

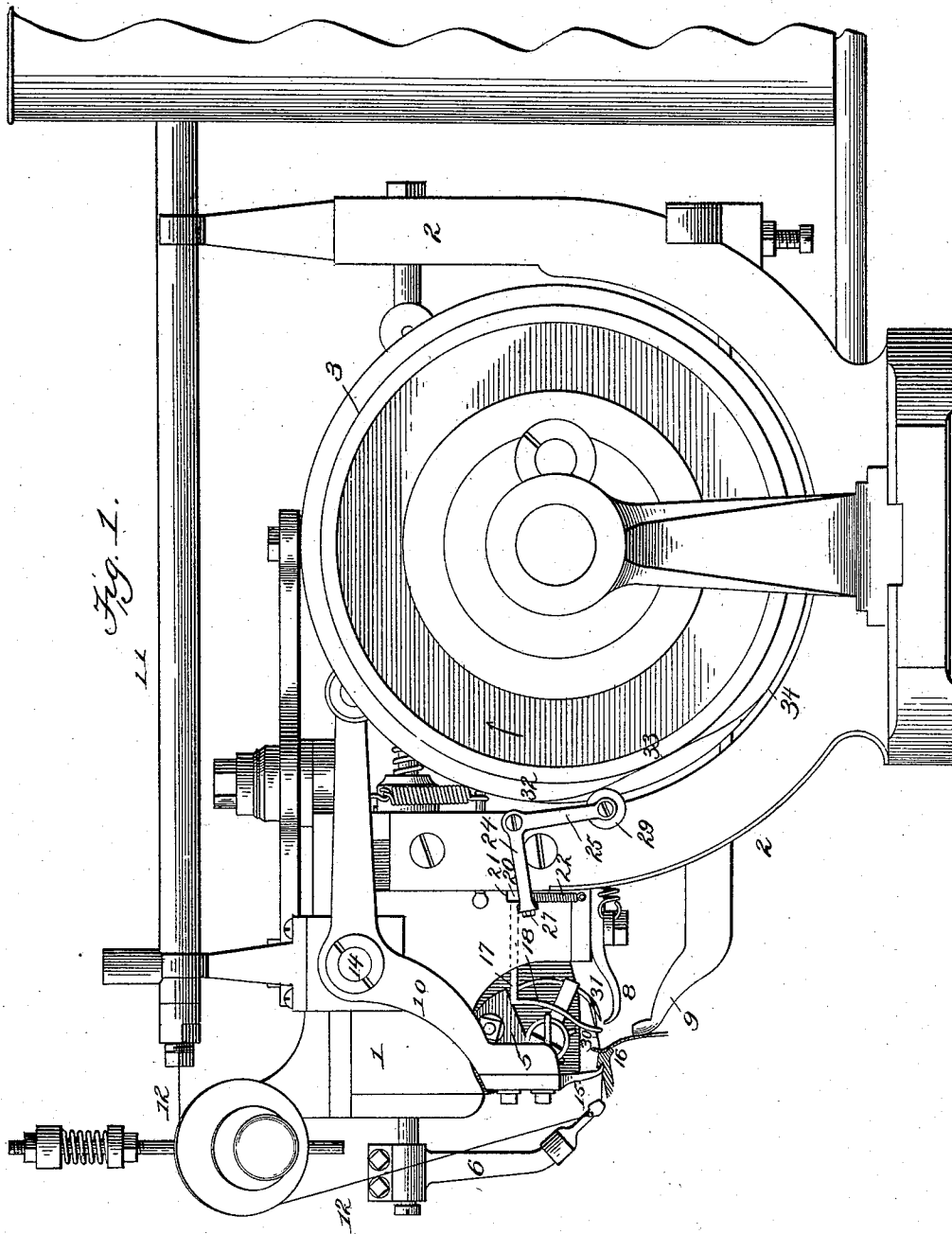
(No Model.)

3 Sheets—Sheet 1.

F. A. MILLS.
SEWING MACHINE.

No. 571,007.

Patented Nov. 10, 1896.



WITNESSES:

Edwin L. Bradford
 Wm. G. Steinhilber, Jr.

INVENTOR

Francis A. Mills
BY ^{att} Johnson Johnson
ATTORNEYS

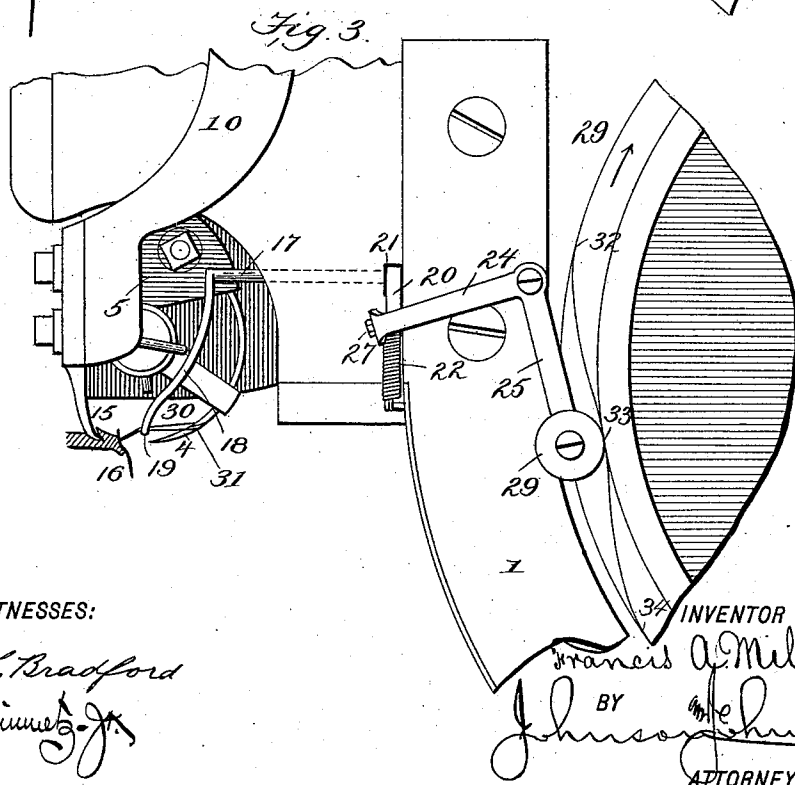
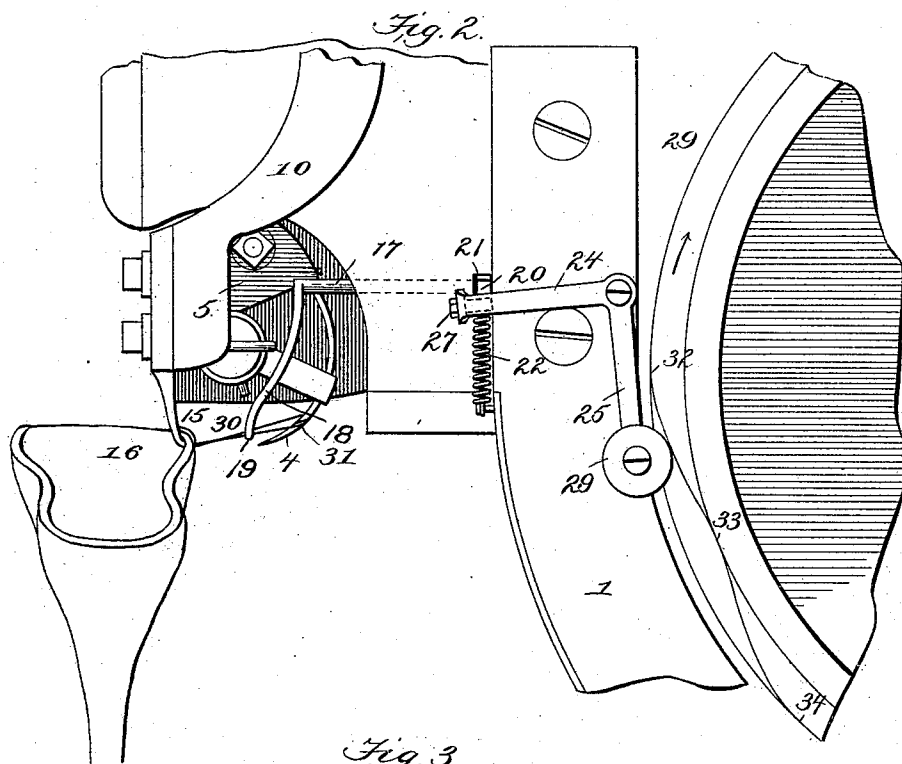
(No Model.)

3 Sheets—Sheet 2.

F. A. MILLS.
SEWING MACHINE.

No. 571,007.

Patented Nov. 10, 1896.



WITNESSES:

Edwin L. Bradford
A. G. Stearns, Jr.

INVENTOR
Francis A. Mills
BY
John S. Johnson
ATTORNEYS

(No Model.)

3 Sheets—Sheet 3.

F. A. MILLS.
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Fig. 4.

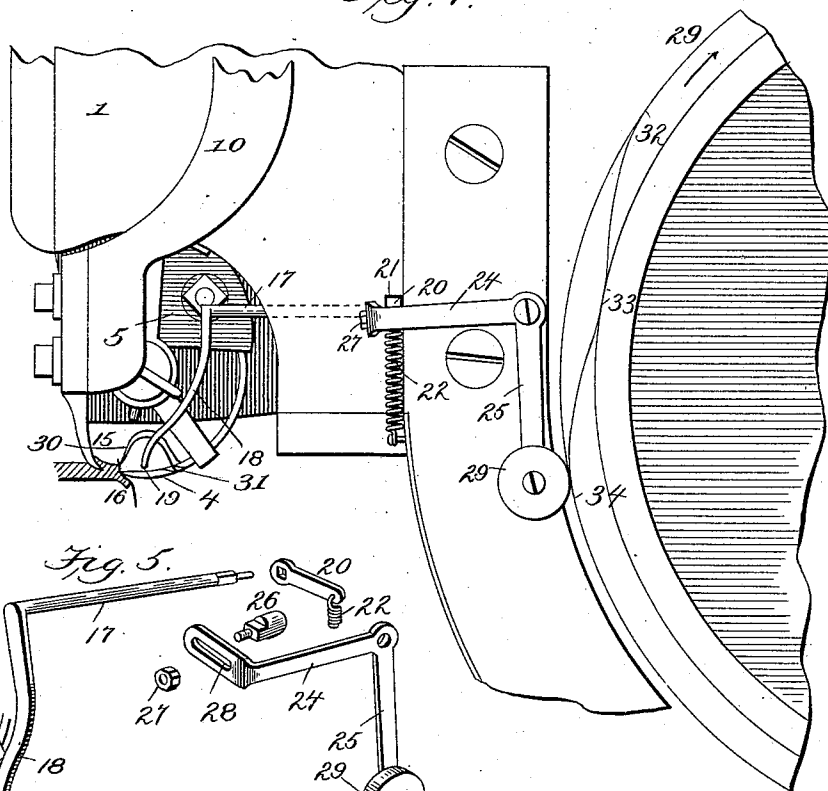


Fig. 5.

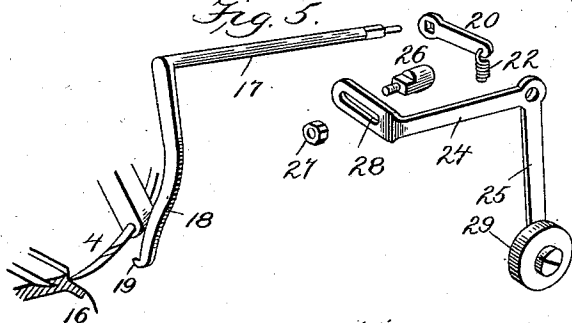
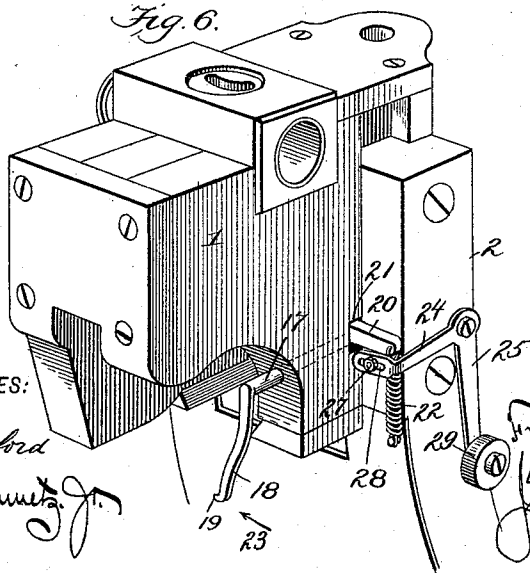


Fig. 6.



WITNESSES:

Edwin L. Bradford
Tom. G. Steinmetz, Jr.

INVENTOR

Francis A. Mills

ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANCIS ARTHUR MILLS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
OF ONE-HALF TO JAMES MUNDELL, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,007, dated November 10, 1896.

Application filed April 17, 1895. Serial No. 546,128. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS ARTHUR MILLS, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have
5 invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

In loop-stitch sewing-machines, and particularly in such machines using waxed
10 thread, the needle is constantly liable to lose and often does lose the loop from the barb of the needle after it has pulled the loop through the work to set the stitch—that is, the loop often becomes disengaged from the barb and
15 slips off or escapes from the needle. This is a troublesome difficulty, as the escaping of the loop from the needle causes the skipping of stitches.

My invention is directed to provision for
20 preventing the needle from freeing itself of the loop in the operation of the machine.

In the operation of loop-stitch sewing-machines I have found that the primary cause of skipping stitches is due to the opening or
25 spreading of the loop while the needle is approaching the work. As this spreading takes place in the path of the needle, the latter is thereby caused to pass through and free itself of the loop. One of the causes of the
30 spreading of the loop is produced in wax-thread machines by the wax on the loop sticking in the eye or barb of the needle and acting in a way that pushes the loop open in the path of the needle, so that the latter
35 passes out and frees itself of the loop in its forward movement to pierce the work. In Figure 4 of the drawings the loop, as it is held in the barb, is shown as having been kinked or deflected to one side of the path of the
40 needle as it moves forward to pierce the work, so that the liability of the needle to escape or free itself of the loop is reduced to a minimum if not, indeed, made practically impossible. In Figs. 2 and 3 the deflecting-finger
45 is shown in the position it occupies to act upon the loop to pass both sides or strands thereof to one side of the needle at the time the latter is about to move forward.

Referring to the accompanying drawings,
50 Fig. 1 shows in side view so much of a loop-stitch sewing-machine as embodies my in-

vention of a loop-finger device for kinking or deflecting the loop held in the barb of the needle to prevent its escape from the needle in its forward movement to pierce the work. 55
Fig. 2 is a side view of so much of the machine as illustrates the position of the loop-finger device in its relation to its actuating-cam, the needle, and the work to kink or deflect the loop out of a straight line as it is
60 held in the barb of the needle. Fig. 3 is a similar view showing the position of the needle as having moved nearer the work, causing the loop to slack, and the finger in the position it occupies in causing the loop to be
65 closed and passed over the top of the needle to one side to hold it on the barb. Fig. 4 is a similar view showing the position of the needle at the instant of entering the work and the position of the loop-kinking finger
70 out of the way of the needle-guide, the loop being shown with its full slack at one side of the needle. Fig. 5 shows in detail the parts which compose the loop-kinking finger and its operating connections, and Fig. 6 is a view
75 in perspective of so much of the sewing-head as illustrates the relation thereto of the loop-kinking-finger device and its operating connections.

Referring to Fig. 1, so much of the machine 80 as is illustrated is organized after the construction shown and described in my patent of August 14, 1894, No. 524,336, and it is to such machine that my present invention is adapted for use, but it is obvious that my invention of a loop-kinking device can be applied for use with other forms and constructions of machines. The sewing mechanism
85 is mounted in a housing structure or head 1 at the front end of a supporting-frame 2, within or upon which is mounted suitable cam-cylinders 3 for operating the several members of the mechanism employed in sewing the loop-stitch. As such loop-stitch-forming mechanism is well understood, it is
90 deemed unnecessary to particularly describe the elements or members thereof or their operation. A brief designation, however, of the elements of such mechanism is deemed
95 necessary in connection with my present improvements, and for such mechanism more particularly reference is had to my said pat-

ent. The needle 4 is of the curved-barb construction, having the barb on its left side looking at the front of the machine, and is supported by a guide and is fitted in a carrier 5, which is mounted to have a reciprocating movement in the arc of a circle. In front of the needle a looper-arm 6 hangs and is mounted above the needle to have an oscillating movement in front of, across the path of, and around the eye or barb of the needle.

A back gage 8 and a slide-rest 9 support the lasted shoe in position to the sewing mechanism, while the feed-lever 10 is mounted to operate in the channel of the sole to feed the work between each stitch, the work being held by the feed-lever and the back gage while the needle is moving to enter and to draw the loop through the between substances.

The machine is provided with suitable heating and waxing devices which may be mounted upon the rear end of the machine, while the tension device is mounted upon the top of the sewing-head above the looper-arm, so that the conduit 11, containing the waxing tube for the thread 12, will pass from the wax-pot in a straight line to the tension device to deliver the waxed thread in close proximity to the tension-wheel 13.

Referring to Figs. 1 and 6, the side plate of the sewing-head is shown as having an under curved or arched open space within which the feed-lever, which is pivoted at 14, works with its feed-arm 15 in position to enter the channel of the sole 16 to feed the shoe. In the wall of this arch is suitably mounted a horizontal rod 17, so that its end extends within the arch and has a finger 18, which, like a crank-arm, stands downward with its lower end in position to cross the path of the curved needle, and has an oscillating movement toward and from the loop. The lower end of this finger 18 terminates in a tooth 19 at its inner side. The other end of the rod 17 has a horizontal arm 20, which extends through an opening 21 in the side plate of the sewing-head and is connected by a spring 22 to the frame, so as to constantly exert a downward force on said arm 20, and therefore a force tending to move the toothed end of the finger inward across the path of the needle in the direction of the arrow 23 in Fig. 6. A bell-crank lever is pivoted to the frame in position with one of its arms 24 to engage the arm 20, the other arm 25 of said lever hanging in position to engage a cam on the cam-cylinder, as seen in Fig. 1.

The engagement of the bell-crank arm 24 with the loop-finger-actuating arm 20 I prefer to make by a cylindrical stud 26, secured by a square seat and nut 27 in a slot 28, in the end of the arm 24, which end stands parallel with the arm 20, so that the latter will press downward upon the arm 24, and thereby constantly press the lower end of the hanging arm 25 rearward, so as to maintain its roll 29 in contact with its actuating-cam. The

crank-arm 25 has a forward and backward vibratory movement, which imparts to the loop-finger 18 vibratory movement at right angles to the path of the needle in a way and for a purpose which I will now describe.

In the operation of the machine the function of the loop-kinking finger is as follows: Referring to Figs. 1 and 2, the loop-kinking finger is shown in the position about to kink the loop 30 between the eye or barb 31 of the needle and the work 16, and in this position the finger-operating cam-roll 29 is at a point midway between the points 32 and 33 of the cam, which has given the loop-finger a position from which it is about to act to kink the loop, as shown in Fig. 3, as the needle has moved slightly forward. The cam, continuing in the direction of the arrow, brings the finger-operating cam-roll 29 to the point 33, which is the extreme stroke of the cam for allowing the spring to operate the loop-finger to kink the loop, and in doing which it passes both sides or strands of the loop to one side of the needle and holds it until the needle has passed forward under the loop, as shown in Figs. 3 and 4, and in this movement said finger crosses above the path of the needle. This movement of the loop-finger has been caused by the action of the spring 22, which connects the inner end of the finger-arm 20 with the frame, the action of said spring being to constantly move the finger 18 toward the loop. The cam, continuing to move from the point 33 to the point 34, acts upon the finger-arm roll, so as to positively move the finger away from the kinked loop to its starting point, carrying the finger out of the path of the needle, as shown in Fig. 4, ready to repeat the operation of kinking the next loop. The finger-arm roll remains in this position to hold the loop-finger out of the way of the needle-guide, allowing the needle to move forward and penetrate the work to get the next loop, and to pull it through the work until the needle reaches the point shown in Fig. 1. It will be understood that during this operation of the finger all the stitch-forming elements are performing their respective functions as the shoe is being held by the operator and sewed, and that the tension-wheel is at no time locked.

I form the kinking-finger arm 18 with a tooth 19 at its point to pass under the loop and prevent the possibility of it dropping under the end of the finger, getting on its outer side and becoming entangled therewith. The length of the finger, however, is such as to extend down a sufficient distance below the line of the loop to render it certain to strike it, kink it, and hold it out of the path of the needle until the latter has passed under the loop, when the finger retreats from it.

I provide the slotted-arm connection 28 for the loop-kinking finger for the purpose of allowing the adjustment of the stroke of the finger to give the proper deflection to the loop by setting the stud 26 nearer the rocking rod 17 of

the finger will lengthen its stroke, and the reverse of such adjustment will shorten the stroke of the finger in relation to the loop.

The timing of the movements of the loop-deflecting finger in proper relation to the movements of the needle is more particularly stated as follows: After the needle has received the loop of thread in its barb it is pulled through the work by the needle until the latter reaches its full backward movement. As the needle commences to move forward the loop will become slack and the finger pressing against it will carry it over the needle and hold the loop thereon. In this way the joint action of the needle and the finger prevents the loop from escaping from the needle, and it will be understood that the deflection of the loop by the finger will be in the same direction as the feed of the shoe.

It is evident that immaterial changes may be permitted from the general construction and arrangement of parts contributing toward my invention, and for this reason I do not wish to be understood as limiting myself in precise detail and construction; and while I have shown the application and use of my invention in the form in which I prefer to employ it, it will be understood that it is not limited to such form, and that it may be used in modified forms without departing from the spirit of my invention and without exceeding the scope of the concluding claims.

I claim as my invention—

1. In a loop-stitch sewing-machine, the combination, with a curved barbed needle, a looper device and operating mechanism therefor, of a loop-deflecting finger arranged to operate upon the loop within the radius of the needle and to hold the loop within such radius during the formation of the stitch.

2. In a loop-stitch sewing-machine, the combination, with a curved barbed needle, a looper device and operating mechanism therefor, of a finger device arranged to operate upon the loop within the radius of the needle, a spring and a cam for operating said finger and suitable intermediate connections for the spring and cam whereby the loop is held within the radius of the needle during the formation of the stitch.

3. In a loop or chain stitch sewing-machine, the combination of a barbed needle, a looper device and operating mechanism therefor, with a loop-kinking or side deflecting device consisting of a finger depending in position to engage the side of the loop, a rock-rod supporting said finger having a crank-arm, a spring connecting the latter and the frame, a crank-lever having an adjustable connection with said rod-arm and a cam adapted to move said finger away from the loop against the tension of the spring, for the purpose stated.

FRANCIS ARTHUR MILLS.

Witnesses:

EUGENE ZIEGLER,
THOMAS W. BINKER.