No. 788,213. PATENTED APR. 25, 1905.

R. L. LYONS.

STITCH FORMING MECHANISM FOR BUTTON SEWING MACHINES.

APPLICATION FILED MAY 23, 1904.

3 SHEETS—SHEET 1.

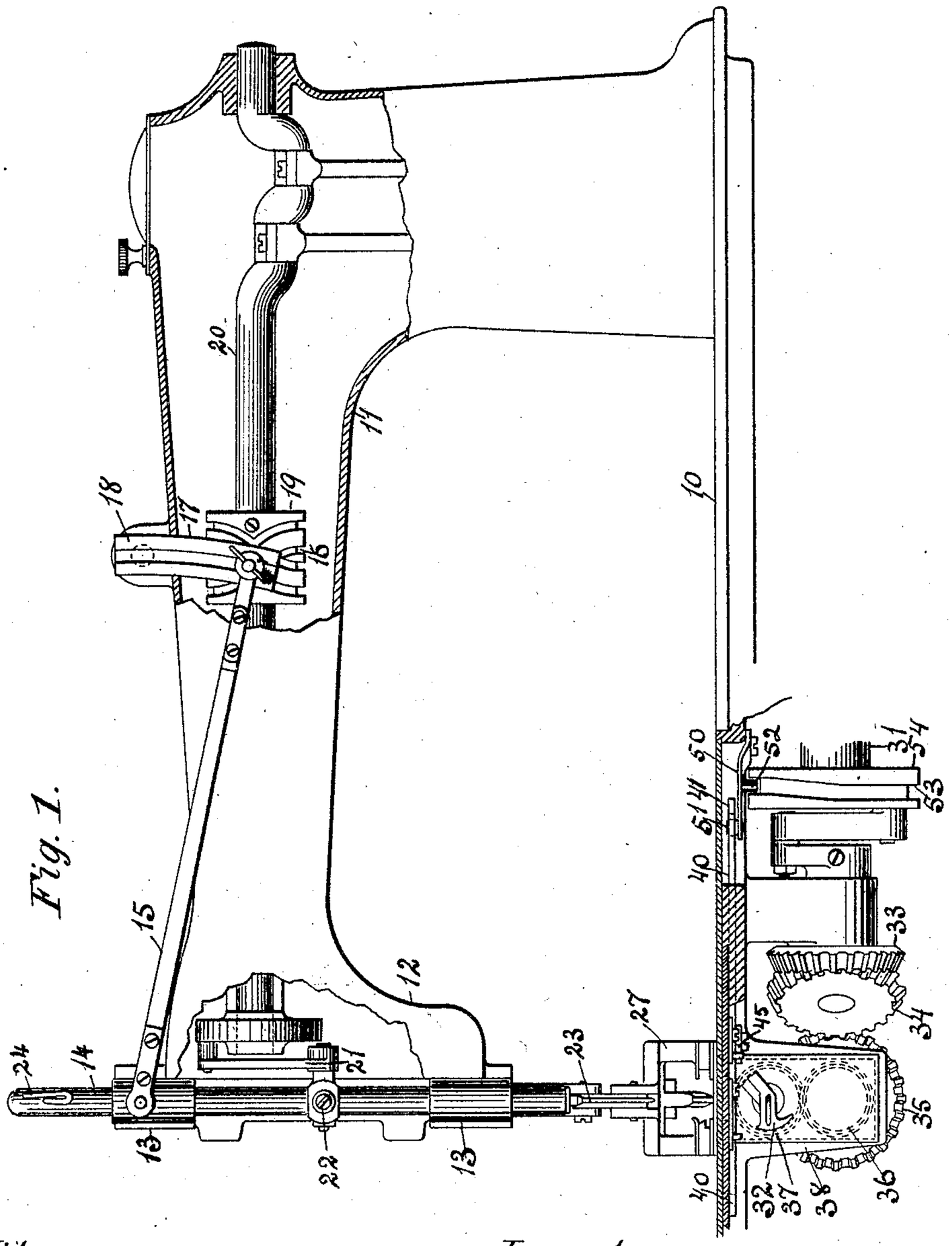

Fig. 1.

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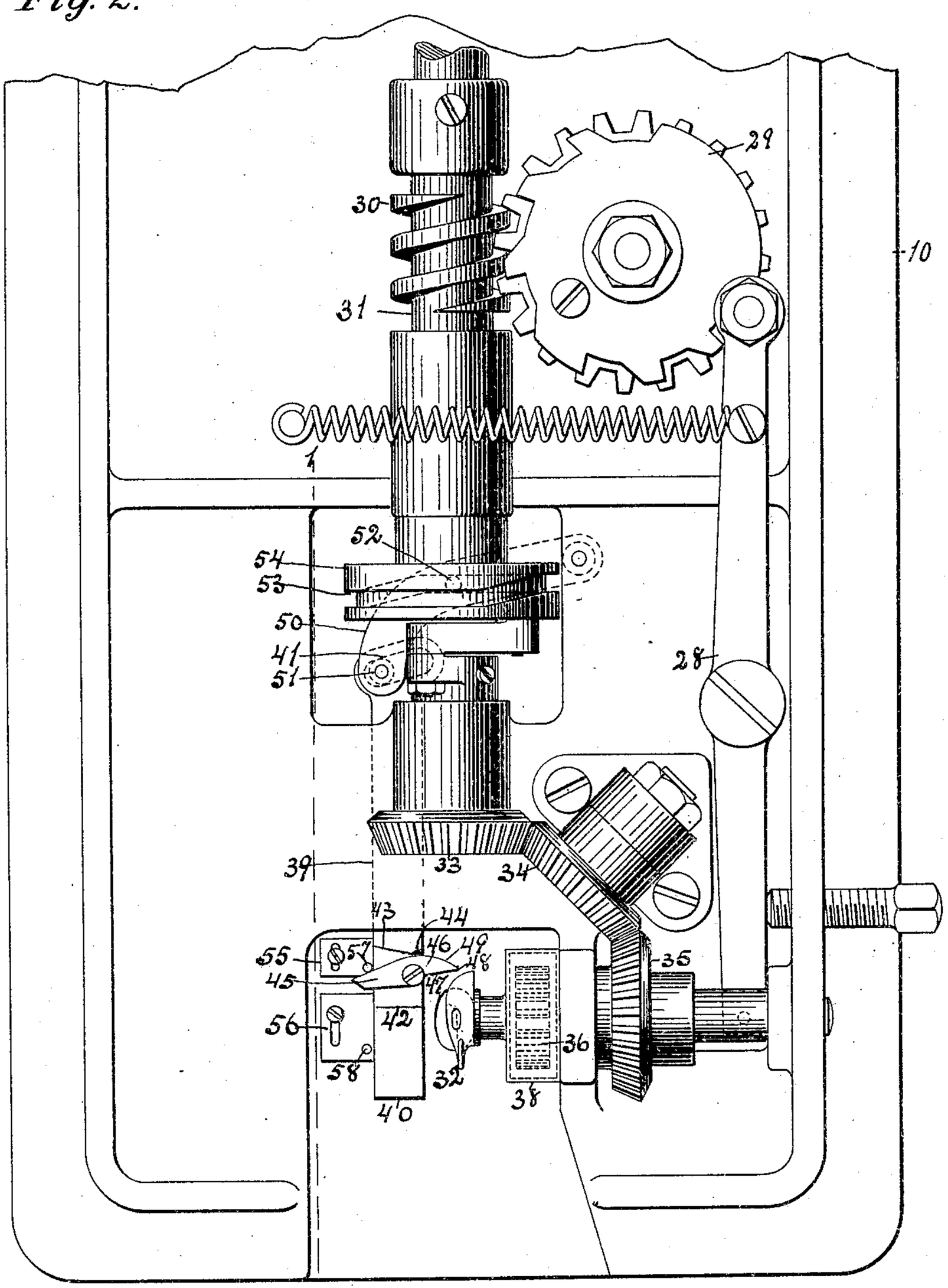
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

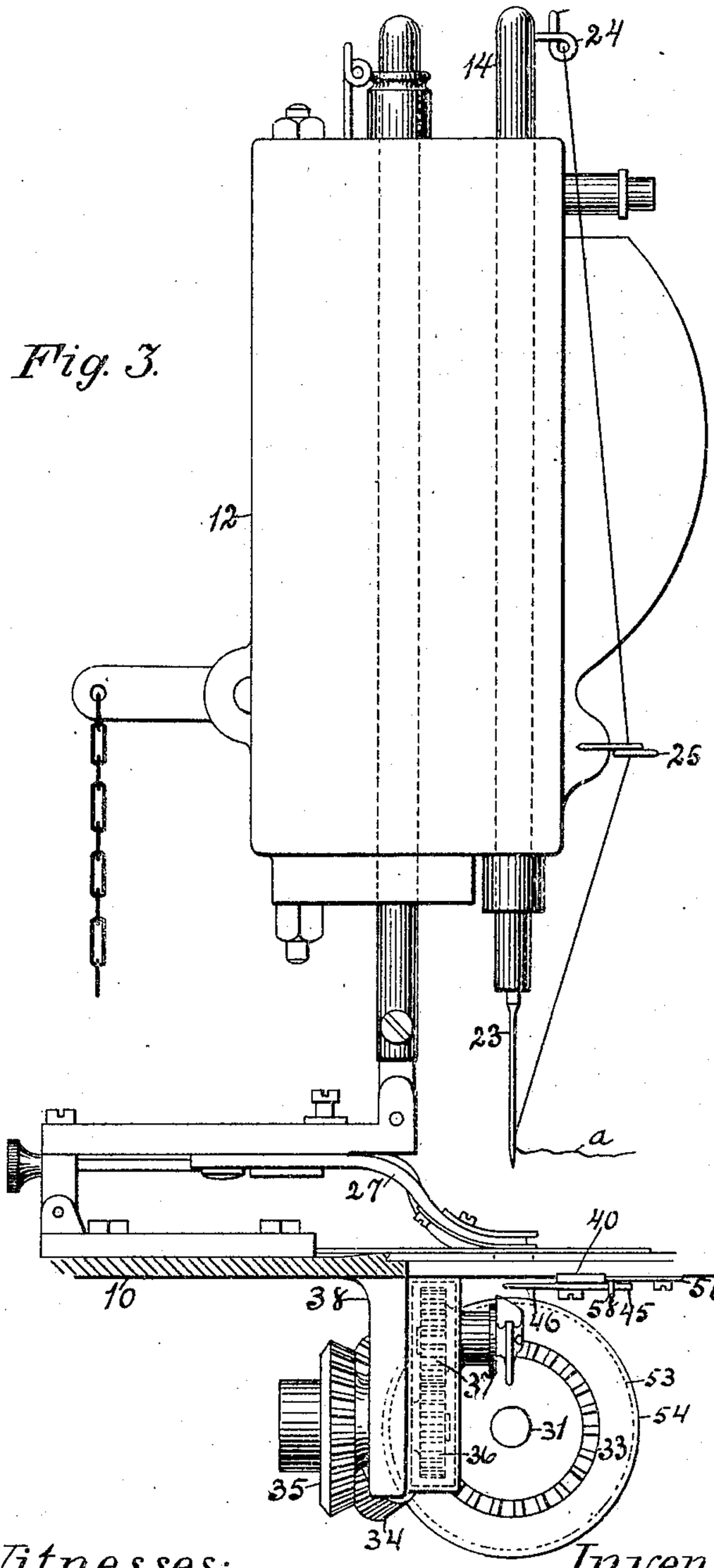


Fig. 4.

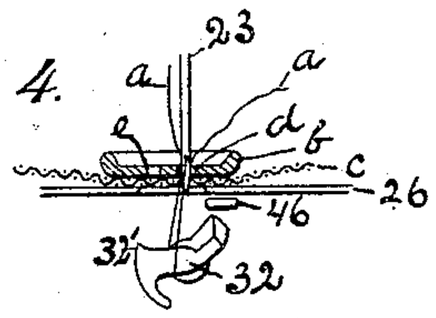


Fig. 5.

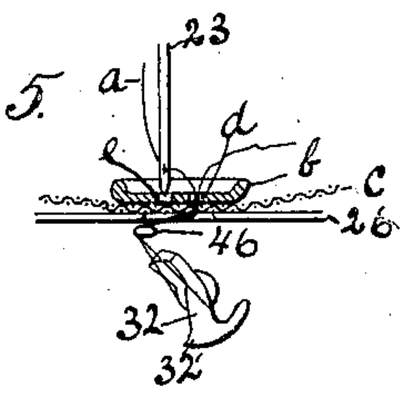
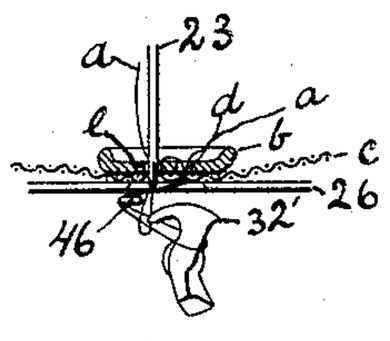


Fig. 6.



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UNITED STATES PATENT OFFICE.

ROBERT L. LYONS, OF WALTHAM, MASSACHUSETTS.

STITCH-FORMING MECHANISM FOR BUTTON-SEWING MACHINES.

SPECIFICATION forming part of Letters Patent No. 788,213, dated April 25, 1905.

Application filed May 23, 1904. Serial No. 209,172.

To all whom it may concern:

Be it known that I, ROBERT L. LYONS, of Waltham, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Stitch-Forming Mechanism for Button-Sewing Machines; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in stitch-forming mechanism for single-thread sewing-machines adapted for sewing on buttons or for similar work in which the work is held from progressive movement while a group of stitches is formed.

The object of the invention is to so construct a single-thread sewing-machine provided with means for vibrating the needle that the loops of the thread may be positioned to be cast off from the looper onto the next succeeding loop of the thread in the alternate paths in which the needle works.

Another object of the invention is to improve the construction of single-thread sewing-machines which are provided with means for vibrating the needle.

The invention also consists in a sewing-machine comprising a needle adapted to work successively in several paths and means for positioning a previously-formed loop in the particular path in which the needle is working.

The invention also consists in the construction of the thread-positioner and in the operating means therefor.

The invention also consists in such other novel features of construction and combination of parts as shall hereinafter be more fully described, and pointed out in the claims.

Figure 1 represents a side elevation, partially in section, of the improved sewing-machine, the main shaft being broken off. Fig. 2 represents an enlarged bottom plan view of portions of the same. Fig. 3 represents an end elevation of the same, partly in section. Figs. 4, 5, and 6 represent diagrammatic views of the needle, the looper, and the thread-positioner, illustrating successive steps in the operation of these parts in the sewing of a button to fabric.

Similar characters of reference designate corresponding parts throughout.

In carrying this invention into practice my main object has been to so construct a single-thread sewing-machine furnished with a vibrating needle that the first loop of thread may be positioned to receive the succeeding loop of thread delivered by the needle in a path removed from the path in which the first loop was delivered, whereby the looper in engaging the second loop may cast off the first loop onto said second loop, thus adapting the single-thread sewing-machine, with its vibrating needle, to the sewing of buttons to fabric and for other uses in which the work may remain stationary while a group of stitches is formed.

As shown in the drawings, 10 represents the bed-plate of the machine, on which is mounted the frame 11, having the head 12, carrying the needle-bar guides 13 13, in which the needle-bar 14 is free to slide vertically, the guides 13 being constructed and mounted in any well-known manner to permit the vibration of the same under the action of the usual needle-guide-vibrating mechanism, which is herein represented by the connecting-rod 15, pivoted to the upper of said guides and to the clamp 16, adjustable in the slot 17 of the plate 18, pivotally supported on the frame 11 and having any usual means working in the well-known cam 19 on the shaft 20, the construction of this needle-vibrating mechanism being shown and described in Letters Patent of the United States No. 762,544, granted to me June 14, 1904.

The shaft 20 is journaled in bearings in the frame 11 and is driven in any usual manner, being pivotally connected by the usual connecting-rod 21 with the stud 22, adjustably mounted on the needle-bar 14 to effect the vertical reciprocation of said bar under the rotation of the shaft 20, as is well known. The needle-bar 14 is furnished at its lower end with any ordinary means for securing the needle 23 in place, and guide-eyes 24 and 25 are provided to guide the thread *a* to the needle.

The bed-plate 10 is furnished with the usual throat-plate 26, having the usual needle-passage, as is shown in Figs. 4, 5, and 6.

In the present machine a button-clamp 27 is mounted on the bed-plate 10, this clamp being caused to move laterally, as usual, by the lever 28, pivoted at the under side of the bed-plate and actuated by the rotatable cam 29, the gear of which works in engagement with the worm 30 of the usual main shaft 31, suitably mounted on the bed-plate, this shaft 31 being also designed to drive the hook or looper 32 through the train of gears 33, 34, 35, 36, and 37, said looper being journaled in the bracket 38, depending from the bed-plate 10, and being so positioned beneath the needle-passage of the throat-plate that the hook end of the looper may engage the loop of thread carried downward by the needle.

Referring now to Fig. 4 of the drawings, it will be seen that for the purpose of sewing the button *b* to the fabric *c* the needle 23 must move successively in two vertical paths, which are herein defined by the perforations *d* and *e* of the button. In said figure the needle 23 is illustrated as having passed downward through the perforation *d* and being now on its upward movement, the tension on the thread *a* tending to draw the thread toward the axial portion of the looper, as shown. If after its full upward movement the needle is now passed down through the path defined by the perforation *e* of the button, the hook of the looper 32 will engage the second loop of the thread; but the first loop will be cast off from the rear end 32 of the looper as the hook engages the second loop, and no chain of loops will be formed. Thus the first loop will effect no useful purpose, as said first loop will simply be drawn out by the tension and the drawing action of the needle. In order that the loop of thread engaged by the hook of the looper 32 when the needle passes down through the path indicated by the perforation *d* of the button may be cast off onto the loop carried downward by the needle when it passes through the perforation *e* of the button, it is necessary that means should be provided for suitably positioning a portion of the first-mentioned loop approximately beneath the path of the needle in carrying downward the second loop. To accomplish this movement or positioning of the first of each pair of loops, the following-described mechanism is preferably used. At the lower portion of the bed-plate 10 is formed a guide 39, extending longitudinally of the bed-plate at one side of the needle-hole, as is indicated in dotted lines in Fig. 2. In this guide 39 is mounted the slide 40, having at its rear end the cam-slot 41, extending at an angle with the general extension of the slide and in its lower surface a recess 42, having the shoulders 43 and 44, and in this recess is pivotally mounted the arm 45, having the finger 46, the straight edge 47 of which ends in the tip 48, while the back edge 49 is inclined in its extension from such tip. To effect the reciprocation of the slide 40 from the main shaft 31, I provide the lever 50, having the pin 51, engaged with the cam-slot 41 of said slide 40, the lever 50 being pivotally mounted on the bed-plate 10 and having the pin 52, on which the cam-slot 53 of the cam 54, attached to the main shaft 31, works, this slot 53 of the cam 54 being shaped to cause the suitable actuation of the pin 52 and its lever to effect the desired reciprocation of the slide 40. At the under side of the bed-plate 10, adjacent to the slide 40, are adjustably mounted the plates 55 and 56, each having a pin 57 or 58, adapted to intercept the arm 45 as said arm is carried back and forth by the slide 40 to effect the swinging of said arm on its pivot.

At the downward movement of the needle through the path defined by the perforation *d* of the button the hook of looper 32 engages the loop of thread carried downward by the needle, as is indicated in Fig. 4. The needle then moves upward until it has moved out of the lateral path of the finger 46, and before the needle again moves downward across said path the slide 40 is driven forward by its actuating mechanism, and a portion of the loop of thread extending from the work to the looper is engaged by the finger 46 and is carried to the position shown in Figs. 5 and 6. In this movement the swinging of the arm 45 and its finger 46 is limited by the shoulder 44 of the slide 40, and the thread is prevented from sliding off the edge 47 by the slight angular extension of the tip 48. The needle during its movement above the work being brought into the path defined by the perforation *e* of the button by the vibration of the needle-bar guides now moves downward through the perforation *e* and carries a loop of thread to a position to be engaged by the hook of the looper 32, which approximately as it engages said second of the pair of loops casts off the first loop, which is subsequently drawn up on said second loop to form a chain. After the delivery of the second loop by the needle to the looper the needle again moves upward, and the slide 40 is drawn backward, the pivoting of the arm 45 and the inclined edge 49 of its finger 46 permitting this finger to ride against the thread extending between the looper and the work without engaging the same. In its next downward movement the needle carries its loop through the loop at that time engaged by the looper, which latter loop is cast off onto the new needle-loop after said needle-loop has been engaged by the looper.

It is not my intention to limit myself to the particular features of construction herein disclosed, as I am well aware that various mech-

anisms may be utilized to so position the first of a pair of separated loops that said loop may be cast off onto the second of said pair of loops, nor do I wish to confine myself to reciprocative means for accomplishing the object of this invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a single-thread sewing-machine, the combination with stitch-forming mechanism comprising a needle, needle vibrating and driving mechanism, and a looper, of a thread-positioner movably mounted to engage the needle-thread beneath the work and to move the same laterally, and actuating means for said positioner in driving connection with the main shaft.

2. In a single-thread sewing-machine, the combination with stitch-forming means comprising a needle, means for vibrating the needle, and a looper, of a needle-thread positioner movably mounted beneath the work and having a path of movement across the needle-path, and means for actuating said positioner to move the needle-thread laterally at alternate loop-delivery movements of the needle, as and for the purpose described.

3. In a sewing-machine, the combination with stitch-forming means including a needle and a looper, of the bed-plate 10, the slide 40 movably mounted in a guide of said bed-plate, the arm 45 pivotally mounted on said slide, plates adjustably mounted on the bed-plate and having pins for intercepting said arm, and connections between the slide and the main shaft for effecting the reciprocation of said slide, as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT L. LYONS.

Witnesses:
HENRY J. MILLER,
S. GOOSTRAY.