

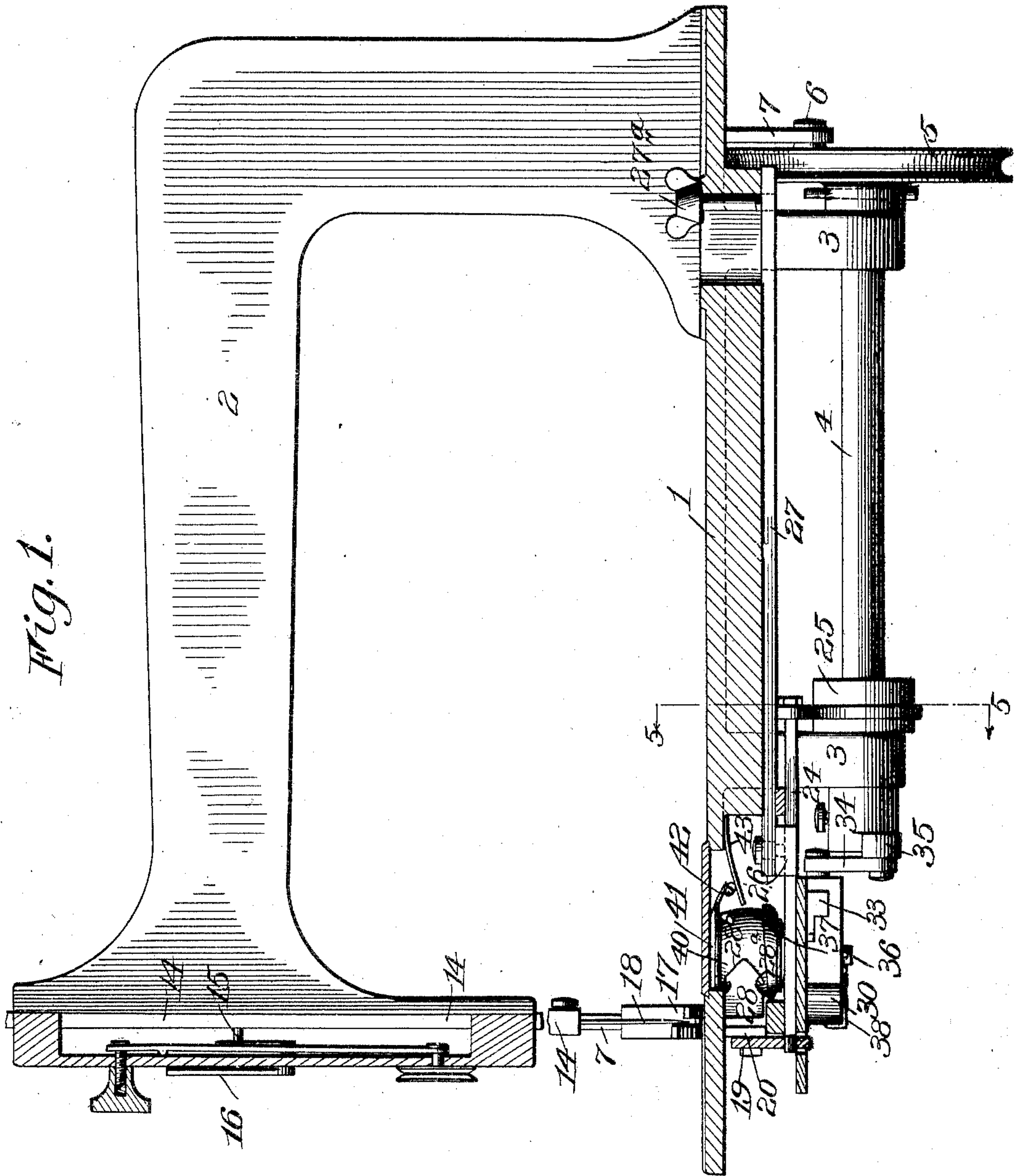
No. 780,028.

PATENTED JAN. 17, 1905.

C. E. FINKLE.
ROTARY HOOK SEWING MACHINE.

APPLICATION FILED JULY 15, 1903.

4 SHEETS—SHEET 1.



Witnesses.

Walter B. Payne.
Clarence A. Bateman.

Inventor.

Charles E. Finkle
by Frederick L. Church
his Attorney.

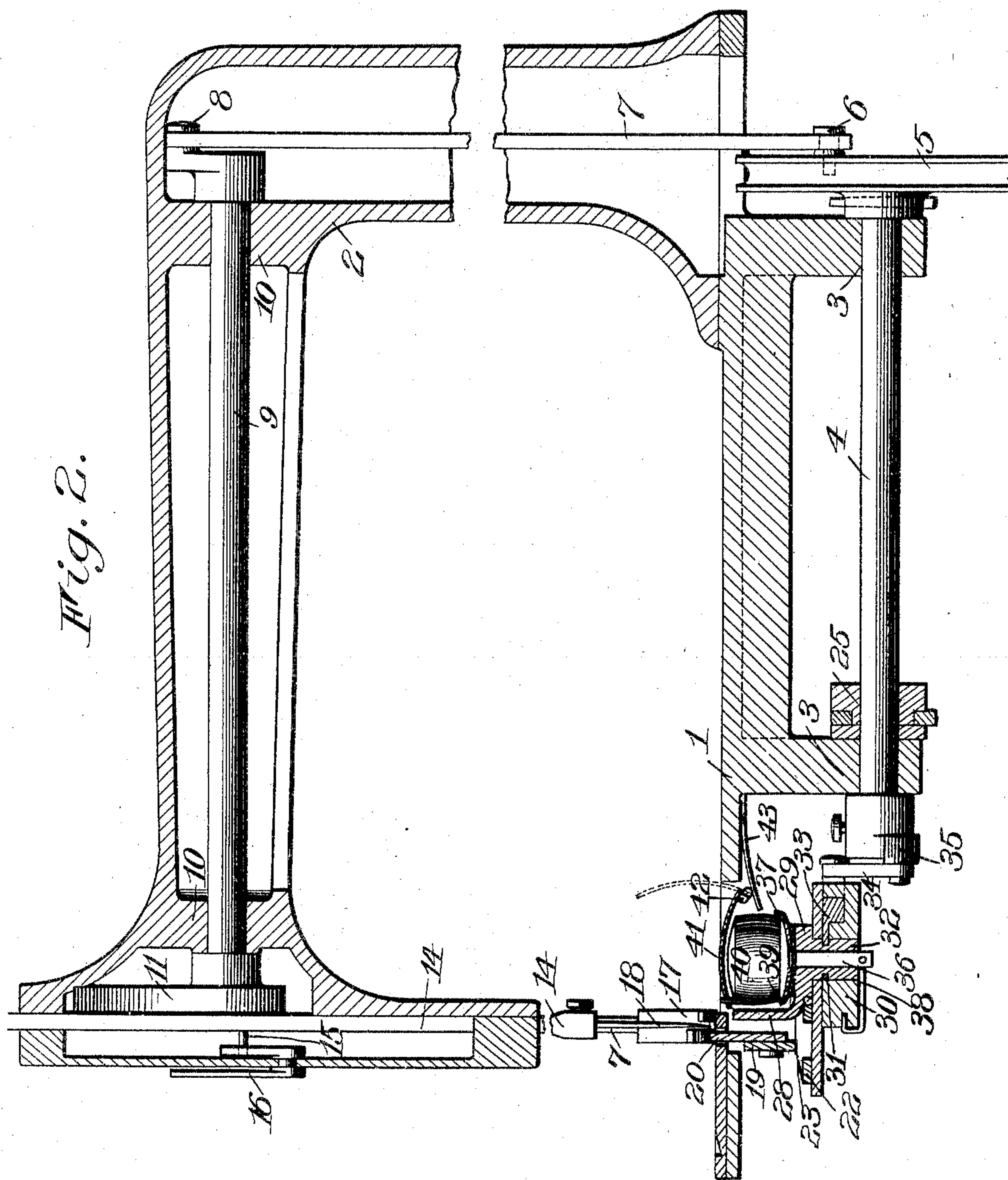
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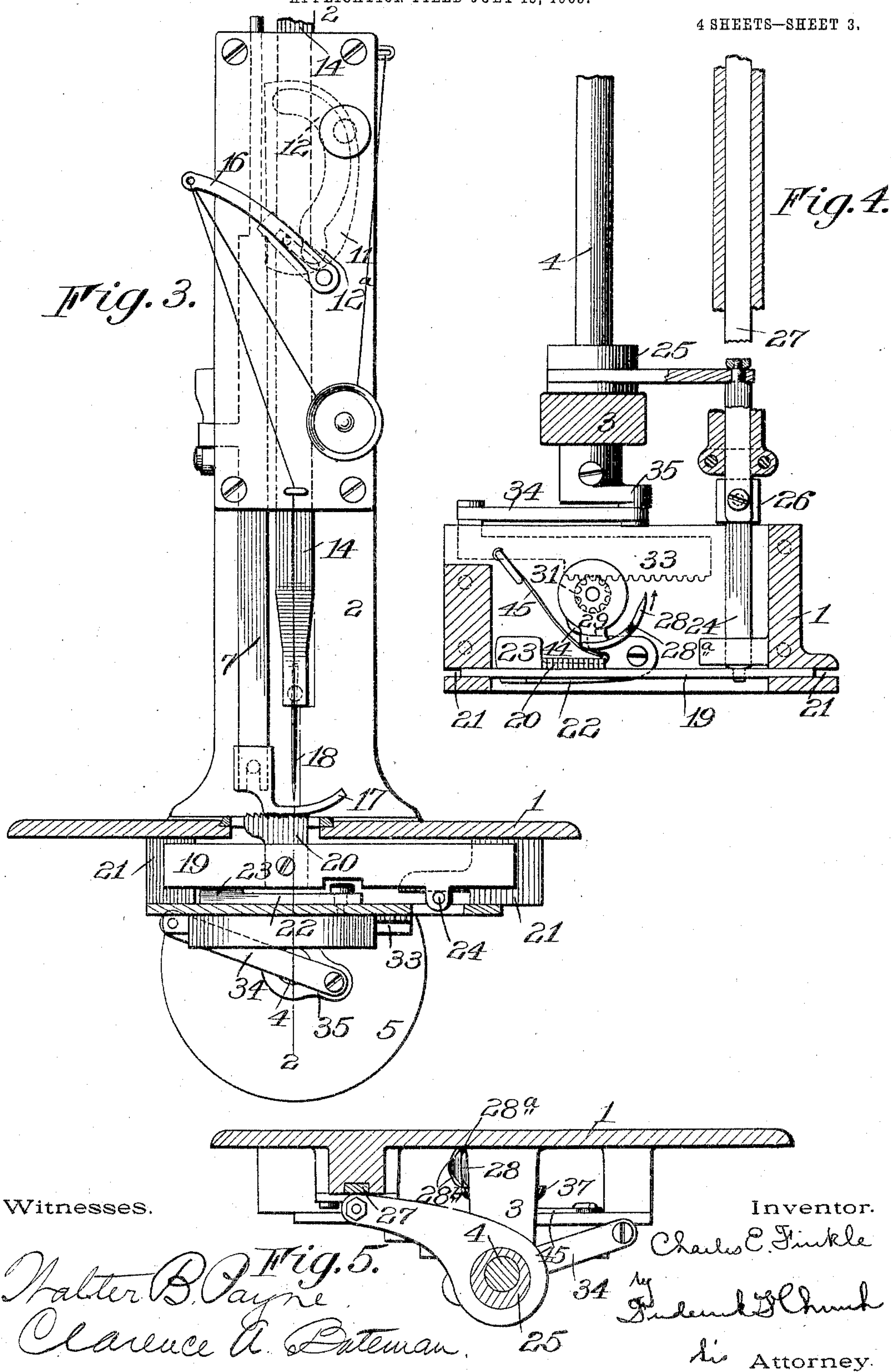


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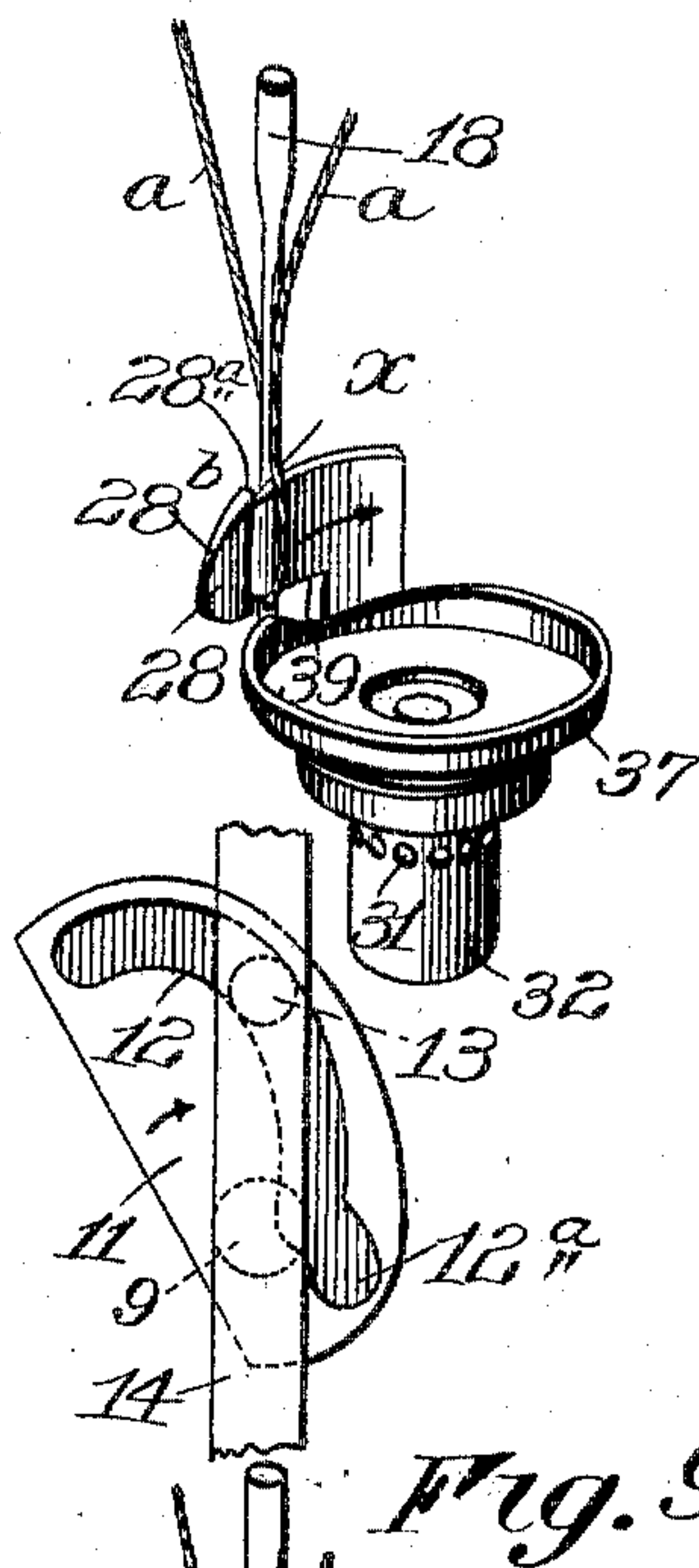
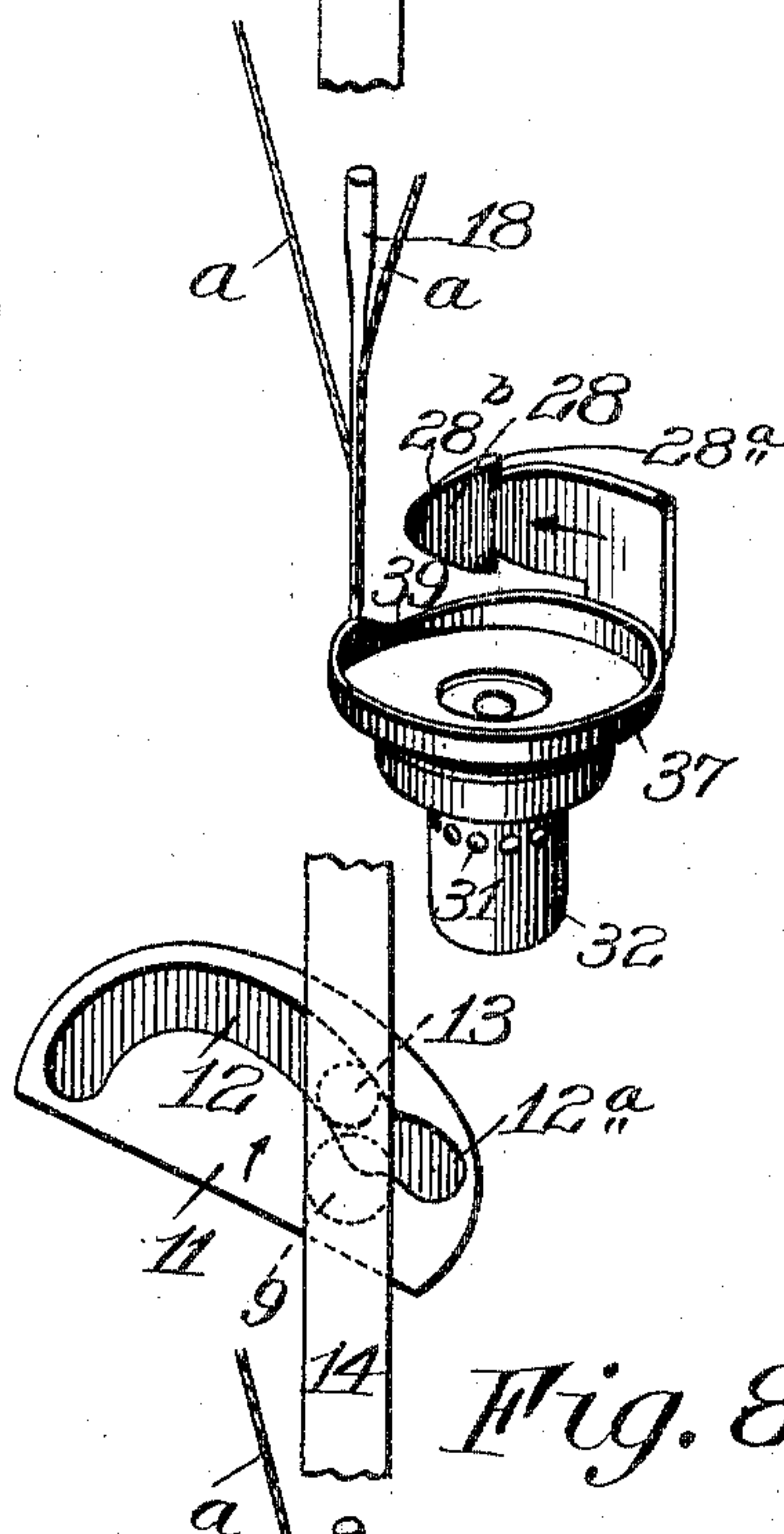
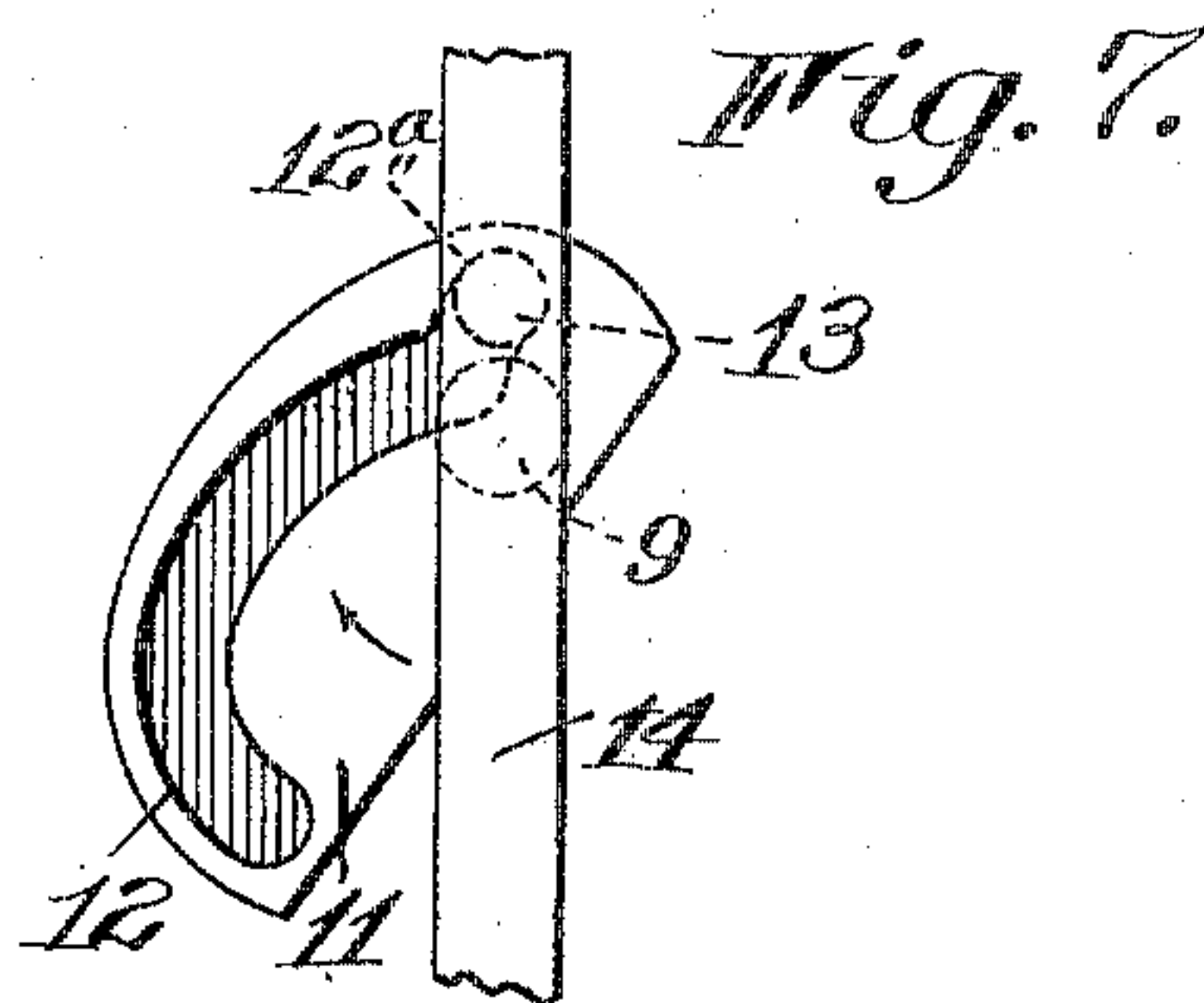
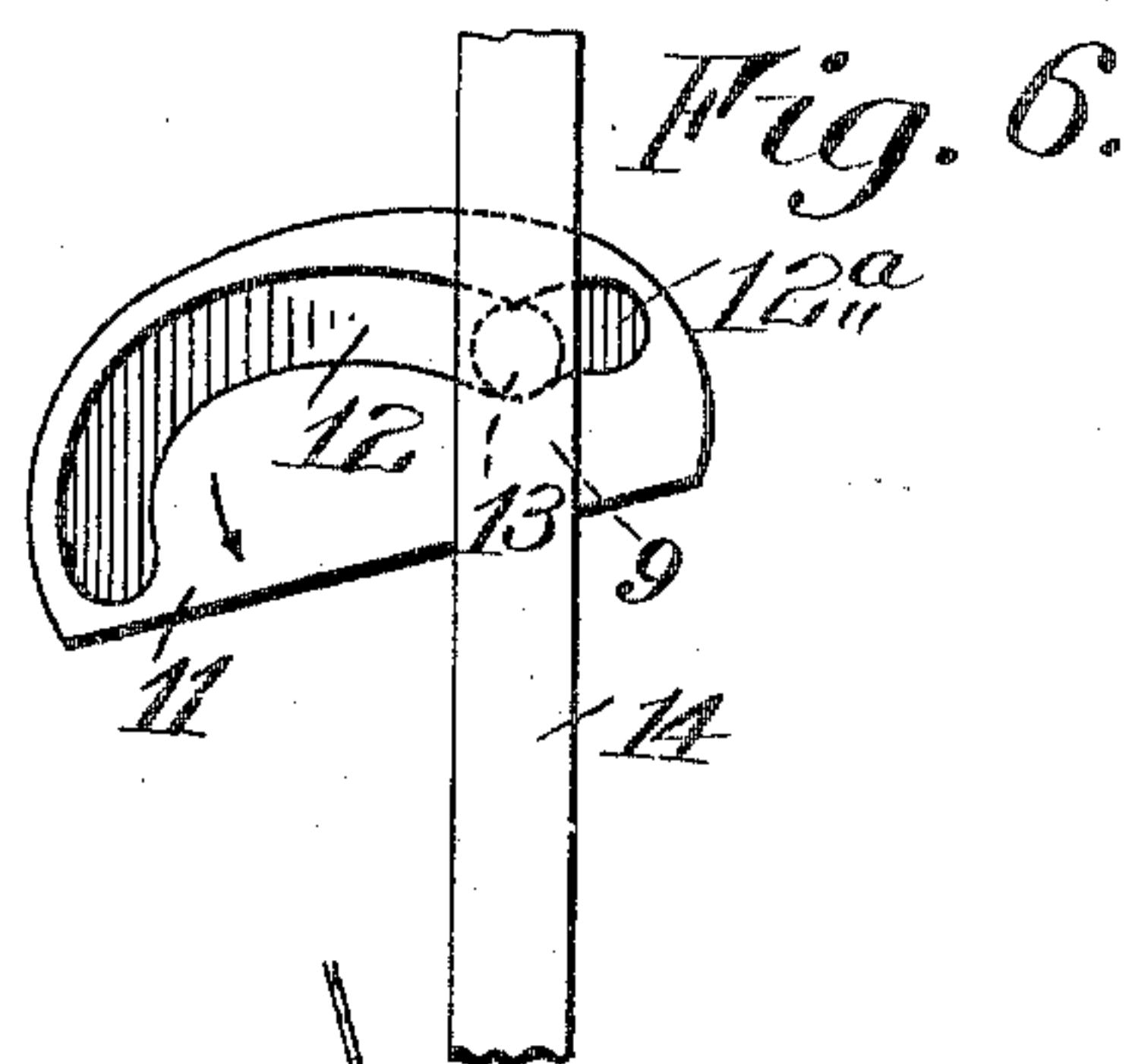
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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ROTARY-HOOK SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 780,028, dated January 17, 1905.

Application filed July 15, 1903. Serial No. 165,596.

To all whom it may concern:

Be it known that I, CHARLES E. FINKLE, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Rotary-Hook Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference characters marked thereon.

My present invention relates to improvements in sewing-machines, and more especially to that class employing a looper-hook for looping the needle-thread in forming the stitch; and it has for its object the production of a device of this character wherein the needle is moved downwardly and slightly raised, and the loop thus formed is engaged by the looper-hook and passed over the bobbin and then released before the rising of the needle, after which the needle and thread-controller complete the formation of the stitch, the result being that the loop is formed with a minimum length of thread.

Other features of novelty and advantage will be hereinafter more fully described, and pointed out in the claims hereunto annexed.

In the drawings, Figure 1 is a side elevation of a device embodying my invention. Fig. 2 is a sectional view of the same on the line 2 2, Fig. 3. Fig. 3 is an end view looking toward the right in Figs. 1 and 2. Fig. 4 is a plan view with the top plate removed to show the looper and connected parts. Fig. 5 is a transverse sectional view on the line 5 5, Fig. 1, looking in the direction of the arrow; and Figs. 6, 7, 8, and 9 are diagrammatic views showing the successive positions of the parts at various stages in the formation of the loop.

The same characters of reference indicate similar parts in the several views.

In the present embodiment of my invention, 1 designates the bed-plate, supporting the arm 2 and the bearings 3 3, carrying the operating-shaft 4, provided with the driving-wheel 5, and this wheel 5 carries a pin 6, connected by the pitman 7 to the crank 8 of the oscillating shaft 9, journaled in bearings 10 10 of the arm

2. The forward end of this shaft 9 carries a cam 11, provided with a slot 12 to receive and operate the pin or roller 13 of the needle-bar 14, and connected to this needle-bar, through the pin 15, is a thread-controller or take-up 16, which may be of any suitable construction. A presser-foot 17 may also be provided, through which operates the needle 18 of the needle-bar, and below the presser-foot may be provided a feed-dog of any suitable type, the form shown comprising a bar 19, carrying the dog 20 and so mounted as to be capable of vertical and longitudinal motion in the guides 21, and beneath this bar is pivotally mounted a cam 22, having an inclined surface 23 thereon, upon which said bar rests, motion of said cam about its pivot causing said bar, and consequently said dog, to rise and fall in a vertical plane. Motion is imparted to said bar through the oscillating lever 24, connected to the eccentric 25 on the operating-shaft, said lever being supported intermediate its ends by the sliding block 26, pivoted on the adjusting-bar 27, carrying the screw 27^a for varying the feed to any desired degree.

In conjunction with the parts above described or their equivalents I have provided an improved looper comprising in the embodiment shown an oscillating bearded hook 28, mounted on a carrier 29, journaled to rotate on the support 30, a pinion 31 being provided on the extension 32 thereof and meshing with a rack 33, slidingly mounted in the support 30 and reciprocated by the pitman 34, connected to the crank 35 on the operating-shaft. The extension 32 of this carrier is bored centrally and fitted with the stud shaft or pin 36, provided with the bobbin-support 37 and a retaining device 38 to prevent its rotation. This bobbin-support is cut away, as at 39, for a purpose to hereinafter more fully appear, and in this support rests the bobbin 40 of any suitable character, a bobbin-retainer 41, resting above the bobbin and pivoted at 42, being provided and normally held down upon the bobbin under the action of the spring 43.

The hook 28 is provided upon its lateral edges with the oppositely-arranged projec-

tions 28^a, which extend laterally in opposite directions toward the sides of the bobbin, and adjacent to these lateral projections are provided the oppositely-inclined surfaces 28^b, which diverge rearwardly from the point of the hook to the thread-engaging projections. Such a construction is very advantageous, for the reason that as the hook advances between the needle and its thread the loop of the needle-thread is gradually expanded laterally by the inclined surfaces until it is engaged in an expanded form upon the relatively lateral projection 28^a, and while the loop is held in the expanded position upon these projections it may be readily passed over the opposite sides of the bobbin, thereby reducing the friction of the thread to a minimum in passing over the bobbin and also permitting bobbins of greater dimensions to be employed, as will hereinafter appear.

Assuming that motion is transmitted to the operating-shaft 4, it will be seen that with the parts in the position shown in Fig. 3 the pitman 7 will oscillate the shaft 9 to rock the cam 11 down, as indicated in Fig. 6, lowering the needle into the position shown. At the same time the crank 35 and pitman 34 will act on the sliding rack 33, engaging the pinion 31, causing a rotation of the carrier and the bearded hook in the direction indicated by the arrow, Fig. 6. Continued operation of the parts will swing the cam 11 into the position indicated in Fig. 7, the projection 13 of the needle-bar riding up into the portion 12^a of the cam, raising the needle slightly, and consequently forming a loop *x* in the thread *a* of the needle. While the needle is still at rest in such position, the motion of the carrier will pass the hook 28 through the loop *x* thus formed, when the crank 35, operating the carrier, will reach the end of its throw in one direction. With the needle still substantially at rest the carrier will reverse its motion, retracting the hook 28, the projections 28^a of which will have engaged the loop to draw it around the bobbin, and as the motion of said carrier progresses the portion *x'* of the loop will slip over the bobbin and the under portion thereof will slip through the cut-away portion 39 and pass beneath the bobbin, said loop remaining upon said hook until it has passed a point diametrically opposite the needle, when the loop will be released or cast off from said hook by slipping over the inclined faces 28^b thereof, and the latter will be ready for its return motion to engage and form the next succeeding loop. In the meantime the cam 11 will begin to rise and with it the needle, it being understood that between the time the hook engages the loop and releases or casts it off the needle will remain almost stationary in its lowered position; but when the loop has passed around the bobbin the needle is ready to rise and with it the take-up 16, the result being to draw the loop tight,

and as the bobbin-thread *b* remains relatively in the position shown in Figs. 8 and 9 it will now extend through the loop formed by the needle-thread to complete a stitch when said loop is drawn tight in the usual manner.

The inclined surfaces 28^b, extending rearwardly from the point of the hook, serve the double purpose of gradually spreading the loop of the needle-thread as the hook advances until the thread has been engaged upon the projections 28^a and also to release or cast off the loop from these projections when the hook reaches a predetermined position, as the retreating hook will cause those portions of the loop adjacent to the projections to be lapped around them until the inclined surfaces 28^b are reached, and at this moment the thread, directed by these inclined surfaces, will slip up over the projections, and thereby cast off from the hook.

In forming the loop in the manner hereinbefore described it will be observed that a minimum length of thread is required, as the needle remains in its lowered position from the time the loop is begun or engaged by the hook until it has passed over the center of the bobbin and is cast off by the hook, when the needle begins to rise and the loop is drawn up tight to complete the stitch.

The feed mechanism, any form of which may be employed, may be conveniently operated to engage the material being sewed by the cam projection 44 on the carrier engaging the cam-plate 22 to move it outwardly about its pivot, causing the inclined surface 23 to pass beneath and elevate the bar 19, carrying the feed-dog 20, a spring 45 being employed to return said plate to its normal position, the location of said cam projection being such that said feed mechanism will be in operative position when the needle is in its raised position; but it will be understood, of course, that while I have shown and described the present embodiment in connection with one particular form of feed mechanism I do not so limit myself, as any suitable mechanism for this purpose may be employed in connection with the looper. It will also be understood that while I have shown certain devices for operating the parts of the looper and the needle I do not limit myself to such devices, as other devices may be employed for a similar purpose.

I claim as my invention—

1. In a sewing-machine, the combination with the needle-bar carrying the needle and operating means therefor, of a bobbin, a hook capable of an oscillatory motion about the bobbin having the thread-engaging projections thereon extending laterally toward the sides of the bobbin, and means for advancing the hook to engage the needle-thread upon the projections and retracting it to spread the loop of the thread over the bobbin.

2. In a sewing-machine, the combination with the needle-bar carrying the needle and

operating means therefor, of a bobbin, a hook capable of an oscillatory motion about the bobbin having the thread-engaging projections thereon extending laterally relatively to the bobbin, and means for advancing the hook to engage the needle-thread upon said projections to form an expanded loop, and retracting it to extend the expanded loop over the bobbin.

3. In a sewing-machine, the combination with the needle-bar carrying the needle and operating means therefor, of a bobbin, a hook capable of an oscillatory motion about the bobbin having a thread-engaging point provided with the inclined loop-spreading surfaces extending rearwardly therefrom, and the thread-engaging projections in rear of said surfaces and extending laterally relatively to the bobbin, and operating means for advancing the point of the hook between the needle and its thread until the loop of the latter is expanded by the inclined surfaces and engaged upon said projections, and thence retracting the hook until the expanded loop is extended over the bobbin and is cast off from the projections by the engagement of the thread upon the inclined surfaces of the hook.

4. In a sewing-machine the combination with the needle-bar carrying the needle, and operating means therefor, of a hook capable of an oscillatory motion having the forwardly-directed point, the rearwardly-directed projections, and the divergent portions leading from the point to said projections for expanding the loop of the needle-thread and engaging it upon the projections, a bobbin around which the hook oscillates, and operating means for advancing the hook to engage the needle-thread upon the projections, and retracting it around the bobbin until the loop of the thread engages the divergent portions adjacent the projections and thereby casts off the loop from the latter.

5. In a sewing-machine the combination with the needle-bar carrying the needle, and the operating means therefor, of a hook capable of an oscillatory motion having a flat forwardly-directed point, the rearwardly-disposed projections formed upon the opposite edges thereof, and the rearwardly-divergent surfaces leading from the point to the said projections for expanding the loop of the needle-thread and engaging it upon the projections when the hook is advanced, and for engaging the looped thread adjacent the projections to disengage the loop from the latter when the hook is retracted to a predetermined point, a bobbin around which the hook oscillates, and operating means for said hook.

6. In a sewing-machine the combination with the needle-bar and the needle carried thereby, of a hook capable of an oscillatory motion in a plane substantially at a right angle to the line of motion of the needle having a flat forwardly-directed point adapted to en-

ter between the needle and its thread, the projections formed upon the opposite edges of the hook in rear of the point, and the rearwardly-diverging surfaces formed upon the opposite edges of the hook and leading from the point to the projections for expanding the loop of the needle-thread and engaging it upon the projections when the hook is advanced, and for engaging portions of the loop adjacent the projections and thereby casting off the loop from the latter when the hook is retracted to a predetermined point, a bobbin around which the hook oscillates, and operating means for the hook.

7. In a sewing-machine the combination with the needle-bar carrying the needle and devices for operating it in such a manner as to produce a pause or rest in its return motion and to form a loop in the needle-thread, of a curved hook capable of an oscillatory motion having a point thereon adapted to enter the loop of the needle-thread, oppositely-disposed projections in rear of the point and inclined loop-spreading surfaces adjacent the point leading to the projections for engaging both sides of the loop, a bobbin around which the hook moves, and operating devices connecting the needle-operating devices and the hook for advancing the latter to engage the loop of the needle-thread during the pause of the needle and retracting it to spread the thread around the bobbin before the retraction of the needle.

8. In a sewing-machine, needle-operating mechanism comprising an oscillatory shaft, a cam carried by said shaft having a slot formed therein and a projection carried by the needle-bar and adapted to ride in said slot in such a manner that when said shaft is oscillated in one direction the needle-bar will be advanced to its limit of motion in one direction and then retracted to a predetermined point to produce a pause or rest in the motion of the needle, the return motion of the shaft completing the retracting or return motion of the needle-bar.

9. The combination in a sewing-machine, of a needle-bar carrying the needle, an oscillatory cam, and a projection upon said needle-bar cooperating with said cam for reciprocating said needle-bar in such a manner as to produce a pause or rest in its return motion, of an oscillatory looper-hook having barbs or projections formed thereon, a bobbin around which said hook moves, and means for advancing said hook to engage the needle-thread upon said barbs, and retracting it to extend said thread around the bobbin permitting it to disengage itself from said hook to complete the formation of the loop during the pause or rest in the motion of the needle.

10. The combination with the needle-bar carrying the needle, and devices for operating it in such a manner as to produce a pause or rest in its motion, of a looper-hook having

a forwardly-extending point and a pair of oppositely-disposed rearwardly-extending barbs or projections formed thereon adjacent said point, a bobbin, and devices for advancing said
5 hook to engage the needle-thread upon the barbs or projections thereof and retracting it, to draw said thread around the bobbin and

permit it to be released from said hook while the needle remains substantially at rest.

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Witnesses:

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