F. LA CHAPELLE.

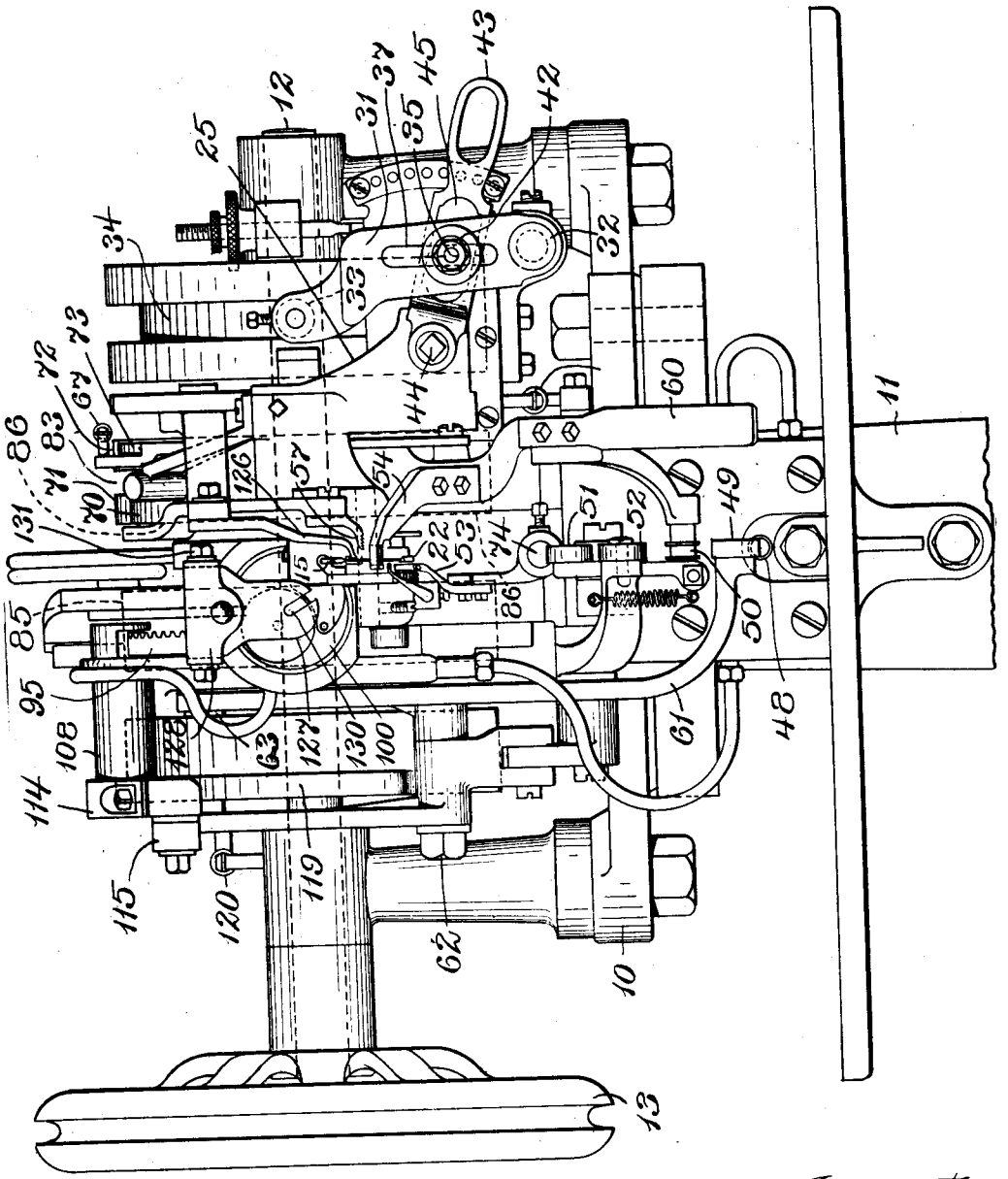
LOCK STITCH SHOE SEWING MACHINE.

APPLICATION FILED MAY 24, 1905.

1,048,549.

Patented Dec. 31, 1912.

8 SHEETS—SHEET 1.



Witnesses:
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Fig. 1.

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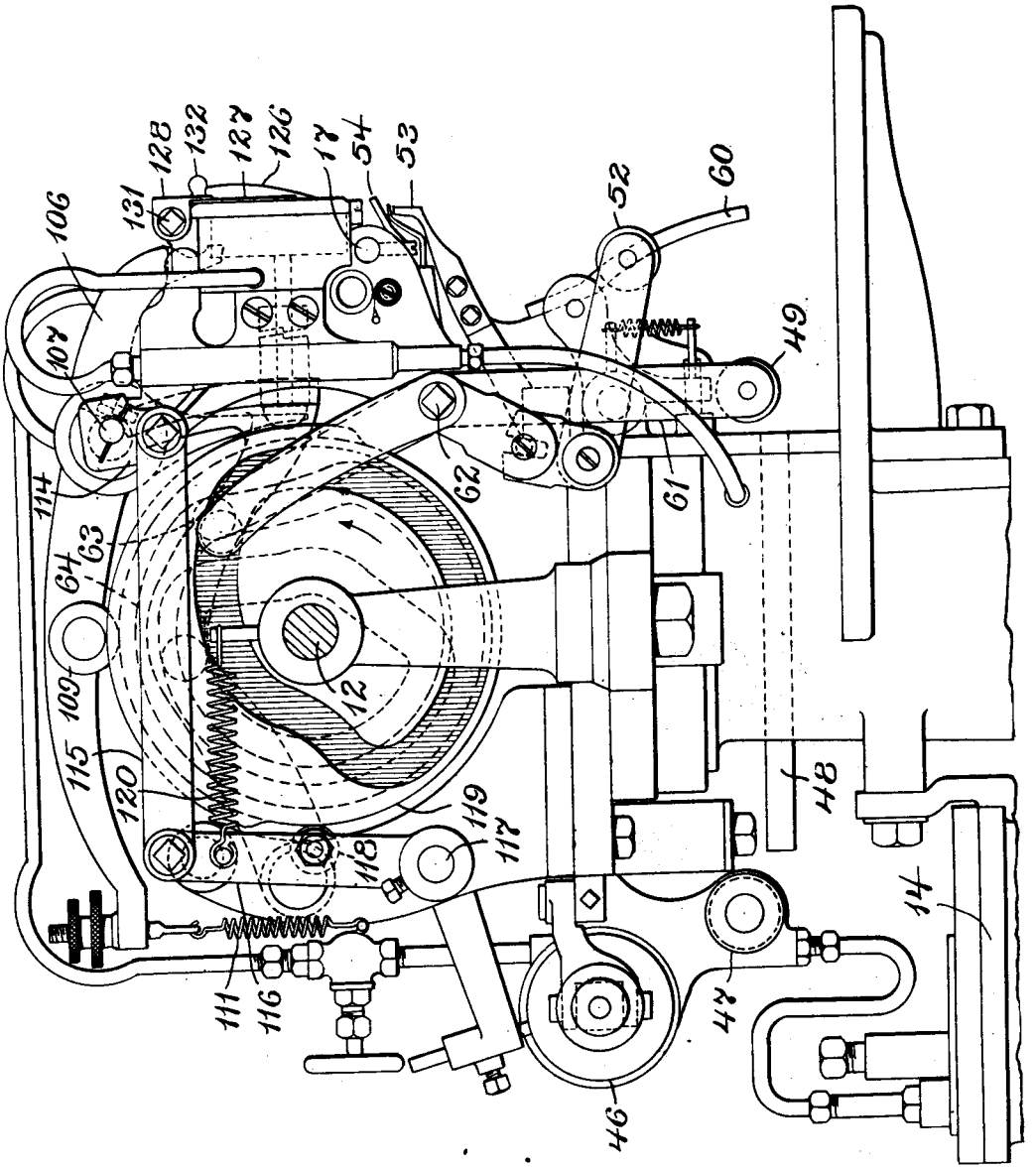

Fig. 2.

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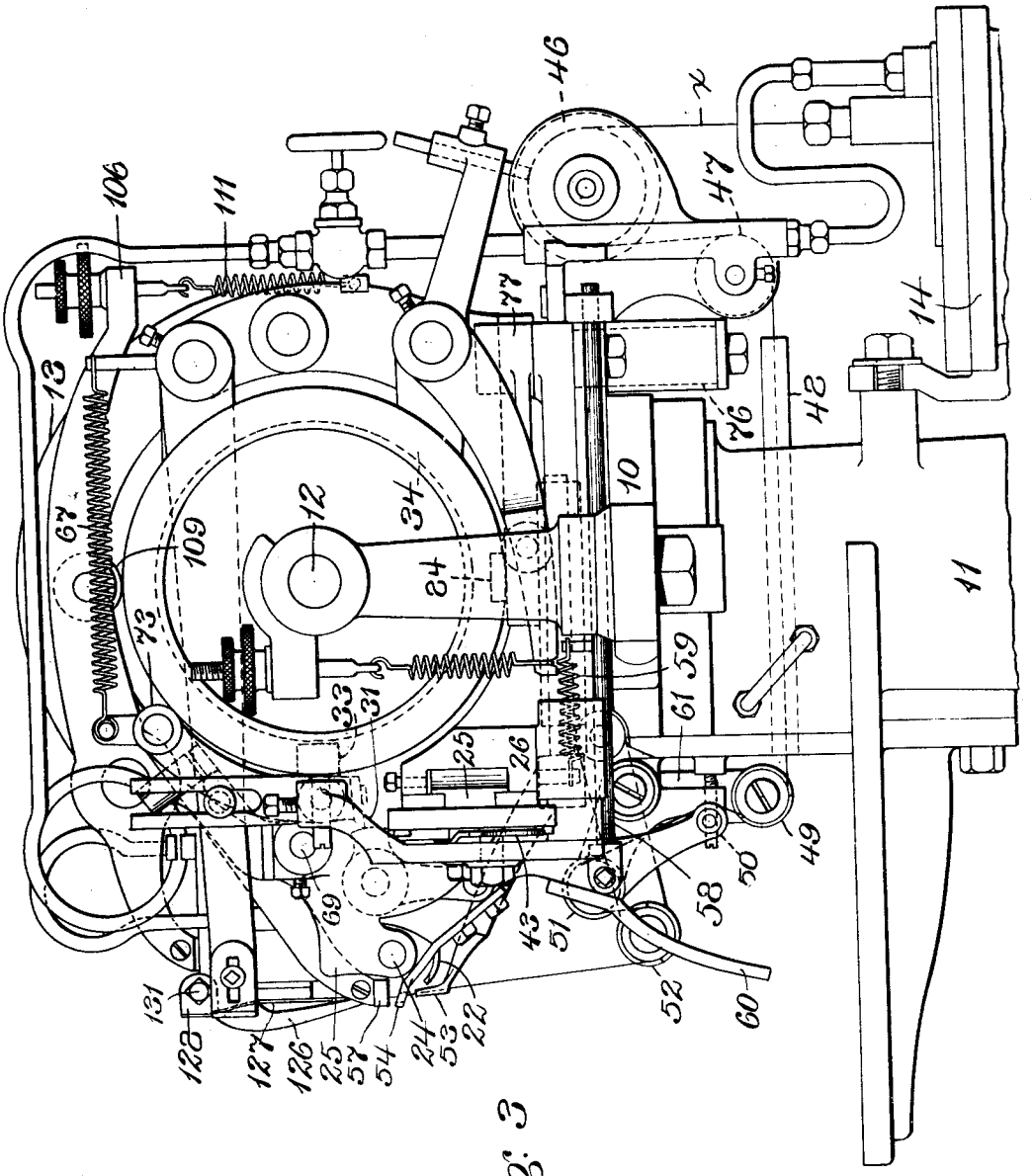

Fig. 3.

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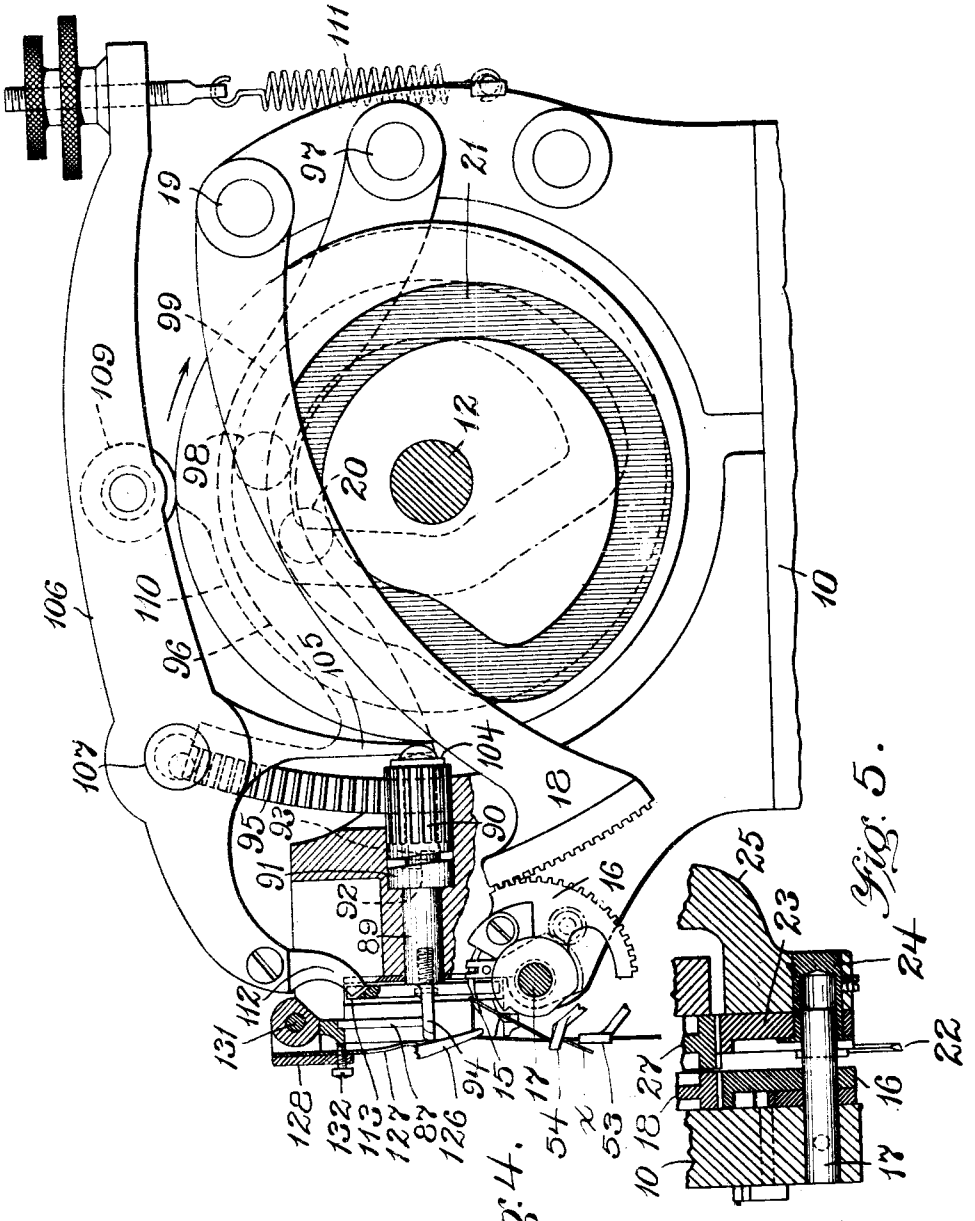

Fig. 4.

Fig. 5.

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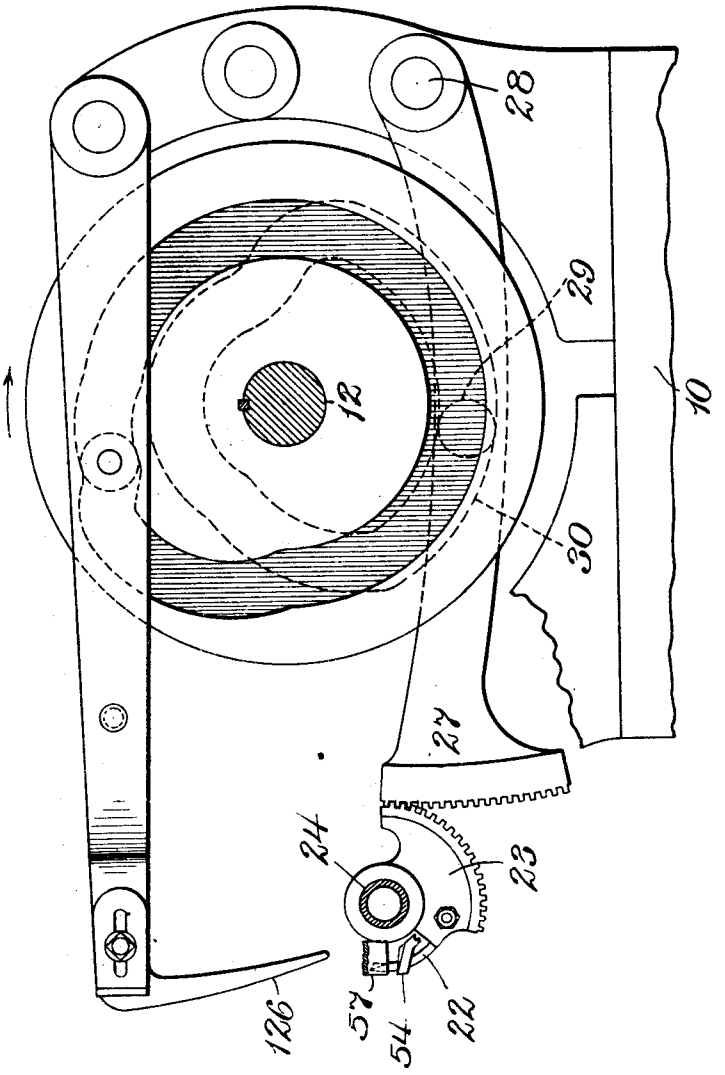

Fig. 6.

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8 SHEETS—SHEET 6.

Fig. 7.

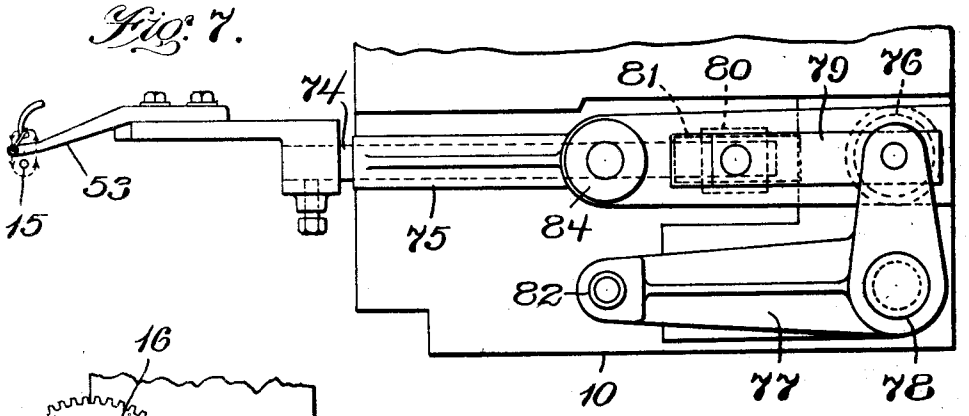


Fig. 8.

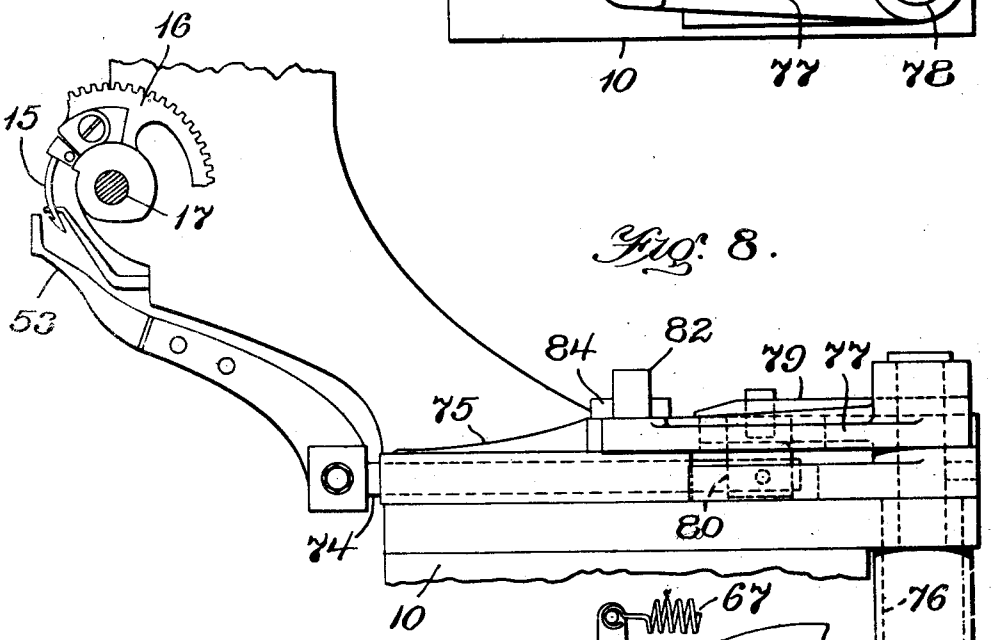
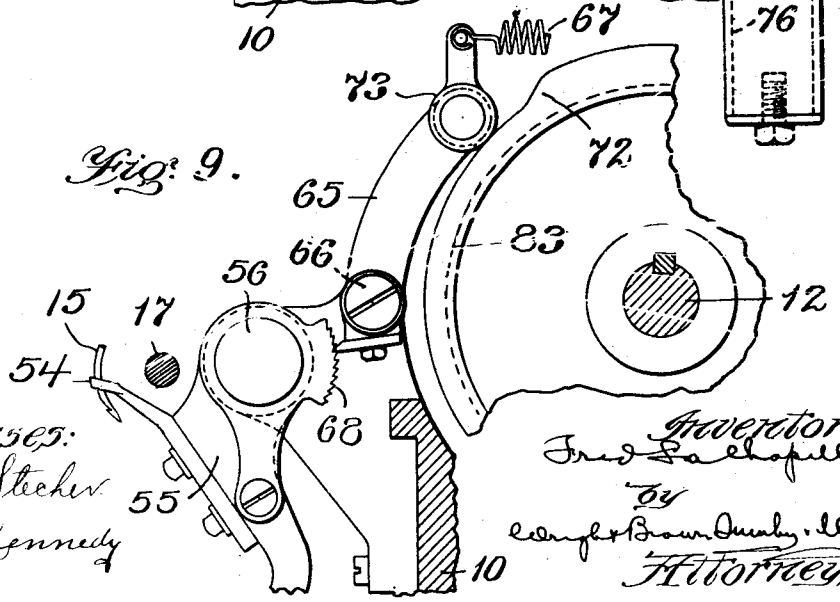


Fig. 9.



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1,048,549.

Patented Dec. 31, 1912.

8 SHEETS—SHEET 7.

Fig: 16.

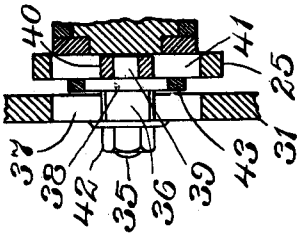


Fig: 11.

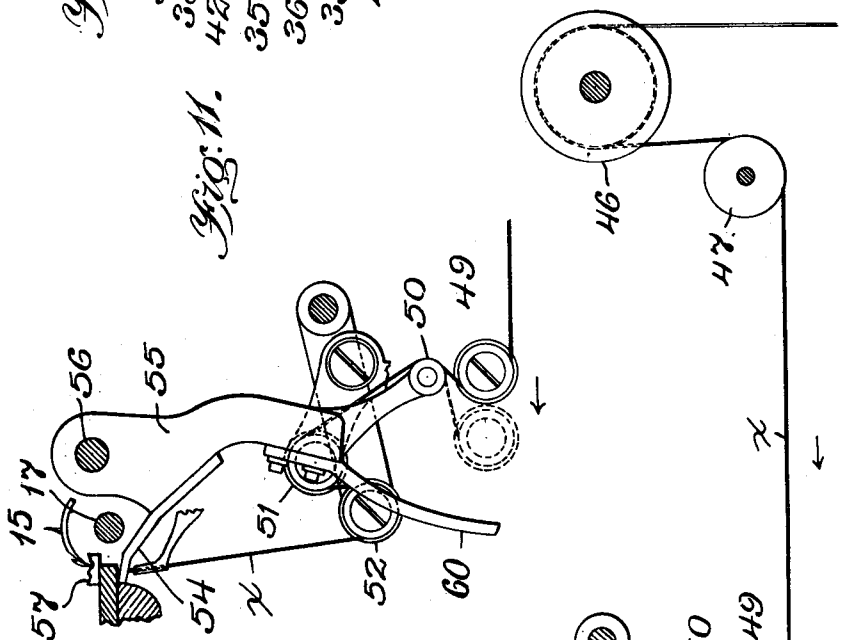
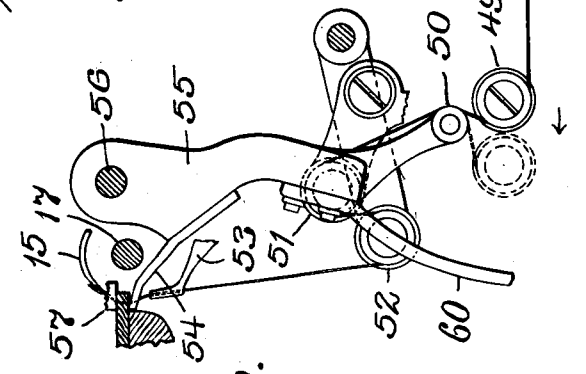


Fig: 10.



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1,048,549.

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8 SHEETS—SHEET 8.

Fig. 13.

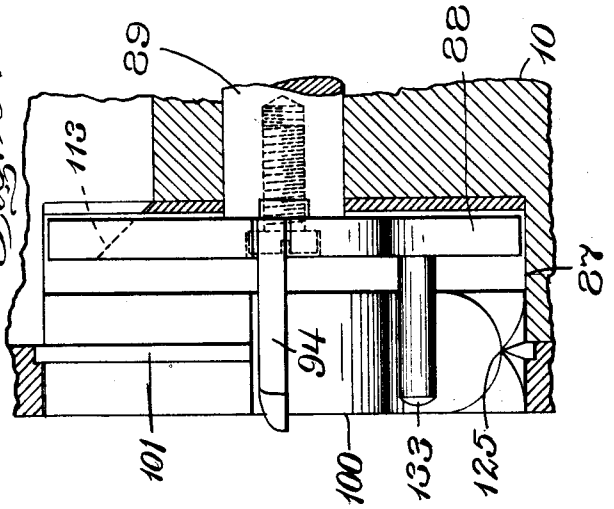


Fig. 15.

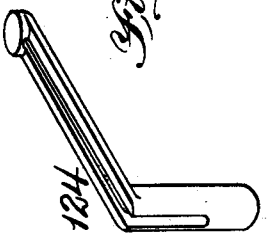


Fig. 12.

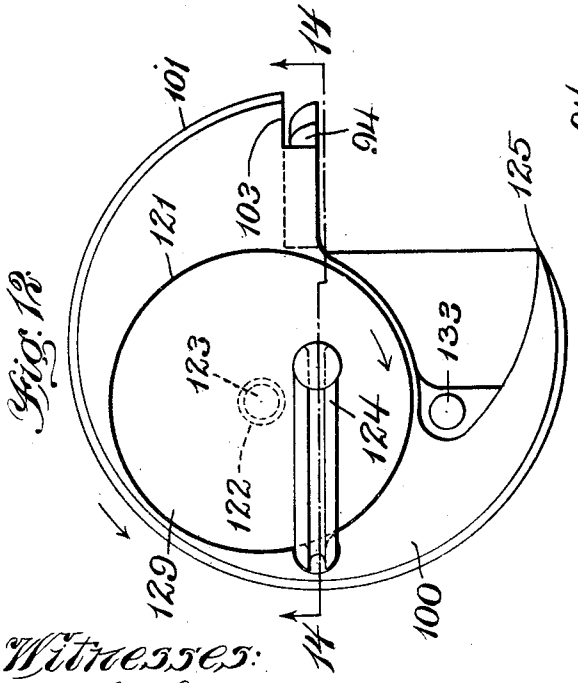
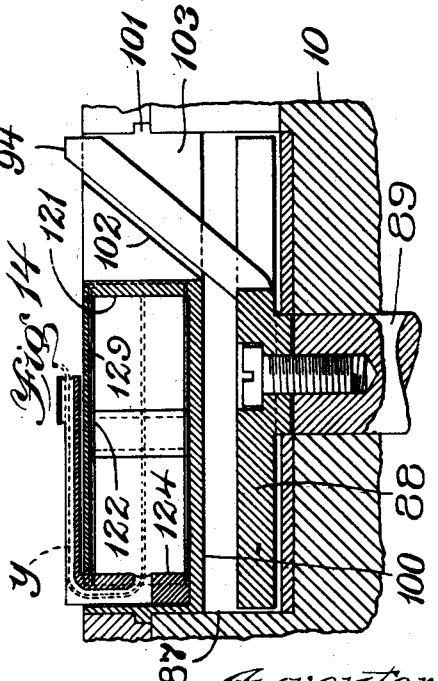


Fig. 14.



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UNITED STATES PATENT OFFICE.

FRED LA CHAPELLE, OF ASHLAND, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

LOCK-STITCH SHOE-SEWING MACHINE.

1,018,549. Specification of Letters Patent. Patented Dec. 31, 1912.

Application filed May 24, 1905. Serial No. 261,956.

To all whom it may concern:

Be it known that I, FRED LA CHAPELLE, of Ashland, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Lock-Stitch Shoe-Sewing Machines, of which the following is a specification.

This invention relates to lock-stitch shoe-sewing machines, and has for its object to provide certain new and simplified forms of mechanism designed to render the machine more efficient than those heretofore employed, and to improve the quality of the work performed thereby.

The machine herein illustrated is in general appearance and operation somewhat similar to those usually employed, and illustrated in Letters Patent No. 412,703, granted October 8th, 1889, to French and Meyer.

The principal features of the present invention are the shuttle with driving and locking mechanism therefor. The shuttle, unlike the oscillatory shuttle usually employed in a machine of this type, operates by an intermittent uni-direction rotary movement. By reason of this movement the shuttle requires much less driving power than the oscillatory shuttle, it operates more quietly, and permits the machine to be operated at a greater rate of speed.

Other improvements are hereinafter specified and illustrated upon the accompanying drawings, forming a part of this specification.

Of the said drawings:—Figure 1 is a front elevation of a lock-stitch shoe-sewing machine having the hereindescribed features of the invention. Fig. 2 is a left side elevation minus the driving pulley. Fig. 3 is a right side elevation. Fig. 4 is a vertical section of the shuttle and needle mechanisms. Fig. 5 is a horizontal section of the needle and awl carriers. Fig. 6 is a vertical section of the awl and spreader mechanism. Fig. 7 is a plan of the looper mechanism. Fig. 8 is a side elevation of the looper mechanism. Fig. 9 is a side elevation of the work-rest and locking mechanism therefor. Figs. 10 and 11 are diagrammatic views of the thread-measuring device. Fig. 12 is a front elevation of the shuttle. Fig. 13 is a vertical section therethrough. Fig. 14 is a section on the line 14—14 of Fig. 12. Fig. 15 is a perspective view of the shuttle thread-guide. Fig. 16 is a vertical section of a portion of the feeding mechanism.

The same reference characters indicate the same parts or features in all the drawings.

The machine herein illustrated comprises the usual head 10 mounted upon a standard 11 and having a driving shaft 12, pulley 13, wax-pot 14 and steam-heating pipes.

15 is the hooked oscillatory needle clamped in a toothed needle-carrier 16 which is oscillatably mounted on a stud 17 projecting from the head 10, (see Fig. 4). The toothed carrier intermeshes with and is driven by a gear segment 18 pivoted upon a stud 19 and having a trundle-roll 20 which coöperates with an operating cam 21 affixed to the shaft 12.

Awl.—22 is the oscillatory awl which cooperates with the needle. The awl is clamped to a toothed carrier 23 oscillatably mounted upon a hollow stud 24 projecting from a carriage 25 and into which the needle-stud 17 projects, (see Fig. 5). The studs 17 and 24 are independently mounted and yet are concentric enabling the carriers 16 and 23 to oscillate upon the same axis. The carriage 25 which carries the awl is mounted in a guide 26 on the head and adapted to be reciprocated laterally to feed the work. When so reciprocated, the awl and the stud 24 slide back and forth upon the stud 17. The toothed awl-carrier 23 intermeshes with and is oscillated by a gear-segment 27 pivoted upon a stud 28 and having a trundle-roll 29 which coöperates with an actuating cam 30 secured upon the shaft 12. The face of the segment is sufficiently broad to maintain operative engagement with the awl-carrier 23 which reciprocates axially with relation thereto.

Feed.—31 is a lever pivoted to the head by a stud 32 and having at its free end a trundle-roll 33 in operative engagement with a cam 34 secured upon the shaft 12.

35 is a stud connecting the lever 31 and the feeding carriage 25. Said stud has a flattened body 36 which is adapted to slide but not turn in a radial slot 37 in the lever 31, a flange 38 between the lever and the carriage, and a cylindrical end 39 provided with a flattened bushing 40 which is adapted to slide in a slot 41 in the carriage, (see Fig.

16). A nut 42 on the outer end of the stud serves to steady it, but not to bind it in any way to the lever 31.

43 is a feed-regulating handle pivoted by a stud 44 to the head 25, and having a slot 45 occupied by the flange 38 of the stud 35.

The lever 31 receives from the cam 34 a uniform movement which is transmitted to the carriage 25 by the stud 35, but the stud may be manually shifted in the slots 37 and 41 by means of the handle 43 so as to be moved to a greater or less extent by the lever, and move the carriage correspondingly.

The needle-thread x is drawn from the wax-pot 14 over a tension truck 46, under an idle roll 47, through a tube 48, under the pulling roll 49, the measuring roll 50, take-up rolls 51, 52, and through the looper 53 and work-rest 54 to the needle. The work-rest and the measuring roll 50 are both carried by a supporting member 55 oscillatably mounted upon a stud 56 in the head 10. The sole a of a shoe to be sewed is inserted between the work-rest 54 and a presser-foot 57 mounted on the carriage 25. The work-rest is normally held upward by a rod 58 pivoted to the support 55 and held forward by a spring 59. The work-rest may be manually depressed from the presser-foot 57 by means of a handle 60 affixed to the support 55 to admit the sole, and when released, so that the spring 59 presses the work-rest against the sole, the positions of the work-rest and the measuring-roll 50 are determined by the thickness of the sole. The position of the roll 50 relatively to the roll 49 compensates for the thickness of the sole in measuring the thread for each stitch, as hereinafter explained.

The roll 49 is mounted on one end of a lever 61, (see Figs. 1, 2 and 3) which is fulcrumed upon a fixed stud 62 and has at its other end a trundle-roll 63 in operative engagement with a cam 64 secured upon the shaft 12. The cam 64 oscillates the lever 61 so as to move the pulling roll 49 uniformly back and forth once for each stitch, as indicated by full and dotted lines in Figs. 10 and 11. The full lines indicate the normal position of the roll 49, and it will be observed, by reason of the angularity of the thread x on either side of said roll in Fig. 10, that when the roll starts in the direction of the arrow the thread is drawn from the supply approximately as fast as the roll moves. As the roll advances however, the angularity of the thread constantly decreases so that near the end of the stroke the thread is being drawn nearly twice as fast as the roll moves. The quantity of thread thus drawn is sufficient for a stitch in the sole being sewed, but if a thicker sole such as that shown in Fig. 11 be inserted between the presser-foot and the work-rest, it causes the pulling-roll 49 to draw a correspondingly greater quantity of thread. It will be observed that the position of the measuring-roll 50 relatively to the pulling-roll 49 in Fig. 11, causes a decrease in the angularity of the thread extending around the roll 49. By reason of this decrease in the angularity of the thread the pulling roll 49, when it starts forward, draws the thread approximately one and one-half times as fast as the roll itself moves, increasing to twice as fast as it advances. The work-rest is locked during the feeding of the work by a pawl 65 pivoted upon a fixed stud 66 and held by a spring 67 in engagement with a segmental ratchet 68 affixed to the supporting member 55.

The presser-foot which is instrumental in feeding the work is fulcrumed upon a stud 69 carried by the carriage 25, and has at its upper end a roll 70 which is engaged by a cam 71 on the shaft 12. Just previous to the feeding movement of the carriage 25, the cam 71 rocks the presser-foot against the sole of the shoe which is supported by the work-rest, locked as described. The carriage then moves, carrying the presser-foot and the awl to the left, after which the cam 71 releases the presser-foot, and a cam 72 formed integrally therewith, engages a roll 73 on the pawl 65 and disengages said pawl from the ratchet 68, releasing the work-rest. The carriage is then returned to the right and the work-rest and presser-foot locked as before.

Looper.—The looper 53 which winds the thread around the barb of the needle is affixed to the forward end of a rod 74. Said rod is carried by and movable radially in an arm 75 which is adapted to oscillate laterally on a pivot 76 mounted in the head. A bell-crank lever 77 also pivoted to the head by a stud 78 is connected by a pivoted link 79 to a block 80 which is adapted to slide in a radial slot 81 in the arm 75. The rear end of the rod 74 is pinned in the block 80 and movable radially therewith but prevented from turning thereby. The lever 77 carries a roll 82 which is operatively engaged by a cam-groove 83 formed between the cams 71 and 72, and moved laterally to move the rod 74 radially in the arm 75. The arm is provided with a roller 84 which stands between a cam 85 and a cam 86 formed upon a flat face of the cam 71. The cams 85 and 86 serve to swing the arm 75 and the looper laterally and the radial movement already described is combined therewith to cause the looper to describe a nearly circular motion around the needle, (see Fig. 7).

Shuttle.—The shuttle, indicated by 100, which is not completely circular, comprising only about 270 degrees of a circle, is installed and adapted to rotate in a shuttle-race 87,

in which it is guided by a peripheral flange 101 The shuttle-race is made sufficiently deep to contain the head 88 of a rotary shuttle driver 89 mounted in a suitable bearing concentric to the shuttle, and to provide ample space between the shuttle and said head for the passage of the needle-thread *x*. Said driver is in the form of a shaft and carries a pinion 90 loosely mounted on its rear end. (see Fig. 4). Between the ends of the driver is a rigid collar 91 of which the rear face is inclined like a single ratchet-tooth to form an abutment 92. The forward face of the pinion, is similarly formed, having an abutment 93 adapted to engage the abutment 92, and when rotated to rotate the driver. The front face of the pinion constitutes a ratchet-toothed clutch, or clutch member, which coacts intermittently with the complemental face of the collar, or other clutch member, on the driver. It is evident that, while the clutch and the pinion are formed in one piece, this is not necessary although convenient. The head 88 has an inclined nose or extension 94 which projects across an undercut face 102 on the heel 103 of the shuttle, and when rotated by the pinion 90, said extension abuts against the heel and so rotates the shuttle. The extension is inclined for the purpose of deflecting the needle-thread and casting it off after the shuttle has passed through it, as hereinafter described, and the face 102 is so formed as to leave a clear space between it and the extension for the passage of the thread therebetween. The outward inclination of the finger or extension 94 is of great benefit in the casting off of the loop of needle thread, since it guides the loop axially and yet outwardly from the shuttle.

Shuttle-actuating mechanism.—95 is a crown gear segment on an arm 96 mounted to oscillate in operative engagement with the pinion 90, about a stud 97. Said arm carries a roll 98 in operative engagement with a cam 99 by which it is actuated to oscillate the pinion 90. By reason of the inclined faces of the abutments 92 and 93 on the collar and pinion, the pinion when oscillated to the right is forced toward the rear end of the driver, as in Fig. 4, instead of rotating it. Then previous to being oscillated to the left the pinion is moved into engagement with the collar by means of a cap 104 which is adapted to slide in and out of the end of the driver. Said cap is engaged by a finger 105 on a lever 106 fulcrumed upon an eccentric stud 107 journaled in a boss 108 on the head 10. The lever 106 has a roll 109 which is held in engagement with a cam 110 by a spring 111 attached to the rear end of the lever, and when said cam permits the roll to be depressed by the spring, the cap 104 and pinion are thrust forward by the finger 105. The lever 106 also carries a finger 112 which is adapted to enter a notch 113 in the periphery of the head 88 and so lock it. The movement of the lever 96 is such as to impart one revolution to the pinion and shuttle each time so that the notch 113 always stops at the same point. At the completion of the forward or left-hand movement of the pinion, the roll 109 is raised by the cam 110 to release the pinion from the collar 91 and at the same time the finger 112 is lowered into the notch 113, thereby locking the driver until the lever 106 is once more actuated to thrust the pinion into engagement with the collar, when the locking finger 112 is simultaneously raised out of the notch to release the driver. A pin 133 on the head 88 prevents the shuttle from running away from the head. The eccentric stud 107 on which the lever 106 is fulcrumed provides means whereby the finger 112 may be actuated to lock the driver without affecting the pinion 90. 114 is an arm clamped upon the opposite end of the stud 107, and connected by a pivoted link 115 to an arm 116 fulcrumed upon a stud 117 and having a roll 118 which is held against a cam 119 by a spring 120. At the completion of the motion imparted to the shuttle, and just prior to the hereinbefore described locking operation of the lever 106, the cam 119 permits the spring 120 to rock the arm 116 forward. This causes a partial rotation of the eccentric stud 107 which lowers the forward end of the lever 106 without causing any perceptible forward or backward movement of the finger 105, and so causes the finger 112 to seek the notch 113 before being rocked thereinto by the positive action of the cam 110.

The shuttle 109 has a cylindrical chamber 121 for the reception of a bobbin 122, and a stud 123 therein for the bobbin to turn on. The thread *y* indicated by dotted lines in Fig. 14 is guided from the exterior of the coil on the bobbin to a point on the axis of the shuttle by a thread-leader 124 having its shank secured in the shuttle outside the periphery of the bobbin. The thread-leader is so arranged with regard to the bobbin that the thread *y*, passing therethrough, may be caused to rotate the bobbin in the opposite direction to that in which the shuttle rotates. As the shuttle is rotated to the left, as indicated by the arrow in Fig. 12, the nose thereof enters the loop of thread *x* upon the needle 15 and the spreader 126, and so removes the loop from said needle and spreader. During the passage of the shuttle through the loop of thread *x*, the inner side of the loop passes between the shuttle and the driver-head 88, finally striking the inclined extension 94 by which it is deflected and cast off. A leaf spring 127 extending from a holder 128 is adapted to bear upon a washer 129 over the bobbin and so exacta

friction tension on the bobbin and shuttle and consequently on the thread *y*. Said spring has a notch 130, extending across the axis of the shuttle, through which the bobbin thread passes. The holder 128 is clamped to the head by bolts 131 and adjusted by a thumb-screw 132, and may be swung about the bolts to permit the removal of the bobbin or shuttle.

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. In a lock-stitch shoe-sewing machine, a rotary shuttle, a rotary driver for rotating said shuttle, a clutch member fast on said driver, an oscillatory and axially movable clutch member adapted when rotating in one direction to operatively engage and rotate said driver and to rotate independently thereof during its retrograde movement, means for oscillating said clutch consisting of a pinion and a segment in contact intermeshed relation therewith, means for causing said clutch to operatively engage said driver, and movable means for intermittently engaging and locking the driver independently of said clutch members.

2. In a lock-stitch shoe-sewing machine, a rotary shuttle, a rotary driver for rotating said shuttle, an oscillatory ratchet toothed clutch adapted when moving in one direction to operatively engage and rotate said driver and to move independently thereof during its retrograde movement, means for oscillating said clutch, means for locking the driver during said retrograde movement of the clutch, and means actuated by said locking means for causing said clutch to operatively engage said driver.

3. In a lock-stitch shoe-sewing machine, a rotary shuttle, a rotary driver for rotating said shuttle, an oscillatory clutch so toothed that it is adapted when moving in one direction to operatively engage and rotate said driver and to move independently thereof during its retrograde movement, means for oscillating said clutch, a notch in said driver, a member adapted to enter said notch, and to move said clutch into operative engagement with said driver and leave said notch substantially simultaneously, and means for moving said member to occupy said notch during retrograde movement of said clutch and to move said member out of said notch at the completion of said retrograde movement.

4. In a lock-stitch shoe-sewing machine, a rotary shuttle, a rotary driver for rotating said shuttle, an oscillatory longitudinally movable clutch adapted when rotating in one direction to operatively engage and rotate said driver and to rotate independently thereof during its retrograde movement, means for oscillating said clutch, a notch in said driver, a clutch moving and driver locking member adapted to release said clutch and enter said notch substantially simultaneously, and to leave said notch and move said clutch into engagement simultaneously, and means for actuating said member.

5. A lock-stitch shoe-sewing machine comprising a needle, a rotary shuttle adapted to take the loop from the needle, a shuttle-race, and a rotary driver having its axis at right angles to the plane of rotation of the shuttle and having an extension outwardly inclined relatively to the axis of the driver as at 94 adapted to abut against the heel of the shuttle and to cast off the looped thread, there being a free space between the shuttle and the driver for the passage of the thread.

6. A lock-stitch shoe-sewing machine comprising a rotary shuttle, means for rotating said shuttle in one direction, a rotary bobbin carried by said shuttle and free to turn therein, and a thread leader having its shank secured in the shuttle outside the periphery of the bobbin for guiding the thread from the exterior of the coil to a point on the axis of rotation of the shuttle.

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

FRED LA CHAPELLE.

Witnesses:
MARCUS B. MAY,
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