

No. 776,407.

PATENTED NOV. 29, 1904.

W. E. LOMBARD.
SHOE SEWING MACHINE.
APPLICATION FILED MAY 4, 1903.

NO MODEL.

5 SHEETS—SHEET 1.

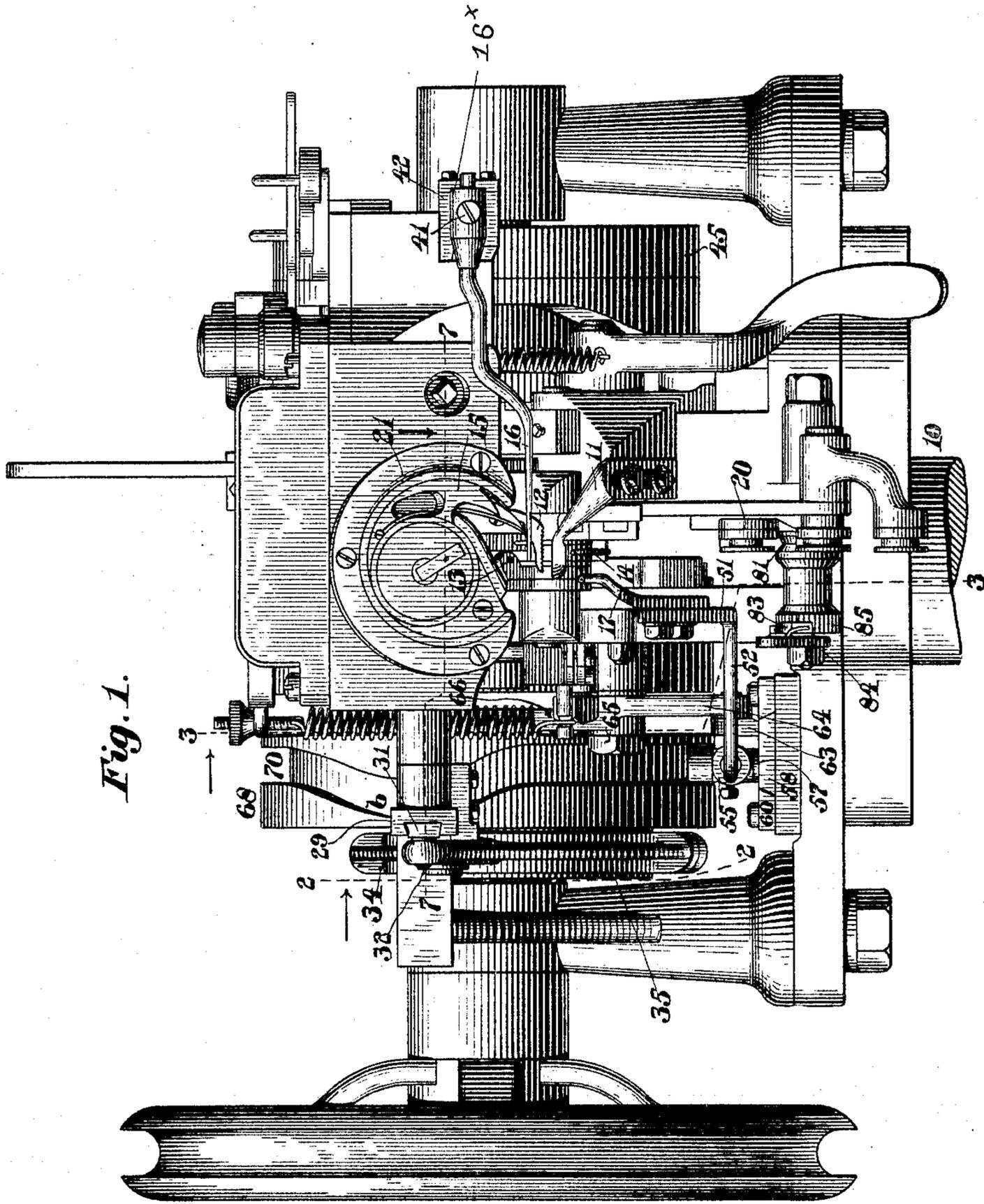


Fig. 1.

Witnesses:

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Edwin C. Cleveland

Inventor:

Walter O. Lombard

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5 SHEETS—SHEET 2.

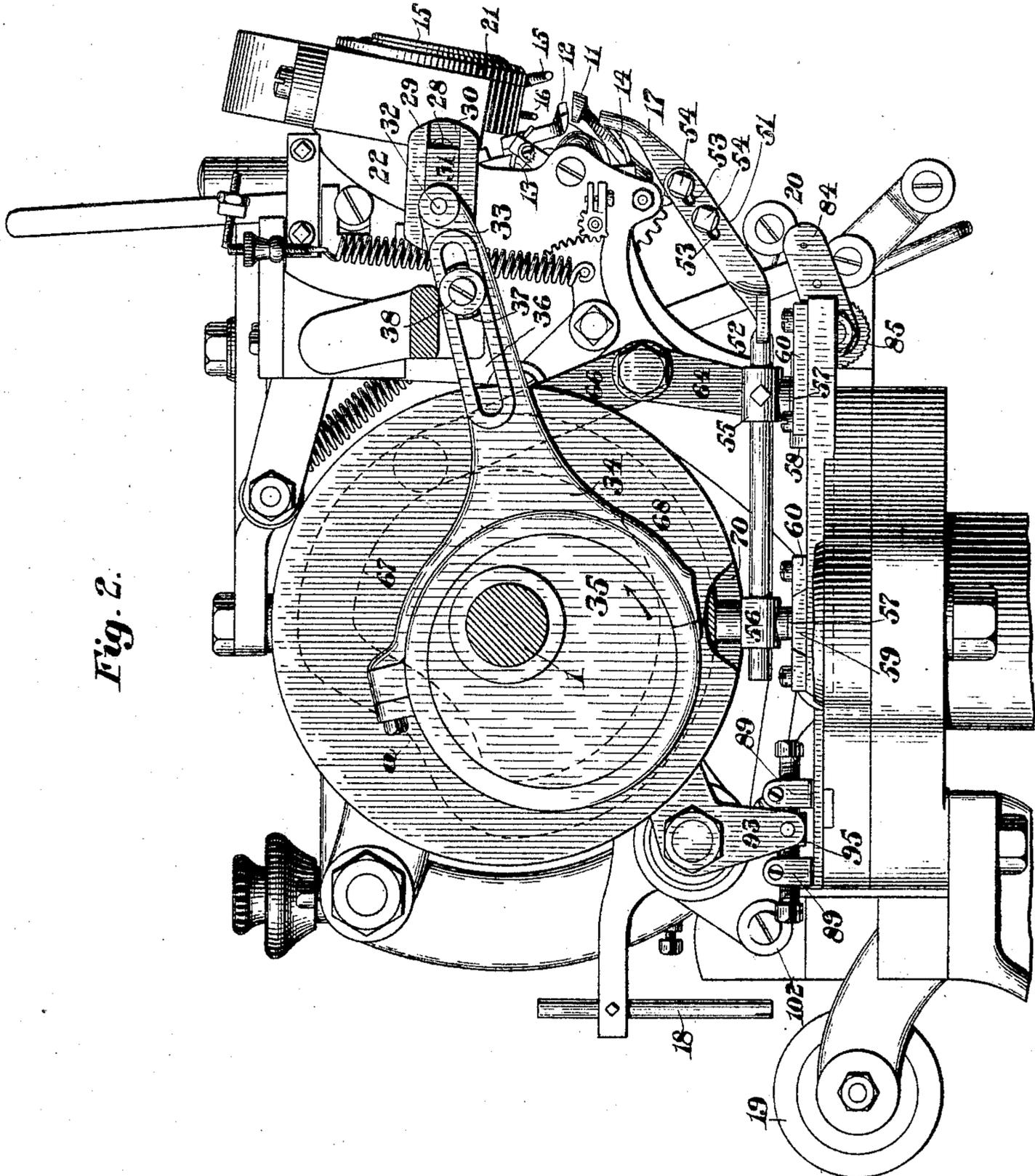


Fig. 2.

Witnesses:
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5 SHEETS—SHEET 3.

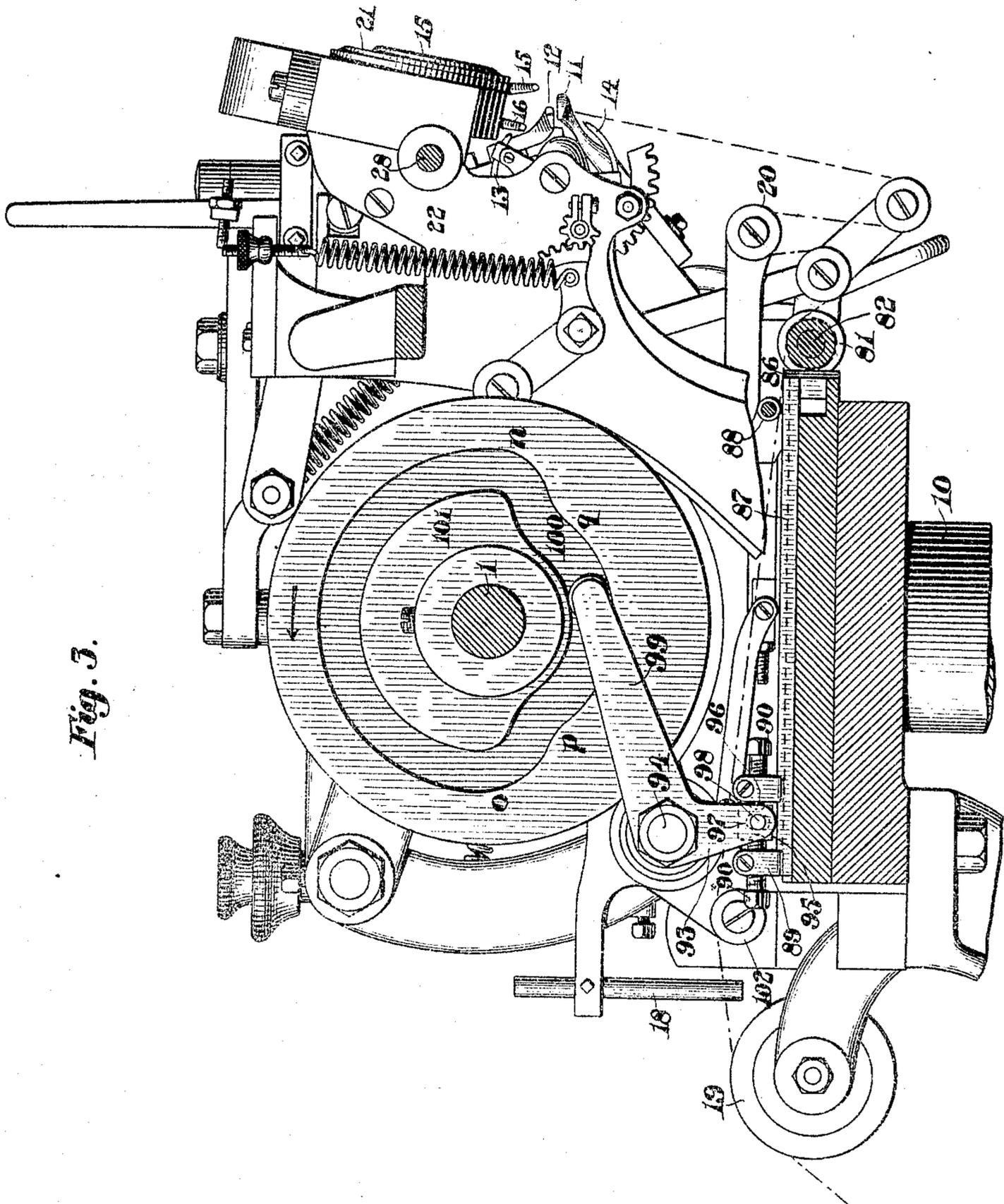


Fig. 3.

Witnesses:

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5 SHEETS—SHEET 4.

Fig. 4.

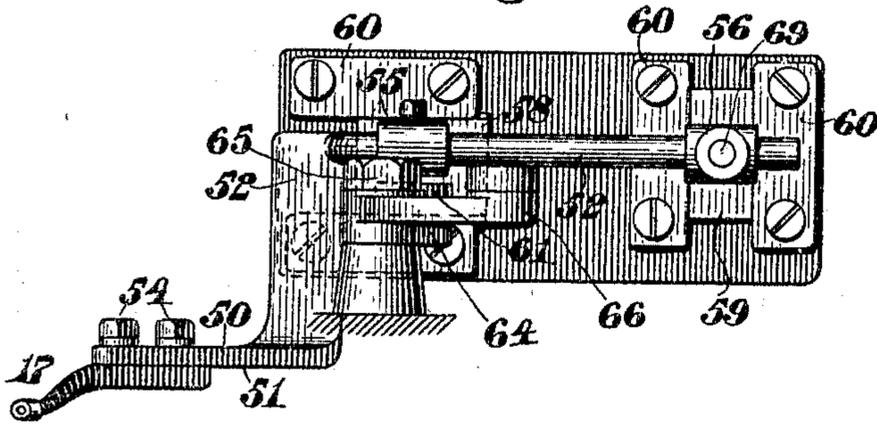
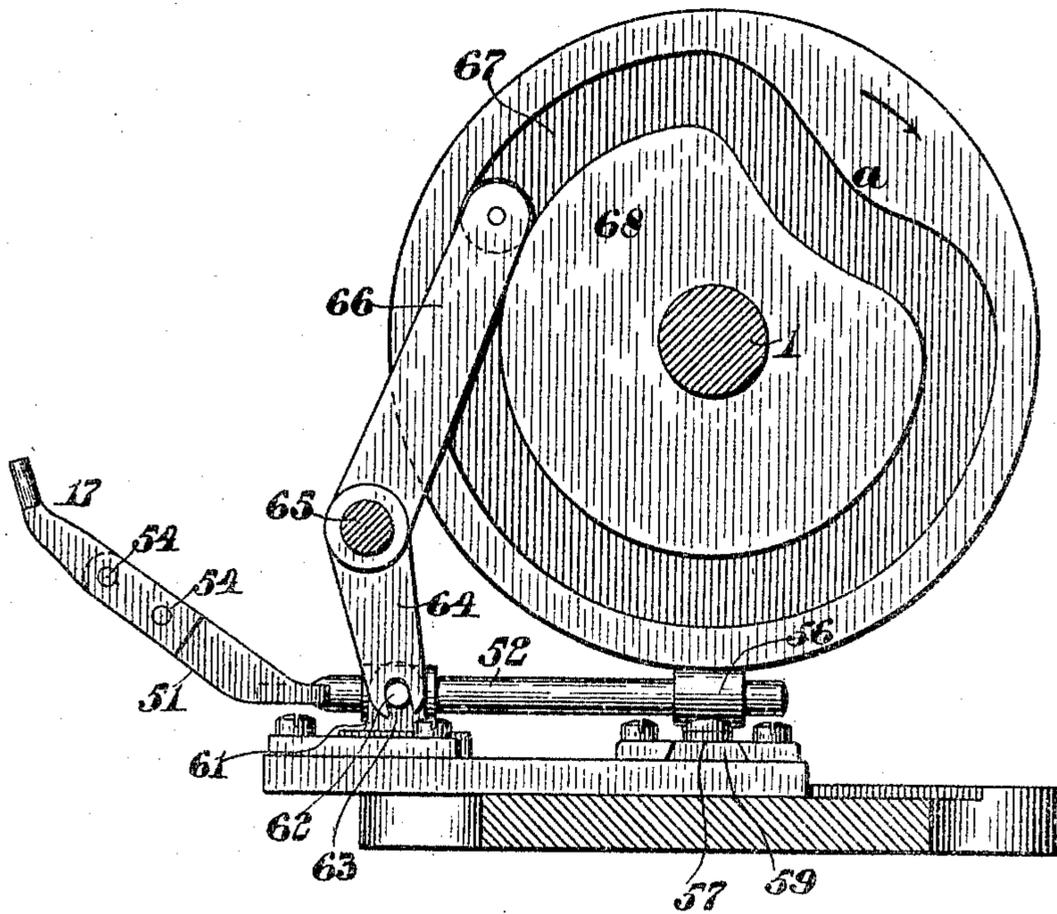


Fig. 5.



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5 SHEETS—SHEET 5.

Fig. 6.

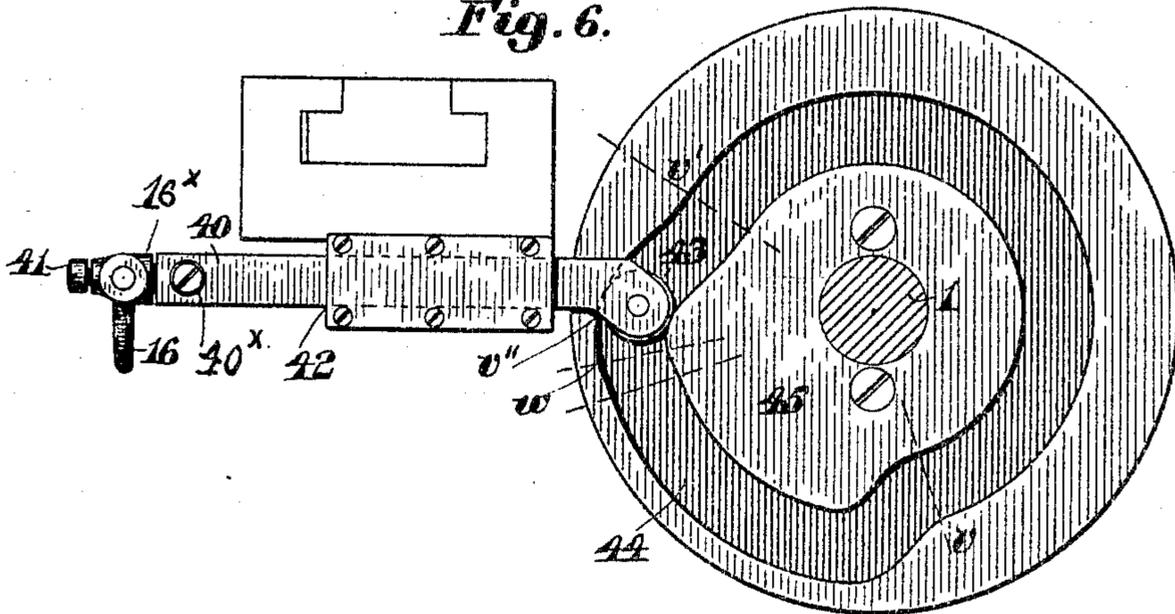


Fig. 9.

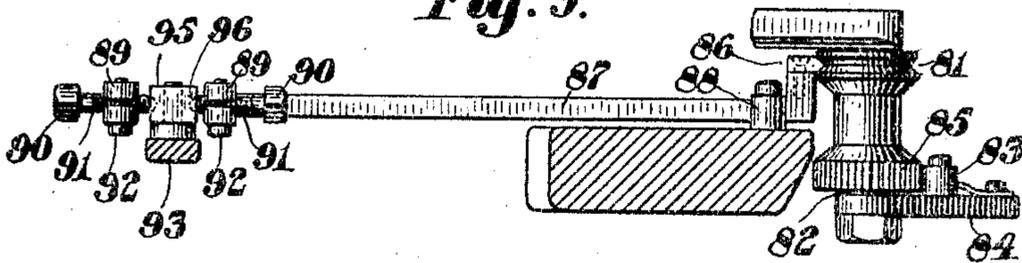


Fig. 7.

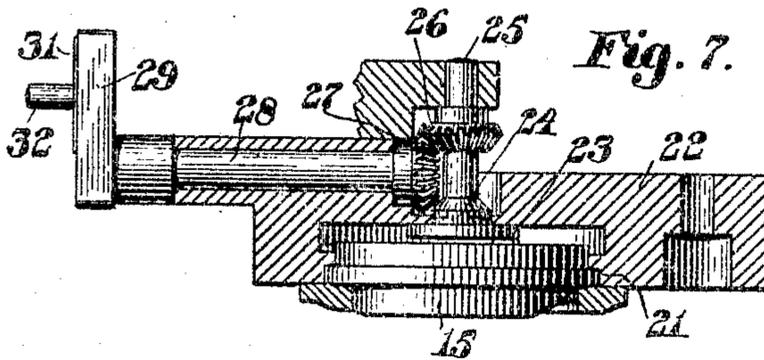
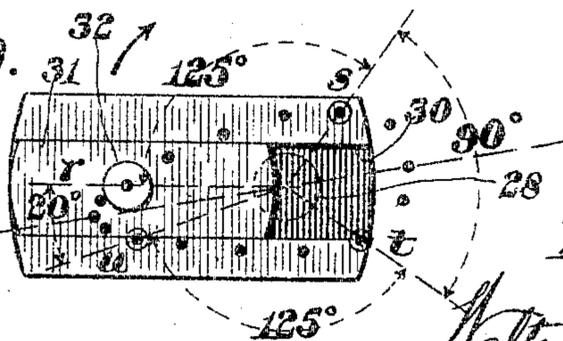


Fig. 8.



Witnesses:
Edwin Luce
Edna C. Cleveland

Inventor:
Walter E. Lombard

UNITED STATES PATENT OFFICE.

WALTER E. LOMBARD, OF ARLINGTON, MASSACHUSETTS.

SHOE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 776,407, dated November 29, 1904.

Application filed May 4, 1903. Serial No. 155,483. (No model.)

To all whom it may concern:

Be it known that I, WALTER EDWIN LOMBARD, a citizen of the United States, residing at Arlington, in the county of Middlesex and State of Massachusetts, have invented a new and useful Sewing-Machine, of which the following is a specification.

This invention relates to improvements in shoe-sewing machines, and more especially to lock-stitch wax-thread machines for stitching outer soles of shoes to the welt, as shown in the United States Patent to J. E. Bertrand, No. 646,594, dated April 3, 1900; and it consists in certain novel features of construction and arrangement of parts, which will be thoroughly understood by reference to the description of the drawings and to the claims to be hereinafter given.

In the drawings, Figure 1 is a front elevation of a sewing-machine embodying this invention. Fig. 2 is a vertical transverse section thereof on line 2 2 on Fig. 1. Fig. 3 is a vertical transverse section thereof on line 3 3 on Fig. 1. Fig. 4 is a detail plan view of the looper and its supporting elements, together with an actuating-lever. Fig. 5 is a transverse sectional elevation of the same, showing also an actuating-cam. Fig. 6 is a detail and side elevation of the loop-expanding finger and actuating mechanism therefor. Fig. 7 is a sectional detail of the shuttle-driving mechanism on line 7 7 on Fig. 1. Fig. 8 is a diagram showing the movement of a portion of the driving mechanism for the shuttle; and Fig. 9 is a detail in plan, portions being in section, of the thread-locking device.

All sections are taken in the direction indicated by the arrows.

Similar characters designate like parts throughout the several figures of the drawings.

The machine is supported on a suitable pedestal 10, carrying the necessary arms or standards upon which the elements cooperating to produce the line of stitches and their actuating mechanisms are mounted. These cooperating elements comprise a work-support 11, a presser-foot 12, a barbed needle 13, an awl 14, a shuttle 15, carrying the usual bobbin of thread, a loop-expander 16, a looper 17, and measuring, tension, and take-up devices 18,

19, and 20, respectively, for controlling the needle-thread. Many of these elements are the same as those disclosed in the Bertrand patent above mentioned, and therefore need not be particularly described herein.

The shuttle 15 is mounted to rotate continuously in one direction in a raceway 21, formed in an arm 22, rising from the pedestal or in a member secured thereto. At the rear of the raceway, moving in a recess in the arm or member, is a shuttle-carrier 23, upon which may be formed one member of a clutch 24, the other member being carried by the end of a short shaft 25, journaled in the arm 22, this connecting-clutch enabling the parts to be readily disconnected and removed. Upon the shaft 25 is preferably located a bevel-gear 26, which meshes with a bevel-gear 27 upon a shaft 28. This shaft 28 carries a crank-arm 29, provided with suitable ways 30, in which slides a block or connecting member 31. By this block is preferably carried a pivot-pin 32, to which is articulated an arm 33, which may be formed integrally with an eccentric-strap 34, situated about the periphery of the driving-eccentric 35, turning with the shaft 1.

In the eccentric-arm 33 is shown a longitudinal slot 36, into which extends a block 37, fitted therein and mounted to rock freely on a stud 38, fixed to the arm 22 and serving as a relatively fixed fulcrum for the eccentric-arm.

The eccentric 35, which serves as the periphery-driver for the shuttle-driving mechanism, being continuously and uniformly rotated in the direction of the arrow in Fig. 2, movement will be imparted to the eccentric-arm, which may also be termed a "driving-arm," and its end will be constrained by the fixed fulcrum about which it shifts to move in a closed curved path, carrying with it the pin upon the connecting-block and causing its axis to revolve in the orbit indicated by the heavy dotted line in Fig. 8 and in the direction shown by the arrow thereon, this movement being permitted by the sliding of the block in the ways. As a consequence of this movement being derived from an eccentric different lengths of the orbit will be passed over in equal times, this being shown

in Fig. 8 by the small circles, which indicate successive positions of the axis of the pivot-pin at the end of sixteen equal time intervals, the orbit being divided into four equal periods by lines *r*, *s*, *t*, and *u* radiating from the axis of the shaft 28. It will be seen that during three quarters of the time occupied in covering this orbit—that is, from *r* to *u*—the pin will move at a comparatively high speed through almost the entire orbit, while during the remaining quarter (from *u* to *r*) it will move slowly through but a short distance. Of the first three quarters mentioned the first (from *r* to *s*) and the third (from *t* to *u*) will be accomplished at a considerably-higher rate of speed than the second, (from *s* to *t*.)

The movement of the block will in turn impart an analogous rotation to the crank-arm and through the bevel-gearing to the shuttle-carrier. The carrier is so connected to the shuttle with relation to the hook thereof that during the time that said hook is engaging the loop of the needle-thread it will be revolved at a rate and through a space corresponding to that from *r* to *s* on the diagram, so that the loop will be quickly engaged. Then as the loop is being spread over the shuttle to encircle its thread to form a lock-stitch the movement will be more gradual, preventing the danger of straining or breaking the thread. During the third period the shuttle will be rotated more quickly, while dropping the loop to enable the take-up to tighten the stitch, and, last, the hook will be moved very slowly to give time for the needle to be passed through the work and a new loop to be formed. The entire cycle of operations will be performed smoothly and easily without the rapid changes in speed and the great frictional resistance of the ordinary cam mechanism, while the timing of each step is such as to most effectively accomplish the desired result. As the hook approaches the loop of the needle-thread this loop must occupy such a position that the hook will with certainty pass through it. To effect this, a loop-expander is preferably provided. This is here shown as consisting of a bent finger 16, normally situated just below and to the front of the shuttle. It is secured at one end in a socket 16*, adjustably secured to a bar 40 by a set-screw 40*, said bent finger 16 passing through an opening in said socket 16* and being adjustably secured in place by a set-screw 41.

The bar 40 is mounted to slide longitudinally in a bearing 42, carried upon an arm from the pedestal, and at the opposite end from the finger is a roller 43, extending into a cam-groove 44 in a disk 45 at or near one end of the main driving-shaft 1. This groove is formed with a portion from *v* to *v'* curved upon the arc of a circle concentric to the driving-shaft, and while the roller is in this position the finger will remain stationary. From *v'* to *v''* the groove quickly increases its

distance from the center, at which time the loop will have been brought up by the needle into proximity with the finger, and this is then moved out by the bar to engage one side of the loop, moving transversely thereof in a substantially horizontal plane. It then expands the loop and holds the same while the roller is moving in a short portion of the groove from *v''* to *w*, which is also concentric to the shaft. The hook will now have engaged the loop, and it is ready to be spread over the shuttle, so to permit the finger to readily release the loop under the pull of the hook. The groove at *w* drops readily for a short distance toward the center, moving the bar and finger quickly inward. The finger is now at a convenient time returned to its normal position to await the recurrence of this cycle.

The looper 17 may be formed and located similarly to that of the Bertrand machine, but is supported and actuated by improved mechanism which will now be described.

The tube or looper proper through which the thread passes is preferably mounted on a carrier 50, which is shown as consisting of an inclined portion 51, rising from a substantial horizontal portion or bar 52. In the portion 51 may be slots 53 for adjustably securing the looper by bolts or screws 54. The portion 52 may be cylindrical and extend through openings in supports 55 56, swiveled at 57 to members 58 59, respectively. These members slide in ways 60 formed in or secured to the base of the machine, the ways for the member 58 extending longitudinally of the carrier-bar 52, while those for the member 59 lie transversely thereof, practically at right angles to the first named.

The member 58 is preferably provided with a lug 61, carrying a pin 62. This pin is here shown as engaged by a slot 63 in a lever 64, which is pivoted at 65 to a portion of the frame, and carried at or near the end opposite the slot 63 is a projection 66, which may be provided with an antifriction-roll extending into a cam-groove 67 formed in one side of a disk 68, carried by the shaft 1. The support 56 is preferably provided with a projection 69, which may also carry an antifriction-roll extending into a cam-groove 70 in the periphery of the disk 68.

It will be seen that the sliding members, and therefore the supports therein, are capable of moving in intersecting paths, which are shown as lying at right angles to each other, and that they have movement imparted to them by the cam-faces of the grooves, which also lie in similarly-intersecting planes. A considerable portion of the groove 67 lies concentric to the shaft 1, and while the roll on the lever is coacting therewith the support 55 will remain stationary; but a portion at *a* departing from this concentric relation will cause an oscillation of the lever and con-

sequent reciprocation of the support. In the same manner a portion of the groove 70, which lies in one vertical plane, will maintain the support 56 stationary; but when the groove 5 curves away from this plane, as is shown at *b*, a lateral reciprocation of the support will be produced. These portions *a* and *b* of the grooves are so related to each other that they act upon the supports at the same time. This will result in a compound movement of the carrier, it moving longitudinally with the support 55, sliding through the support 56, and also being moved laterally by the latter support, the swivels permitting this compound movement. As a consequence the looper will have imparted to it an orbital movement in a path encircling that in which the needle moves, and as the cam-grooves are so designed that this movement shall occur when the needle has been passed through the work and lies within the orbit of the looper the looper will be moved about the needle and the thread deposited in the barb to be drawn up through the work for coaction with the shuttle to form the stitch. With this arrangement the cam-grooves may be of such gradual curvature that but little frictional resistance will be encountered and the whole operation of the device will be smooth and effective.

After the hook of the shuttle has carried the loop to a point where it should be dropped to encircle and be drawn up with its companion thread to form a stitch the take-up device 20 puts the proper stress upon the needle-thread to effect this result. It is then necessary to lock this thread between the take-up and the thread-supply (not shown) to prevent it from being drawn from the latter. For this purpose a locking device is provided, being in the form of a brake acting upon the thread. As here shown, one of the elements of this brake is a support for the thread consisting of a grooved sheave 81, mounted to rotate freely in one direction upon a stud 82, fixed to a portion of the framework and located adjacent to the take-up device. The sheave is preferably prevented from turning in the opposite direction by a spring-pressed detent 83, mounted upon an arm 84, supported upon the stud 82, engaging a ratchet-wheel 85, turning with the sheave. This arrangement, while permitting the thread, which makes a turn about this sheave, to move freely toward the work, prevents it from being readily drawn in the opposite direction by the action of the measuring device when thread is taken from the source of supply to form a new stitch. The element cooperating with the sheave or the brake member proper, as illustrated, consists of a contact-piece 86, provided with a vertically-extending beveled end adapted to enter the groove in the sheave. This contact-piece is secured to or integral with the end of a shank 87, mounted to slide

longitudinally in ways, here shown as formed in the base-plate of the machine, the shank being retained in said ways by a projection 88 from the frame of the machine, which may be provided with a roll pressing upon the upper surface of the shank.

The brake member is provided upon the shank thereof with a pair of contact members consisting of lugs 89 89, through which are threaded oppositely-placed adjusting-screws 90 90. The lugs may be split at 91 and each provided with a screw 92 to draw the portions together and clamp the adjusting-screws in position. Above the shank is situated a bent lever 93, fulcrumed at 94 to the frame. A block or connector 95, formed with depressions at 96, into which extend the ends of the screws 92, furnishing a pivotal support therefor, is preferably provided with a somewhat elongated opening 97, into which extends a lateral pin or projection 98 upon the lower arm of the lever. This projection may, if desired, be integral with the arm of the levers, and it will be seen that while in the machine illustrated herewith it is convenient to use such a projection in others it might be omitted and the end of a lever lying in a single vertical plane project directly between the lugs. The other arm is provided with a projection 99, which may carry an antifric-tion-roll extending into a cam-groove 100 in a disk 101, fast upon the driving-shaft. This cam-groove is formed with a portion from *n* to *o* concentric to the driving-shaft, then with an inwardly-inclined portion from *o* to *p* approaching the shaft, from which point it continues concentric thereto to *q*, and is from that point inclined outward to join the other concentric portion at *n*. The needle-thread coming from a suitable wax-pot passes about the tension device 19, under the measuring device 18, over the guide-sheave 102 to the front of the machine, about the supporting and retaining sheave 81, under the brake member, and then over the sheaves of the take-up 20, as usual, to the work. The cam-disk is so set on the shaft that while the loop is being formed, expanded by the finger, and passed over the shuttle to surround the companion thread the brake member will be held clear of the sheave 81, the projection on the lever being in the portion of the groove from *n* to *o*. Then as the inwardly-inclined portion of the groove is reached the contact-piece of the brake is advanced into the groove in the sheave and is pressed against the thread therein, locking it against movement and enabling the take-up to tighten the stitch, the brake member being held in its thread-locking position while the projection on the lever is within the second concentric portion of the groove from *p* to *q*. When this has been accomplished, the outwardly-inclined portion of the groove withdraws the brake member and leaves the thread free for the formation of

the next stitch. It will be seen that with this locking device the thread is positively held against movement without the danger of the take-up "stealing thread" from the supply and failing to properly set the stitch, as may be the case when spring-pressed brakes are used, and also that by the location of the locking device near the take-up there is practically no length of loose thread to become stretched and impair the efficiency of the machine in drawing up the stitches.

It is believed the operation of the machine will be thoroughly understood without any further description.

Having thus described my invention, I claim—

1. In a shoe-sewing machine, a stitch-forming mechanism consisting of a needle, a shuttle rotatable continuously in one direction, driving mechanism for said shuttle whereby the speed is decreased as the hook approaches the loop of needle-thread and is then increased after the hook has entered said loop, a loop-forming mechanism, a finger in a plane at right angles to the needle supported in slidable ways and adapted to expand the loop held by the barb of the needle as the shuttle coöperates therewith, and a cam for giving a positive movement transversely of said loop in either direction.

2. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle, a support therefor, means for adjusting the finger longitudinally in said support, and means for moving the finger transversely of the loop held by the barb of the needle.

3. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle, a slidable support therefor consisting of two members, means having provision for the adjustment of said members relative to each other longitudinally of said support, means for adjusting said finger longitudinally in said support, and means for moving the support longitudinally of its bearing.

4. In a shoe-sewing machine, a stitch-forming mechanism consisting of a needle, a shuttle mechanism, a loop-forming mechanism, a cam-operated finger adapted to expand the loop as the shuttle coöperates therewith, a support therefor, and means for adjusting said finger longitudinally and transversely of said support.

5. In a shoe-sewing machine, a stitch-forming mechanism consisting of a needle, a shuttle mechanism, a loop-forming mechanism, and a cam-operated finger adjustably mounted in a slidable support and adapted to be moved to expand the loop held by the barb of the needle as the shuttle coöperates therewith.

6. In a shoe-sewing machine, the combination with a needle, of a shuttle provided with a hook and rotated continuously in one direc-

tion, driving mechanism for said shuttle whereby its speed of rotation is decreased as the hook approaches the loop of the needle-thread, and a movable finger at right angles to and acting upon the loop held by the barb of the needle before it is engaged by the hook and adjustable lengthwise in its supporting member.

7. In a shoe-sewing machine, the combination with a needle, of a shuttle provided with a hook and rotatable continuously in one direction, driving mechanism for said shuttle whereby its speed of rotation is decreased as the hook approaches the loop of needle-thread, a finger movable transversely of the loop held by the barb of the needle and acting thereon before its engagement by the hook, a support for said finger, and means for adjusting said finger in said support.

8. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle and supported for movement in a substantially horizontal plane transversely of the loop held by the barb of the needle, and positive means for moving said finger to expand the loop.

9. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle, a support therefor slidable in ways, and positive means for moving the finger transversely of the loop held by the barb of the needle to spread said loop.

10. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle, a support therefor slidable in ways, and a cam for positively moving the support longitudinally of the ways to move said finger transversely of the loop to expand the same.

11. In a shoe-sewing machine, a needle, a loop-expanding device comprising a finger in a plane at right angles to the needle, a support therefor slidable in ways, a roll carried by the support, and a disk provided with a groove into which said roll extends to move said finger transversely of the loop.

12. In a shoe-sewing machine, a loop-expanding device comprising a finger and a support therefor provided with a head movable to furnish an angular adjustment of the finger, and means for adjusting the finger longitudinally through the head.

13. In a shoe-sewing machine, the combination with a needle, of a finger located adjacent to the path of the needle at right angles thereto, and means for moving the finger in one direction to engage the loop of needle-thread and in the opposite direction for a less distance to release said loop.

14. In a shoe-sewing machine, the combination with a needle, of a finger located adjacent to the path of the needle at right angles thereto, and a disk mounted upon the driving-shaft of the machine provided with a cam-groove

having a portion concentric to the shaft, a second portion inclined outward from this concentric portion toward the periphery of the disk, and a third portion of less length than the second inclined toward the driving-shaft.

15. In a shoe-sewing machine, the combination with two sliding members, of a support movably mounted upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and means for moving the looper.

16. In a shoe-sewing machine, the combination with two sliding members, of a support movably mounted upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and means for moving the supports in intersecting paths.

17. In a shoe-sewing machine, the combination with two sliding members, of a support movably mounted upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and a rotatable cam-face acting upon each support.

18. In a shoe-sewing machine, the combination with two sliding members, of a support swiveled upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and means for moving the looper.

19. In a shoe-sewing machine, the combination with a looper, of two supporting-bearings therefor, a projection from each of said bearings, two rotatable cam-faces one of which coacts with one of the projections to move said looper-supporting means laterally, and a lever intermediate the other projection and the second cam-face to move said looper-supporting means longitudinally.

20. In a shoe-sewing machine, the combination with a looper, of a movable supporting means therefor, a plurality of projections from said supporting means, two rotatable cam-faces at right angles to each other, one of which coacts with one of the projections, and a lever intermediate the other projection and the second cam-face.

21. In a shoe-sewing machine, the combination with a looper, of a movable supporting means therefor, a plurality of projections from said supporting means, a rotatable disk provided with a cam-groove in its periphery coacting with one of the projections and a second cam-groove in one side, and a lever coacting with the latter groove and with the other projection upon the support.

22. In a shoe-sewing machine, the combination with slides mounted in ways, of supports upon the slides, a looper carried by the supports, a rotatable disk provided with a peripheral and a lateral cam-groove, a roller upon one support projecting into the peripheral groove, a projection upon the other support,

and a lever engaging said projection and the lateral groove.

23. In a shoe-sewing machine, the combination with slides mounted in ways lying at right angles to each other, of supports swiveled upon the slides, a looper carried by the supports, a rotatable disk provided with a peripheral and a lateral cam-groove, a roller upon one support projecting into the peripheral groove, a projection upon the other support, and a lever engaging said projection and the lateral groove.

24. In a shoe-sewing machine, the combination with a looper, of two independent sliding members, a support movably mounted upon each member, a carrier secured to one support and slidable through the other, and independent means for moving each of said sliding members.

25. In a shoe-sewing machine, the combination with a looper, of two independent sliding members, a support movably mounted upon each member, a carrier secured to one support and slidable through the other, and independent means for moving each of said sliding members in paths perpendicular to each other.

26. In a shoe-sewing machine, the combination with two sliding members, of a support swiveled upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and means for moving each of said sliding members.

27. In a shoe-sewing machine, the combination with two sliding members, of a support swiveled upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, and means for moving each of said sliding members in paths perpendicular to each other.

28. In a shoe-sewing machine, the combination with two sliding members, of a support swiveled upon each member, a carrier secured to one support and slidable through the other, a looper mounted upon the carrier, two rotatable cam-faces at right angles to each other, one of which operates one of said sliding members, and a lever intermediate another sliding member and the second cam-face.

29. In a shoe-sewing machine, the combination with a looper, of two independent slidable bearings therefor, guides therefor, and means for moving said bearings.

30. In a shoe-sewing machine, the combination with a looper, of two independent slidable members, guides therefor, a swiveled support for said looper upon each member, and means for moving said members.

31. In a shoe-sewing machine, the combination with a looper, of two independent slidable bearings, guides therefor, and independent means for moving them in intersecting paths.

32. In a shoe-sewing machine, the combina-

tion with a looper, of two independent slidable bearings, guides therefor, and independent means for moving them in intersecting paths perpendicular to each other.

5 33. In a shoe-sewing machine, the combination with a looper, of two independent slidable members, guides therefor, a support for said looper upon each member, and means for moving said members.

10 34. In a shoe-sewing machine, the combination with a looper, of two independent slidable bearings therefor movable in intersecting paths, guides therefor, and rotatable cam-faces operable to move said slidable bearings.

15 35. In a shoe-sewing machine, the combination with a looper, of two independent swiveled supporting-bearings therefor, guides therefor, and means for moving them in intersecting paths.

20 36. In a shoe-sewing machine, the combination with a looper, of two independent slidable members, guides therefor, a support upon each member, a carrier mounted in said supports, and independent means for moving said

25 slidable members in intersecting paths.

37. In a shoe-sewing machine, the combination with a looper, of a carrier therefor, means

for moving said carrier, two independent slidable bearings therefor, one of which is movable longitudinally of the carrier and the other 30 transversely thereof, guides for said slidable bearings, and means for moving said bearings.

38. In a shoe-sewing machine, the combination with a looper, of two members movable in straight intersecting paths, a swiveled bearing 35 for said looper mounted on each member, guides on either side of said members, and independent means for moving each of said members.

39. In a shoe-sewing machine, the combination 40 with a looper, of two independent slidable members, guides on either side of each of said members, a swiveled bearing for said looper mounted on each member, means for moving one of said members in a straight line 45 longitudinally of the looper, and independent means for moving the other in a straight line at right angles to the movement of the former.

Signed by me, at Boston, Massachusetts, this 19th day of May, 1904.

WALTER E. LOMBARD.

Witnesses:

EDWIN T. LUCE,

NATHAN C. LOMBARD, 2d.