

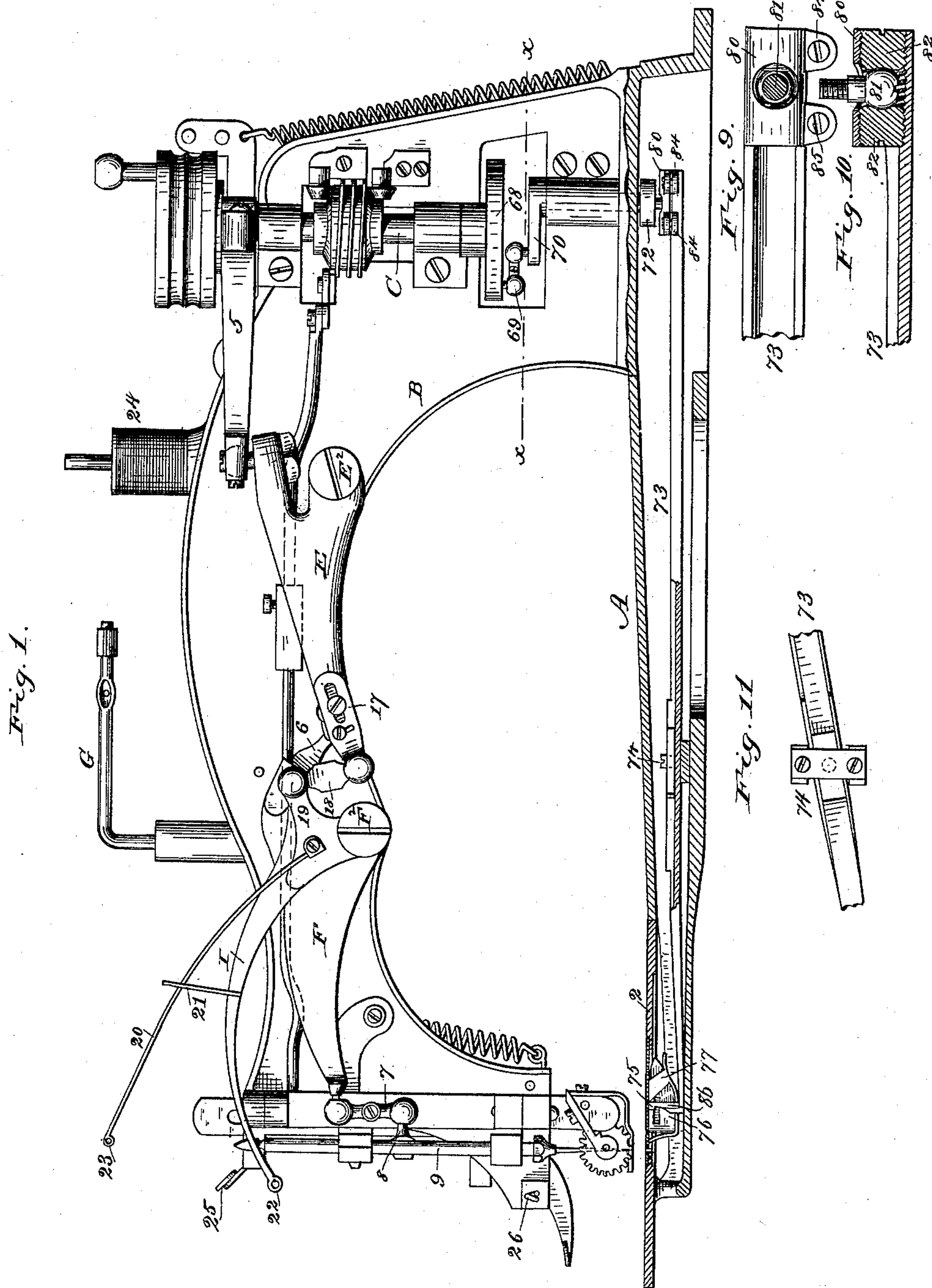
(No Model.)

4 Sheets—Sheet 1.

S. ARNOLD.
SEWING MACHINE.

No. 331,107.

Patented Nov. 24, 1885.



Witnesses:

A. N. Low.

E. D. Smith.

Inventor:

Satterlee Arnold,

by Henry K. Allen
Att'y.

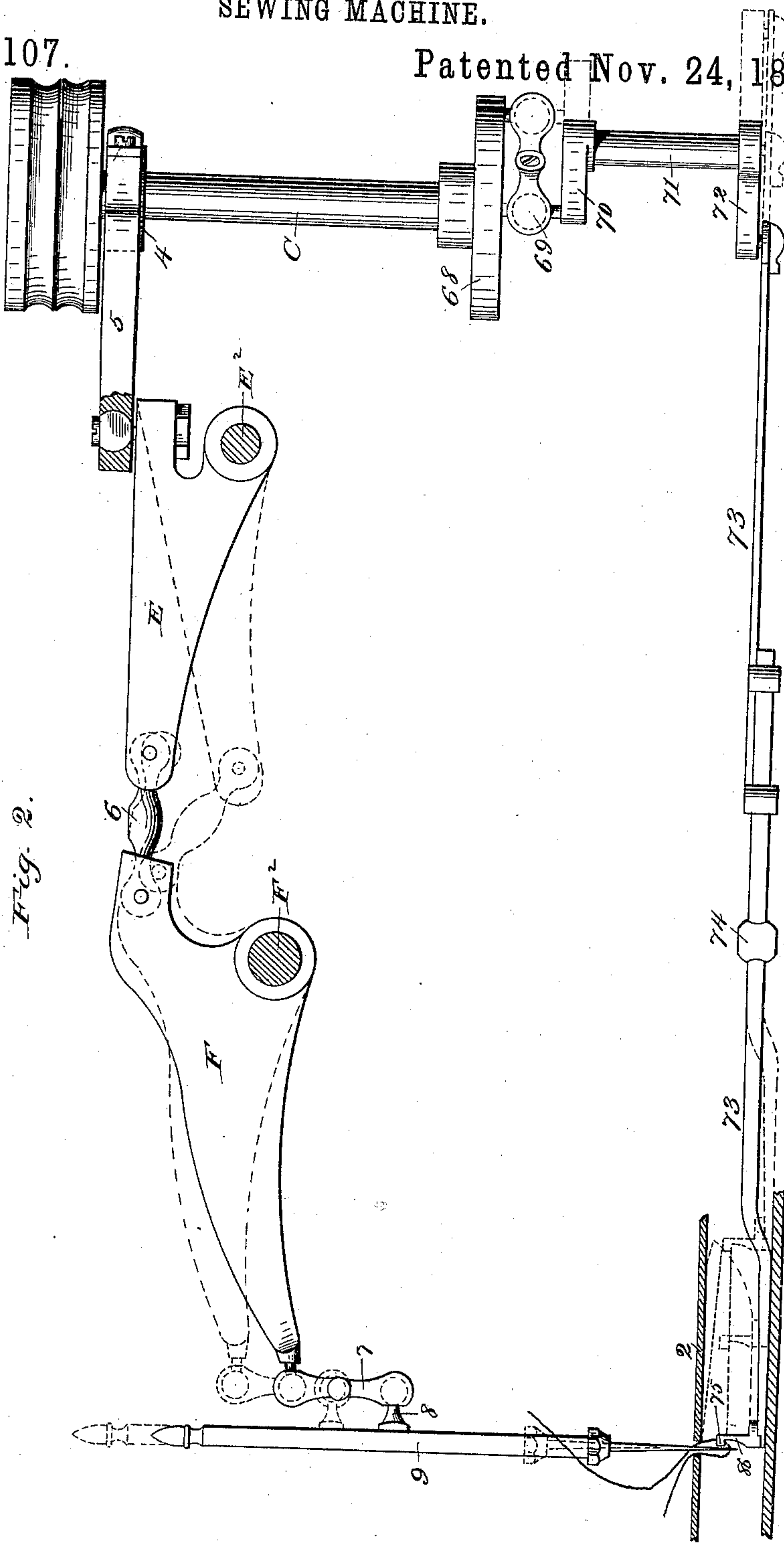
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4 Sheets—Sheet 2.

S. ARNOLD.
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No. 331,107.

Patented Nov. 24, 1885.



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(No Model.)

4 Sheets—Sheet 3.

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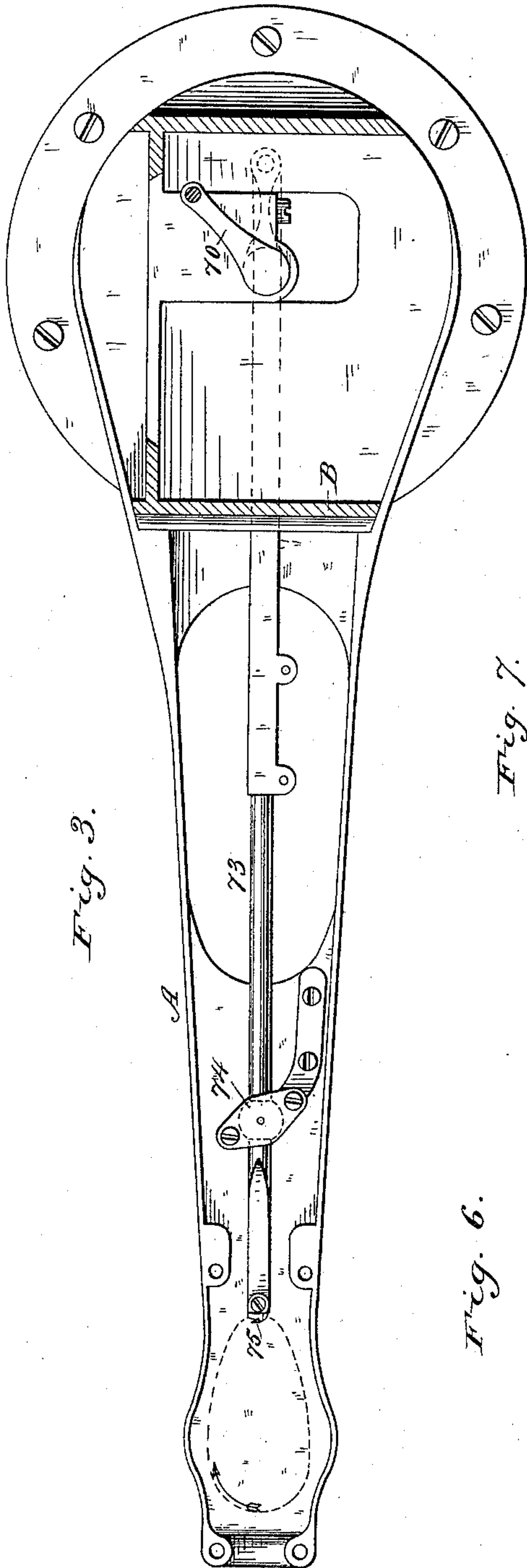


Fig. 7.

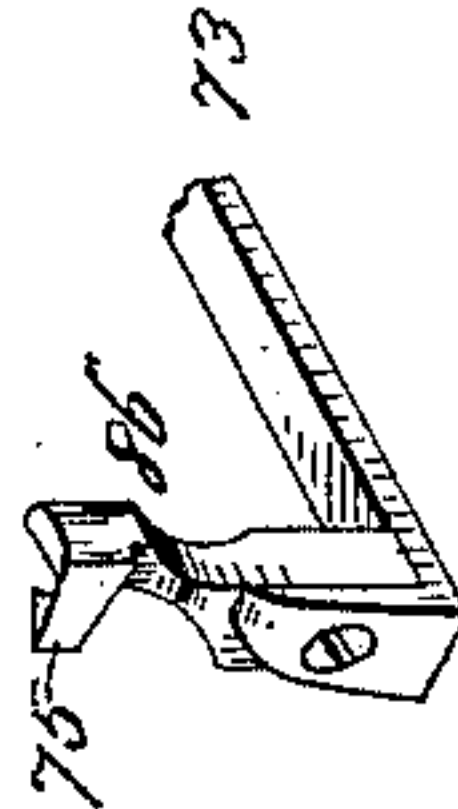
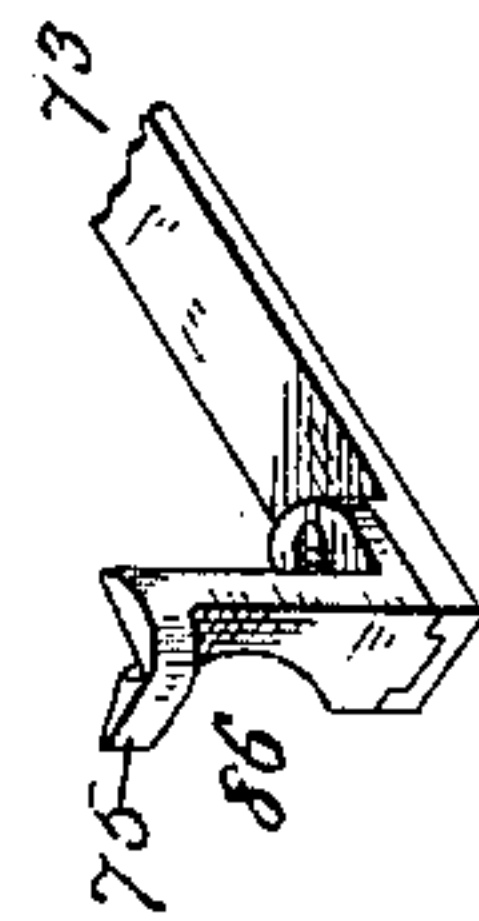


Fig. 6.



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(No Model.)

4 Sheets—Sheet 4.

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SEWING MACHINE.

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Fig. 8.

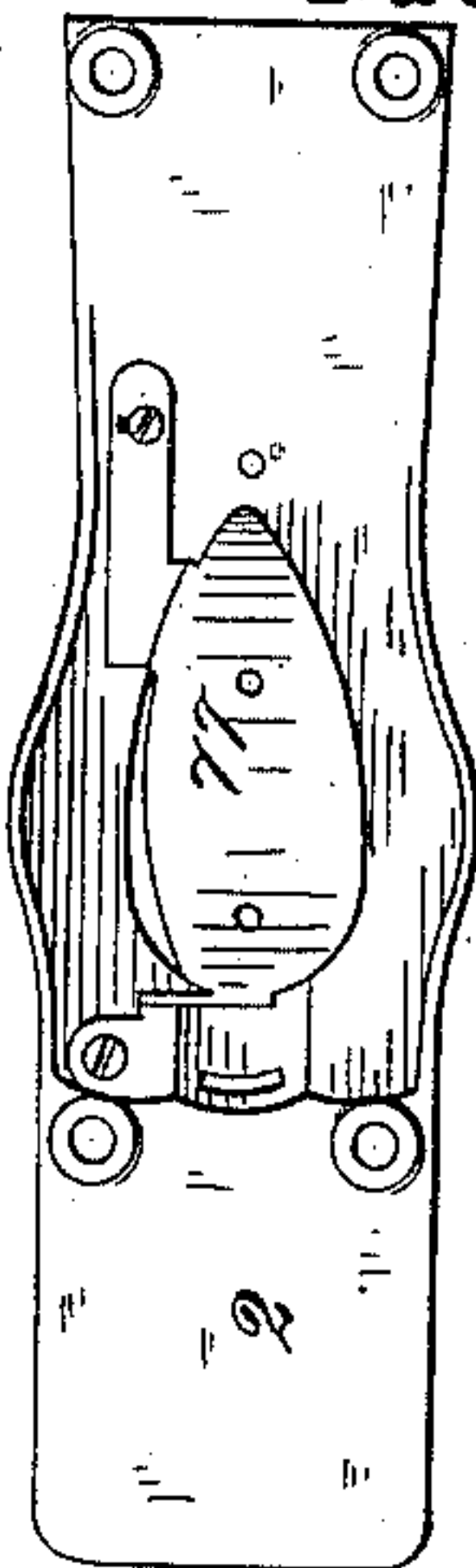


Fig. 4.

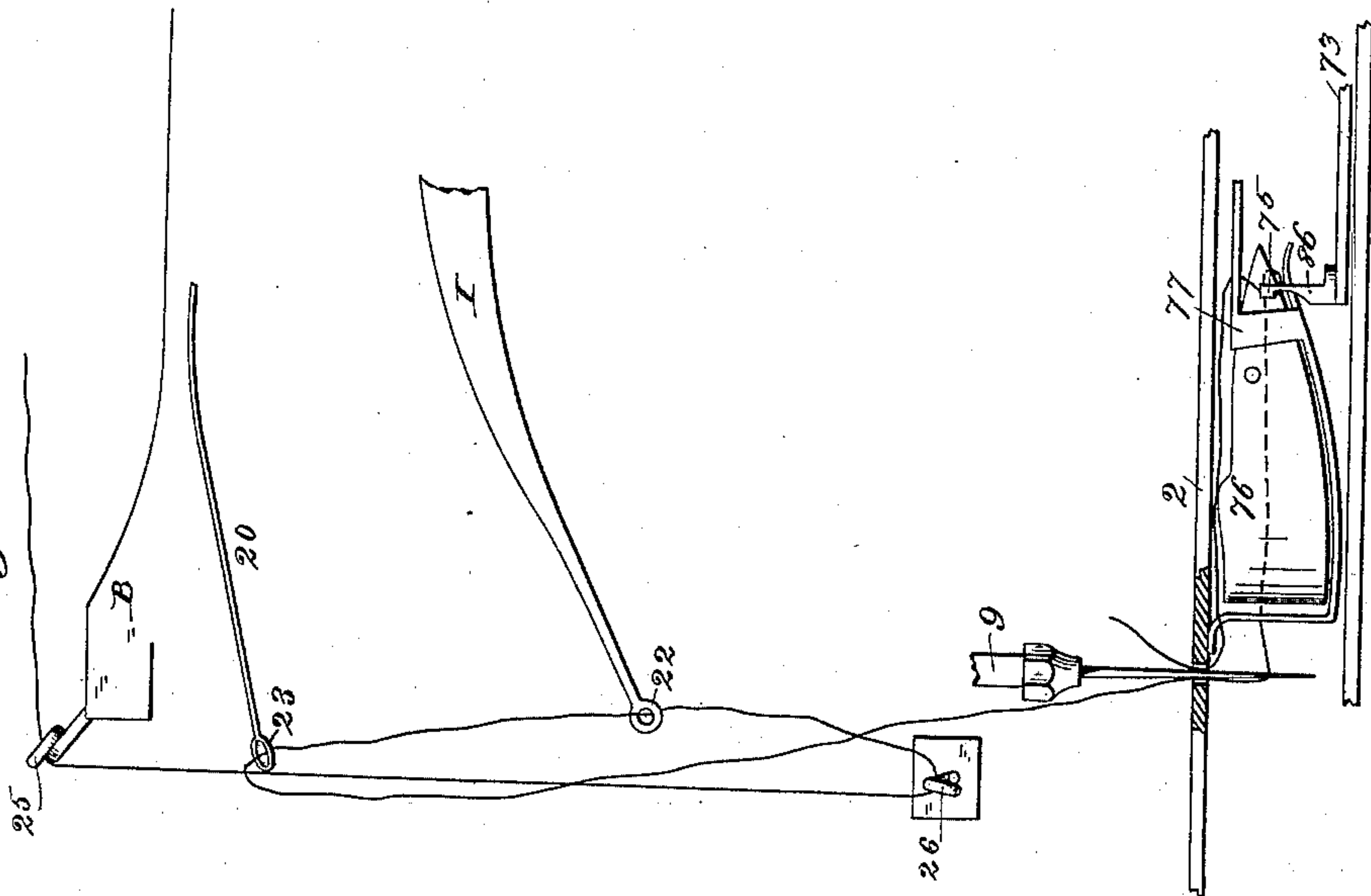
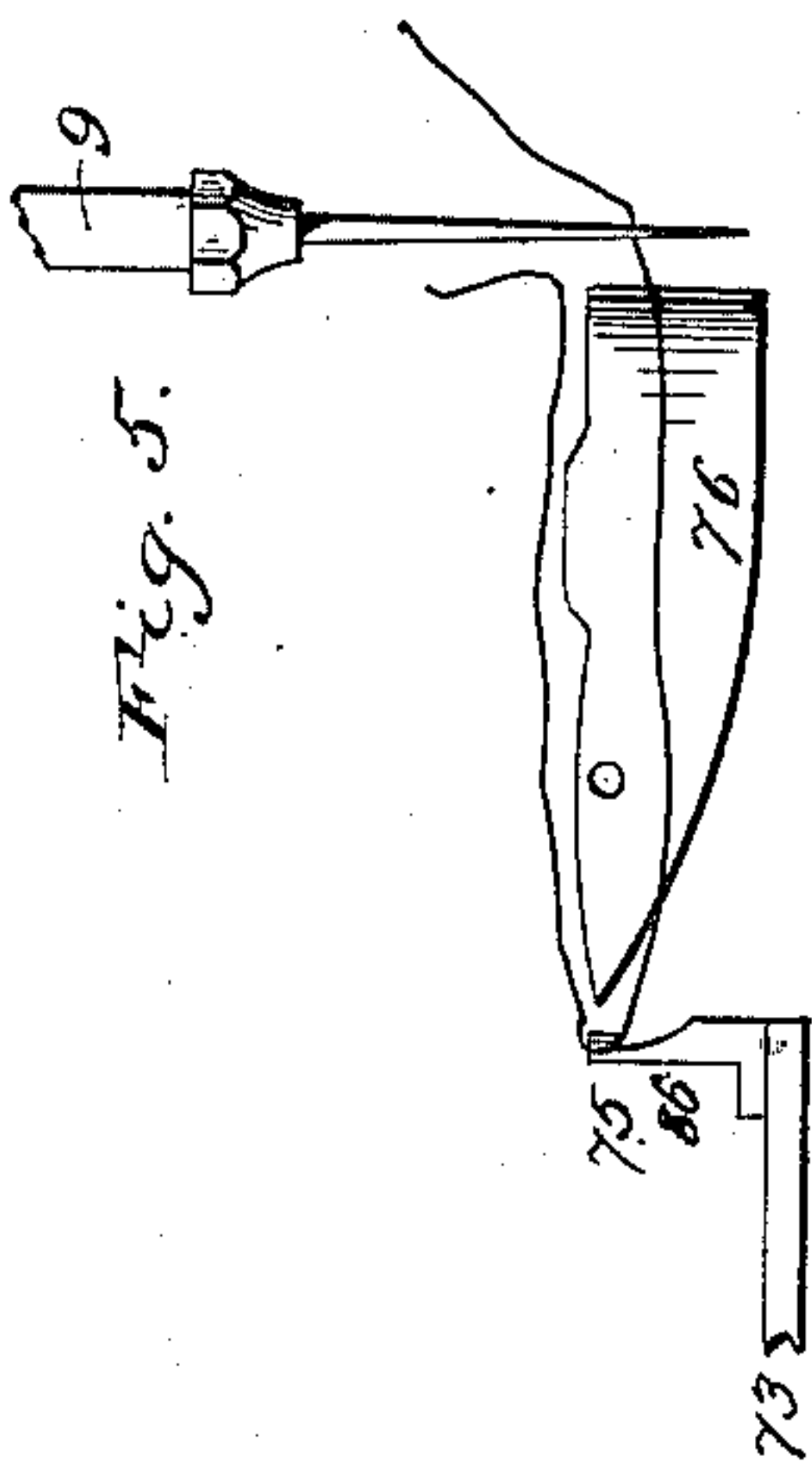


Fig. 5.



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UNITED STATES PATENT OFFICE.

SATTERLEE ARNOLD, OF BROOKLYN, NEW YORK, ASSIGNOR TO ANNA M. ARNOLD, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 331,107, dated November 24, 1885.

Application filed May 14, 1884. Serial No. 131,488. (No model.)

To all whom it may concern:

Be it known that I, SATTERLEE ARNOLD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is to provide a stitch-forming mechanism capable of efficient operation at high rates of speed with comparatively little friction.

In the accompanying drawings, Figure 1 is a sectional side elevation of a sewing-machine embodying my invention. Fig. 2 is a skeleton view of the needle and looper mechanisms, the latter being somewhat modified. Fig. 3 is a plan view, the bracket-arm being in section on line *x x*, Fig. 1. In this figure the covering-plates are removed from the lower arm of the machine and the looper mechanism is the same as is shown in Fig. 2. Figs. 4 and 5 are detail diagrams illustrating the formation of the stitch. Figs. 6 and 7 are detail perspective views of loopers and the end of the looper-rods to which they are attached. Fig. 8 is a bottom plan view of the cloth-plate and the shuttle-holder attached thereto. Figs. 9, 10, and 11 are detail views of the looper-rod.

My invention in the form herein illustrated is embodied in a machine adapted for sewing tubular articles, said machine in all its details being described in my application No. 131,487, Case A, filed simultaneously herewith.

In this machine the bed or work plate A is made in the form of an arm or horn for the reception of the stitch-forming mechanism co-operating with the needle. Formed integral with or suitably secured to the rear end of the work-plate is the bracket arm B, made somewhat longer than usual, and supporting at its forward end the needle and presser bars. Journaled in bearings in the rear portion of the bracket-arm B is the driving-shaft C, having at its upper end fast and loose pulleys. On said shaft adjacent to said pulleys is an eccentric, 4, connected by a pitman, 5, with a primary needle-operating lever, E, pivoted on a stud, E², secured to the bracket-arm B. The

forward end of the lever E is connected by a link, 6, with a secondary needle-operating lever, F, pivoted on a stud, F², supported by the bracket-arm. The lever F is connected by a link, 7, with an arm, 8, secured to a needle-bar, 9, said needle-bar carrying at its lower end the usual eye-pointed needle. A take-up lever, I, is pivoted on the stud F², which serves as a fulcrum for the lever F. The lever E is provided at its forward end with a plate, 17, which is preferably slotted, so that it may be adjustably connected with said lever. Plate 17 is joined by a link, 18, with the short arm 19 of the take-up lever I. By adjusting the plate 17 on the lever E it is obvious that the movement of the take-up lever I may be properly timed. To the take-up lever I is secured a light supplementary spring take-up, 20, the upward movement of which is limited by a loop, 21, attached to the lever I. Eyes 22 and 23 for the passage of the thread are provided at the outer ends of the take-up lever I and supplementary take-up 21. The needle-thread passes from the spool 24, around the tension-bar G, of ordinary construction, through guide-eyes 25 and 26 on the forward end of the arm B. From the guide-eye 26 the thread is carried upward through the eye 22 in the end of the take-up lever I, then to the eye 23 in the end of the supplementary take-up, whence it passes downward to the needle.

To the lower end of the vertical driving-shaft C is secured a crank-disk, 68, carrying a crank-pin, connected by a link, 69, with a similar crank-pin on an arm, 70, attached to the upper end of a secondary vertical shaft, 71. Shaft 71 is journaled to the arm B in a different vertical plane from that of the driving-shaft C, so that the axes of these two shafts are out of line. By this arrangement and connection of these two shafts a differential rotary movement will be imparted to the shaft 71 from the driving-shaft C. In other words, while these two shafts will rotate coincidentally, or will both perform a single revolution in the same time, the shaft 71 will move much more rapidly during one portion of its revolution than it will during the other portion.

To the lower end of the shaft 71 is attached a crank, 72, connected with a looper rod or

lever, 73, guided by a swiveled fulcrum, 74, and having at its forward end a looping-hook, 86. The fulcrum 74 may consist of a spherical bearing-piece, through which the looper-rod is adapted to the slide, as shown in Figs. 2 and 3; or it may consist of a pivoted block embraced by guiding-ribs on the looper-rod, as shown in Figs. 1 and 11. The looper-rod 73 may be formed in two pieces, adjustably secured together, so that said rod may be lengthened or shortened, as may be necessary to bring the looper in proper position relative to the needle and shuttle. The swiveled fulcrum 74 is located considerably forward of the center of the looper-rod, so that the looper on the front end of said rod will be caused to travel in an elliptical path which is somewhat more flattened at one end than at the other, as indicated in Fig. 3. The shuttle 76 is stationary and is loosely supported in a holder 77, preferably attached to the under side of the cloth-plate 2, which latter is removably secured to the forward end of the work-supporting arm or plate A. The shuttle is thus arranged in the interior of the forward end of the arm or horn on which the work is supported. The shuttle-thread is carried by a disk-bobbin of ordinary construction loosely supported in the shuttle.

Instead of making the looper-rod in two pieces, adjustably secured together, as above referred to, adjustment of said rod to compensate for wear and to bring the looper in proper operative relation to the needle may be secured by the construction shown in detail in Figs. 9 and 10, in which the rear end of the looper-rod 73 is shown as being formed with an internally-threaded sleeve, 80, having at its upper side an opening to admit the ball-headed crank-pin 81 on the crank-arm 72. Screws 82 are fitted to the threaded sleeve 80, said screws being provided on their inner end with cups or concave recesses adjacent to the head of the crank-pin 81, which is thus embraced by said screws.

It will be obvious that by adjusting the screws 82 the working length of the rod 73, or, in other words, the distance between the crank-pin 81 and the hook or looper 75 on the forward end of the said rod, may be increased or diminished, and thus the hook may be adjusted to the needle with the utmost nicety, and any wear on the crank-pin 81 and its embracing-screws will be by the same adjustment readily compensated for.

To prevent any accidental displacement of the screws 82 after adjustment, the threaded sleeve 80 is split at one side and formed with ears 84, into which are tapped set-screws 85, which may be tightened to compress the said sleeve, and thus securely hold the adjusting-screws 82 in place after adjustment.

My hoop or looper 86 is shown in perspective, somewhat enlarged, in Figs. 6 and 7, the form of the said looper differing but slightly in the two figures. In both of the forms shown said looper may be said to consist of a vertical

base or shank, by which it is attached to the looper-rod, said shank being cut away to form a diminished neck, which supports the pointed or sharp-edged hook proper, 75. This hook 86 extends horizontally from the neck outside of the latter, and is wedge or chisel shaped, its outer face being straight, or nearly so, and its inner face beveled. At the base of the hook proper, on its inner or beveled face, is formed a groove for retaining the needle-thread after it has been seized by the hook. As the said hook 75 extends slightly outward beyond the neck by which it is supported, said neck, when the machine is in operation, will be within the vertical plane in which the needle moves, while the point of the hook will just graze or lightly touch the needle in seizing the loops of needle-thread.

The operation of my machine is as follows: Motion being given to the driving-shaft, the eccentric 4 thereon, through the connecting-rod 5, primary and secondary levers E and F, and links 6 and 7, imparts a vertical reciprocating movement to the needle-bar. In the present instance the relative arrangement and connection of the levers E and F are such that the well-known double-reciprocating or "dip" movement will be given to said needle-bar and needle, the upward movement for the second descent being very small. This dip movement, however, is not essential, as in the construction shown the looper or hook 75 seizes the loop of needle-thread on the first descent of the needle; but it is essential that the needle before it makes its final ascent should pause a sufficient length of time to enable the looper or hook to carry the loop of needle-thread around the point of the shuttle, and to do this before the needle rises the said looper or hook must move with great rapidity after it has caught the loop of needle-thread.

The looper or hook 75 is operated by means of its connections with the shaft 71, which, as before explained, has a differential movement, the rapid portion of its revolution commencing when the said looper or hook is about to catch the loop of needle thread, and continuing while it is carrying said loop around the point of the stationary shuttle 76, after which time the slower movement of the shaft occurs, causing the looper to slacken its speed to enable the take-up to draw the thread entirely around the shuttle and its interlocking thread and to tighten and thus complete the stitch. The rapid movement of the looper or hook when passing the needle insures the engagement of said hook with the developed loop of needle-thread. Thus the operation continues, the stitches being repeated indefinitely while the machine runs.

As soon as the loop of needle-thread has been carried around the point of the shuttle by the looper or hook 75, and has become disengaged from the said looper or hook as the latter backs or travels away from said loop, the supplementary spring take-up 20, which has been drawn down by the rapid expansion

of the loop, suddenly reacts and pulls the thread quickly around the shuttle and out of the way of the advancing looper before the main take-up I rises to complete the stitch.

5 The supplementary take-up 20 also serves to keep the thread from slackening during the first part of the descent of the needle-bar, thus holding the thread out of the way of the point of the needle. The upward movement of the
10 supplementary take-up is limited by the loop 21, as before explained.

I do not wish to claim, broadly, in this application the needle-operating mechanism hereinbefore described, as said mechanism is
15 embraced by my application No. 131,487, Case A, filed simultaneously herewith.

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

1. In a sewing-machine, the combination of
20 a driving-shaft, a secondary shaft having its axis in a different plane from that of the driving shaft and connected with the latter, and thus deriving a variable rotary motion from the uniformly-rotating driving-shaft, a stationary
25 shuttle, a hook or looper for carrying the needle-thread around said shuttle, and a looper-rod for imparting an irregular or variable rotary movement to said hook or looper from said secondary shaft, substantially as set
30 forth.

2. In a sewing-machine, the combination of a stationary shuttle, a hook or looper for carrying the needle-thread around said shuttle, a take-up for tightening the stitches, a supplementary spring take-up for drawing the
35 thread quickly out of the way of the advancing hook or looper when said thread is released therefrom, a device, as loop 21, connected with the main take-up for limiting the
40 upward movement of the said spring take-up, and mechanism for operating said hook or looper and take-up, substantially as set forth.

3. In a sewing-machine, the combination of a work-plate constructed in the form of an
45 arm or horn, a stationary shuttle arranged in the forward part of said arm or horn, a looper-rod extending longitudinally of said arm or horn, and having at its forward end a hook or looper, and mechanism for imparting a
50 rotary movement to the forward end of said looper-rod, substantially as set forth.

4. In a sewing-machine, the combination of a work-plate, a stationary horizontal shuttle supported by said work-plate, a vertically-
55 pivoted looper-rod the forward end of which is adapted to work beneath said shuttle, a hook or looper attached to the forward end of said looper-rod and projecting above the latter, and mechanism for operating said loop-
60 er-rod, substantially as set forth.

5. In a sewing-machine, the combination, with a needle-bar and its operating mechanism, of a stationary shuttle and a looper-rod carrying a hook or looper, and having a variable or differential rotary movement at its
65 forward end, whereby the said hook or looper is enabled to move rapidly to carry the loop of needle-thread over the point of the shuttle, and then move slowly while the stitch is being completed, substantially as set forth. 70

6. In a sewing-machine, the combination, with the looper-rod and its operating mechanism, of a hook or looper having a vertical shank the upper portion of which is cut away to form a diminished neck, to which latter is
75 attached a wedge-shaped horizontal hook, having its outer side slightly beyond or outside of said shank, and being provided at its base on its inner or beveled face with a thread-retaining groove, substantially as set forth. 80

7. In a sewing-machine, the combination of a looper-rod having at its rear end an internally-threaded sleeve and at its forward end a hook or looper, a ball-headed crank-pin projecting within said sleeve, and two adjusting-
85 screws fitting said sleeve, and having concave recesses on their inner ends adjacent to the head of said crank-pin, substantially as set forth.

8. In a sewing-machine, the combination of
90 a looper-rod having at its rear end an internally-threaded sleeve, which is split at one side and formed with ears, set-screws tapped in said ears, a hook or looper at the forward end of said rod, a ball-headed crank-pin projecting within said sleeve, and two adjusting-
95 screws fitting said sleeve and having concave recesses on their inner ends adjacent to the head of said crank-pin, substantially as set forth. 100

9. In a sewing-machine, the combination, with a needle-bar and its operating mechanism, of a stationary device, as a shuttle, for holding the lower thread, a pivoted looper-rod having a variable or differential rotary
105 movement at its forward end, and provided with a hook or looper for carrying the needle-thread partly around said stationary device, and a take-up timed to tighten each stitch while the looper-rod and looper are performing the slower part of their movement, substantially as set forth. 110

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

SATTERLEE ARNOLD.

Witnesses:

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ALBERT H. NORRIS.