

(Model.)

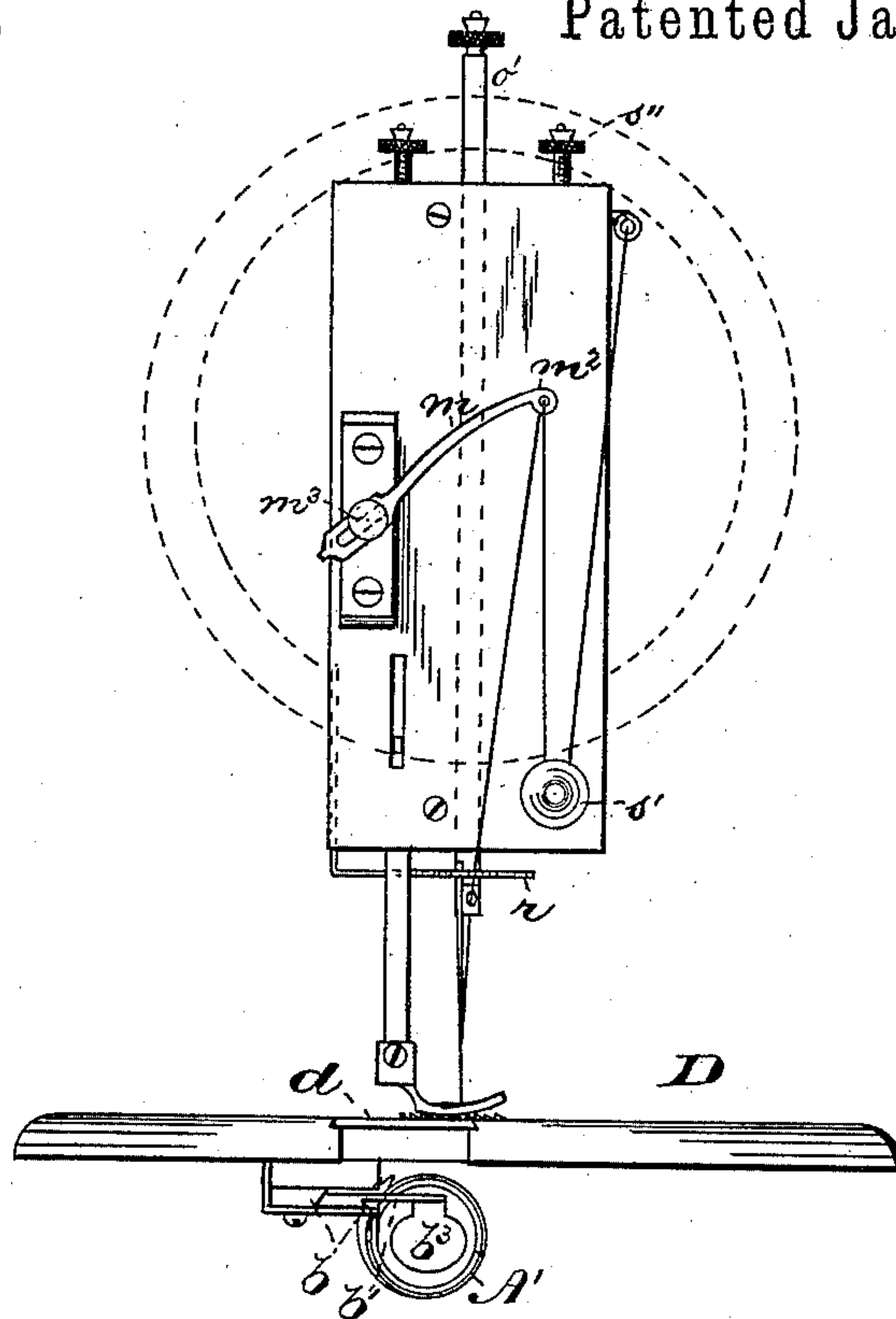
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J. BOPPEL.  
SEWING MACHINE.

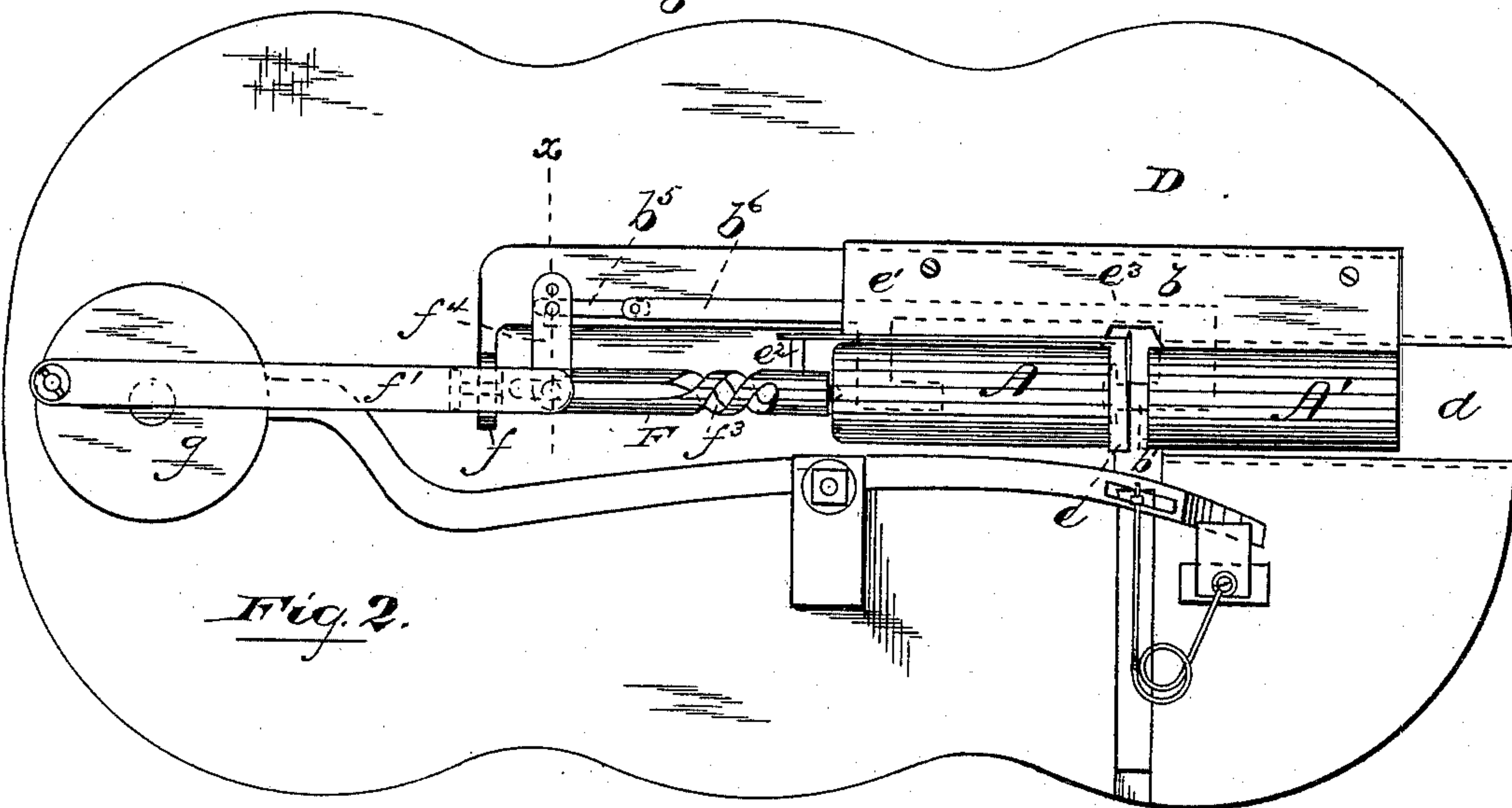
No. 396,979.

Patented Jan. 29, 1889.

*Fig. 1.*



*Fig. 2.*



WITNESSES:

*Frank J. Campbell.*  
*C. R. Bennett*

INVENTOR:

*Jacob Boppel,*

BY *Drake & Co.* ATTYS.

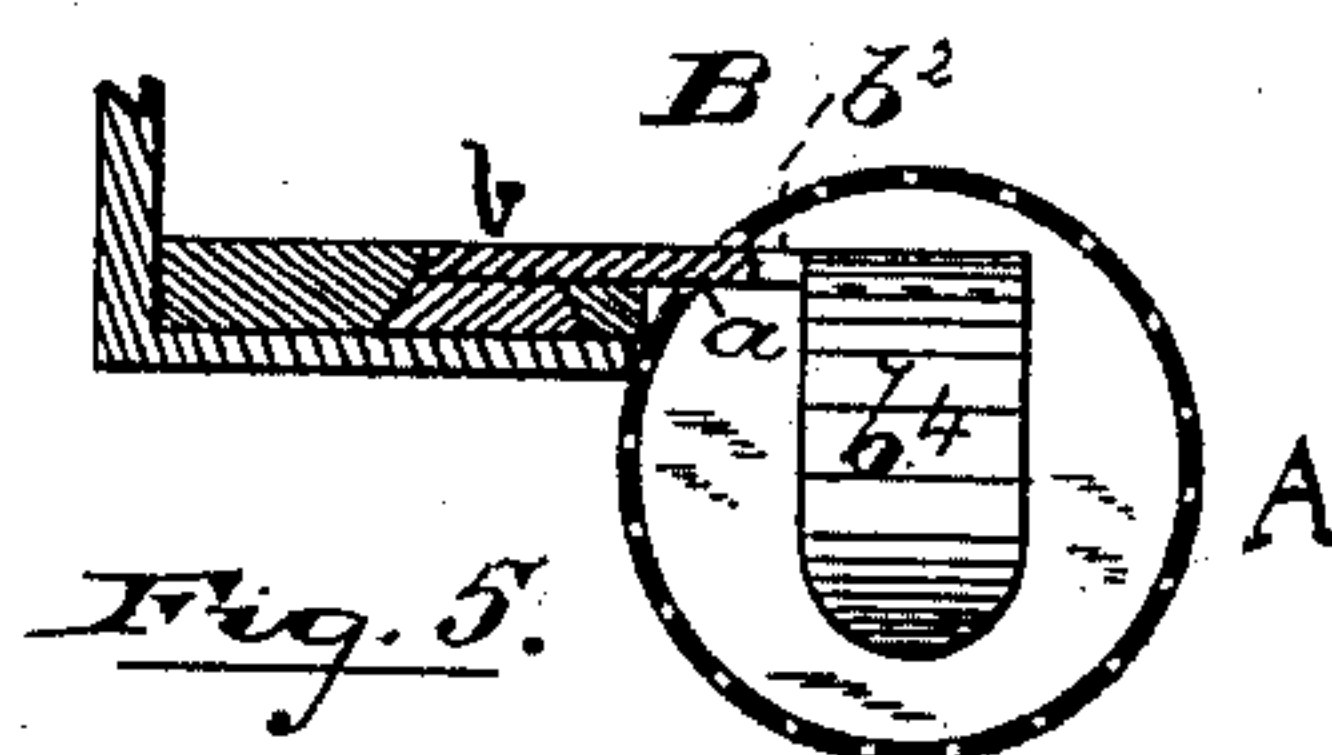
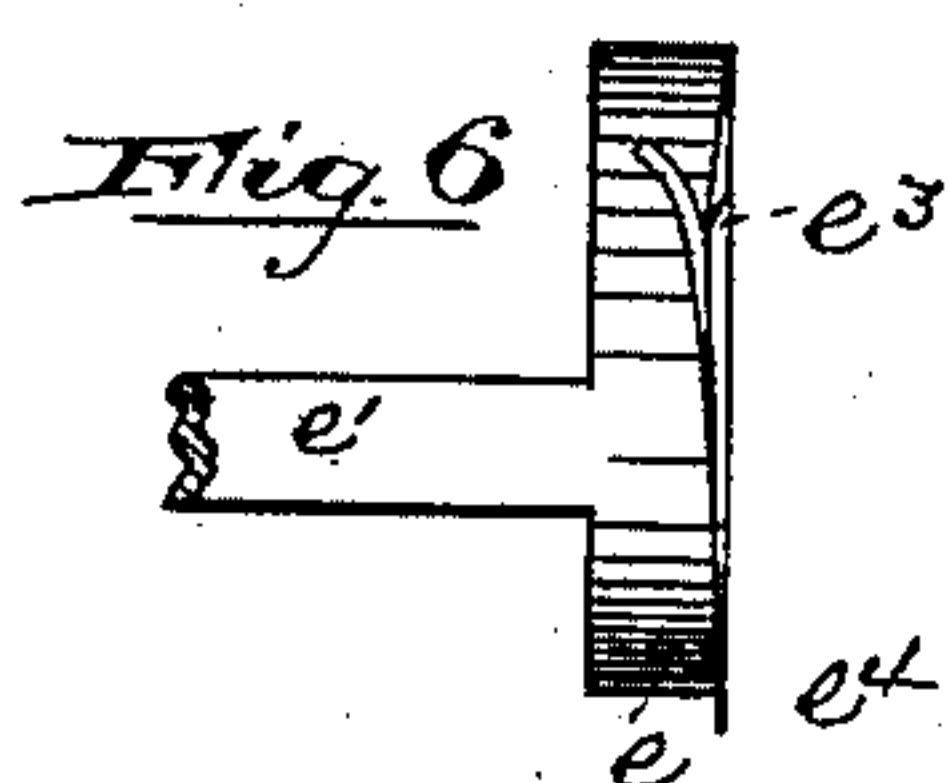
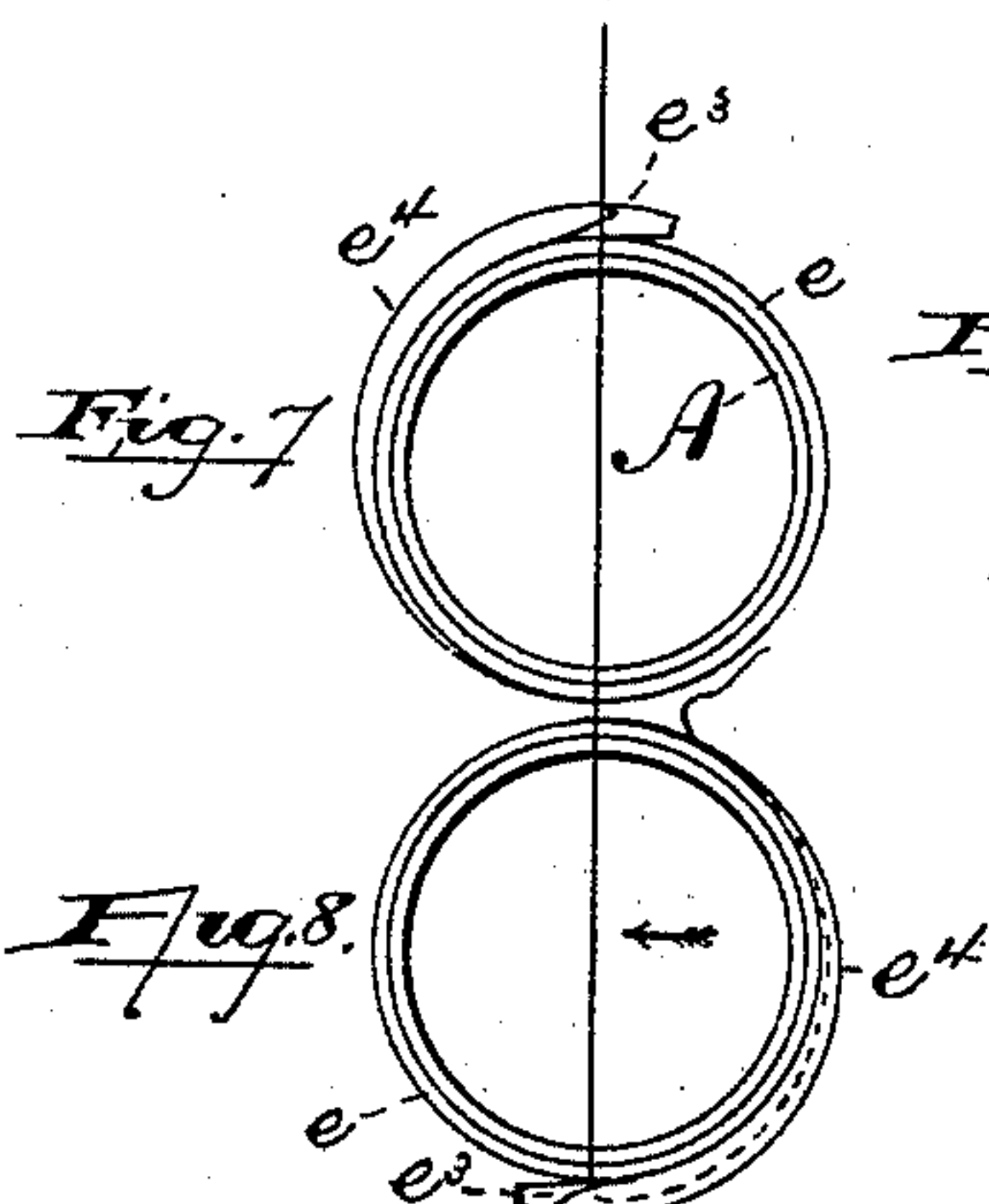
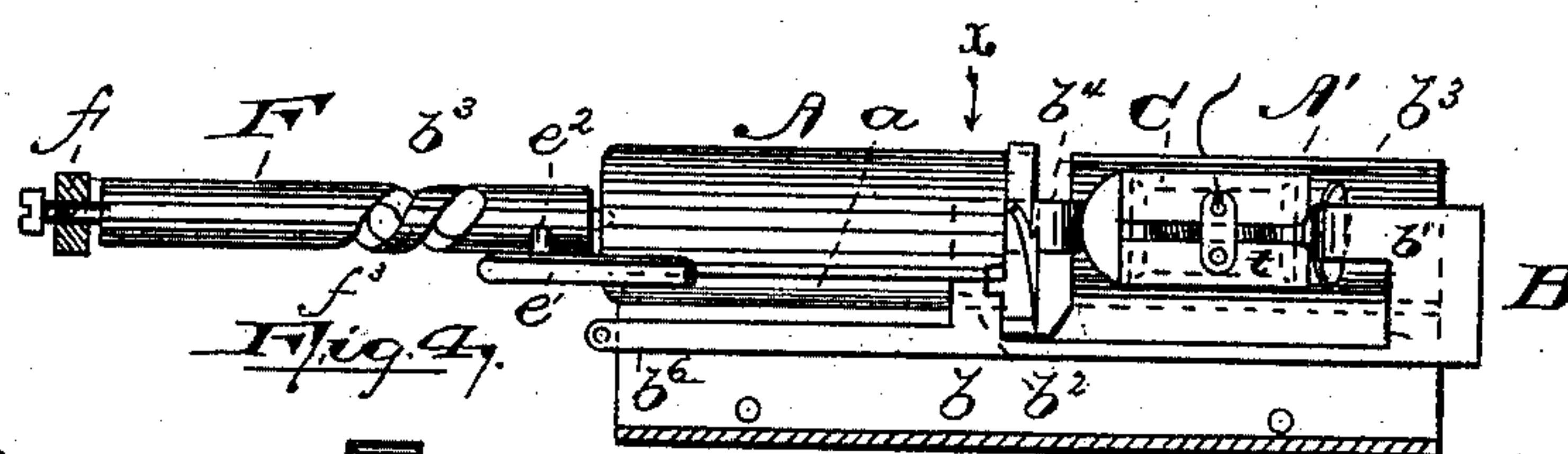
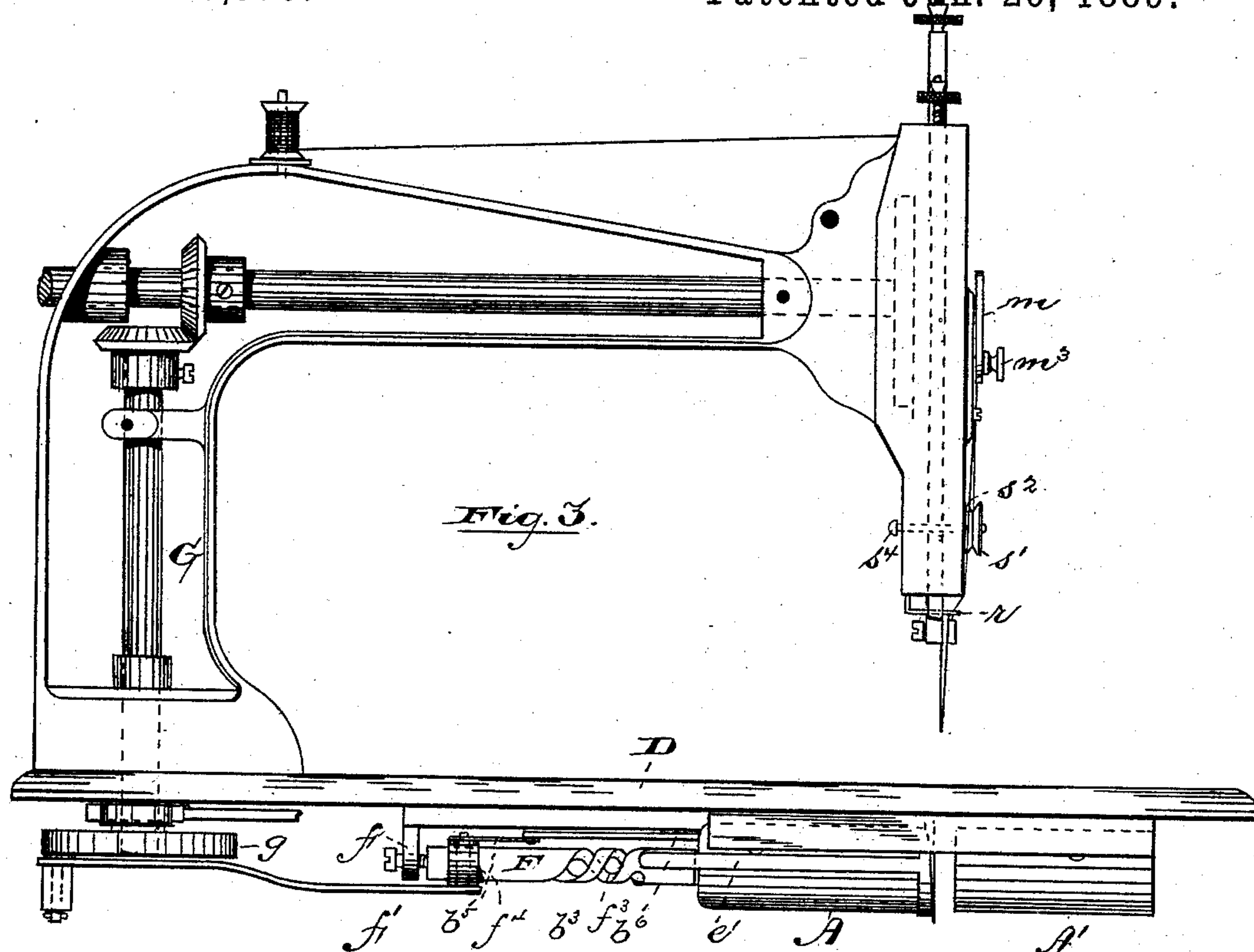
(Model.)

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WITNESSES:

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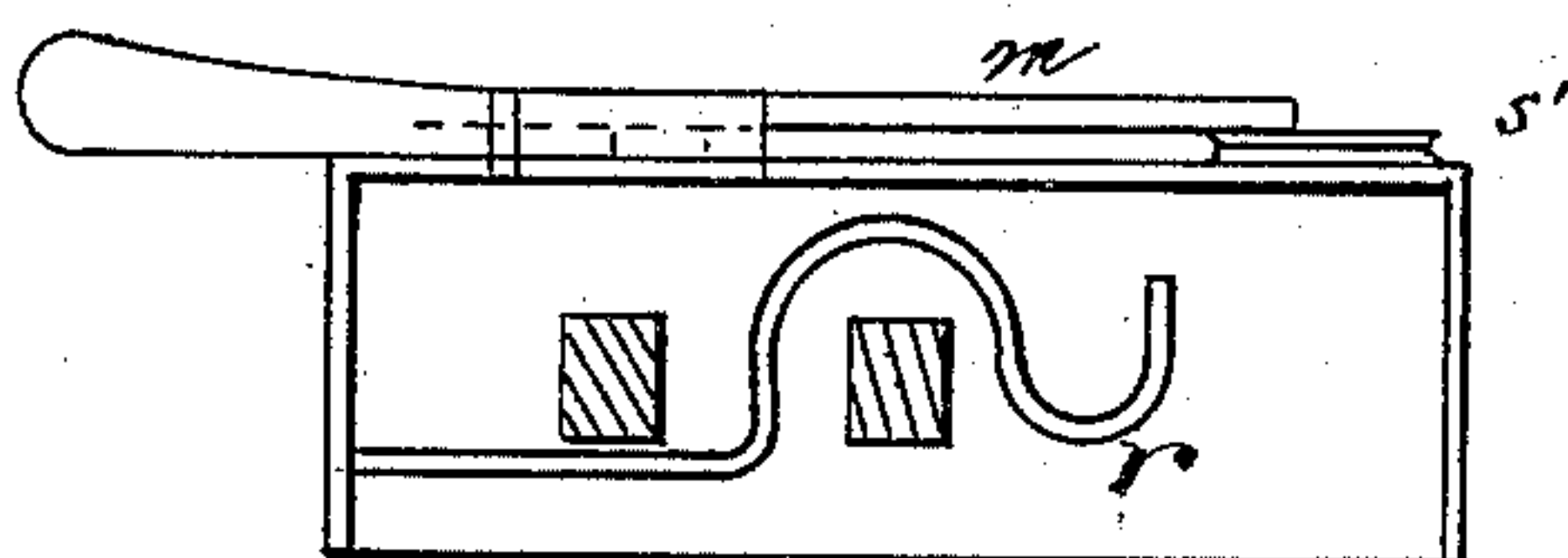
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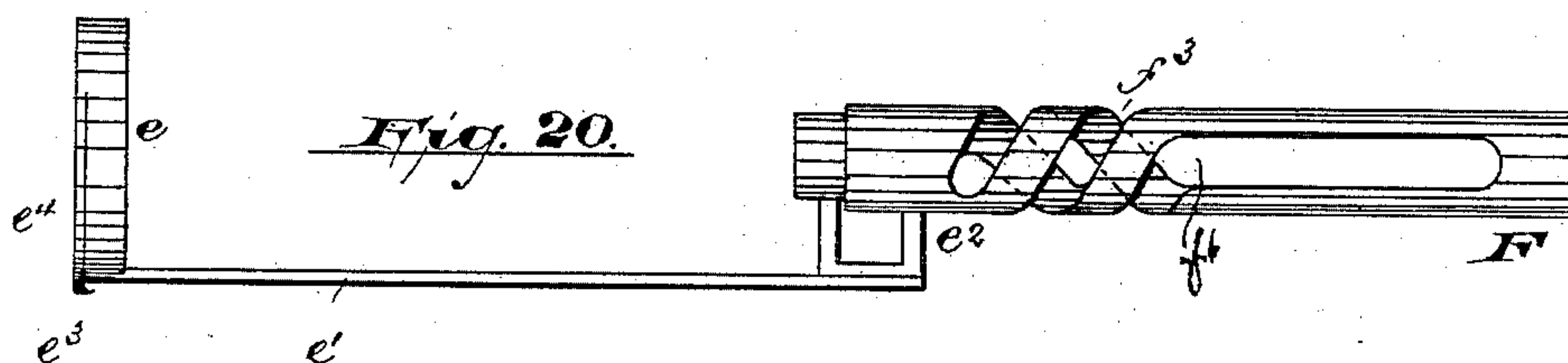
J. BOPPEL.  
SEWING MACHINE.

No. 396,979.

Patented Jan. 29, 1889.



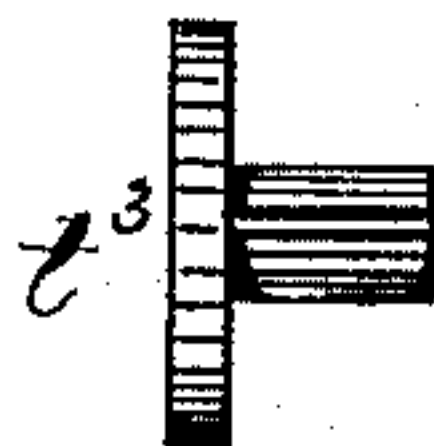
*Fig. 19.*



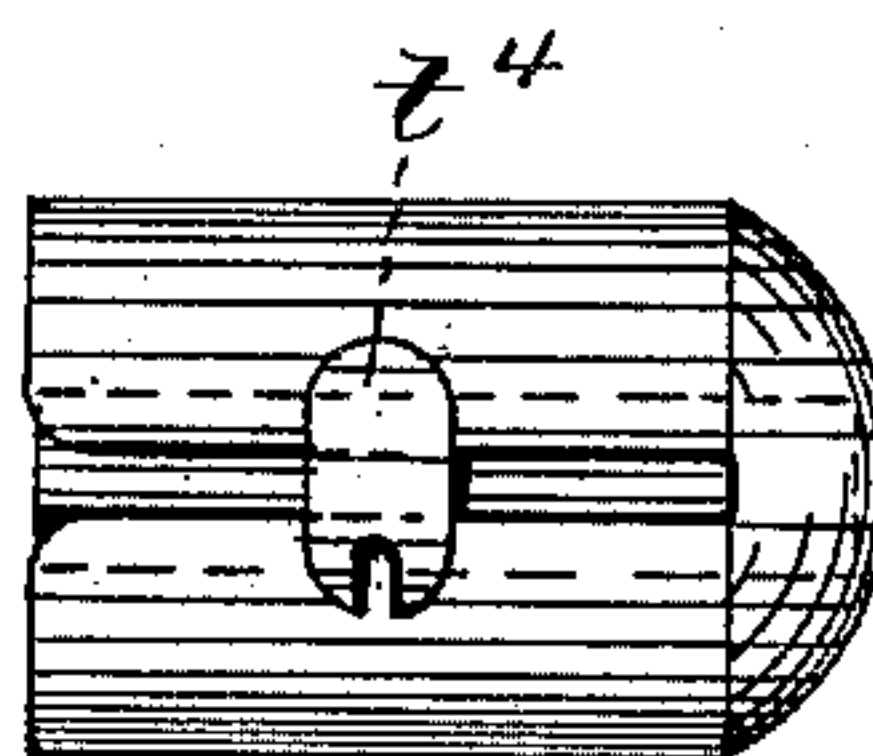
*Fig. 20.*



*Fig. 21.*



*Fig. 22.*



*Fig. 23.*

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# UNITED STATES PATENT OFFICE.

JACOB BOPPEL, OF NEWARK, NEW JERSEY.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 396,979, dated January 29, 1889.

Application filed March 20, 1886. Serial No. 195,891. (Model.)

*To all whom it may concern:*

Be it known that I, JACOB BOPPEL, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The objects of this invention are, first, to avoid the repeated winding of bobbins, whereby considerable time has heretofore been consumed and trouble and labor expended; to secure the above results by mechanism of greater simplicity of construction and of reduced cost; to secure a loop through which an ordinary spool may pass, having a closer conformity to said spool, so that the thread to be taken up after the passage of the spool will be reduced in quantity and the mechanism for taking up said thread may be more compact and simple, and generally to secure greater efficiency, durability, simplicity, and cheapness.

The invention consists in the arrangements and combinations of parts, substantially as will be hereinafter set forth, and finally embodied in the clauses of the claim.

Referring to the accompanying drawings, in which like letters indicate corresponding parts in each of the several figures, Figure 1, Sheet 1, is a front elevation of the head and bed of a sewing-machine to which my improvements have been applied. Fig. 2 is a plan of the under side of the bed of said machine, showing the spool-carrying and looping devices and mechanism for actuating the same. Fig. 3, Sheet 2, is a side elevation of said machine and devices. Fig. 4 is a top view of the spool-race, &c. Fig. 5 is a section through line *x* on Fig. 4, showing more clearly a slot or opening at one side of the spool case or race. Fig. 6 is an elevation of the looper, part of which is broken away; and Figs. 7 and 8 are elevations of the looper on the end of the spool-race, illustrating the operation there-

of in forming the loop. On Sheet 3, Fig. 9 is an elevation of the interior of the head, the face-plate being removed. Fig. 10 is an elevation of said removed face-plate, showing the tension device, presser-foot bar, and the short arm of the take-up. Fig. 11 is a side elevation of the take-up. Fig. 12 is a sectional view of the tension-releasing device. Fig. 13 is a similar view of the upper portion of the tension-regulator. Fig. 14 is a plan of a slack-thread regulator. Fig. 15 is a side elevation of the spool carrier and holder, and Fig. 16 is a longitudinal section of the spool-holder and inclosed spool. Fig. 17 is a section of the spool-holder through *y* of Fig. 15, and Fig. 18 is a section through *x* of Fig. 2. Fig. 19, Sheet 4, illustrates in plan a wire spring for holding the slack thread away from the needle and presser-foot and showing the relation of said spring with the head of the machine and the needle and presser-foot bars of the same. Fig. 20 is a detail view of a device for forming a loop through which the spool, acting as a shuttle, may pass, and showing clearly a slot therein by means of which the device may be given at certain intervals a rotary or reciprocating motion; and Figs. 21, 22, and 23 are details illustrating the spool-holder and an end plate that may be employed therewith.

In the drawings above referred to in brief, A A' indicate a spool-race, in which a spool-carrier, B, reciprocates, and which is constructed to hold a spool receptacle or holder, C. The spool-race is formed in two parts, A A', leaving an annular opening, which lies beneath the needle, and into which said needle enters as it moves vertically downward. The said race is suitably secured to the bed D of the machine, and consists, preferably, of two tubes of the proper size, one-half of the tube (marked A') being cut away, as indicated in Fig. 4, to permit the insertion and removal of the spool-holder through an opening in the bed closed by a slide, *d*, Fig. 2, similar to that in the ordinary machine through which the shuttle is inserted.

Within the spool-race the spool-carrier B slides, as above described, in grooved ways *b*, Fig. 1. Said carrier is provided with arms *b'* *b''*, which project into the race, and are there



provided with broadened ends  $b^3 b^4$ , between which the spool-holder is held as it reciprocates with the carriage or carrier. The tube A of the race is slotted, as at  $a$  in Figs. 4 and 5, to permit the arm  $b^2$  of the carrier to project into the said tube and allow a sufficient and full reciprocating movement of the carrier.

The looping device is arranged in connection with the tube A, and consists of a cylindrical flat ring,  $e$ , rotating freely around the end of said tube at the opening between the parts of the race, and is provided with an arm,  $e'$ , which has a post,  $e^2$ , engaging with a slotted or grooved bar, F.

The actuating mechanism (illustrated in the drawings) for producing the motion of the looper and the reciprocating movement of the spool-carrier consists of a grooved or slotted bar, F, above referred to, which is pivotally secured in or at the end of the race A, and a standard,  $f$ , formed on the bed of the machine, and is oscillated from the vertical driving-shaft G of the machine or a plate,  $g$ , thereon through or by means of a connecting-rod,  $f'$ , and a pin,  $f^2$ , on the end of said rod  $f'$ , which latter projects into a groove or slot,  $f^3$ , in the bar F. As the connecting-rod moves backward and forward under the influence of the revolving plate or crank-wheel  $g$ , it causes a rotary motion of the bar F, which is transmitted to the looper through the medium of the arm  $e'$ . The slot or groove in the bar F is so formed that the rod  $f'$  or pin thereon does not cause any motion of the bar during the first part of its movement, the slot being formed longitudinally straight in the bar, as will be understood upon reference to Fig. 20 at  $f^6$ ; but toward the end of the stroke the pin enters a spirally-formed portion or continuation of the groove, so that the bar F is caused to move pivotally about three-quarters of a complete revolution and to produce a corresponding movement in the looper. The reciprocal or oscillatory movement of the rod  $f'$  is transmitted to the spool-carrier by means of an arm,  $f^4$ , secured to the rod  $f'$ , and a link,  $b^5$ , connecting the said arm with an arm,  $b^6$ , on the spool-carriage, as indicated in Fig. 2.

As shown in Figs. 7 and 8, a hook,  $e^3$ , for catching the needle-thread by passing between the needle and said thread upon the descent of the needle, is formed on the ring  $e$ . This hook is a continuation or a projecting termination of a feather,  $e^4$ , which is formed at one edge of the ring  $e$ , and, as said ring turns, the thread, after having been caught by the hook, is caused by the feather, which extends around about one-half of the periphery of said ring to stretch over the periphery of the ring and form a loop closely resembling a ring, through which the spool in its carrier passes. The feather  $e^4$ , beginning at the hook, extends partly around the ring at the edge thereof, as indicated in Fig. 20, becoming less in height as it approaches the side of the ring diamet-

rically opposite the hook, and the thread, after the passage of the spool, is caused to slip off the edge of the ring at this point opposite said hook, forming a slack, which the take-up device acts on immediately.

The operation of the needle is so timed in its relation to the movement of the spool-carriage that the thread passes across the end of the tube A and slips between the rounded end of the spool-holder and the bent end  $b^4$  of the carriage. The spool-holder presses the thread toward the left, or in the direction indicated by the arrow in Fig. 8, forming the loop through which the holder passes carrying the spool-thread. When the end of the spool-holder reaches the annular opening between the tubes of the race, the loop with the lower thread is drawn up between the end of the spool-holder and the broadened end  $b^3$  of the arm  $b'$  of the carrier close to the under side of the goods by the action of the take-up. When this is accomplished, the spool-carrier and holder return to the beginning of their forward stroke, and the looper oscillates back to its original position ready to again seize the upper thread when the needle descends. From this operation and the comparatively large loop necessary to permit the passage of the spool-holder it is necessary to take up the slack by mechanism different from the take-up devices commonly in use.

In Figs. 1, 9, 10, and 11 is illustrated the construction of the improved take-up, which consists of a long arm,  $m$ , which moves across the face of the head, and a short arm,  $n$ , formed integrally with said long arm or secured thereto by a bar,  $m'$ , the said short arm working within the chambered head of the machine. On the end of the horizontal shaft in the said head is secured a grooved plate, O, to which a link,  $o$ , is stretched, whereby the rotary motion of the said plate is converted into a reciprocating movement in the needle-bar  $o'$  in the usual manner.

Pivoted to the frame  $o^2$  of the head, and extending from one side thereof across the plate O to the opposite side of the said frame, is a lever,  $p$ , having a roller thereon, as shown dotted on Fig. 9, which moves in a groove,  $o^3$ , formed in the plate O, as indicated in the same figure. The end of the lever  $p$  is slotted to receive a pin,  $n'$ , projecting from the end of the short arm of the take-up, and as the lever is raised and lowered by the action of the grooved plate or cam a corresponding movement takes place in both the long and short arms of the take-up. By this arrangement the extent of the movement is greatly augmented, a very slight movement of the lever and short arm producing an extended sweep of the long arm of the take-up, as will be evident.

The formation of the cam is of such a construction and the operation of the take-up is so timed that the downward movement of the take-up coincides with or immediately precedes the formation of the loop, while the up-



ward sweep of said take-up occurs when the spool-holder has passed entirely through the loop in the manner before mentioned.

The take-up is provided with the usual perforation,  $m^2$ , to receive the thread, and is preferably slotted at its opposite end, whereby the arm may be adjusted to vary the extent of its sweep. A thumb-screw,  $m^3$ , holds the said arm in any desired position.

To supplement the action of the take-up and to prevent the slack thread between the end of the lowered take-up arm  $m$  and the eye of the needle, or that in the needle-bar, from becoming entangled with the presser-foot, or from being otherwise disarranged so as to interfere with a proper sewing operation, I employ a holding-spring,  $r$ , which takes the thread between the said take-up arm and the needle-bar and needle and holds it in proper relation to said needle. The thread, after passing through the eye  $m^2$  of the arm  $m$ , passes over or through a hooked or looped end of said holding-spring  $r$ , and the slack thread is held thereby, so that below said hook or loop the said thread will be fairly taut. The said holding-spring is secured to the under side of the head, and the spring quality therein is effective in securing greater regularity of tension.

The peculiar spring-piece herein shown, Figs. 1, 3, 14, and 19, consists of a wire strip or rod, which is bent, substantially as in Figs. 14 and 19, around the front of the needle-bar, and is preferred because of its simplicity and efficiency.

The tension device shown in the drawings consists of a spring-piece,  $s$ , adjusting-screw, and the ordinary clamping-plates  $s'$   $s^2$ , between which the thread is held, one of said plates, as  $s'$ , being arranged loosely on a rod,  $s^3$ , formed on or secured to the second plate,  $s^2$ , and projecting through the face-plate and a slot in the end of the tension-spring  $s$ .

To release the pressure of the tension-spring upon the plates  $s'$   $s^2$  temporarily, without disturbing the tension-regulator, is one of the objects of this invention. This is effected by extending the rod  $s^3$  entirely through the head, as in Fig. 12, and providing a finger-piece,  $s^4$ , at the back or opposite side of said head. A shoulder,  $s^5$ , is formed on the rod at the spring  $s$ , so that any pressure applied to the finger-piece will be brought to bear against the end of said spring and will separate the clamping-plates  $s'$   $s^2$  and allow the thread to slip freely between them. While this construction is preferred on account of its easy operation, I

do not wish to limit the invention to the exact construction shown.

In Figs. 4, 15, 16, and 17 are shown several views of the spool-holder, which consists of an outer casing,  $t$ , slotted on one side and rounded on one end, having within a spindle or rod,  $t'$ , on which the spool  $t^2$  turns, and an end plate,  $t^3$ , which closes the open end after the spool is inserted. Across the slot in the casing is arranged a spring-piece,  $t^4$ , which is fast at one end but free at the other, and is provided in its free end with a slot, through which the thread from the inclosed spool passes to the goods. This spring-piece acts as a tension and prevents the too free escape of the thread.

I am aware that large loops through which ordinary spools may pass have been formed by means of pivoted and hooked arms, which co-operated to spread the loop, and consequently I do not wish to be understood as claiming the same herein.

Having thus described the invention, what I claim as new is—

1. In a sewing-machine, in combination with a reciprocating needle, a tubular race,  $A$   $A'$ , having an opening between the parts thereof, a reciprocating carriage having arms  $b'$   $b^2$  extending toward said race, a spool-holder held between said arms, a driving-shaft,  $G$ , having a crank-wheel,  $g$ , connecting-rod  $f'$ , arm  $f^4$ , link  $b^5$ , connecting said arm with the carriage, a spirally-grooved bar,  $F$ , arranged at the end of the race and given an oscillating movement by the connecting-rod, and a looping-ring connected with the bar  $F$  and moving therewith, all said parts being arranged and adapted to operate substantially as and for the purposes set forth.

2. In a sewing-machine, the combination of a bed,  $D$ , a reciprocating needle, a race,  $A$   $A'$ , having a needle-opening between its parts, a reciprocating spool-holder and a carriage to give movement to the same, a looping-ring working at said needle-opening and connected with and receiving motion from a spirally-grooved or slotted rod or shaft,  $F$ , a revolving plate,  $g$ , secured to the driving-shaft  $G$ , and a connecting-rod,  $f'$ , connecting said revolving plate and rod  $F$ , substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my set my hand this 17th day of March, 1886.

JACOB BOPPEL.

Witnesses:

FREDK. F. CAMPBELL,  
CHARLES H. PELL.