

(No Model.)

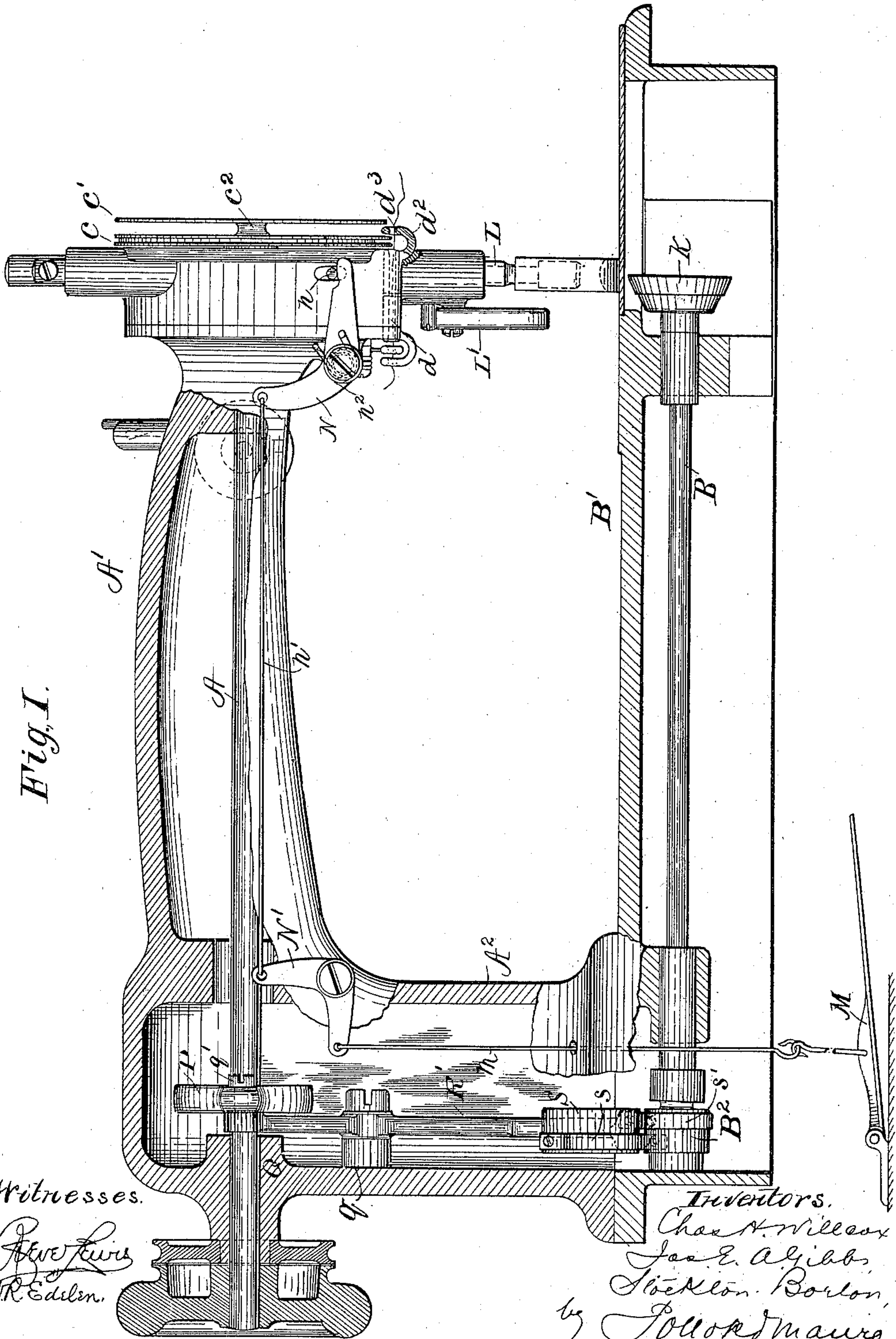
3 Sheets—Sheet 1.

C. H. WILLCOX, J. E. A. GIBBS & S. BORTON.  
SEWING MACHINE.

No. 603,989.

Patented May 10, 1898.

Fig. 1.



Witnesses.

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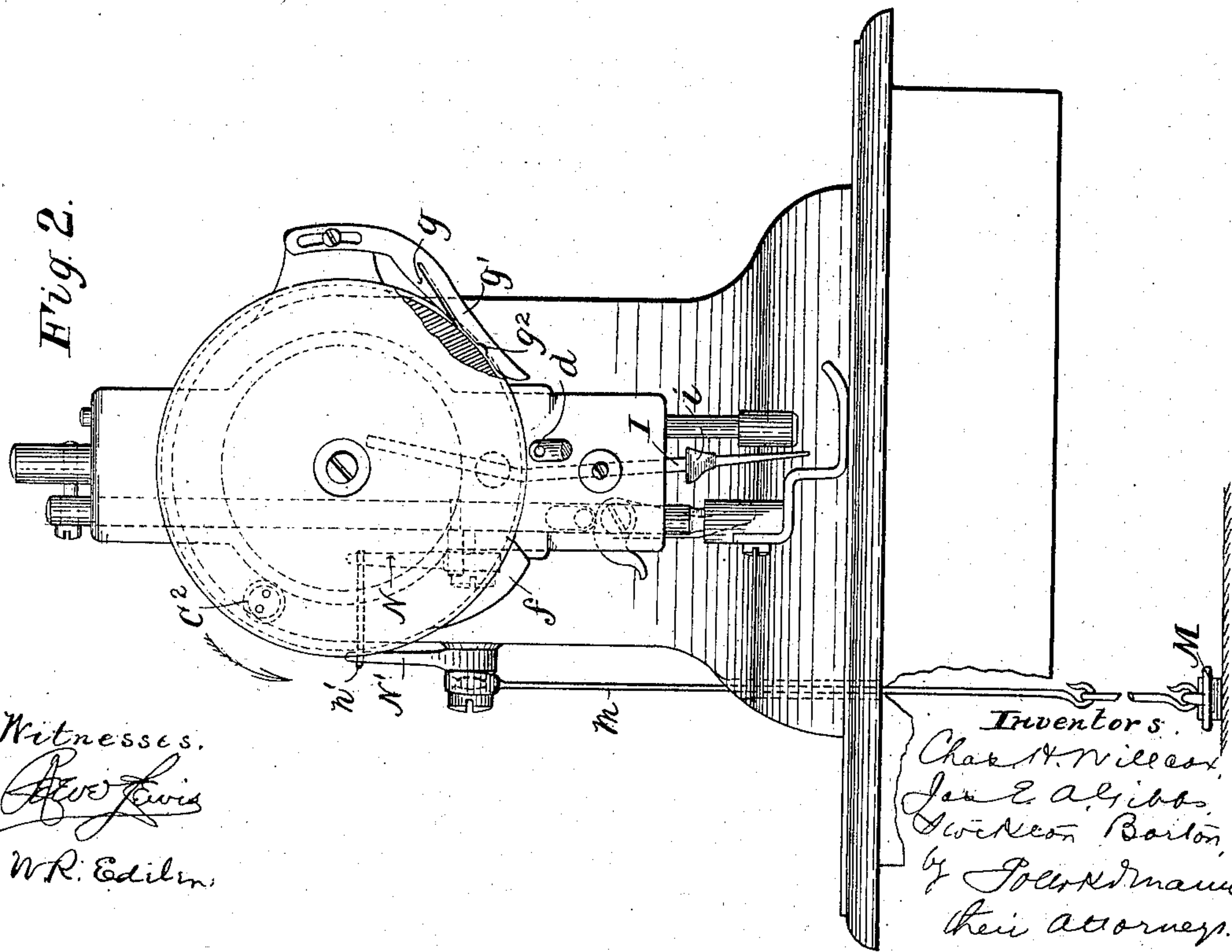
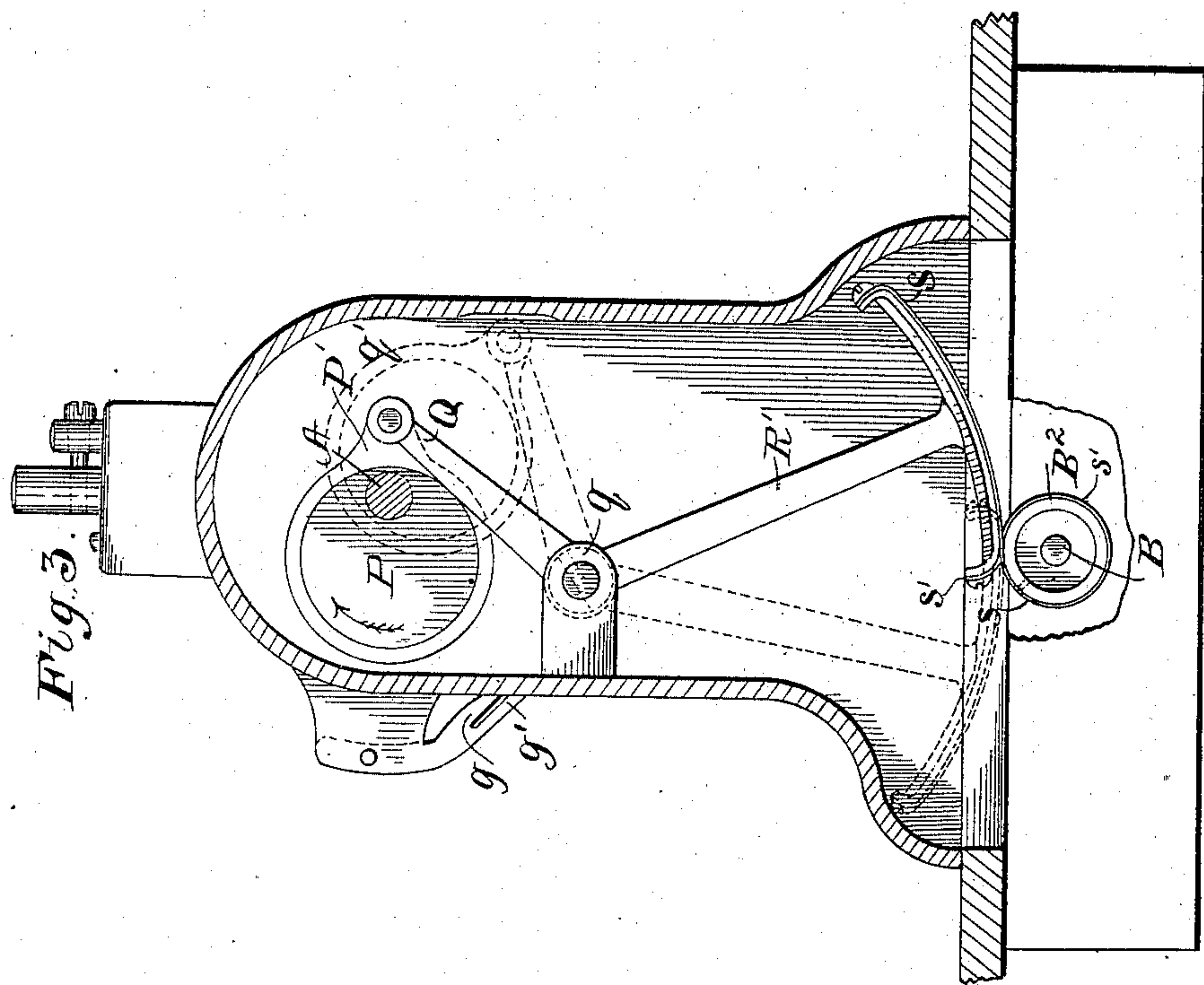
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3 Sheets—Sheet 3.

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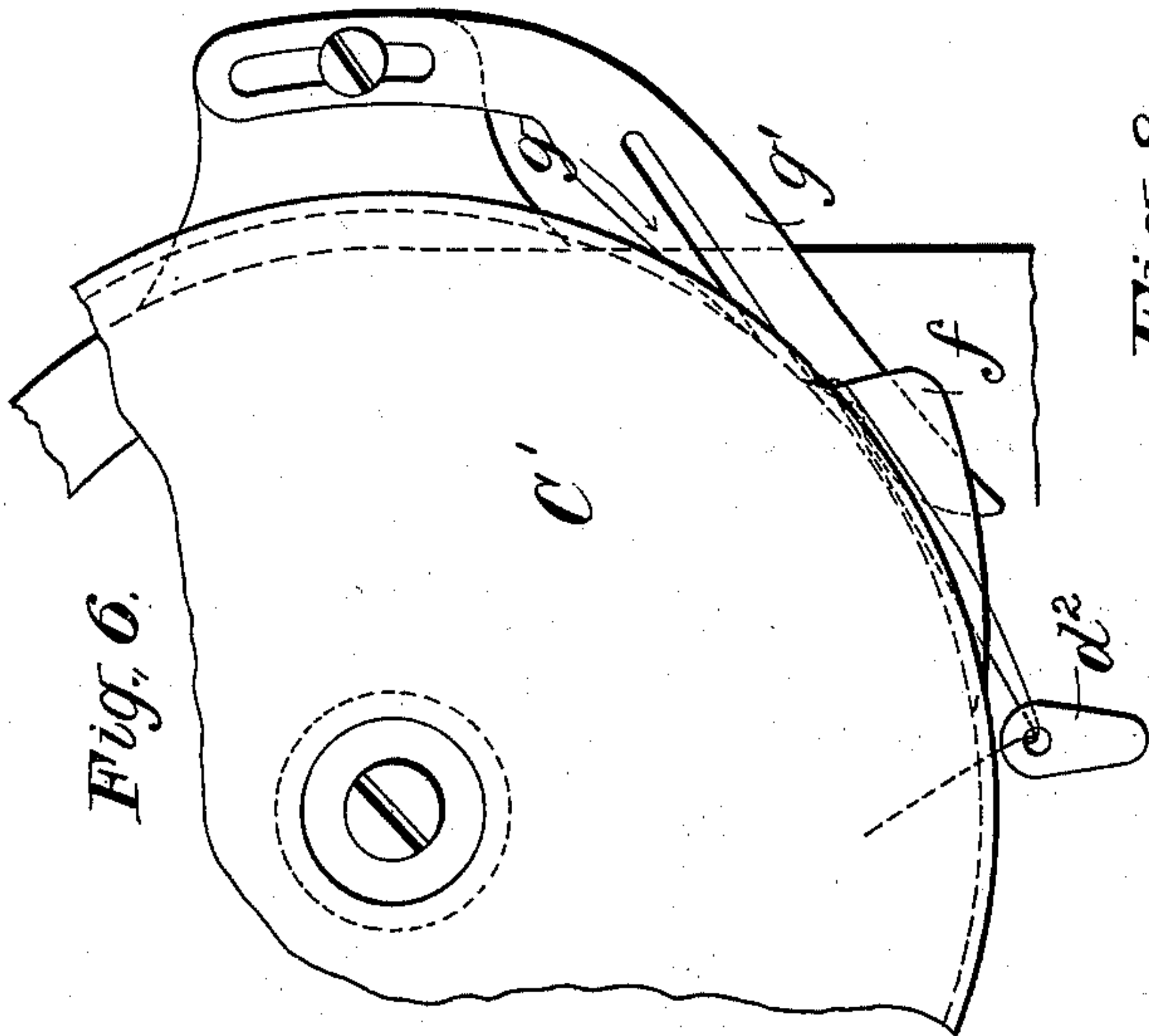


Fig. 6.

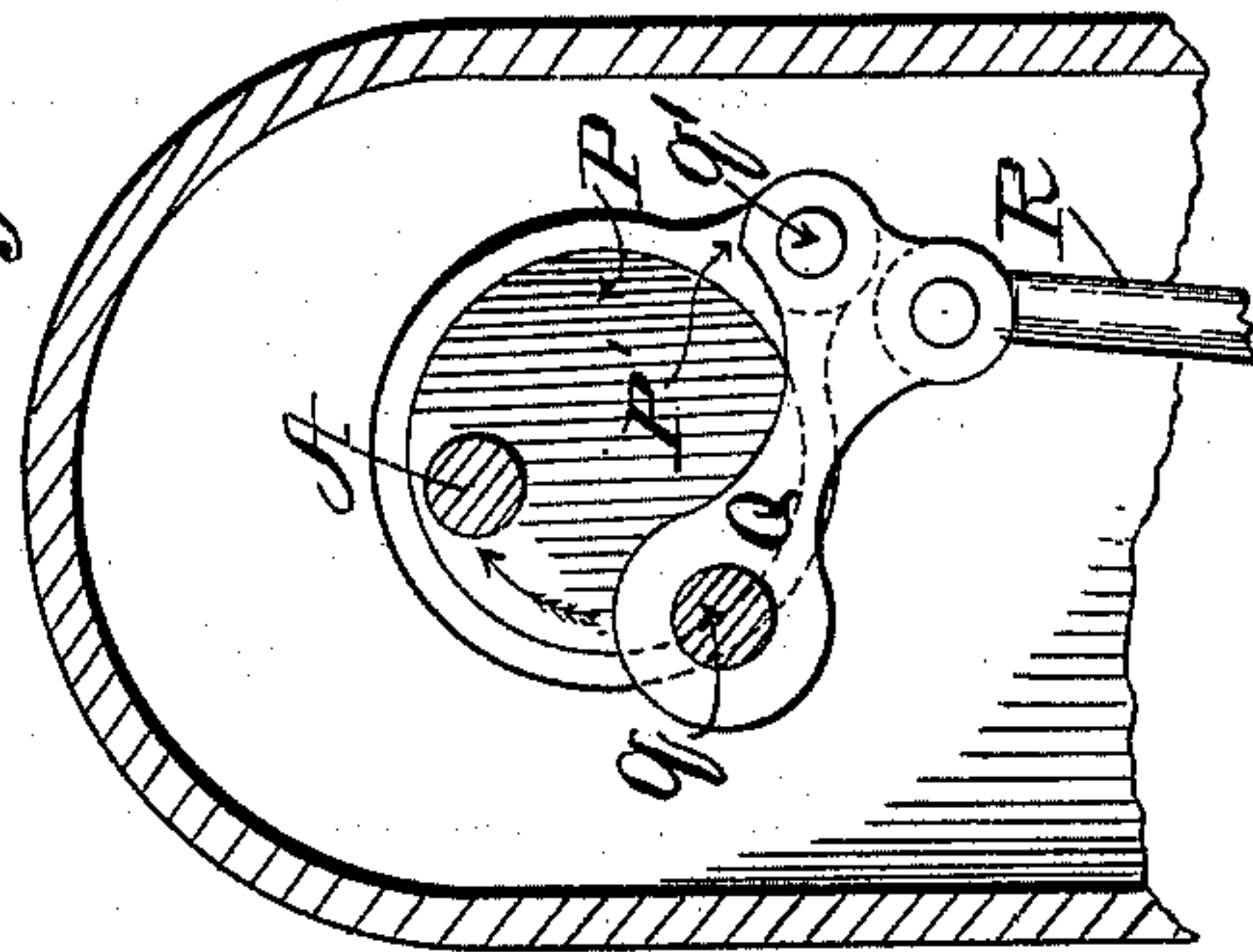


Fig. 8.

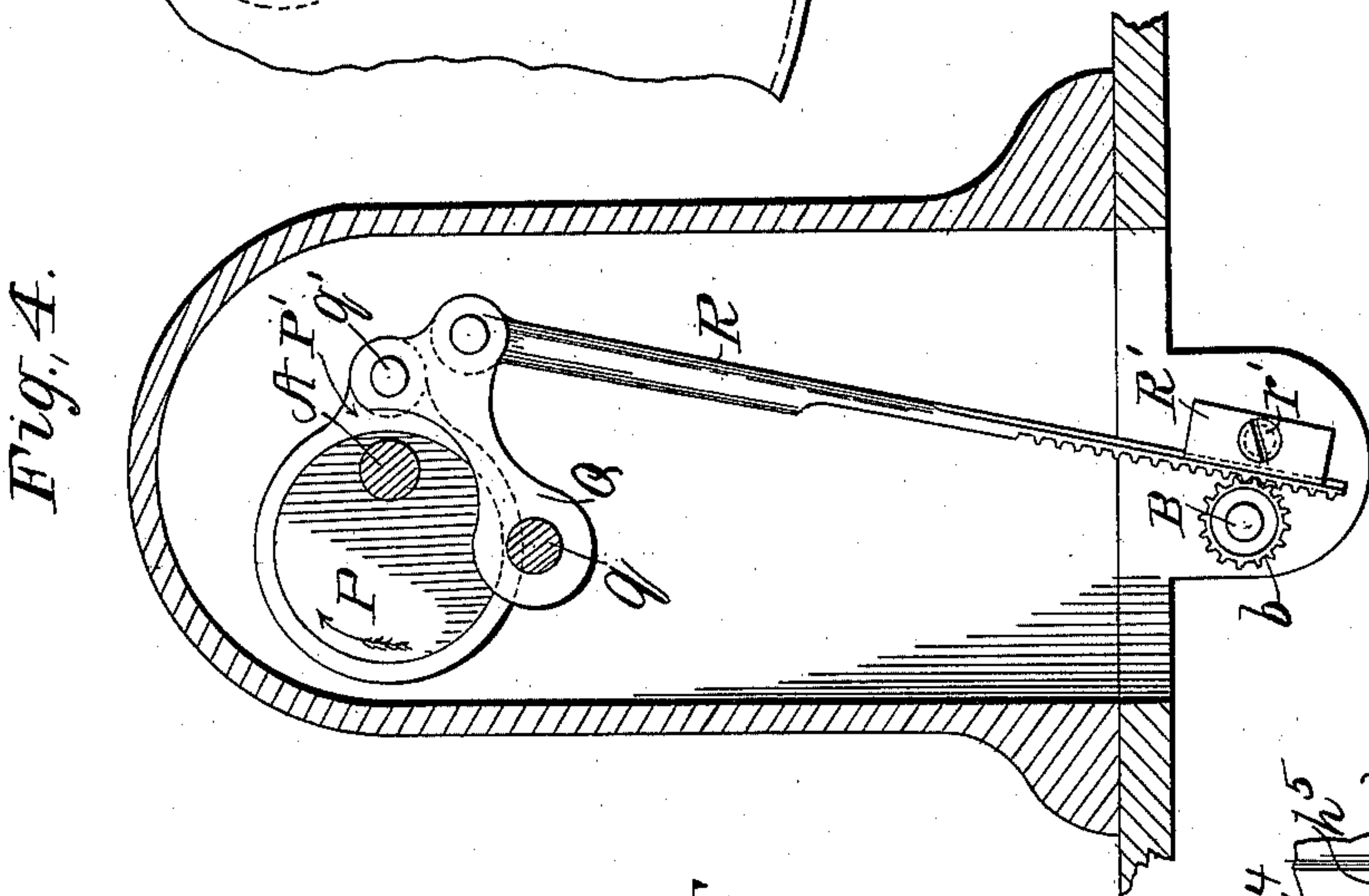
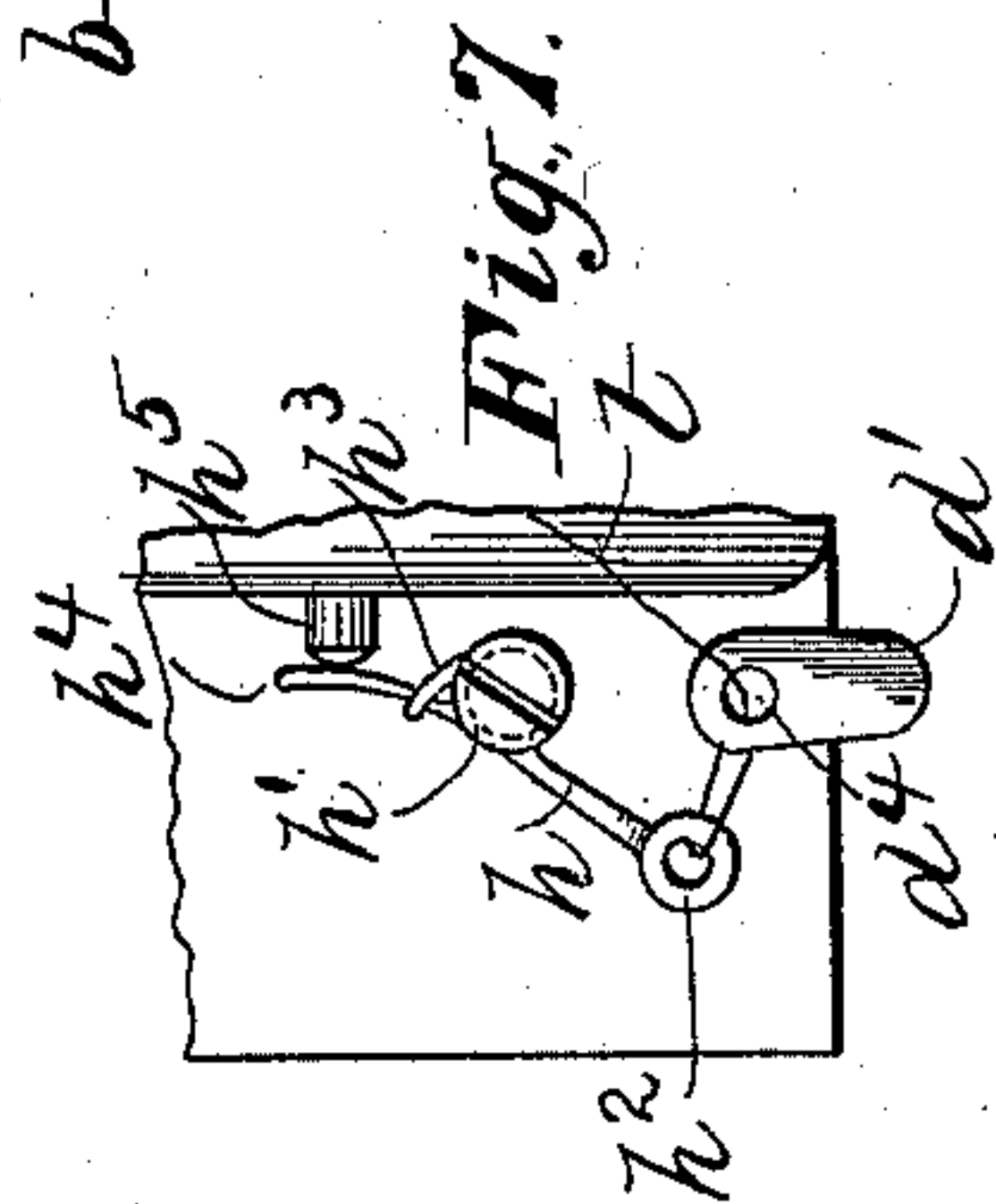
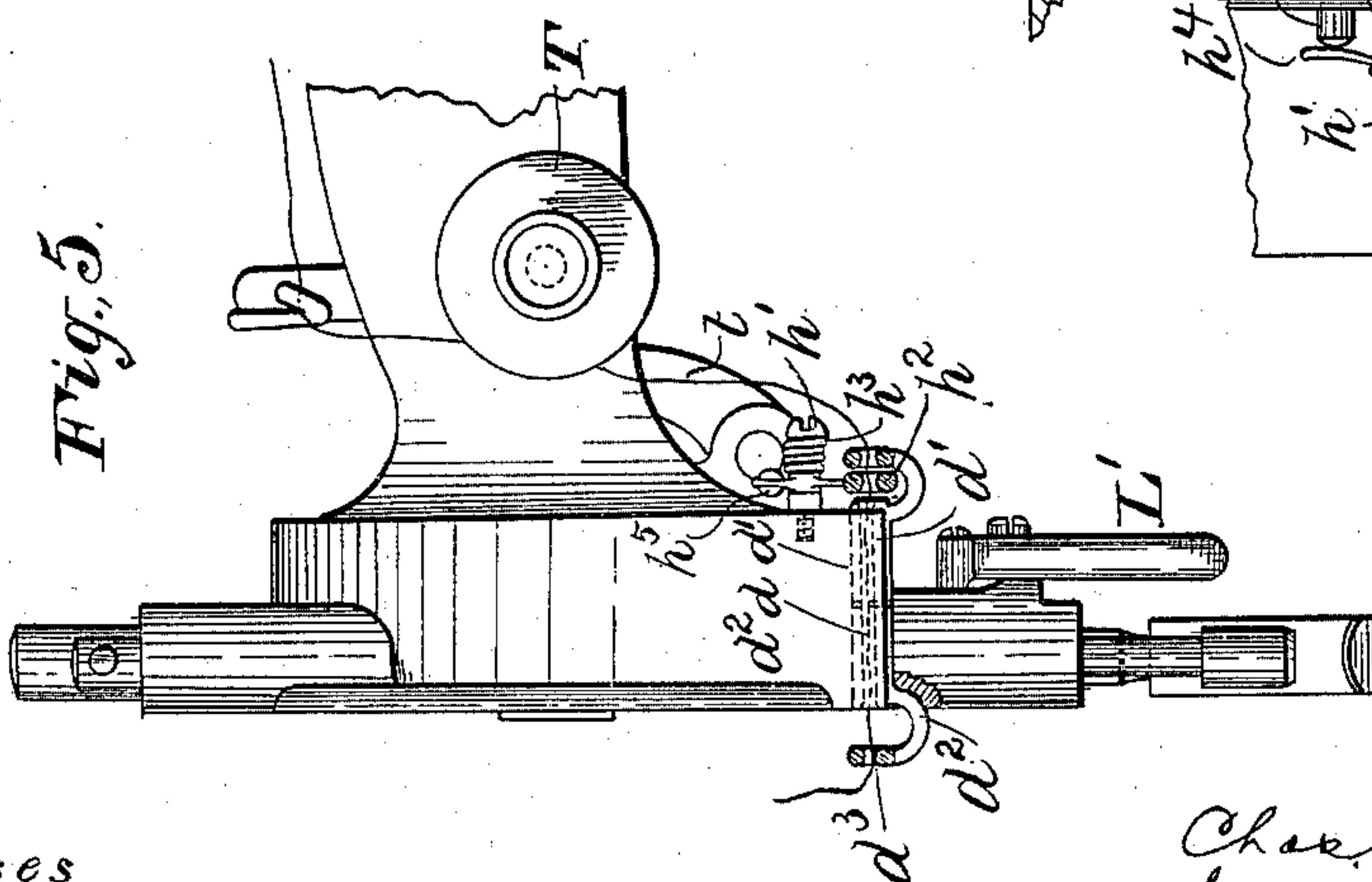


Fig. 4.



*Fig. 7.*



*Fig. 5.*

Witnesses

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# UNITED STATES PATENT OFFICE.

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## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 603,989, dated May 10, 1898.

Application filed July 18, 1896. Serial No. 599,732. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES H. WILLCOX, of New York, N. Y., JAMES E. A. GIBBS, of Raphine, Virginia, and STOCKTON BORTON, of Brooklyn, New York, have invented new and useful Improvements in Sewing-Machines, which are fully set forth in the following specification.

This invention has reference to sewing-machines adapted to make a lock-stitch by means of two threads. The take-up is of the kind which has a continuous rotary motion in one direction and comprises two plates connected by a single crank-pin, the thread entering and leaving the take-up at or near the same point. The main advantage of this form of take-up is that it may be made of comparatively small diameter and permits the taking up of the loop to be accomplished in a brief period of time, thus allowing more time to the hook in which to carry the loop around the bobbin. When the take-up pin begins to release the thread, it does so very rapidly, and the result is that the slack thread is thrown out from between the plates, and on account of its twist it kinks and becomes knotted and is often caught on some part of the frame or mechanism. The looseness of the thread at this time—that is, when the take-up pin has released it—also permits the needle and hook to take down thread more rapidly than is required, and the surplus thread is likely to take a wrong course and be caught and broken. It is therefore of the utmost importance that the course and movement of the thread should, so far as practicable, be under constant control.

The main object of this part of the invention is to take care of the slack thread during the time the take-up pin is performing the idle part of its movement and to insure that the loop of thread runs smoothly and easily to the needle and hook. This object is accomplished by special devices, which will be described hereinafter in detail and which comprise a horn or horns on the rim of one of the take-up plates for engaging the slack loop and means for casting off the loop at the proper moment.

The invention embraces the combination, with the rotary take-up, of a spring-actuated controller which acts while the needle is descending to hold the thread taut until the eye of the needle reaches the work.

The invention further includes means for imparting to the hook or looper a variable oscillatory motion, fastest at the forward movement of the hook and slowest when it retreats, the object being to perform the first part of the movement in the shortest possible time.

In the accompanying drawings, Figure 1 is an elevation, partly in longitudinal section, of a machine embodying the improvements constituting the present invention. Fig. 2 is an elevation looking toward the head of the machine. Fig. 3 is a rear elevation of the mechanism for driving the hook-shaft, the frame being in section. Figs. 4 and 8 are similar views of a modified construction. Fig. 5 is a partial elevation on the opposite side from Fig. 1. Fig. 6 is an enlarged view of the thread-controlling devices auxiliary to the take-up, and Fig. 7 is a detail illustrating the thread-controller.

A represents the main shaft, journaled, as usual, in bearings in the gooseneck or arm A', and B the hook-shaft, journaled beneath the bed-plate B' and driven from the main shaft by connections hereinafter described, which impart to the hook-shaft an oscillatory movement at varying speed.

The take-up, which is located on the head of the machine and rotated by the main shaft, comprises two disks or plates  $c c'$ , set a slight distance apart, so as to form between them a space for the passage of the thread, said plates being connected by a single crank-pin  $c^2$ , which acts upon the thread in taking up a loop.

The thread  $t$ , Fig. 5, passes from the tension T to the take-up through a passage  $d$  in the lower part of the head of the machine just beneath the take-up, thence passes up and around take-up pin  $c^2$ , and thence vertically downward to the needle. Thus pin  $c^2$  acts upon a loop whose ends start from closely-contiguous points, and consequently its action is comparatively rapid, the drawing up



of the stitch being quickly accomplished. On the other hand, when the pin  $c^2$  passes the point where it ceases to draw up the thread it gives out slack thread with great rapidity, and for reasons already explained this slack must be taken care of. This is the function of the slack-taker  $f$ , shown in the form of a horn or lug projecting from the periphery of the inner take-up plate  $c$ . This plate has a peripheral groove extending entirely around it for a purpose which will appear hereinafter. The thread-passage  $d$ , already referred to, is formed by two hollow pins  $d'$   $d^2$ , driven into a hole bored through the head, from opposite sides thereof, respectively, and each of these pins has at its outer end a loop or U-shaped bend. The edge of the inner take-up plate  $c$  extends into the bend of pin  $d^2$ , and the thread crosses this bend from passage  $d$  to and through eye  $d^3$ , from which it goes around pin  $c^2$ . The thread therefore lies across the path of horn  $f$ , by which it is caught at each revolution of the take-up. This occurs when the pin  $c^2$  is giving out slack. The loop must be disengaged from the horn  $f$  in proper time to leave the thread free to be drawn down by the hook, and this disengagement is effected by means of a cast-off or stripper  $g$ , whose point or end lies in the groove of plate  $c$ , already referred to. It is not, however, desirable to leave the cast-off loop entirely free; but, on the contrary, it is important to keep it under control during the time it is being drawn by the looper. This is effected by the thread-detainer  $g'$ , which is arranged to detain the loop with light friction while being drawn down through the work. As shown, the thread-detainer is in one piece with the stripper or cast-off. Its end projects into the groove in plate  $c'$ , and consequently the thread makes a double bend in passing around the edge of plate  $c'$  and the intermediate edge of the thread-detainer. This double bend checks or puts a drag upon the thread. The edge of the thread-detainer is notched or cut away at  $g^2$ , it having been found desirable to permit the thread at this point to move with freedom, or, in other words, to leave it practically free.

It will be seen that the slack-taker  $f$  does not come into action as soon as the take-up pin begins to give out thread. If it did, there would not be sufficient free thread for the needle to take down. It is necessary, therefore, or at least very desirable, that some means be provided to act on the thread the instant the needle begins to descend and to keep it taut during the descent. The bend in the outer end of thread-pin  $d'$  embraces the end of a lever  $h$ , Figs. 5 and 7, pivoted on screw-pin  $h'$  and having in its end a ring or eye  $h^2$ . The thread from the tension passes through the eye  $d^4$ , Fig. 7, in the end of pin  $d'$ , then through the eye  $h^2$ , and then through the hollow of pin  $d'$ . A light coiled spring  $h^3$  tends to throw arm  $h$  away from the stationary thread-eyes  $d'$   $d^4$ , as shown in Fig. 7.

The action is as follows: When the take-up is acting, the pull on the thread overcomes the pressure of spring  $h^3$ ; but at the moment the take-up ceases to draw and slackens the thread arm  $h$  flies up, thus holding the thread taut when the needle is descending.

Lever  $h$  has a backward extension or tail-piece  $h^4$ , which at each vibration of the lever makes contact with a plug or pad  $h^5$ , which may be of leather or other suitable material, this construction being adapted to render the operation of the thread-controller noiseless.

The needle-finger I, Fig. 2, which shields the point of the needle from the thread, is operated as heretofore; but its construction has been modified by the addition of an oil-cup  $i$  to arrest any oil that may descend along the finger, from which cup the oil may readily be wiped out, or the cup may be kept filled with cotton or waste, which is thrown away when saturated.

It has been found very desirable, particularly for machines that are used in factories and driven by power, to provide convenient means whereby the presser-foot can be held off the work, leaving the operator's hands free. Such means have been heretofore provided, the presser-bar being connected with an actuating device operated by pressing with the knee, but its use has proved too fatiguing to be satisfactory.

In the drawings, L represents the presser-bar, provided with the usual hand-actuated lifter L'. A cross-pin  $n$ , fixed to bar L, projects through a slot in the frame, and under this pin engages one end of a bell-crank lever N, pivoted to the frame. The other arm of this lever is connected by a cord  $n'$  to another bell-crank lever N', pivoted on the hollow vertical standard A<sup>2</sup>, which lever in turn is connected by a cord  $m$  to a treadle M beneath the table.

When the operator puts her foot on treadle M, the presser-bar will be lifted, and when she withdraws pressure from the treadle a spring  $n^2$  on the hub of lever N restores the latter to its normal position.

The means for giving the hook-shaft M and hook K oscillatory motion will now be described. It is well understood that a rotary take-up, when one is employed, requires a relatively long time to complete its action, and this has been heretofore allowed for by giving a rotary hook two or more revolutions for each revolution of the take-up, the object being to get the loop around the bobbin-case as rapidly as possible, leaving a relatively long time for the taking up of the thread and tightening of the stitch. According to the present invention an oscillatory motion is imparted to the hook, and this motion is accelerated at the time the loop is carried under the bobbin-case and retarded at other times.

It is not broadly new to oscillate a hook or looper at a speed varying at different parts of its movement, the present improvement



consisting in the means whereby the result is effected.

Main shaft A is provided with a large eccentric P, Figs. 3, 4, and 8, from which eccentric motion is communicated to the hook-shaft B. This eccentric acts upon the arm P', which is in one piece with the eccentric-strap, and vibrates the rocking arm Q. Rock-arm Q is pivoted in the frame at q and pivoted to arm P', which is in fact a short pitman, at q'. The effect due to the relative arrangement of the centers A and q is to rock the arm Q very rapidly at a certain part of its movement and slowly during the other parts. When eccentric P is in the position shown in Fig. 4, the movement of rocking arm Q on its axis is slow; but when the eccentric passes over the top of shaft A and begins to descend the movement of arm Q is more rapid. The relative position of the parts when the eccentric is beneath the shaft is shown in Fig. 8. From this point the movement of the eccentric through an arc of from one hundred and ten to one hundred and fifty degrees raises the arm Q to its highest position, this being the fastest part of the movement of said arm. This variable movement of rocking arm Q may be communicated to hook-shaft B in a variety of ways. In Fig. 4 said shaft is shown as being provided with a pinion b, engaged by a rack r on connecting-rod R, the latter being directly connected to rocking arm Q. The end of rod R slides on a block or support R', which is pivoted at r', so that it can accommodate itself to the varying angular positions of rod R.

The preferred arrangement of driving mechanism is that shown in Figs. 1 and 3. In this case the rod or arm R' is a continuation of the arm Q, the two forming a bell-crank lever. Arm R' has at its free end a curved limb S, which as arm R' vibrates moves back and forth in close proximity to wheel B<sup>2</sup> on shaft B. Connection is made between this limb and the wheel B<sup>2</sup> by means of two flexible bands s s', say of steel. One of these bands is attached to one end of limb S and wound around wheel B<sup>2</sup>. The other is attached to the other end of limb S and wound around wheel B<sup>2</sup> in the opposite direction. Consequently as limb S vibrates shaft B will be oscillated at the varying speed of movement of arm Q first in one direction and then in the other, the bands s s' alternately winding and unwinding on shaft B.

Obviously the invention is not limited to the precise details of construction shown and described, and it is also obvious that parts of the invention may be used separately from others.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a sewing-machine the combination with a needle, a looper and actuating mechanism, of a rotary take-up comprising two plates connected by a take-up pin, thread-guides ar-

ranged to conduct the thread across and in proximity to the edges of said plates, and a slack-taking device in the form of a horn projecting from the edge of one of said plates in position to engage the thread, and take up the slack when the take-up is releasing the thread, substantially as described.

2. In a sewing-machine, the combination of the take-up, comprising two plates connected by a crank-pin, a horn or projection on one of said plates for engaging the slack loop given up by the take-up pin, and a stripper or cast-off for releasing the loop from said horn or projection, substantially as described.

3. In a sewing-machine, the combination of a rotary take-up comprising two plates connected by a crank-pin, a thread-guide for leading the thread to the take-up, said guide being in close proximity to the line taken by the thread in leaving the take-up, a horn on the periphery of one of said take-up plates coming into action on the thread passing to said thread-guide after the take-up pin ceases to act, and means for releasing the loop from said horn, substantially as described.

4. The combination of the rotary take-up comprising two plates connected by a crank-pin, a slack-taker, in the form of a horn projecting from the periphery of one of said plates, thread-guides for conducting the thread to the take-up across the path of said horn, and a stripper or cast-off, substantially as described.

5. The combination with a rotary take-up in the head of the machine, said take-up comprising plates and a connecting crank-pin, and with stationary thread-guides in the rear of the head of the machine through which the thread passes to the take-up, of a vibrating thread-controller coöperating with said guides, and a spring actuating said controller whereby the slack thread, when given up by the take-up pin, is drawn back of the head of the machine, substantially as described.

6. The combination with the rotary take-up comprising take-up plates and a crank-pin connecting them, of a thread-controlling device comprising stationary thread-guides through which the thread passes on its way to the take-up, an eye or ring between said guides carried by a pivoted arm, a spring tending to move said arm from between said guides, and a plug or pad of soft material, said arm being provided with an extension which strikes said pad when the arm is actuated by its spring, substantially as described.

7. The combination of the rotary take-up comprising two plates connected by a crank-pin, a horn projecting from the periphery of one of said plates, said plate and horn being grooved, and a stripper or cast-off having its point lying in said groove, substantially as described.

8. The combination of the rotary take-up, the slack-taker coming into action when the take-up is giving out thread, the cast-off for releasing the thread from said slack-taker,



and the thread-detainer for putting a drag on the thread when released by the cast-off, substantially as described.

9. The combination of the take-up, the 5 slack-taker for taking up the slack given out by the take-up, the cast-off releasing the thread from the slack-taker, and the thread-detainer having a narrow thread-passage through which the thread passes after being 10 released by the cast-off, substantially as described.

10. The combination of the rotary take-up comprising take-up plates and a crank-pin, a horn projecting from one of said plates in- 15 tersecting the path of the thread on its way to the take-up, means for releasing the thread from said horn, and a thread-detainer having a narrow thread-passage through which the thread passes after being released from said 20 horn, said passage being provided with an enlargement, substantially as and for the purpose set forth.

11. In a sewing-machine, the combination with the main shaft and the hook or looper 25 shaft, of mechanism for oscillating the latter shaft at a varying speed so that the looper will move very rapidly when passing through the loop, and very slowly at other times, said mechanism comprising a large eccentric on 30 the main shaft, a short pitman vibrated by

said eccentric, a rocking arm vibrated at varying speed by said pitman, said arm being pivoted in the frame adjacent to said eccentric, extending close to the edge thereof and at its opposite end pivoted to said pit- 35 man, and connections between said arm and looper-shaft.

12. In a sewing-machine, the combination with the main shaft and looper-shaft, of 40 mechanism for oscillating the latter from the former, said mechanism comprising a rocking arm having a curved limb, a wheel or pulley on said looper-shaft, and bands attached one at each end of said limb and wound in oppo- 45 site directions around said looper-shaft, and means for imparting to said arm a motion of varying speed, substantially as described.

In testimony whereof we have signed this specification in the presence of the subscribing witnesses.

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