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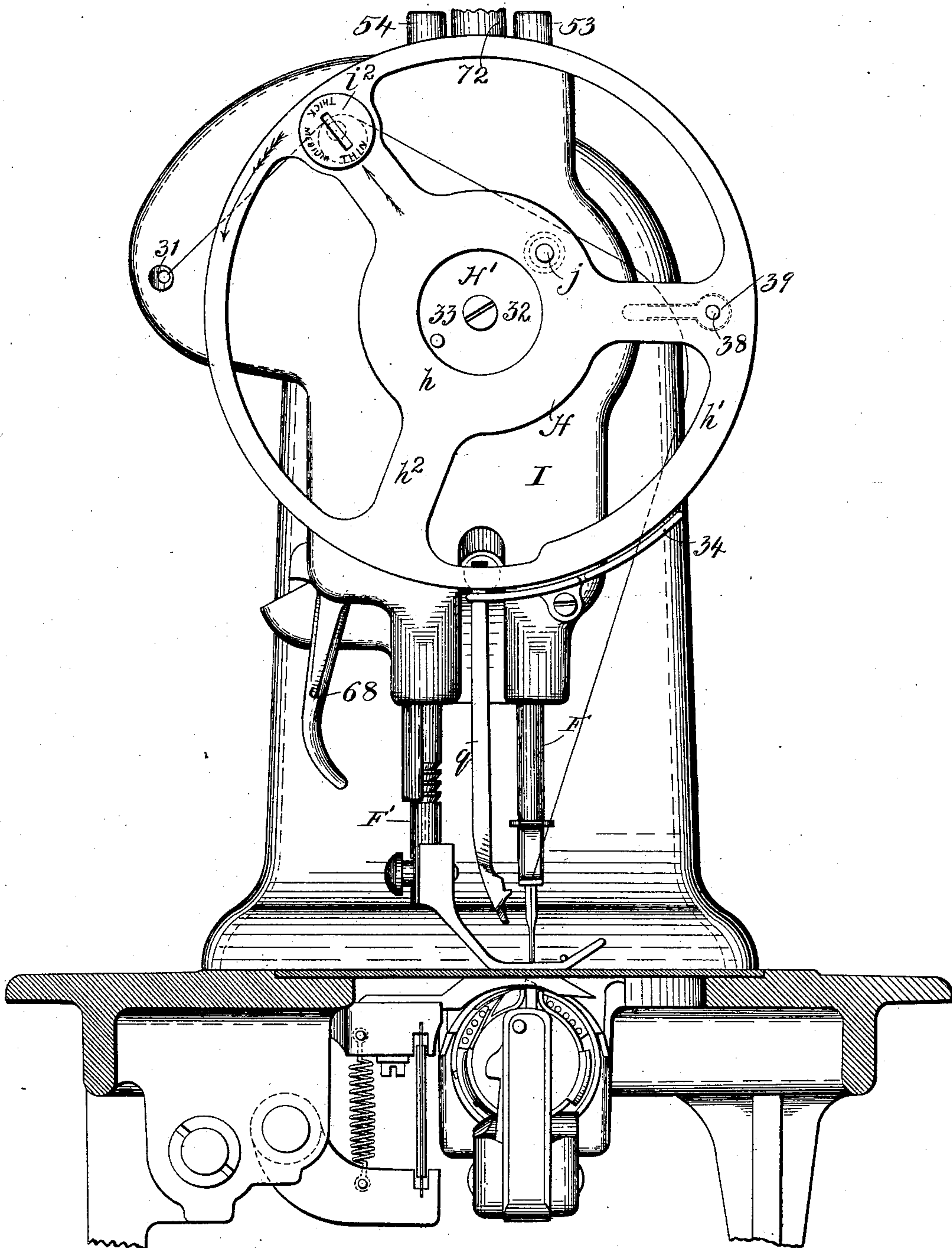
Patented Aug. 2, 1898.

S. BORTON.  
SEWING MACHINE.

(Application filed Aug. 10, 1895.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses  
H. Bess Edgely.  
Geo. Lewis.

Fig. 1.

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his attorney.

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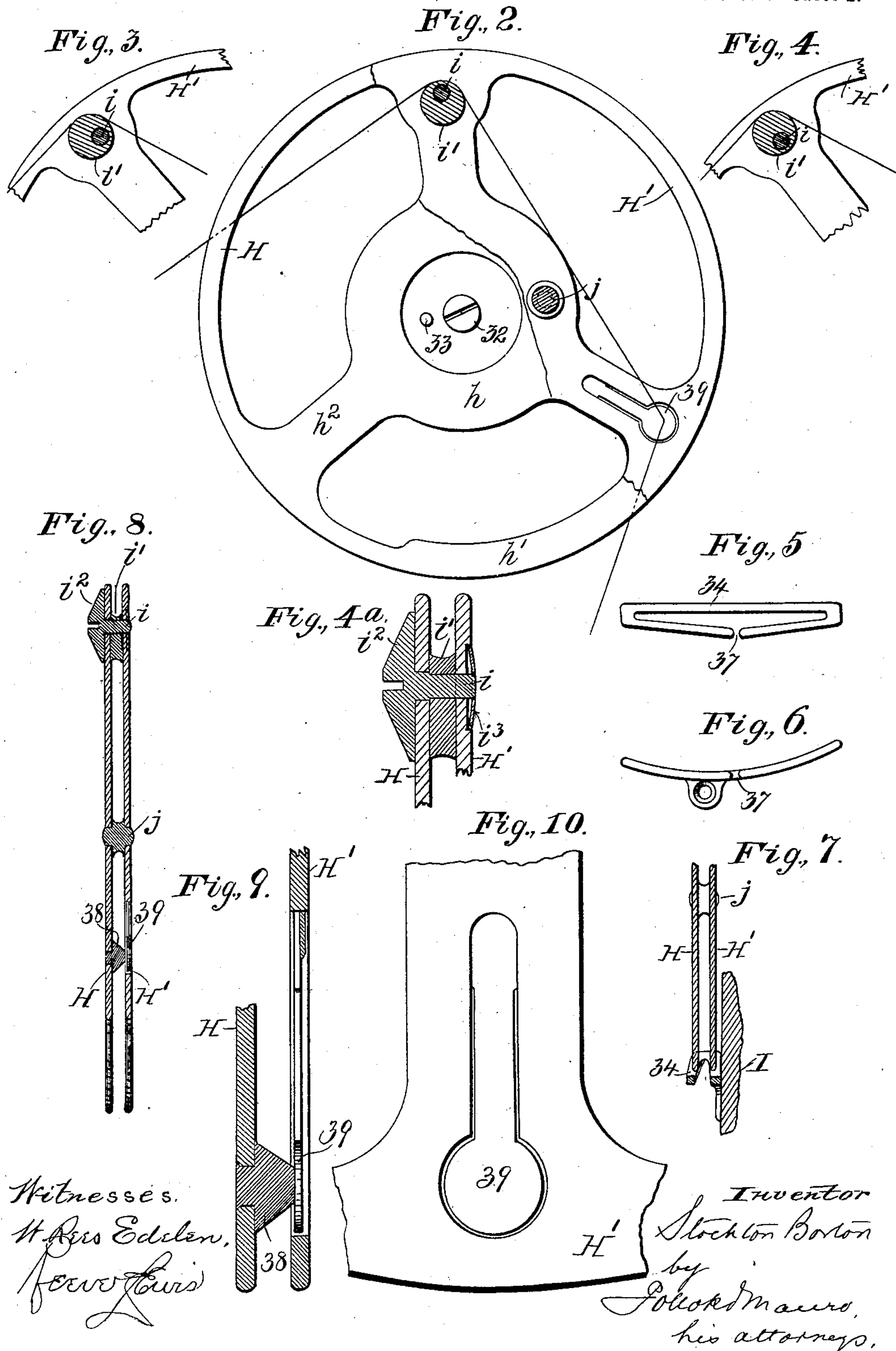
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Fig. 13.

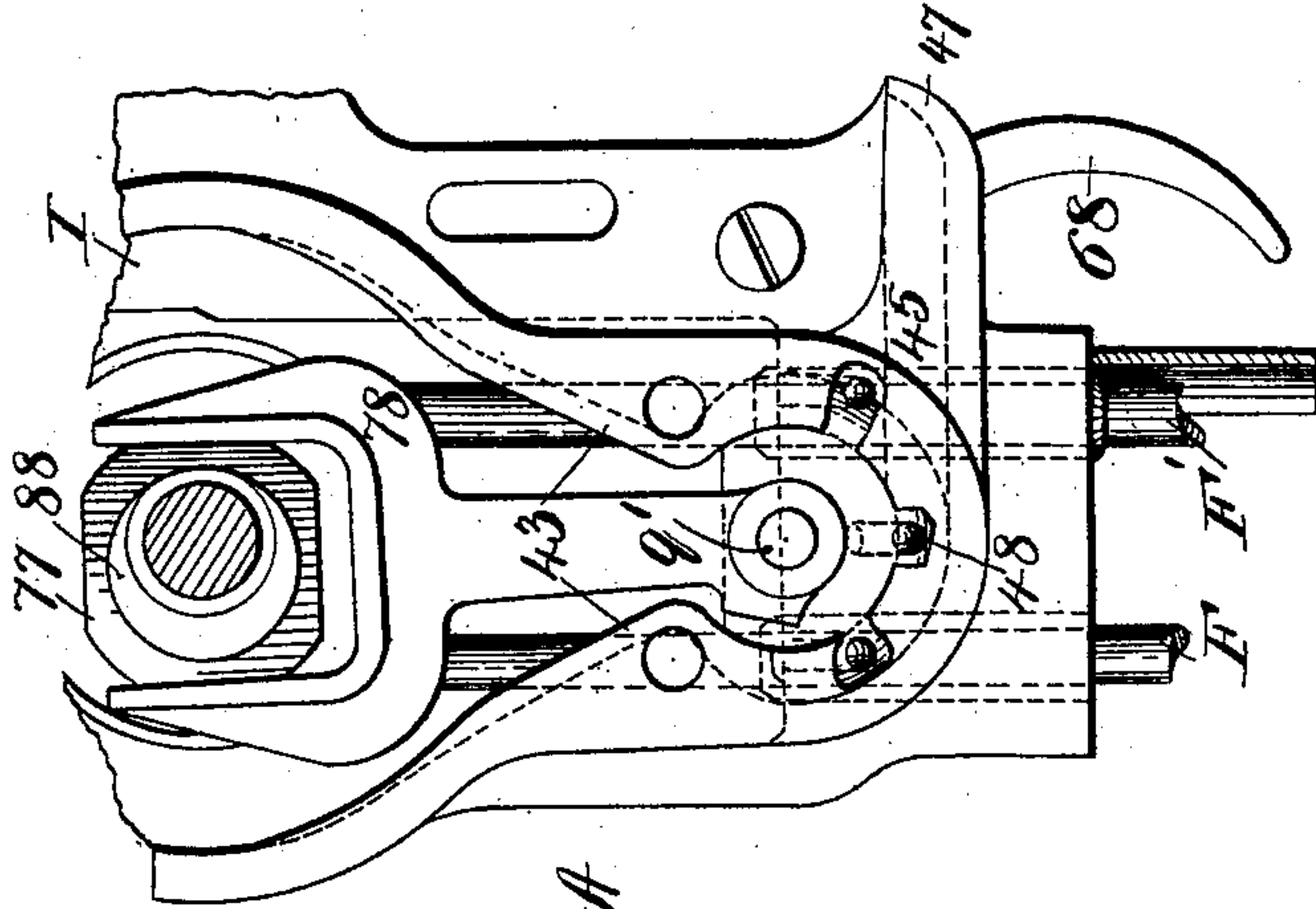


Fig. 12.

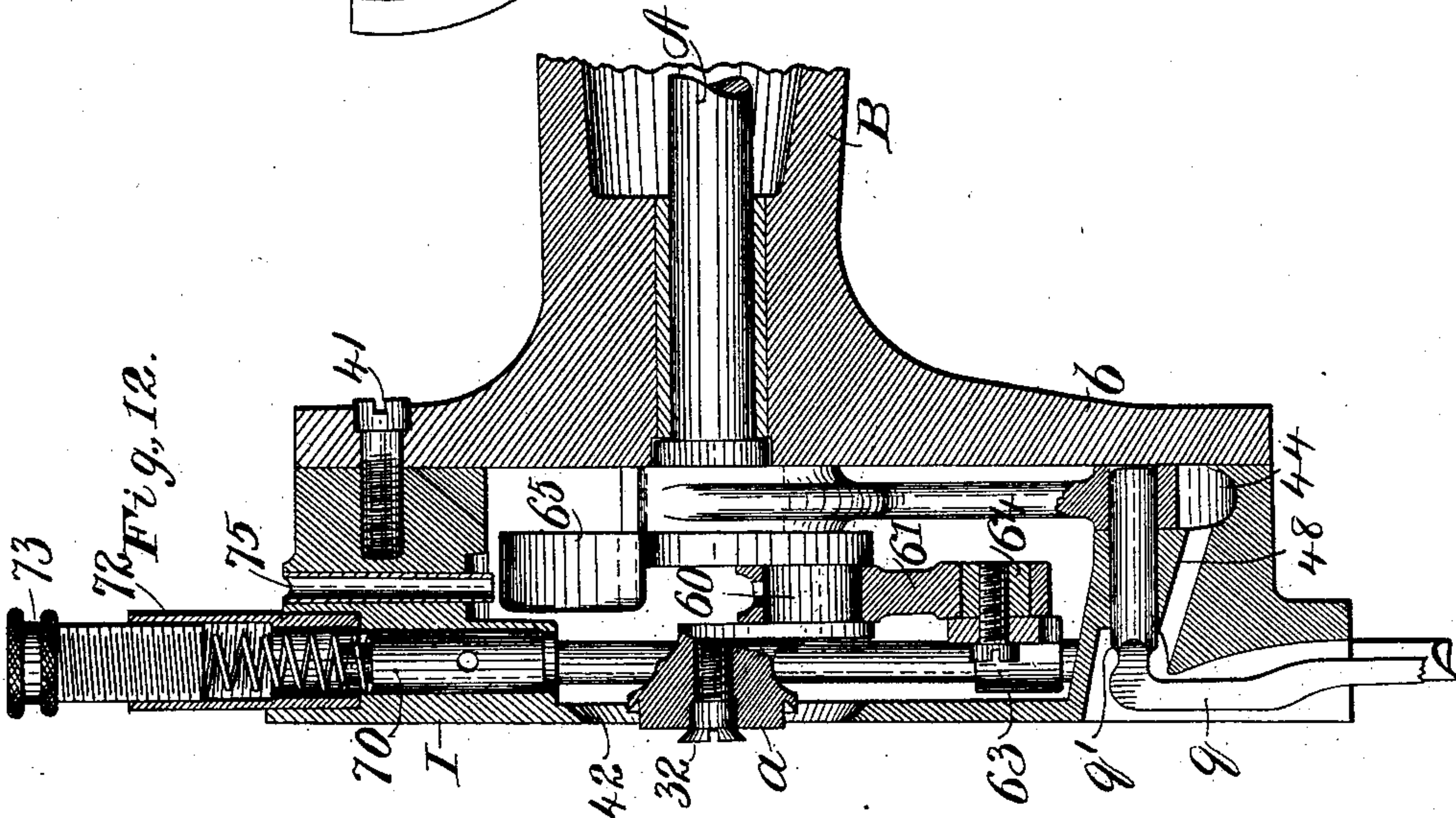
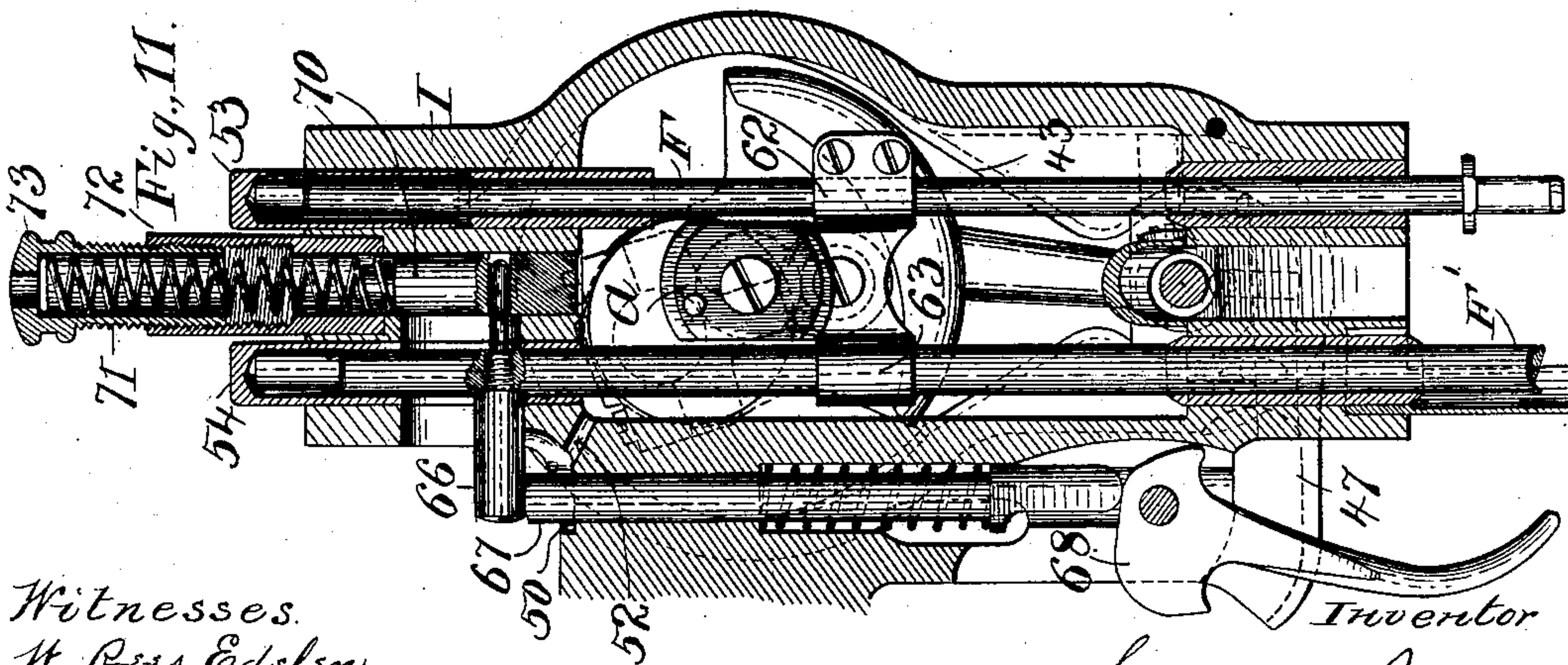


Fig. 11.



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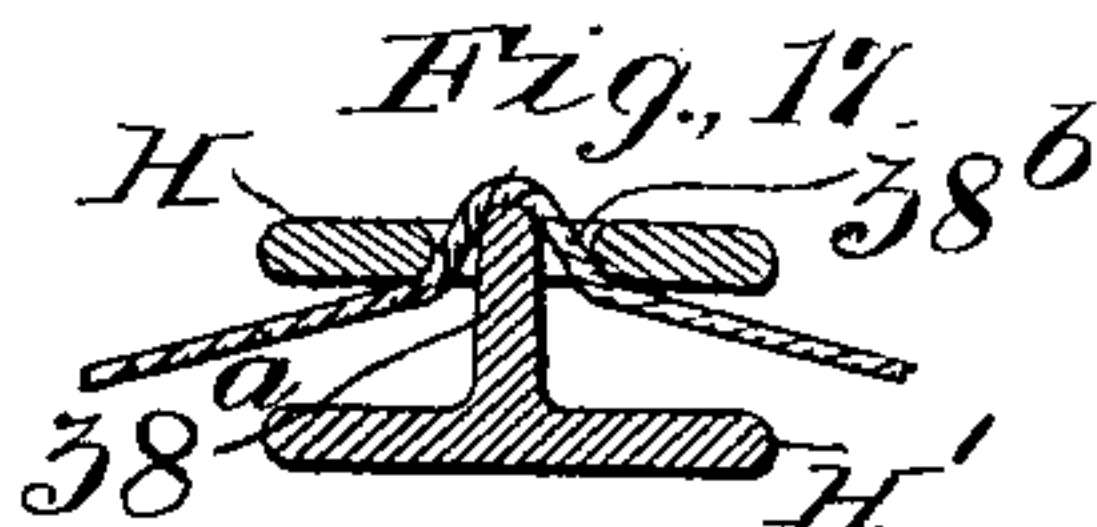
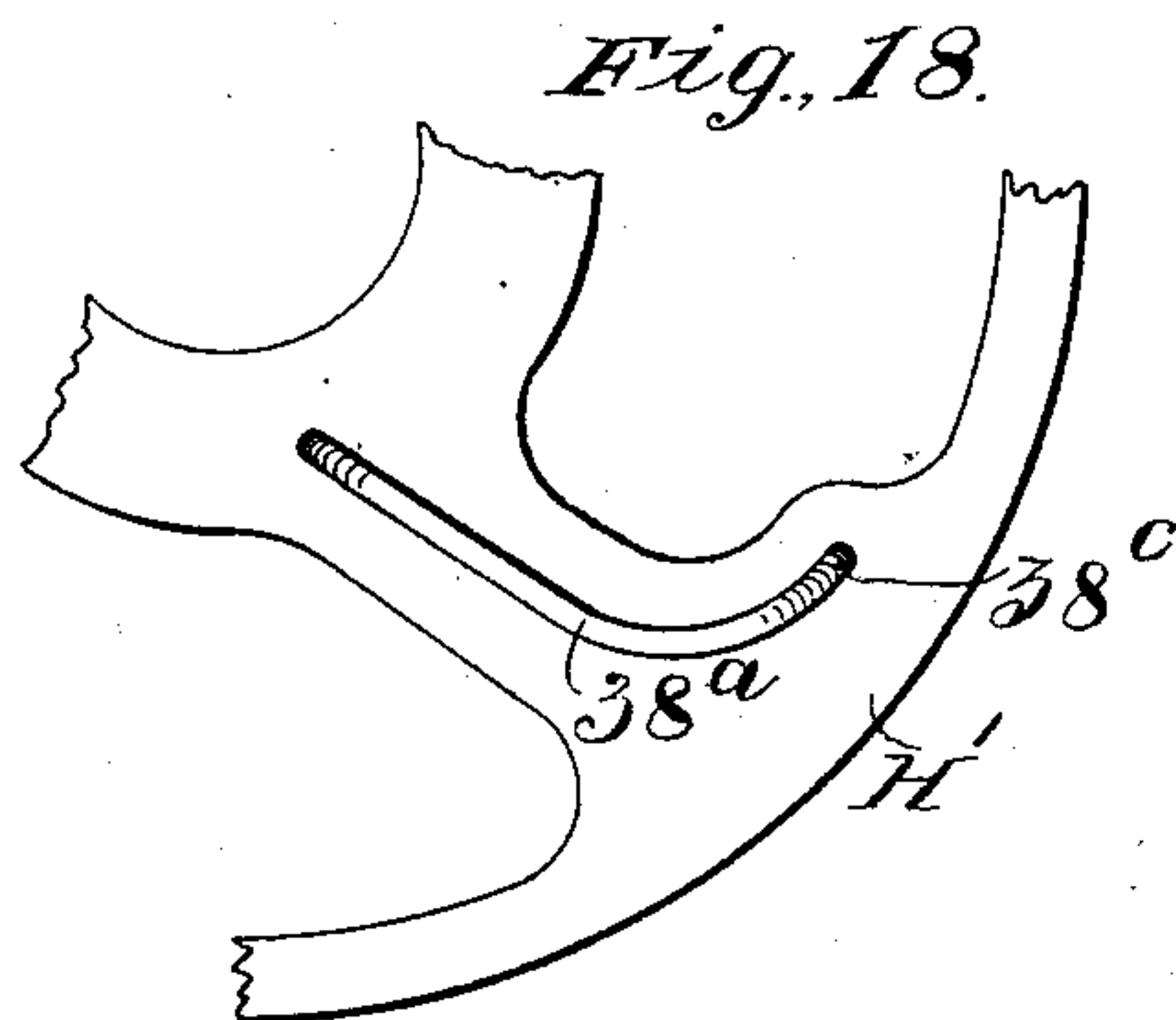
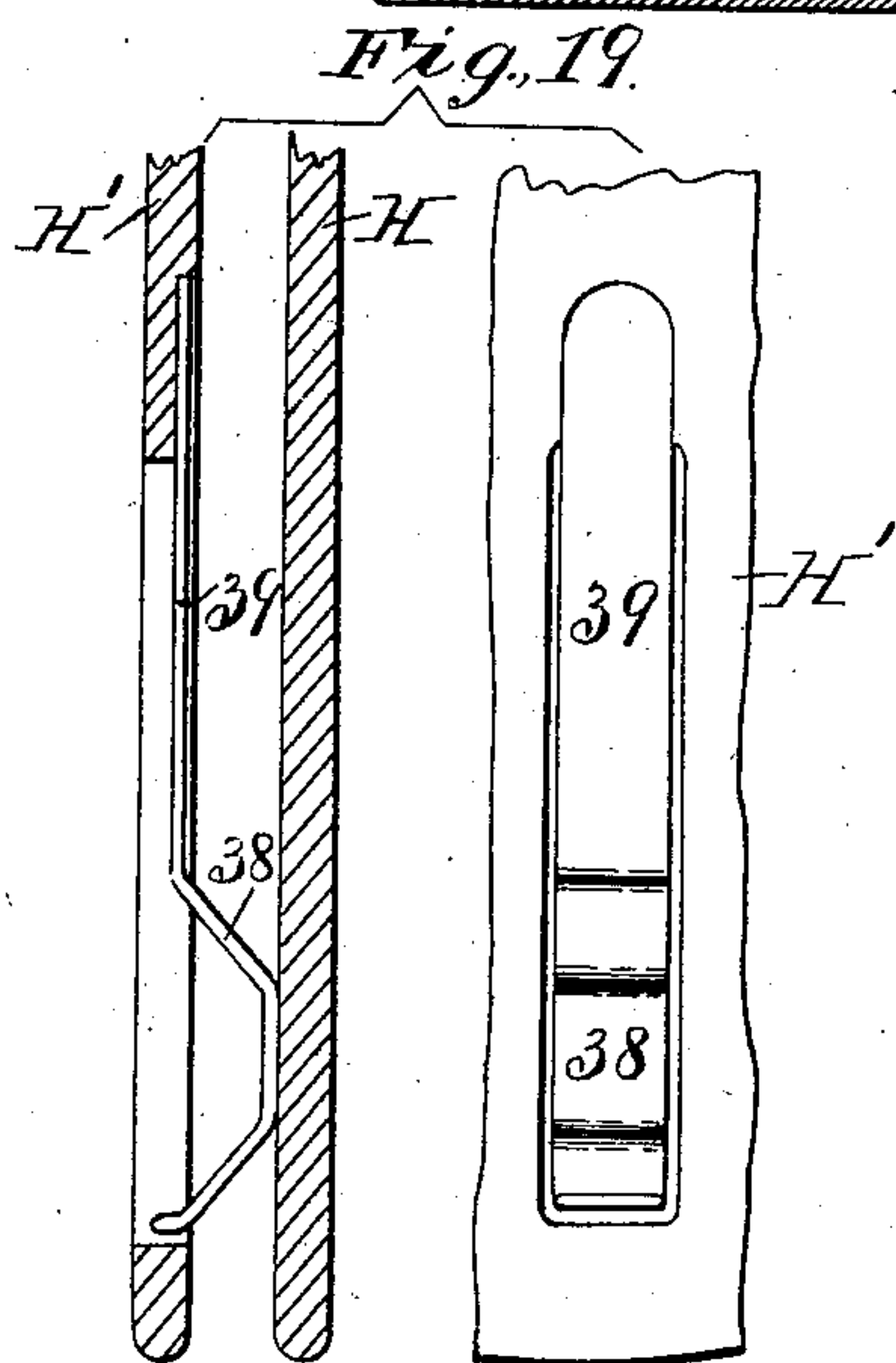
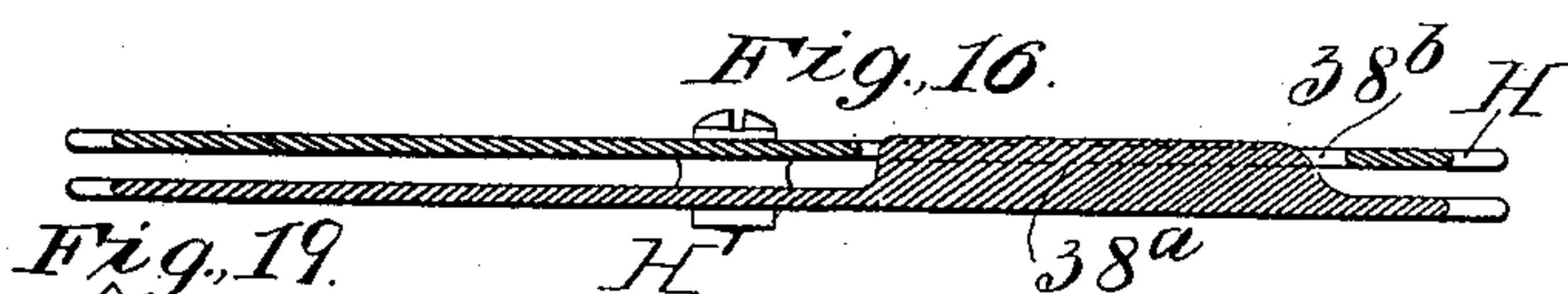
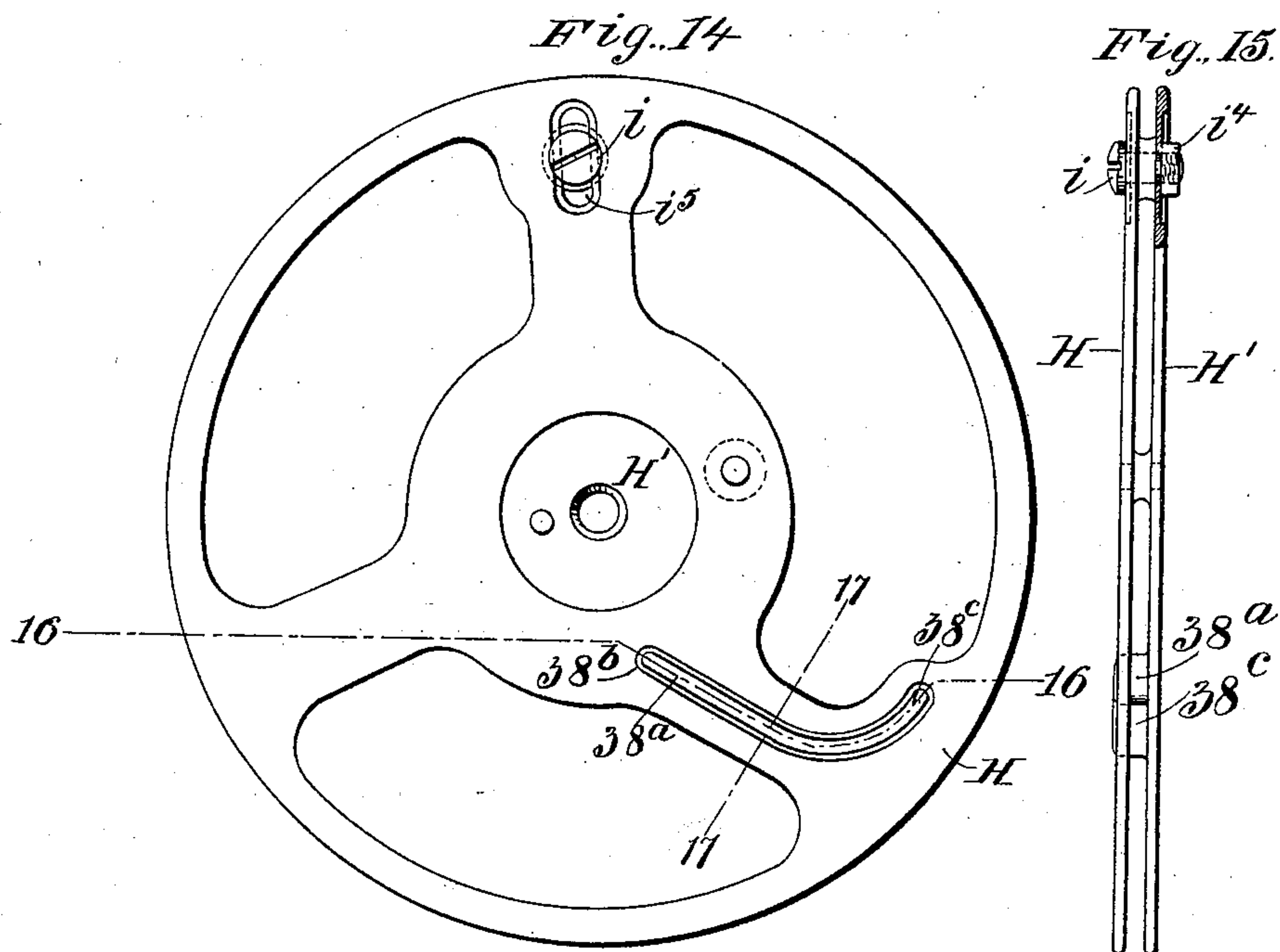
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by J. L. Lewis  
his attorney.



# UNITED STATES PATENT OFFICE.

STOCKTON BORTON, OF NEW YORK, N. Y., ASSIGNOR TO THE WILLCOX & GIBBS SEWING MACHINE COMPANY, OF SAME PLACE.

## SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 608,317, dated August 2, 1898.

Application filed August 10, 1895. Serial No. 558,847. (No model.)

*To all whom it may concern:*

Be it known that I, STOCKTON BORTON, of New York, (Brooklyn,) State of New York, have invented new and useful Improvements in Sewing-Machines, which improvements are fully set forth in the following specification.

This invention embraces improvements in the head of the machine and in parts operating in or upon the same, such as the take-up, needle-bar, and auxiliary appliances.

The invention has special reference to double-thread lock-stitch sewing-machines, though not in all its features limited thereto.

The take-up is of the rotary type having a continuous uniform motion in one direction, such as described in Letters Patent No. 415,814, dated November 26, 1889, and No. 354,589, dated December 21, 1886.

One object of the present invention is to improve the take-up so as to render it certain, efficient, and regular in its action in sewing at a very high rate of speed—say at three thousand stitches a minute and upward—each stitch being completed and tightened before the needle descends to throw another loop.

Heretofore rotary take-ups of the type specified have been formed by two concentric disks or washers fastened together by means of eccentrically-placed pins, the disks being separated a sufficient distance to constitute a thread space or passage, one of the pins being the device which acts directly on the thread and whereby the latter is drawn up after the needle-loop passes beneath the bobbin-case.

I have found it of great importance in maintaining a high rate of speed, as well as in getting up speed, to lighten considerably the moving parts of the take-up mechanism. To this end the take-up plates instead of being solid disks are open skeleton frames comprising a central disk or ring, an outer peripheral ring, and radial connecting-arms.

To keep the thread between the take-up plates and to prevent its flying over the edge thereof, as there is a tendency to do at the high speed mentioned, a curved thread guard or guide having an elongated slot is fixed close to the periphery of the take-up disks. This guard or guide is provided with a thread-passage arranged, as hereinafter described, so that the thread while readily and quickly in-

troduced cannot escape during the running of the machine.

A very important feature of the invention is the thread-controller or device which acts to keep the thread taut after the take-up has ceased to pull on it and before the point of the needle reaches the work. Heretofore in machines employing a vibrating take-up thread-controllers having this function have been devised in the form of a very light spring carrying an eye through which the thread passes, the spring being compressed by the pull of the thread as the take-up completes the stitch and flying back when the take-up releases the thread and the latter slackens. Such controllers operate efficiently at a moderate rate of speed, but are not operative at a very high rate of speed for the reason that the inertia of the spring is too great to vibrate at the required rate.

According to this invention a positive-acting controller is combined with the rotary take-up, the said controller beginning to draw positively on the slack thread as soon as the take-up pin releases it and holding the thread taut until the descent of the needle disengages it from the controller. This device, in the form preferred and in which it has been applied in practice, comprises a flat spring carried by one of the take-up plates pressing upon a rounded stud or projection on the other plate, the controller being located in proper relation to the take-up pin to come into action as the latter releases the thread. So long as the thread is slack the spring prevents it passing the stud, but when the needle draws on the thread the latter lifts the spring and is released.

To provide for the adjustment of the take-up action for work of different thickness, the take-up pin has an eccentric portion between the plates and can be turned to vary the distance of its acting surface from the axis of the take-up, thereby increasing or diminishing its pull on the thread.

The invention also includes improvements in the construction of the head of the machine and of parts working in or upon the same, such as the foot-bar and accessory devices.

In running the machine at a very high rate of speed it is necessary that the bearings of the needle-bar and foot-bar, (particularly the former,) which are practically the only recip-



reciprocating parts, should be constantly supplied with a very copious supply of oil. The presence of so large a quantity of oil and the rapidity with which the parts move cause a constant tendency of the oil to escape through joints in the head of the machine and to spread along surfaces where it may come into contact with and soil the thread in its movements through the take-up. It is well known that it is practically impossible to make joints so tight that oil will not force its way through them under the conditions indicated above. The control of the large quantity of oil so as to confine it to the surfaces to be lubricated has therefore presented a serious problem which it is one of the objects of this invention to solve in a practical and satisfactory manner. Heretofore the face-plate of the head of the machine has been made separately from the side walls thereof and secured thereto by screws or otherwise, and usually openings have been made at suitable points for the connection of parts outside with parts inside the head. As shown, the head is made in the form of a single hollow casting, the side walls and face being in one piece. The hole through which passes a concentric portion of the needle-bar crank-head to connect with the take-up has an inwardly-inclined edge, so that no oil can pass out, and at the rear of the head a rib or flange is provided to conduct such oil as may escape from the bearings downward to a recess or receptacle which drains into a cup outside the head, where it can readily be wiped out. The recess and outside communicating cup *per se* are not of my invention. The entire head of the machine, with all the parts assembled, can be detached, should occasion require, and can be put in place again with little delay and without altering the timing of the needle-bar or other parts. To facilitate the removal of the head and attached parts, the end of the crank to which the take-up is attached is cut away on opposite sides, so that when the shaft is turned to the proper position the end can pass between the needle-bar and foot-bar.

Heretofore the upper end of the needle-bar projected above the head of the machine and by its rapid reciprocation pumped oil out of its bearing. According to the present invention a cap is placed over the end of the needle-bar and joined air-tight, or practically so, with the head. This not only intercepts the escape of oil, but has other advantageous results. It forms a receptacle in which a certain amount of oil is drawn by the stroke of the bar to work its way down again, and thus be constantly reused. Moreover, this arrangement contributes greatly to the easy running of the needle-bar and the reciprocating parts. In its upstroke the air in the cap becomes compressed, and its pressure reacting on the needle-bar as the latter completes its stroke aids in starting it in the downward direction. In like manner the suction produced by the downstroke of the needle-bar

developing its greatest force as the needle completes its downstroke aids in starting it upward. Thus the needle-bar and its connections are assisted at each end of its stroke in changing the direction of the movement.

The invention will be more clearly understood from the following detailed description, in which reference is made to the drawings accompanying and forming part of this specification.

Figure 1 is an end elevation of a sewing-machine embodying the invention in the best form known to me. Figs. 2, 3, and 4 are details in elevation, partly in section, illustrating the eccentric take-up pin in various positions. Fig. 4<sup>a</sup> is a detail, on an enlarged scale, showing the take-up pin in section. Figs. 5, 6, and 7 are details in plan, elevation, and vertical section of the thread-guard. Figs. 8 and 9 are details in section; and Fig. 10, a detail in elevation, illustrating the thread-controller. Fig. 11 is a transverse vertical section through the head of the machine in elevation, looking toward the arm. Fig. 12 is a section at right angles to the above in elevation, looking to the rear. Fig. 13 is a rear elevation of the lower portion of the head. Figs. 14 and 15 are views in elevation and vertical section, respectively, of another form of take-up embodying the invention. Fig. 16 is a section on line 16, and Fig. 17 a section, enlarged, on line 17, Fig. 14. Fig. 18 is a detail showing part of the inner take-up plate, and Fig. 19 illustrates another form of controller in section and elevation.

The rotary take-up is formed of two skeleton frames or plates II II', comprising each a central ring *h*, a peripheral ring *h'*, and three radial connecting-arms *h*<sup>2</sup>. The advantage of this construction over solid plates has already been pointed out. The two plates II II' are fastened together by means of the crank-pins *i j*, which separate the plates a proper distance to form a passage for the thread from the thread-eye 31 to the needle. Pin *i* is the take-up pin proper, and its operation in drawing up the needle-loop on tightening the stitch is the same as in take-up devices of this class described in the patents referred to. The take-up is attached to the crank-head *a* on the end of main shaft A, which projects through a hole in the face of the head I of the machine, by means of a screw 32, being accurately positioned by the aid of a pin 33 on the end of the head *a* entering a hole in the inner plate II'.

It is well understood that the actual length of thread given out to provide for the stitch and for the loop which passes around the bobbin and bobbin-case in forming a stitch varies with the thickness of the work, since in a regular operation the take-up should draw the loop of the upper thread into the fabric until the lock is at the center of the work. It follows that the amount of thread to be given out at each stitch is greater as the work is thicker.



Heretofore adjustable devices in the form of shifting thread-guides have been employed to vary the length of thread drawn up and given out at each stitch. According to the present invention a similar result is secured in a more convenient manner by making the surface of pin *i* which acts on the thread adjustable toward and away from the axis of the take-up. As shown particularly in Figs. 2, 3, 4, and 4<sup>a</sup>, the pin *i* carries an eccentric *i'*, the latter lying between the two plates and being attached so as to turn with pin *i* in any suitable way. A spring-washer *i*<sup>3</sup>, Fig. 4<sup>a</sup>, is attached to the end of the pin and presses on plate H' to hold the pin in position by friction. The pin has a slotted head *i*<sup>2</sup>, whereby with an ordinary screw-driver the pin can be turned in its bearings in the two take-up plates to adjust the position of the eccentric *i'*. The position shown in Fig. 2 is that for thin goods, that shown in Fig. 3 for medium goods, and that shown in Fig. 4 for thick goods. It will of course be understood that when the acting surface of eccentric *i'* is farthest from the axis of the take-up, as in Fig. 4, the length of thread given down and drawn up will be maximum.

Other modes of making the take-up adjustable may be adopted. For example, as shown in Figs. 14 and 15, pin *i* is held in place by a nut *i*<sup>4</sup>, which lies in a groove in the back of plate H', whereby the nut is prevented from turning with the pin. The latter passes through radial slots *i*<sup>5</sup> in plates H H', so that upon turning pin *i* with a screw-driver or by other convenient means it may be loosened and adjusted nearer to or farther from the axis of the take-up.

For the guidance of the operator an arrow or pointer is placed on the frame adjacent to the head *i*<sup>2</sup>, and on the latter are three small marks indicating the positions for thin, medium, and thick work, respectively.

In the rapid rotation of the take-up the slack thread is vibrated with considerable energy, and it is found desirable to provide means for confining it between the take-up plates. This is accomplished by means of the thread-guard 34, Figs. 1, 5, and 6, which is secured to the head of the machine adjacent to the periphery of the take-up. This guard in the form shown is a curved metal piece having a longitudinal slot which confines the thread after passing through the take-up, but is of sufficient length to give it the required freedom of lateral movement. One wall of the thread-guard has a transverse cut 37 to facilitate threading, and to prevent the thread from escaping from the slot while the machine is in operation this wall or strip is deflected, throwing the thread-inlet 37 to one side of the take-up plate H. (See Figs. 5 and 7.) The latter thus guards the thread from escaping by the cut through which it enters.

When the take-up pin *i* has passed its highest position, Fig. 1, it ceases drawing on

the loop, and the thread begins to slacken. From that point, and until the point of the needle has reached the work, it is needful to keep the thread taut. For this purpose thread-controllers in the form of a light spring have been heretofore employed; but no spring can be made sufficiently light and at the same time sufficiently rapid to act upon the slack at the high rate of speed at which the machine containing the present invention is designed to be driven. One feature of the present invention, therefore, is a thread-controller which comes into action as the take-up begins to slacken the thread and which keeps the thread taut until about the time the needle enters the cloth and then which releases it. This thread-controller is formed by the conical pin 38, carried by take-up plate H and extending across the thread-space between the two plates, and the flat check-spring 39, set in an aperture of proper shape in plate H' and pressing lightly on the rounded end of pin 38. From the relative positions of take-up pin *i* and controller-pin 38 the latter comes into contact with the thread soon after the former begins to give it up, and as the two pins rotate together no slack accumulates so long as the thread is acted upon by the controller-pin. Check-spring 39 prevents the thread slipping over the point of pin 38 until the pull on the thread between the pin 38 and the eye of the needle is appreciably felt, when the thread readily lifts the spring and escapes. The point at which this escape is effected will vary slightly, and it is not necessary to determine it with absolute precision. Generally it will occur when the take-up is at or near the position indicated in Fig. 2. In the position shown in Fig. 1 the hook has taken the loop and begun to draw down the thread which has escaped from the controller. This positively-acting controller may of course be made in various forms, but that shown and described is deemed the best for machines of the type illustrated in the drawings, and an explanation of it will suffice to give an understanding of its principle and to enable persons skilled in the construction of sewing-machines to vary its form as may be expedient for the particular machine to which it is applied.

The controller is preferably applied, as shown, to the rotary take-up to act upon the thread between the take-up pin and the needle. When so placed, its construction may be modified within wide limits. Several examples are given in the drawings. In Fig. 19 the pin or projection 38, which forms the controller, is on spring 39 instead of on plate H, the said spring being bent to the form shown in said figure. Another construction is illustrated in Figs. 14 to 17. Plate H' is in this case provided with a curved rib 38<sup>a</sup>, opposite which, in plate H, is cut a similarly-shaped slot 38<sup>b</sup>, into which rib 38<sup>a</sup> projects. The forward end 38<sup>c</sup> of the latter engages the slack thread in the same manner as the pin 38 in



the other figures. The end 38<sup>c</sup> is rounded, so that the bent thread can readily slip over it at the proper time. The thread then rides along the top of rib 38<sup>a</sup>, as shown in Fig. 17, and finally slips off the rear end thereof.

The head I of the machine is preferably a single casting—that is to say, the face and sides are formed in one piece—and it is completely detachable from the end of arm B by removal of the screws 41, by which it is attached to the plate *b* at the end of arm B. The head *a* of the needle-crank on main shaft A passes between the needle-bar F and foot-bar F' and is cut away at opposite sides, so that when the head is detached and the shaft A turned to the position shown in Fig. 11 the head may be removed without disturbing the assemblage of the parts in or upon it.

The working parts within the head are illustrated in Figs. 11, 12, and 13. The needle-bar F is driven, as heretofore, by a crank 60 on the main shaft and a short pitman 61 and cross-head 62, the latter being attached by a loop and clamp-screws at one end to the needle-bar and having at the other end a loop 63, which slides freely over the presser-bar, the latter thus acting as a guide to the cross-head. The stud 64 in the center of the cross-head rests loosely in the socket provided therefor in the end of pitman 61, so that it can be freely withdrawn from said socket when the head is separated from the body of the machine. A counterweight 65 is placed on the crank-head of the main shaft to assist in suppressing the jar occasioned by the rapid reciprocation of the needle-bar and connected parts.

Presser-bar F' has near the upper end a cross-pin 66, which projects over the top of lifter-rod 67, and the usual cam-lever 68 is provided to raise the lifter-rod and presser-bar and hold them in an elevated position. Rod 67 is not in the interior of the head, but works in bearings bored out of the metal on one side of the head. It has a return-spring 69. Screw-pin 66 takes at its inner end into a hole in plunger 70, working in a socket in the upper part of the head against the pressure of a coiled spring 71, which is contained partly in said socket and partly in a tube 72, which forms a continuation thereof. A screw-cap 73, centrally perforated for the admission of oil, furnishes a bearing for the upper end of said spring.

An oil-hole 75 is bored vertically through the top of the head, directly over the axis of the shaft and the needle-bar pitman, and the oil falls from the lower end thereof onto the crank-pin, cross-head, and other parts beneath.

Behind counterweight 65 is a block 77, surrounding an eccentric 88 and embraced by a yoke 78, through which a vibratory movement is communicated to the shaft *q*' of the needle-shield *q*.

The hole 42 in the face-plate, through which the crank-head *a* extends for connection with

the take-up, is countersunk from the rear, so that oil cannot pass out through the same, but will be drawn inward by the inclined edge of the hole. The opening at the rear of the casting has on each side a flange or rib 43, constituting an oil-guard leading the oil which may drip from the upper bearings or which is thrown to the sides of the casting from the moving parts to a recess or depression 44, whence it can flow through the channel 45 to the external receptacle or cup 47.

Beneath the shaft *q*' of the needle-shield *q* is an inclined oil-channel 48, leading from the front of the bearing in which this spindle is journaled to the recess 44, so that the oil oozing from the bearing at its front end is drained off to the cup 47. An annular recess 50 is made in the metal of the head around the lifter-rod 67 to collect oil that may escape by the slot through which pin 66 projects, and this oil serves to lubricate the lifter-rod. Any overflow is led back into the interior of the head by hole 52 and ultimately finds its way to cup 47.

The top of needle-bar F is covered by a cap 53, fitted tightly into the head I, which prevents the needle-bar from throwing oil out of the end of the bearing and also acts as a dash-pot. In the operation of the machine the air contained in this cap reacts upon the needle-bar alternately by compression and suction, accordingly as it is compressed and rarefied by the motion positively imparted to the needle-bar by its driving mechanism, and this action aids the needle-bar upon reaching the dead-point to reverse its direction, conducing to an easy motion and diminishing the jar which always attends the movement of rapidly-reciprocating parts. The end of the presser-bar is covered by a similar cap 54, which performs the same functions as the needle-bar cap and calls for no further description.

The parts of the machine which are believed to be new and are of my invention are particularly pointed out in the following claims:

Having now particularly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sewing-machine a rotary take-up comprising revolving plates, a crank-pin attached to said plates and adapted to act upon the thread, and means for adjusting the position of said pin to vary the distance of its acting surface from the center of the take-up, substantially as described.

2. In a sewing-machine, a rotary take-up having a crank-pin journaled therein so as to be turned to different positions, that part of the pin which acts upon the thread being eccentric to its axis so that the distance of its acting surface from the axis of the take-up may be varied to suit the thickness of the work, substantially as described.

3. In a sewing-machine, a rotary take-up comprising two plates connected together by



a pin crossing the space between them and journaled at its ends in said plates, that portion of the pin between the plates being an eccentric, so that by turning the pin the distance of the acting surface of the eccentric from the axis of the take-up may be varied, substantially as described.

4. The combination with the two take-up plates attached together and separated a suitable distance to form between them a thread-space, and a take-up pin journaled so as to be turned to different positions and having an eccentric portion between them, said pin being provided with a slotted head on the face of the take-up, substantially as described.

5. The combination with the rotary take-up, comprising two plates forming between them a thread-space and crank-pin crossing said space, of a thread-guard having an elongated slot in the same plane as said thread-space; one wall of the slot being thrown to one side of the adjacent plate and having in its projecting part a thread-entrance, substantially as described.

6. The combination with the needle and looping devices, of the rotatory take-up having a take-up pin acting on the thread at proper intervals to draw up and tighten the stitch, a thread-controller coming into action when the take-up ceases to pull on the thread and keeping the latter taut until the needle draws upon it, and means for operating said controller positively, substantially as described.

7. The combination with the needle and looping device, the rotary take-up comprising take-up plates and a crank-pin the periphery of which acts upon the thread to draw up the loop, and a thread-controller carried by and rotating with said take-up plates, and comprising an abutment projecting into the path of the thread and engaging the latter when the take-up pin ceases to act upon it, the controller being constructed and arranged as specified so that the thread may slip past it when drawn upon by the needle, substantially as described.

8. The combination with the needle, looper, and rotary take-up, of a thread-controller carried by said take-up and having a yielding or spring-acting thread-detainer, for releasing the thread when the needle draws upon it, substantially as described.

9. The combination with the needle and looper, of the rotary take-up comprising two plates connected by a take-up pin, and a thread-controller in the space between the two plates acting positively on the thread for keeping it taut after the take-up has ceased to act, said controller being so constructed as to permit the thread to pass when drawn by the needle, substantially as described.

10. The combination with the rotary take-up, of a thread-controller rotating therewith, and comprising a projection for engaging the thread, and a spring cooperating with said

projection to detain the thread, but adapted to yield and permit the thread to pass when the needle draws upon it, substantially as described.

11. The combination with the arm of a sewing-machine, of a head in the form of a hollow casting detachably secured to said arm and having an opening in the face for attachment of the take-up, a main shaft extending into the interior of the head, a crank and crank-head connected with said shaft, a rotary take-up outside of the face of the hollow head and detachably connected with said crank-head, and a presser-bar, needle-bar and actuating mechanism assembled in said head, said actuating mechanism being detachably connected with said main shaft, whereby the head with the needle-bar and foot-bar may be detached from the arm of the machine, substantially as described.

12. In a sewing-machine the combination with the take-up of a thread-controller comprising a pin for engaging and acting upon the thread, and a check-spring bearing lightly on said pin for detaining the thread and means for giving the thread-controller a positive motion, substantially as described.

13. The combination with the take-up plates, of a rotary take-up, of a thread-controller comprising a pin carried by one of said plates and a check-spring carried by the other plate and bearing lightly upon the head of said pin, substantially as described.

14. The combination with the arm of a sewing-machine, and with the main shaft, a hollow head attached thereto, and a rotary take-up on the face of the head, the latter being provided with a hole for the passage of the take-up support or crank-head countersunk from the inside, substantially as and for the purpose described.

15. In a sewing-machine the combination with the arm of the machine, of a hollow casting forming the head thereof and attached to the arm, the head being provided with a rib or oil-guard around the rear edge, adjacent to the arm, and with an oil depression or recess in the bottom thereof, and with a connected oil-cup outside the same, substantially as described.

16. In a sewing-machine, the combination of the hollow head the presser-bar within the same, having a cross-pin extending through a slot in the head, a lifter-rod having bearings in the head and underlying said cross-pin, said rod having also an oil-recess around its upper end to collect oil that may issue through said slot, said recess being connected with the interior of the head by an overflow-passage, substantially as described.

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

STOCKTON BORTON.

Witnesses:

J. H. COOKE,

J. A. REIDENBACH.