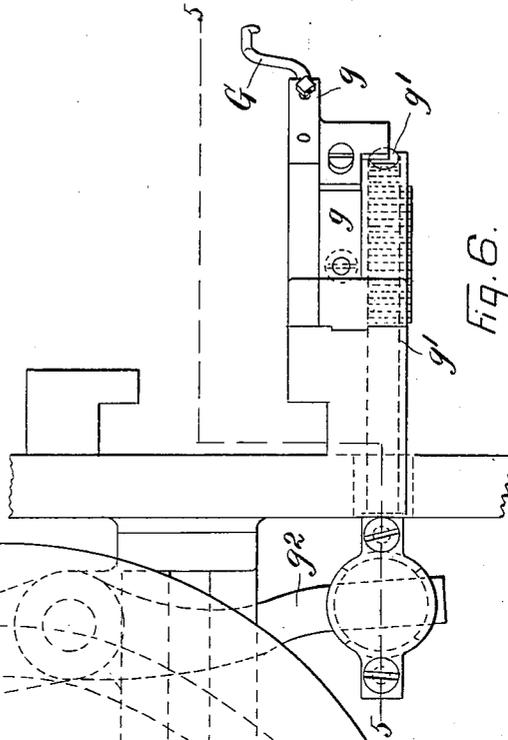
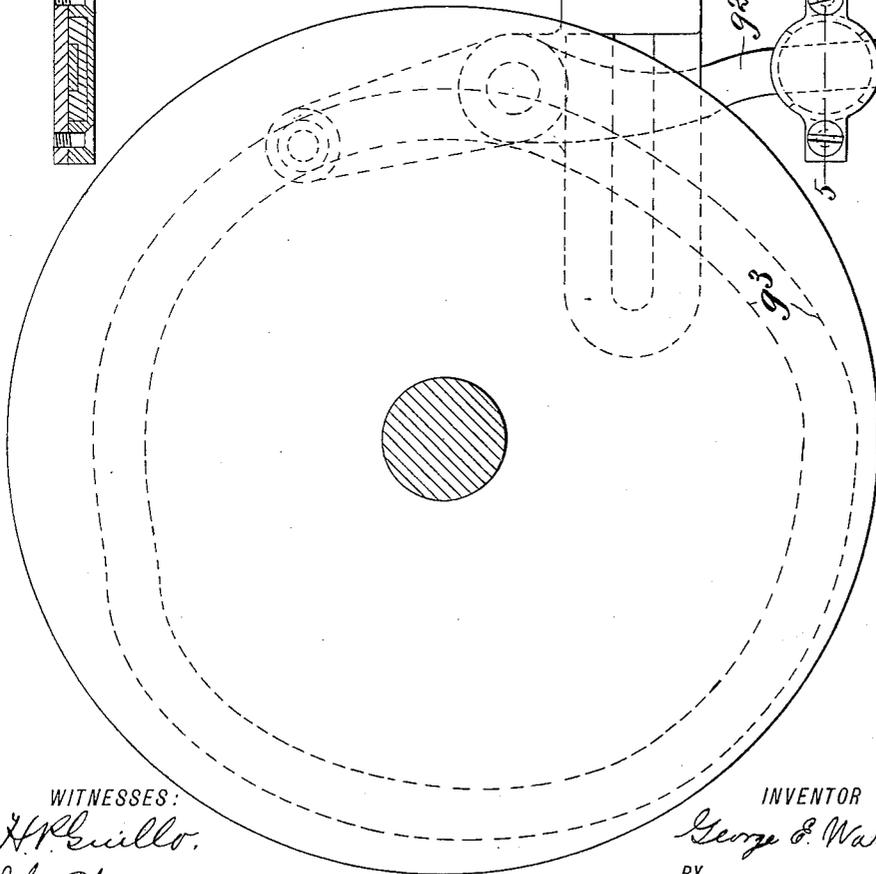


Fig. 6.



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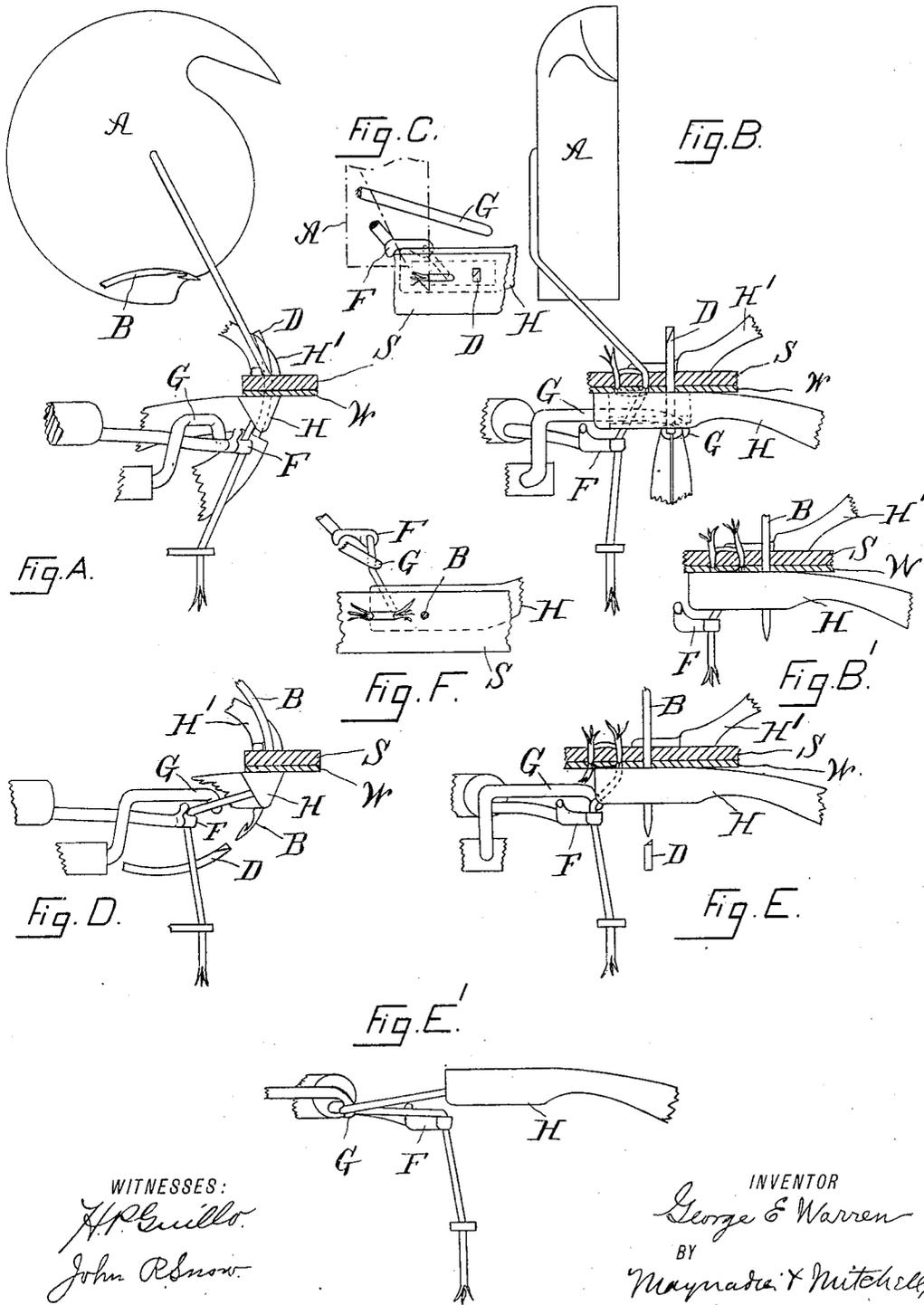
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(Application filed Oct. 12, 1896.)

(No Model.)

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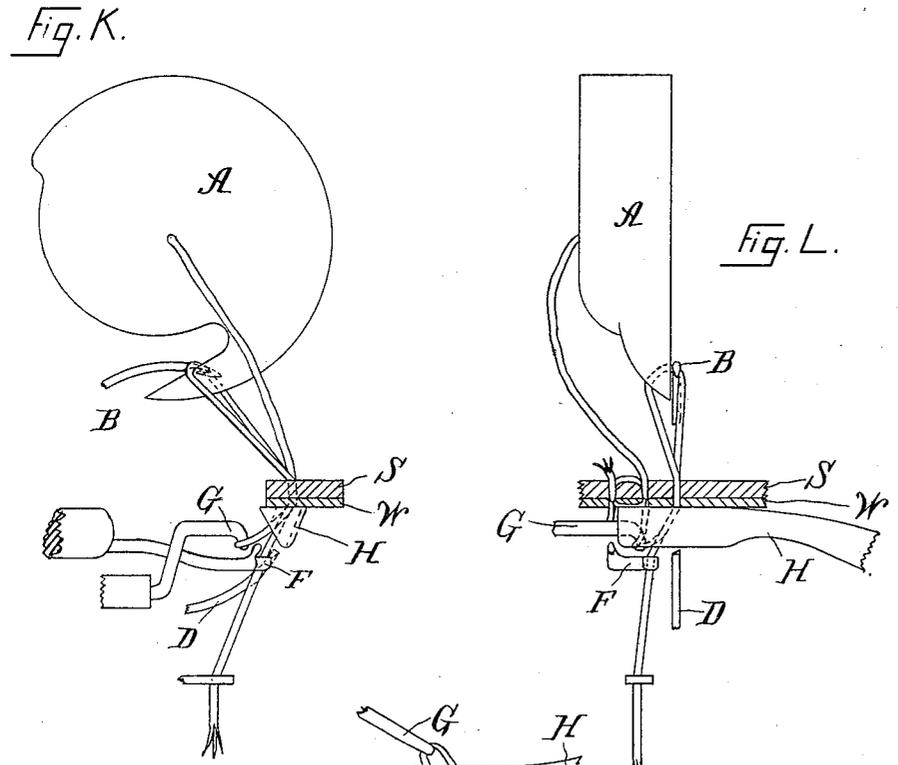
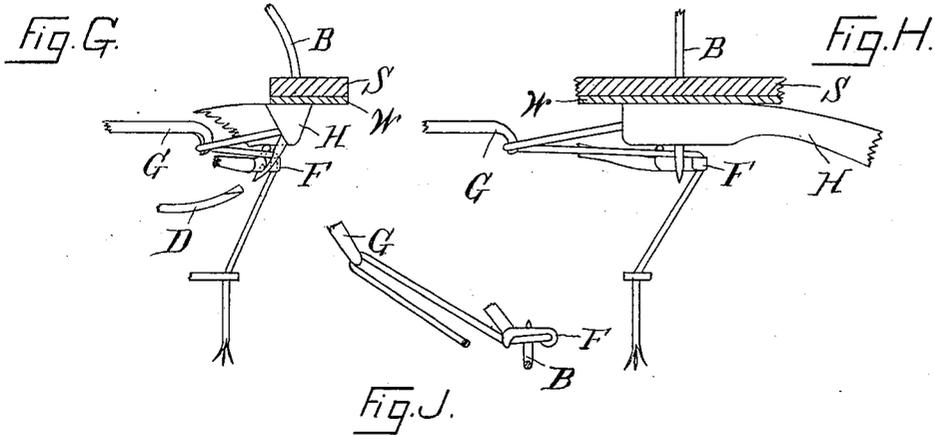
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6 Sheets—Sheet 6.



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UNITED STATES PATENT OFFICE.

GEORGE E. WARREN, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO THE CAMPBELL MACHINE COMPANY, OF SAME PLACE.

SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 658,604, dated September 25, 1900.

Application filed October 12, 1896. Serial No. 608,568. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. WARREN, of Pawtucket, in the county of Providence and State of Rhode Island, have invented an Improved Lock-Stitch Sewing-Machine, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a front elevation, of the head of a sewing-machine embodying my invention. Figs. 3 and 4 are details illustrating mechanism for actuating the thread eye or looper. Figs. 5 and 6 are details, on a larger scale, illustrating mechanism for actuating the thread-arm and loop-holder. Figs. A to M, inclusive, are diagrams showing the relative position of the parts in the formation of a stitch according to my invention.

My invention is an improved lock-stitch sewing-machine; and it consists in the combination of a hook-needle, a shuttle, a shuttle-holder, a shuttle-driver, a thread-arm, a thread-eye, a take-up for the needle-thread, and means for operating these several elements.

The objects of the invention are to measure off shuttle-thread for the next stitch by moving the shuttle-holder away from the preceding stitch while the needle-thread is held taut by the dwell of the take-up, to supply slack thread to the needle while it is drawing the loop of needle-thread through the work, and to hold the needle-thread away from the surface of the work while the shuttle is passing through the loop of needle-thread.

In machines of this class—that is, for forming a lock-stitch—a take-up or equivalent device draws the needle-thread through the work after the shuttle has passed through a loop in the needle-thread to set the stitch and draw the lock—that is, that part of the needle-thread and that part of the shuttle-thread which cross one another in the lock-stitch—to the desired depth or to the desired distance from one surface of the work, and the needle-thread should be and ordinarily is so drawn taut while the shuttle-thread is slack until the take-up or its equivalent is just about to complete its stroke and set the stitch, but at that moment the slack in the shuttle-thread

should be used up and both needle-thread and shuttle-thread should be drawn taut just as the stitch is set and the lock located, with the result that at the moment of completing the lock-stitch the needle-thread is drawn taut by its mechanism, and the shuttle-thread is also drawn taut by the tightening of the needle-thread about it and by the resistance of the shuttle-tension, for as the needle-thread is drawn taut the needle-thread carries the shuttle-thread with it until all the slack of the shuttle-thread is used up and the shuttle-thread is drawn taut between the lock and the shuttle-tension. In prior machines of this class requiring the shuttle-thread to be measured off or pulled through the shuttle-tension to afford slack, as above explained, the shuttle-thread is pulled through the tension by the revolution of the shuttle in order to afford slack shuttle-thread for each stitch; but at the moment of completing the lock-stitch both threads are taut, as above explained, and as the measuring off of shuttle-thread for the next stitch requires about one-sixth of a revolution of the machine the needle-thread must be slacked before that measuring off of the shuttle-thread is completed, and the result is that the tension of the shuttle-thread must be very light, for if it were not the slack needle-thread would yield to the strain on the shuttle-thread, if that strain were great enough to pull the shuttle-thread through a heavy tension, and the lock would be displaced, as it is not practical to keep the needle-thread taut during the time required to measure off slack shuttle-thread when that measuring off is done by the revolution of the shuttle; but a sidewise movement of the shuttle sufficient to measure off the necessary slack thread can be given by an easy cam in a very small fraction of a revolution of the machine, and it is practical to keep the needle-thread taut during that short time by causing the take-up or equivalent mechanism for tightening the needle-thread to dwell a moment while at the end of its thread-tightening stroke, and this feature of my invention is the combination of mechanism to give the shuttle-holder a movement with which dwells at the end of its thread-tight-

ening stroke sufficiently to allow the shuttle-
 moving mechanism to move the shuttle-
 holder and shuttle sufficiently to draw out
 shuttle-thread through the tension, and thus
 5 afford slack shuttle-thread for the next stitch.
 The new results are that the tension of the
 shuttle can be made far heavier than was
 practical in other machines of this class, for
 the measuring off of the shuttle-thread takes
 10 place immediately after the lock is com-
 pleted and while the needle-thread is held
 under strain, and the lock-stitch can be made
 tighter and more uniform as to locating the
 lock. The reason of this greater uniformity
 15 in locating the lock is that when the strain
 on the needle-thread meets not only the re-
 sistance of pulling the lock into its place in
 the work, but also the additional resistance
 of a heavy tension on the shuttle-thread, the
 20 needle-thread will stretch more or less under
 that strain instead of pulling the lock to a
 greater or less depth in the work, and all the
 slight variations in practical operation will
 result simply in unimportant variations in
 25 the stretch of the needle-thread instead of in
 objectionable variations in locating the lock.
 With a light tension on the shuttle-thread,
 as heretofore in all machines of this class,
 these slight variations in practical operation
 30 result in objectionable variations in locating
 the lock. Stated practically, this feature of
 my invention allows the use of a much heav-
 ier tension on the shuttle-thread than has
 heretofore been practical and prevents the
 35 slight variations in that heavy tension from
 producing objectionable variations in the
 tightness of the stitch and in the location of
 the lock. When a loop of needle-thread long
 enough for a shuttle to pass through it is
 40 drawn through the work, the needle-thread
 is sunk more than is desirable in the surface
 of the work, and this is especially the case
 in machines in which the loop, drawn through
 the work by the needle, is taken by the shut-
 45 tle from the needle and elongated by the pas-
 sage of the shuttle through it. This feature of
 my invention wholly remedies this evil, as the
 thread-arm after performing its usual func-
 tion in coöperation with the thread-eye holds
 50 the needle-thread out of contact with the sur-
 face of the welt while the loop is being drawn
 through the work by the passage of the shut-
 tle, and the needle-thread is thus laid on the
 surface of the welt or other work instead of
 55 being sunk into that surface. The arm is of
 course removed from between the needle-
 thread and the work before the stitch is set.
 In the drawings I have shown in Figs. 1 and
 2 the main parts of a sewing-machine embody-
 60 ing both features of my invention in their
 preferred form for use in sewing the outer
 sole to the welt, the shuttle A and its race α
 being above the needle B and awl D and the
 shuttle-driver, the needle-carrier, and the awl-
 65 carrier being actuated by racks and pinions,
 as will be clear from Figs. 1 and 2 to all skilled
 in the art without detailed description. The

thread-eye F is an instrument for laying the
 thread in the hook of the needle, often called
 a "looper," and it and its actuating mechan- 70
 ism are well shown in Figs. 3 and 4. The
 thread-arm G, which coöperates with the
 thread-eye F to form a bight of thread be-
 tween the needle and the work, as is fully
 described in Patent No. 253,156, dated Janu- 75
 ary 31, 1882, granted to Duncan H. Campbell,
 and suitable mechanism for actuating thread-
 arm G are well shown in Figs. 5 and 6. These
 two mechanisms—namely, the thread-eye
 and its actuating mechanism and the thread- 80
 arm and its actuating mechanism—will also
 be clear to all skilled in the art without de-
 tailed description, for both are well known,
 except that the thread-arm G has in addition
 to its usual functions, fully described in said 85
 Patent No. 253,156, the further function of
 laying the thread on the surface of the work
 and preventing it being sunk into that sur-
 face; but this further function as well as the
 new function of the shuttle are more clearly 90
 shown in Figs. A to M, inclusive, and will now
 be fully described by reference to those fig-
 ures.

When the parts are in position, as shown in
 Figs. A, B, and C, a stitch has just been set 95
 and the shuttle A has moved away from the
 last needle-hole full of thread far enough to
 measure off shuttle-thread for the next stitch,
 the needle-thread being held taut by the take-
 up mechanism, and the awl D is preferably 100
 through the work, as shown. As the awl D
 is retracted the needle B follows it, (see Fig.
 D,) and the needle feeds the work and the
 parts assume the position shown in Figs. D, E,
 and F—that is, the thread-eye F and the thread- 105
 arm G engage the needle-thread, as shown in
 Fig. E, so that when the thread-eye F threads
 the needle (in the familiar way with this well-
 known style of thread eye or loop) a bight is
 formed in the needle-thread by the action of 110
 the arm and eye, as shown in Figs. G, H, and
 J. As the needle is retracted the thread-arm
 G moves toward the needle B to deliver slack
 thread on the left side of the needle, as shown
 in Figs. K, L, and M, the take-up mechanism 115
 at the same time affording slack thread on
 the right side of the needle, and when the
 loop is drawn sufficiently through the work
 the shuttle-nose enters the loop of the needle-
 thread. (See Figs. K and L.) The thread-arm 120
 G does not drop the bight of needle-thread as
 soon as the needle has drawn the loop into
 the work, as heretofore in machines contain-
 ing a thread-eye and thread-arm, but holds
 the needle-thread, as shown in Figs. K, L, and 125
 M, while the shuttle passes through the loop
 of needle-thread, and thus prevents it from
 being sunk into the welt W, the position of
 the parts being then as shown in Figs. K, L,
 and M, which also illustrate the slacking of 130
 the shuttle-thread for the next stitch by the
 return motion of the shuttle, aided in this in-
 stance by the feed of the work.

The members of the work-clamp H and H'

and the sole S and welt W are as usual, and their relations to the other parts are clearly shown in the diagrams Figs. A to M. The parts not lettered constitute the main parts of a sewing-machine especially designed for stitching the outer sole to the welt in the manufacture of welted shoes and need no detailed description. The preferred mechanism for actuating the thread-arm G is shown in detail in Figs. 5 and 6 when the carrier *g* of the thread-arm G is mounted in curved ways, (shown in dotted lines in Fig. 5,) and is a segmental gear engaging with the rack *g'*, which is reciprocated by the cam-lever *g²* and cam *g³*.

15 Figs. 3 and 4 show the preferred mechanism for actuating the thread-eye F, its carrier *f* being mounted in one arm of lever *f'*, which lever is actuated by its cam *f²*, and carrier *f* is moved endwise by cam-lever *f³*, suitably connected to carrier *f* and its cam *f⁴*, as will be clear from Figs. 3 and 4.

The shuttle-race *a* is mounted on the bracket *a'*, which is secured to the slide *a²*, which slides in ways in the frame of the machine, 25 as will be clear from Figs. 1 and 2. The slide *a²* is actuated by cam-stud *a³* and cam *a⁴*. The face of the rack *a⁵* is made wide, so that the pinion *a⁶* on the shaft of the shuttle-driver will remain in mesh while the shuttle- 30 holder *a* is moved.

What I claim as my invention is—

1. In a sewing-machine the combination of a hook-needle; a shuttle; a shuttle-holder; a shuttle-driver; a take-up for the needle-thread; mechanism for actuating the needle; 35 mechanism for causing the shuttle and shuttle-driver to move about an axis in the shuttle-holder; mechanism for actuating the take-up to first take up the needle-thread and then dwell; and mechanism for moving the shuttle- 40 holder away from the preceding stitch while the take-up dwells.

2. In a sewing-machine the combination of a hook-needle; a shuttle; a thread-arm; a thread-eye; mechanism for actuating the needle; mechanism for actuating the shuttle; mechanism to cause the arm and eye to deliver thread to the needle in the form of a bight extending from the hook of the needle over the arm to the work in order to supply 50 slack thread to the needle while the needle is drawing the loop of needle-thread through the work; and mechanism to cause the arm to hold the needle-thread away from the surface of the work while the shuttle is passing 55 through the loop of needle-thread, then drop the loop of needle-thread and return to its position to form a new bight, as the stitch is set.

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