

Hartz & Feiss.

Knitting Mach.

N^o 99,670.

Patented Feb. 8, 1870

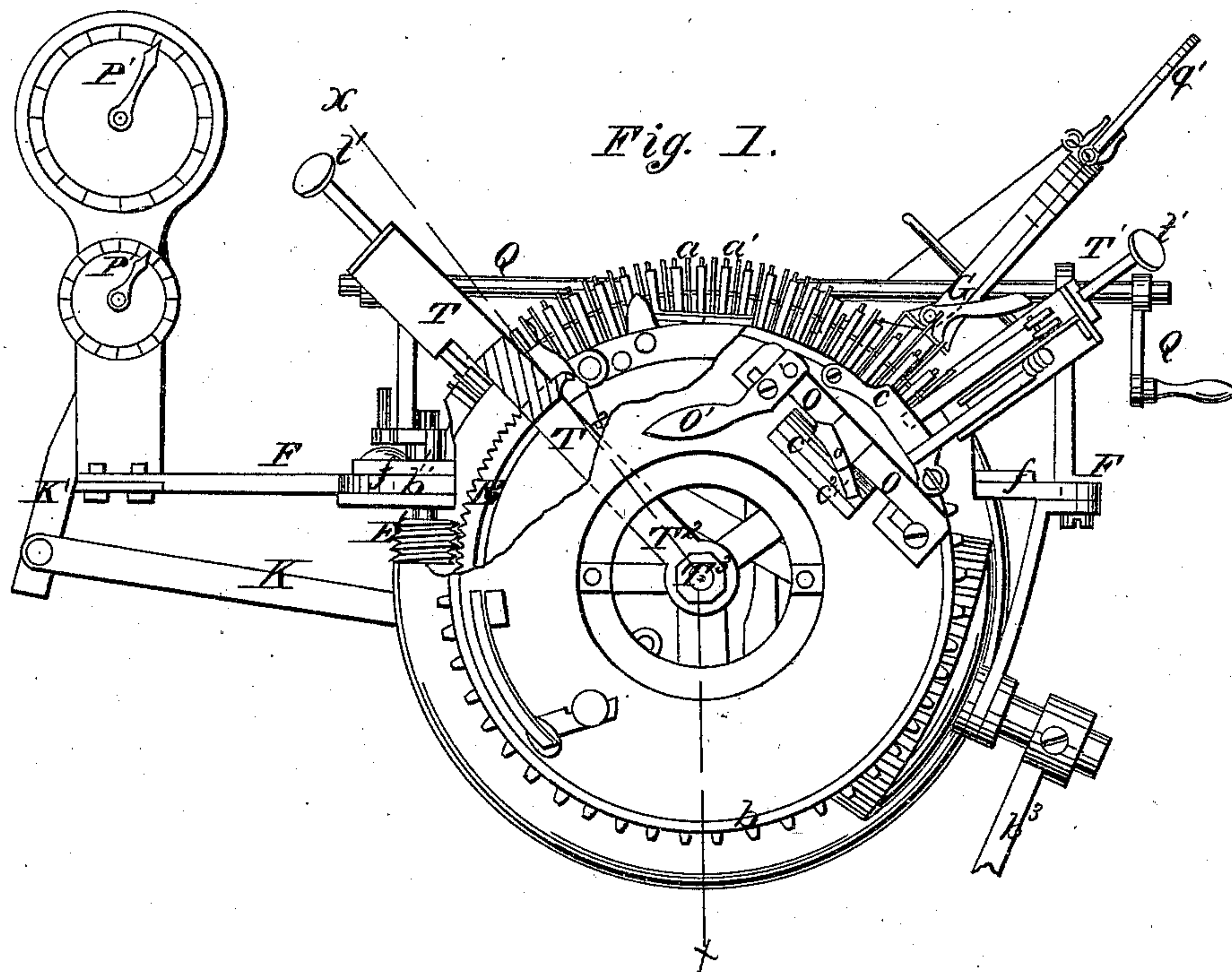
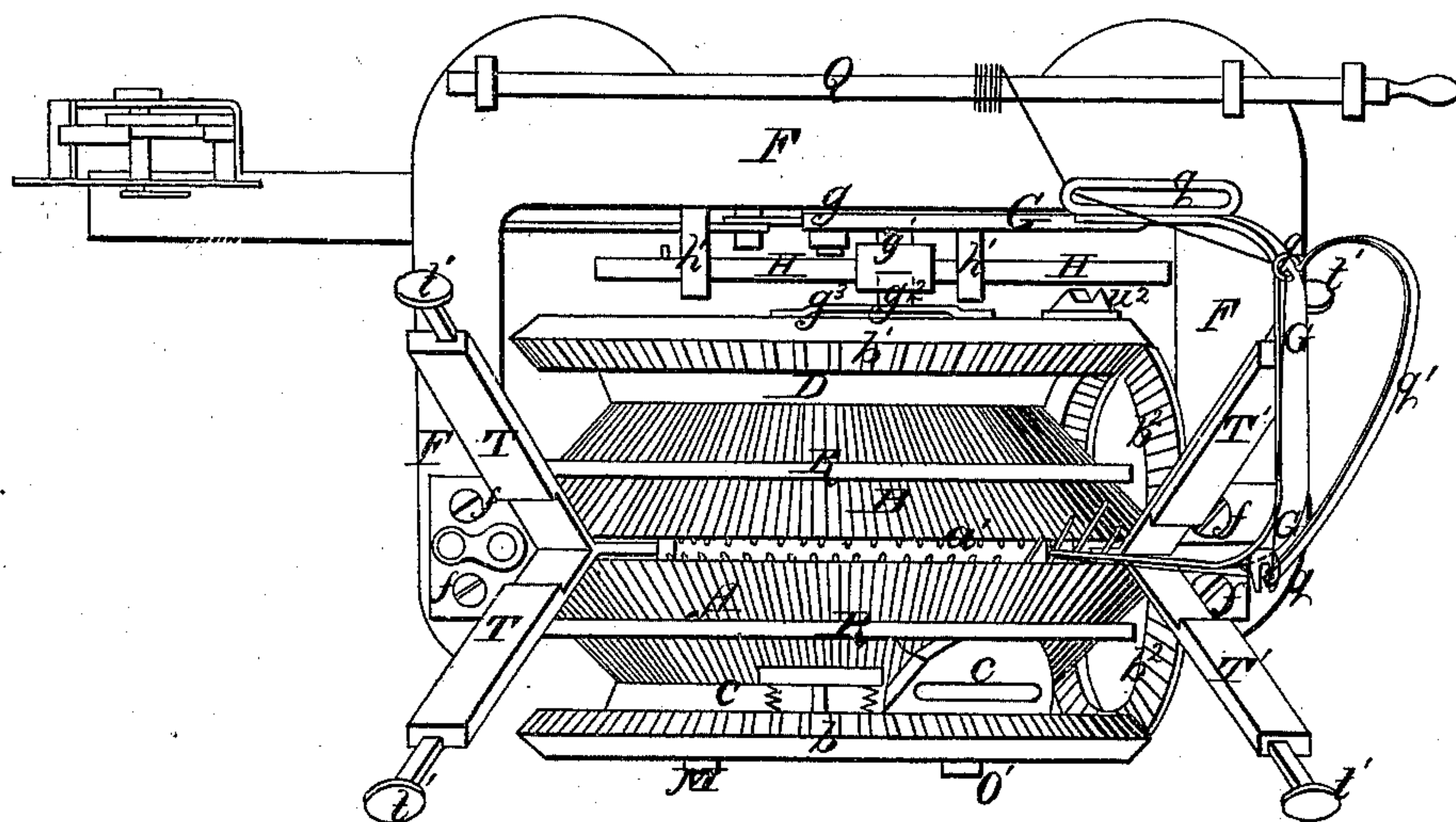


Fig. 2.



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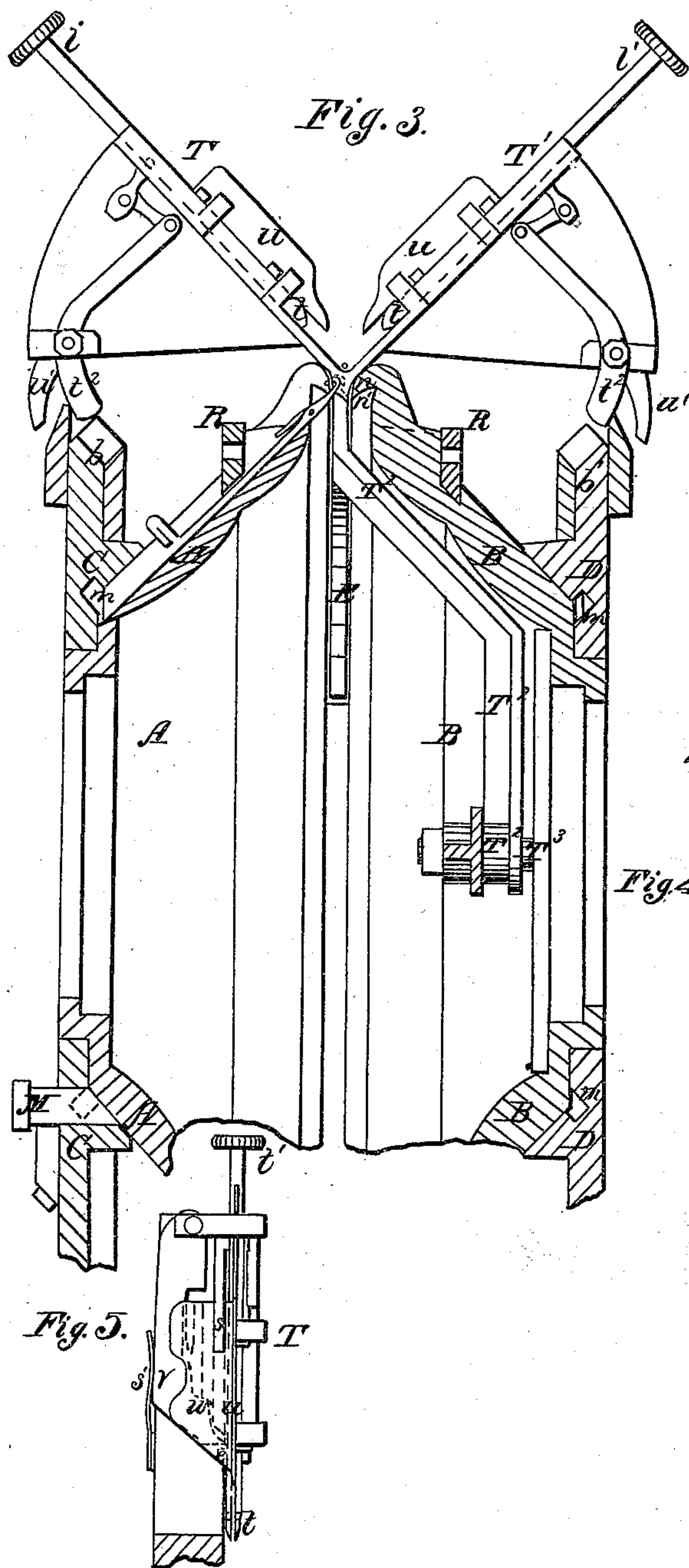


Fig. 6

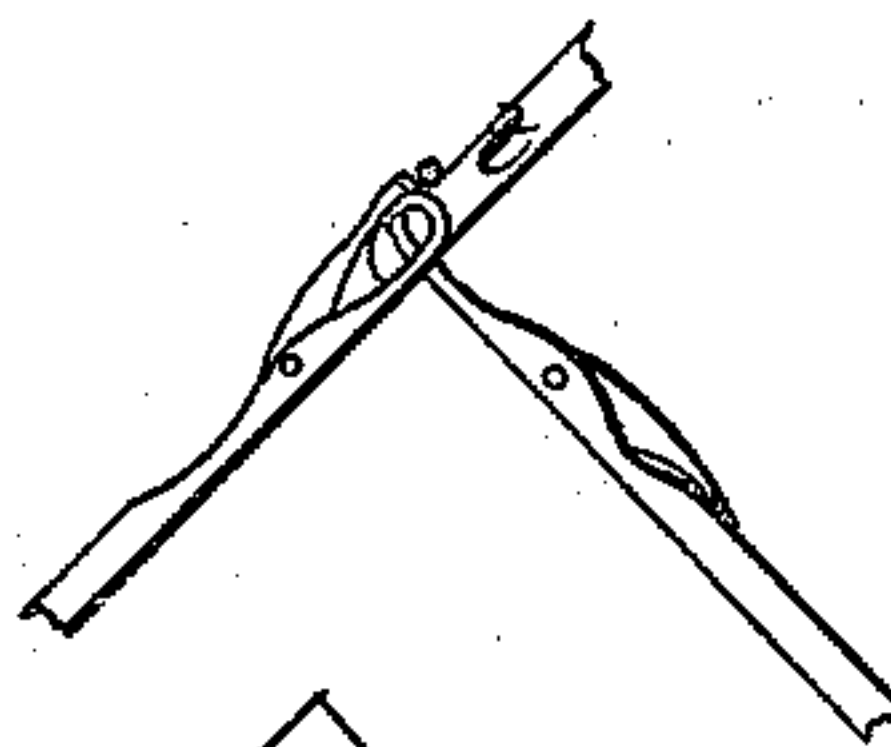


Fig. 4.

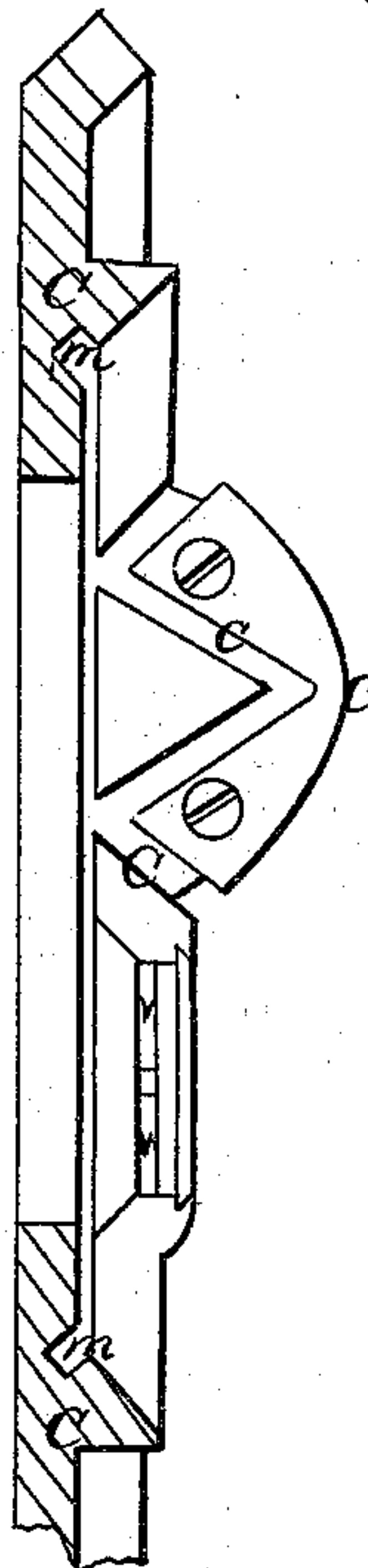
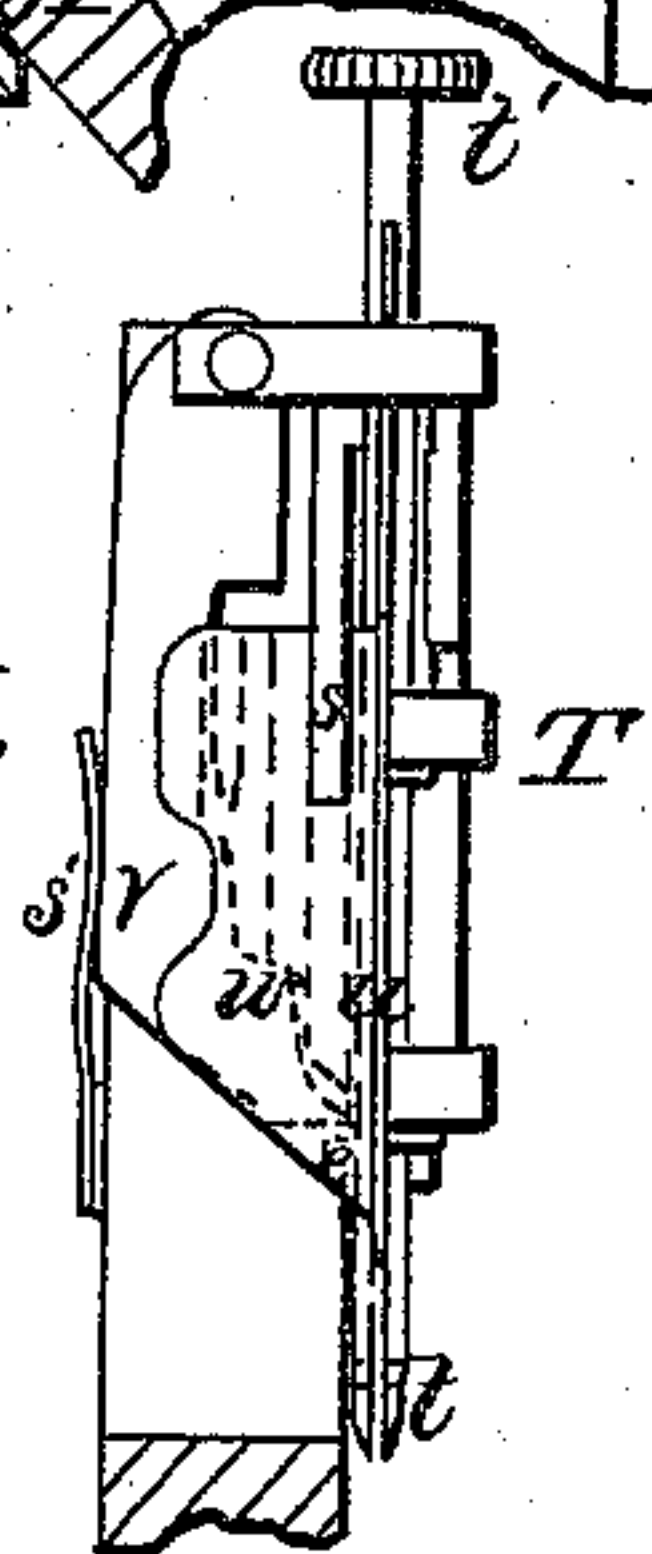


Fig. 5.



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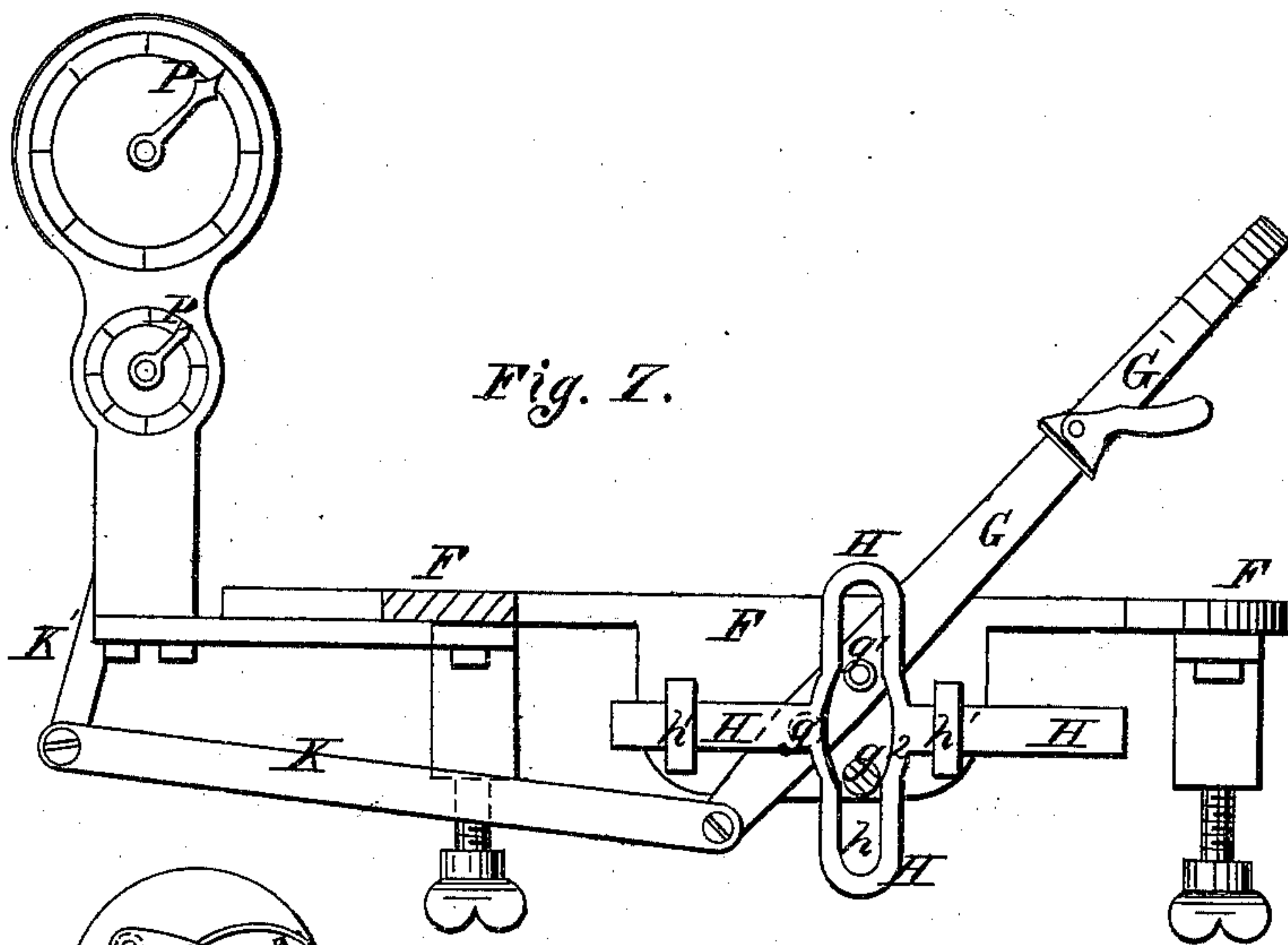


Fig. 7.

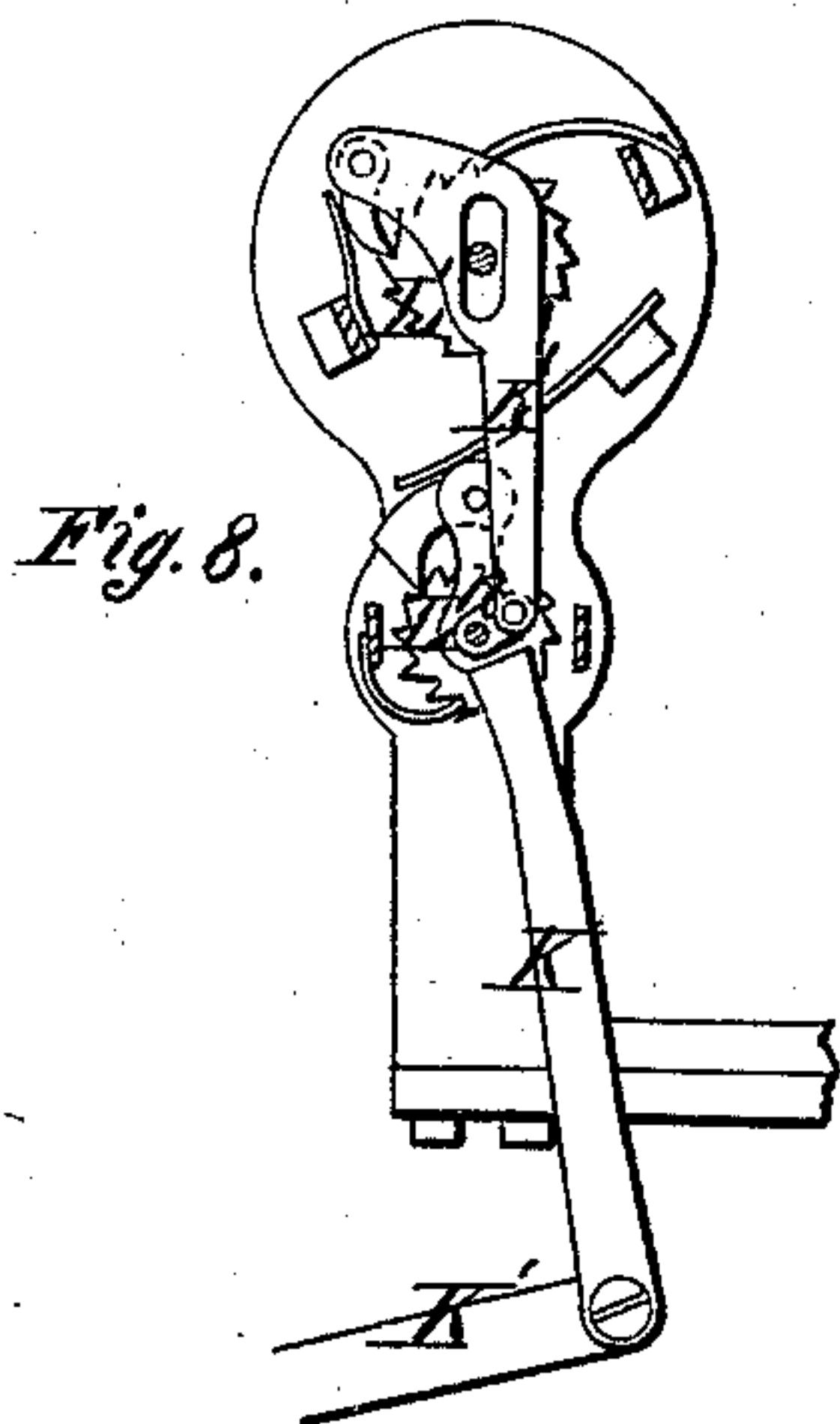


Fig. 8.

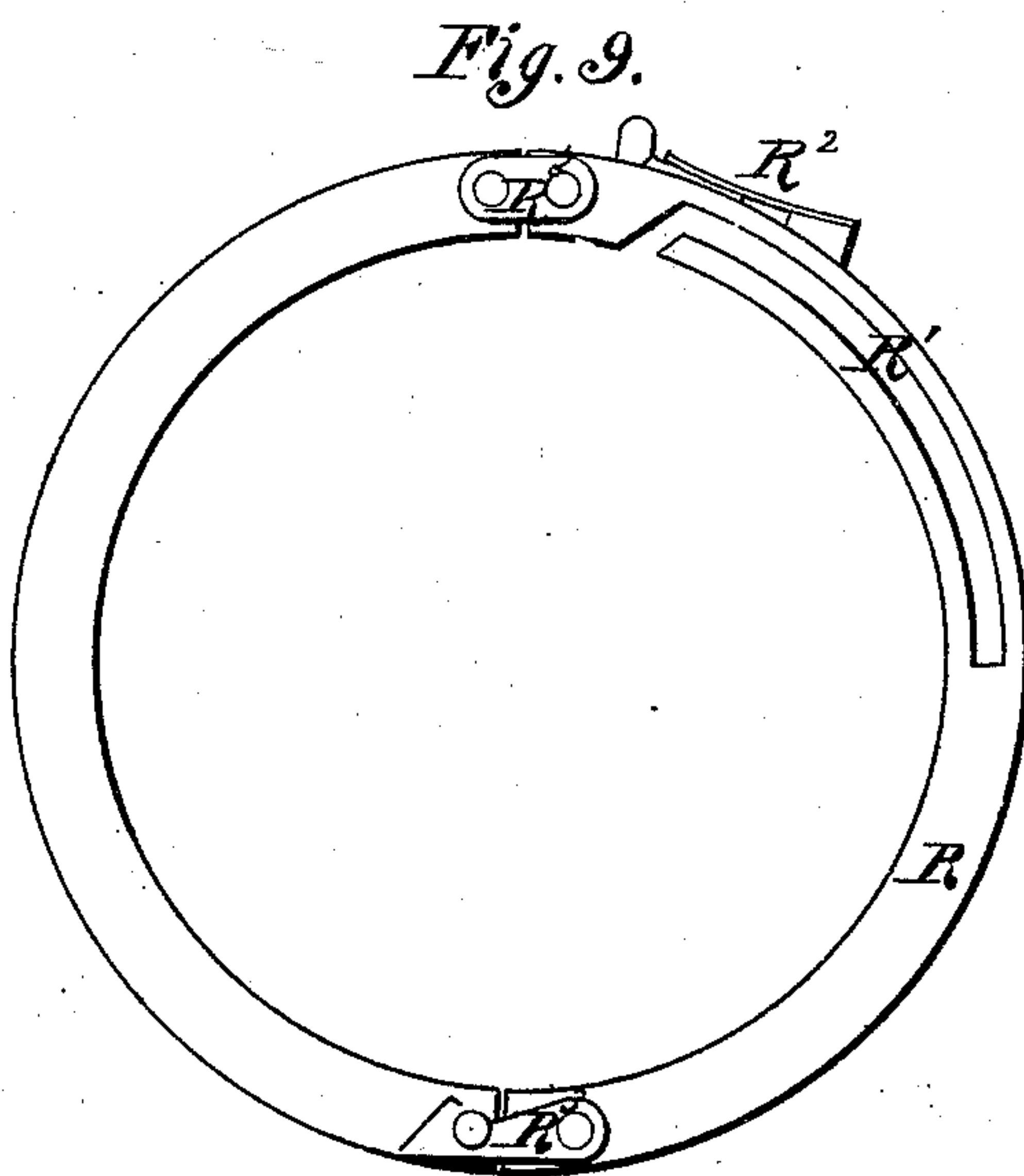


Fig. 9.

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UNITED STATES PATENT OFFICE.

HENRY V. HARTZ AND JULIUS FEISS, OF CLEVELAND, OHIO.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 99,670, dated February 8, 1870.

To all whom it may concern:

Be it known that we, HENRY V. HARTZ and JULIUS FEISS, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and improved Knitting-Machine; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an end view, a portion having been broken away to show the construction more clearly. Fig. 2 is a side elevation. Fig. 3 is a section in line $x x$ of Fig. 1. Fig. 4 is a section showing the cam that operates the needles. Fig. 5 is a detached view of the "take-off" apparatus. Fig. 6 is a side view of a part of the apparatus shown in Fig. 3, and represents the take-off hook at the moment of operating upon the two needles. Fig. 7 is a detached view of the registering apparatus or indicator. Fig. 8 is a rear view of the dial-standard seen in Fig. 7, showing the construction and arrangement of the ratchets, springs, pawls, arms, &c., constituting the operative parts of the indicator. Fig. 9 is a detached view of ring R.

The object of this invention is to simplify and improve the operation of the knitting-machine, making it more convenient and easy to control, while it operates more rapidly, accurately, and effectually, and with less breakage of the yarn, and makes better work.

The main parts of the machine are two stationary circular needle-plates, A B, having a row of needles, $a a'$, extending about one-third of the distance around them; two revolving cam-rings, C D, that operate the two rows of needles, said rings rotating in opposite directions, by means of bevel-gear wheel $b b^1 b^2$, and a crank, b^3 ; a vibrating thread-guide, G, which moves back and forth along the points of the needles as the cam-rings revolve; two sliding rings, R R, by turning which the needles can, one after another, be thrown out of or into action, or, in other words, out of or into connection with the cam-rings; two movable "take-offs," T T¹, which can be set at different points along the rows of needles, to change the thread from one set of needles to the other, when some of the needles are dropped or taken up for the purpose of "narrowing" or

"widening;" an adjusting-ring, E, and worm-screw E', by which the take-offs can be set at any desired point; and an indicating apparatus, (represented in Figs. 7 and 8,) for the purpose of registering and indicating the number of times the machine has knitted across the work.

In connection with these main features are several minor improvements, relating to the adjusting of the cams, needles, guides, take-offs, and other working parts of the apparatus, all which we will now proceed more particularly to describe.

The two tapering plates A B being arranged as shown in Figs. 2 and 3, with the needles $a a'$, respectively, lying in beds or grooves in their outer sides, said needles will be operated by a cam, c , in the inner side of the rings C D, as will be fully understood by reference to Fig. 4, and from a comparison of said figure with the position of the cam-rings and needles, as shown in Fig. 2.

The cams are so arranged upon the two oppositely-revolving cam-rings as to operate the needles of each row at the proper moment to produce the stitch.

R is a ring working in a groove on the outside of the needle-plates, as seen in Figs. 2, 3, and having a slot, R¹, into which the needles will be forced as the ring is turned, and which will lift them out of the way of the needle-operating cam one after the other, the part shown at R² being simply to indicate, by a snap, when the ring has been moved to the proper distance, and the joints R³ R³ being for convenience in putting on the rings or taking them off.

F is the frame of the machine, to which the needle-plates are firmly fixed, as shown at $f f$. To a lug on the under side of this frame the long arm of the bent guide G is pivoted, as seen at g .

Just above the pivot is a pin, g^1 , projecting from the guide into the slot h of a plate, H, so that, as the latter plate is slid back and forth in its guides $h' h'$, it throws the guide G first to the right, then to the left, carrying its upper end along back and forth over the needles.

The slide H is caused to reciprocate properly by the rotation of the rear bevel-wheel b^1 , an eccentric pin, g^2 , arranged on a bar, g^3 , that spans the open portion of the wheel, playing in

the slot h , so as to move the plate or slide in the proper manner.

The slot h is slightly cut away near the middle on each side, as seen in Fig. 7, so that while the eccentric pin g^2 is moving through that part cut away, it will not operate the slide H , but the latter will have two dead-points at each revolution of wheel b^1 , during which the guide G will be at rest at either end of the row of needles. At other times the guide will keep along with the cams c ; in fact, it will always move with each cam, as the two cams are moving the needles on one side or the other.

At the lower end of the back part of guide G , below the pivot g , it is pivoted to a rod, K , and vibrates said rod. Said rod in turn moves a lever, K' , that runs up to the indicating apparatus, and at every thrust starts a wheel, L , one notch.

The wheel is connected with a pointer, P , on the opposite side of the dial-plate, which, at every second movement of the wheel, passes over one degree-mark on the dial up to the number 10.

The shaft of the wheel also has a crank, k , attached to it, and at every revolution it thrusts forward a pitman or lever, k' , and draws it back. The pitman or lever thus moved actuates a second ratchet-wheel, L' , and moves a second pointer, P' , that thus indicates one degree on another dial for every ten on the lower dial indicated by pointer P .

The apparatus can be multiplied to any desired extent for the purpose of noting the tens, hundreds, thousands, &c., of rows of stitches made by the machine.

Q is the rod on which the yarn is wound, or on which the bobbins are supported. $q q q$ are yarn-guides on the large guide G ; and q' is a tension-spring.

The general construction of the take-offs will be very clearly understood by reference to Figs. 1, 2, 3, and 5. Their frame consists in a V-shaped plate, $T T^1$, attached to the ring E , so as to be adjustable in position along the line of needles, and further supported by an arm, T^2 , inside of the hollow needle-plates, and pivoted to a journal or pin, T^3 , supported by lugs cast to one of the needle-plates, or by a bar extending across the opening in the end of said needle-plate. The parts $T T^1$ are, therefore, guided in an arc concentric with the edge of the needle-plates, and, by turning the worm-screw E' , may be set in any position at pleasure.

When the thread runs along with the guide G on one side, during the operation of one cam-ring on the needles, and comes to the end of the row, it is necessary that it should be changed over to the other needles, in order that it may return, with the guide and the other cam-ring, to the place whence it started.

The apparatus connected with the V-shaped plates $T T^1$ is the means by which this transfer is effected. This apparatus consists of the following parts, viz., a sliding hook, t , which is pushed down at the proper time by hand,

by means of the thumb-piece t^1 , and which is divided or slotted to allow a lifting-blade to run down under its barb and lift the thread up over the same; the lifting-blade u , which at the proper moment is moved in one direction by a lever, u^1 , operated by a cam, u^2 , on wheel b^1 , and at other times is kept drawn up out of the way by the action of a spring on the rear side of the part T or T^1 , any arrangement of spring that will answer being used for the purpose; a lever, t^2 , which at the proper moment is struck and moved by a projection on the front side of cam u^2 , above the rim of wheel b^1 , in order to throw up the hook t , and let the thread drop; a spring, s , which keeps the base-plate of the thread-lifter u down flat against the face of the V-shaped plate T or T^1 ; and another flat spring, s' , which holds a stop, v , in under said base-plate, so that one corner of it will come in the way of a shoulder on the shank of hook t , and prevent the latter from being thrown up only at the proper moment, when the cam operates the lever t^2 .

The shoulder or offset on the side of the hook may be seen at e , Fig. 5.

By means of the apparatus here described, the thread is taken up on the hook t , and held until that needle which had held it withdraws, which is done simultaneously with the first one of the opposite row of needles presenting itself. At this instant the cam operates lever t^2 , drawing up the hook rapidly, when the blade u runs under the thread, lifts it, and allows the other needle to take it. The thread then changes its motion, passing back on the row of needles opposite to that on which it came to the "take-off."

In Fig. 1 is seen the device for adjusting the cam c , so as to throw the needles higher or lower, and make a tight or loose stitch.

A lug, e , from the cam, projects through the rim of wheel b , and is provided with an oblique groove or slot, e^2 . Into this slot projects a spur, o , from a longitudinally-sliding plate, O . O' is a lever, by which to move plate O .

Plate O and cam c being held in fixed guides, so that they can slide only in a certain direction, (the cam up and down, and the plate lengthwise,) it follows that, by adjusting the position of the plate, the cam may be raised or lowered at pleasure, to make any kind of stitch required.

The cam not only operates to lift the needles at the proper point, but beneath it is a groove or track, m , which they can follow when dropped, their spur or arm running altogether under the cam, so as to escape its action. This will be fully understood from Figs. 3 and 4.

M is a stop or deflector, which may be made to extend across the track m , and cause the needles to rise out of said track, when desired.

In this machine no sinkers are required, the edges of the needle-plates being cut or recessed on their under side, as shown at n , Fig. 3, so that the projecting part of said edges, between any two needles, forms a hook, n' , which catches

the edge of the work, and holds it in position, without any assistance from weights, springs, or other appliances.

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

1. In a knitting-machine, the combination of the two cam-rings C D, moving in opposite direction, with the gear-wheels b b^1 b^2 , for operating them, substantially as and for the purposes specified.

2. The rings R R, constructed substantially as shown and described, when applied to a knitting-machine for the purpose of raising the needles out of their grooves in narrowing the fabric.

3. The V-shaped take-off plates T T¹, connected to a central axle by the arm T², and adjustable by means of the ring E and worm-screw E', when constructed and operating substantially as described, and for the purpose of supporting and adjusting the take-off devices.

4. The take-off apparatus, (supported by said plates T T¹,) consisting, essentially, of the parts t t^1 t^2 u u^1 v s s' e , all constructed and operating in connection with the cam u^2 and needles a a' , substantially as set forth, and for the purpose of taking up the yarn after it has been delivered to the last needle of one row, and delivering it to the first needle of the opposite row.

5. The combination of split hook t and sliding thread-lifter u , when constructed and oper-

ating as specified, and for the purpose of seizing and holding the yarn at the end of one traverse of the yarn-guide, and then dropping it as the first needle in the opposite row is presented.

6. In combination with cam-rings C D, revolving in opposite directions, and with the needle-plates A B, having needles arranged only on one side, a thread-guide, G, reciprocating back and forth over the needles, substantially in the manner and for the purposes set forth.

7. The combination of the crank-pin g^2 , on the needle-cylinder, with the sliding yoke H, constructed as described, and fitted in bearings h h' , and with the yarn-guide G, friction-bowl g^1 , rod K, and pin g , substantially as described, for the purpose of operating the said yarn-guide and the indicator at the same time.

8. The combination of the working parts of the indicator, substantially as described and represented, said working parts consisting essentially of the rod K', wheel L, crank k , lever or pitman k' , wheel L', and the usual pawls and springs to hold them against the ratchets, all constructed, arranged, and operating as and for the purposes set forth.

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