

**No. 629,673.**

**Patented July 25, 1899.**

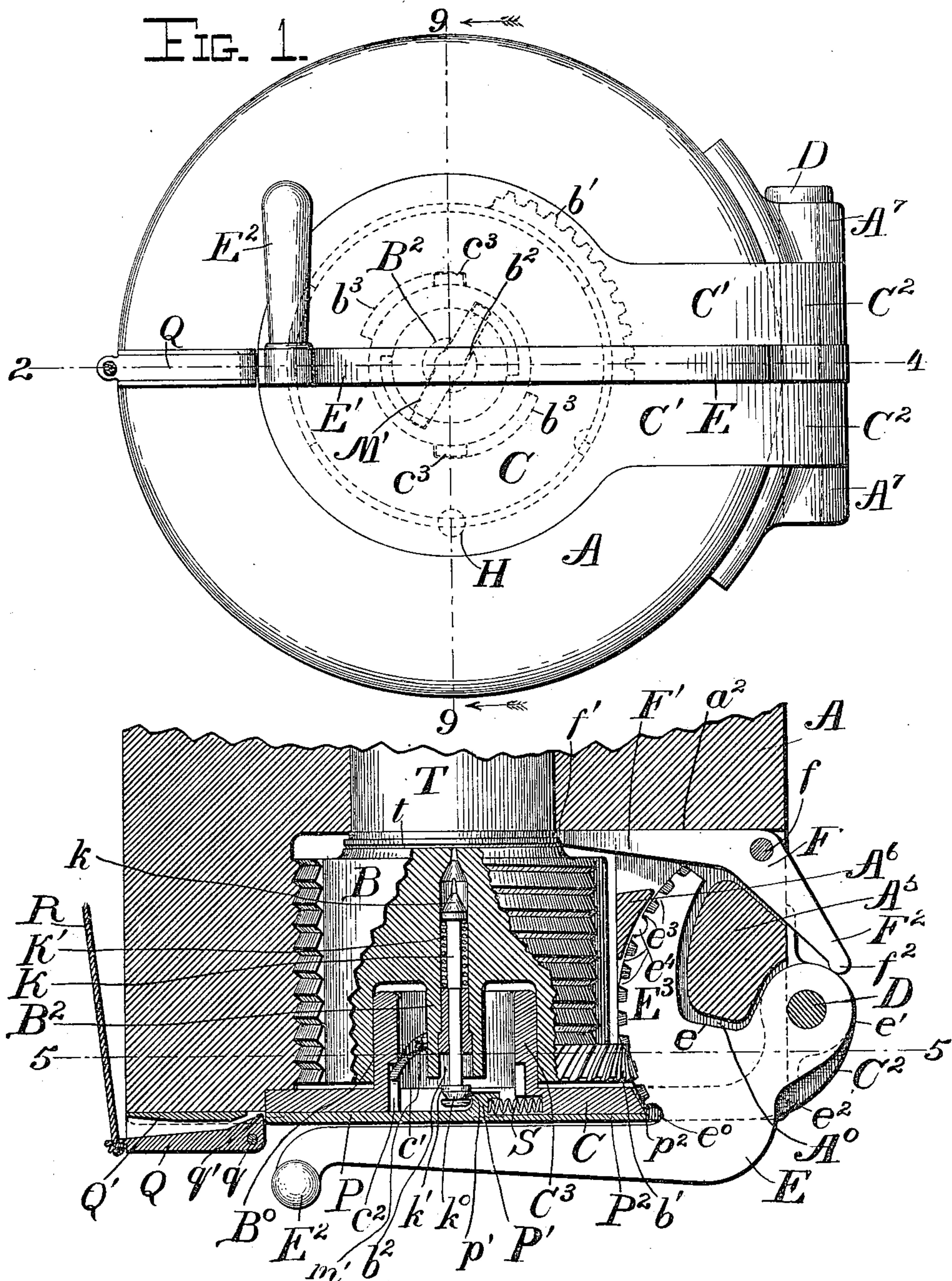
**F. F. FLETCHER.**

## BREECH MECHANISM FOR RAPID FIRE GUNS.

(Application filed Apr. 13, 1898.)

:(No Model.)

4 Sheets—Sheet 1.



Witnesses

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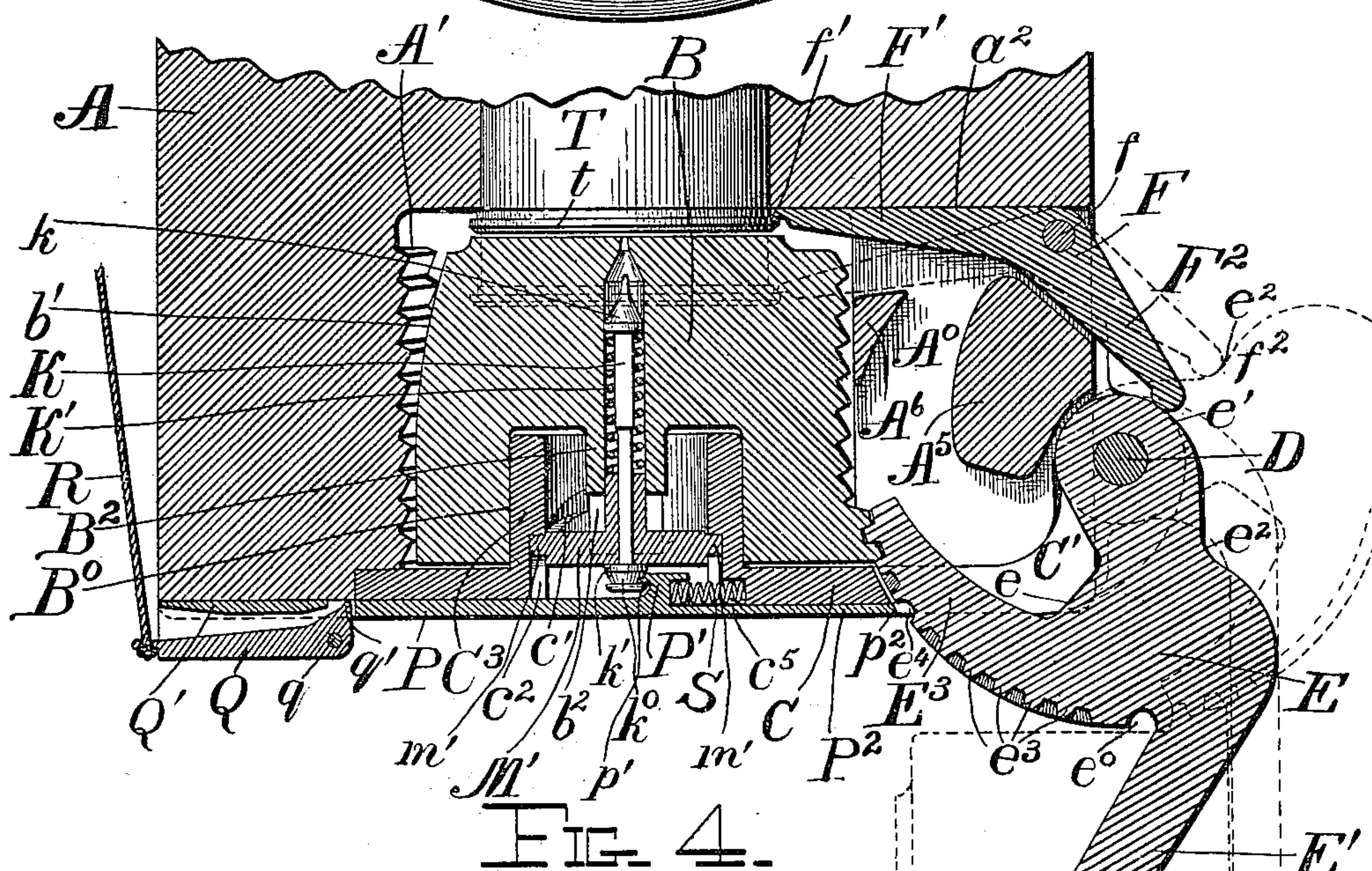
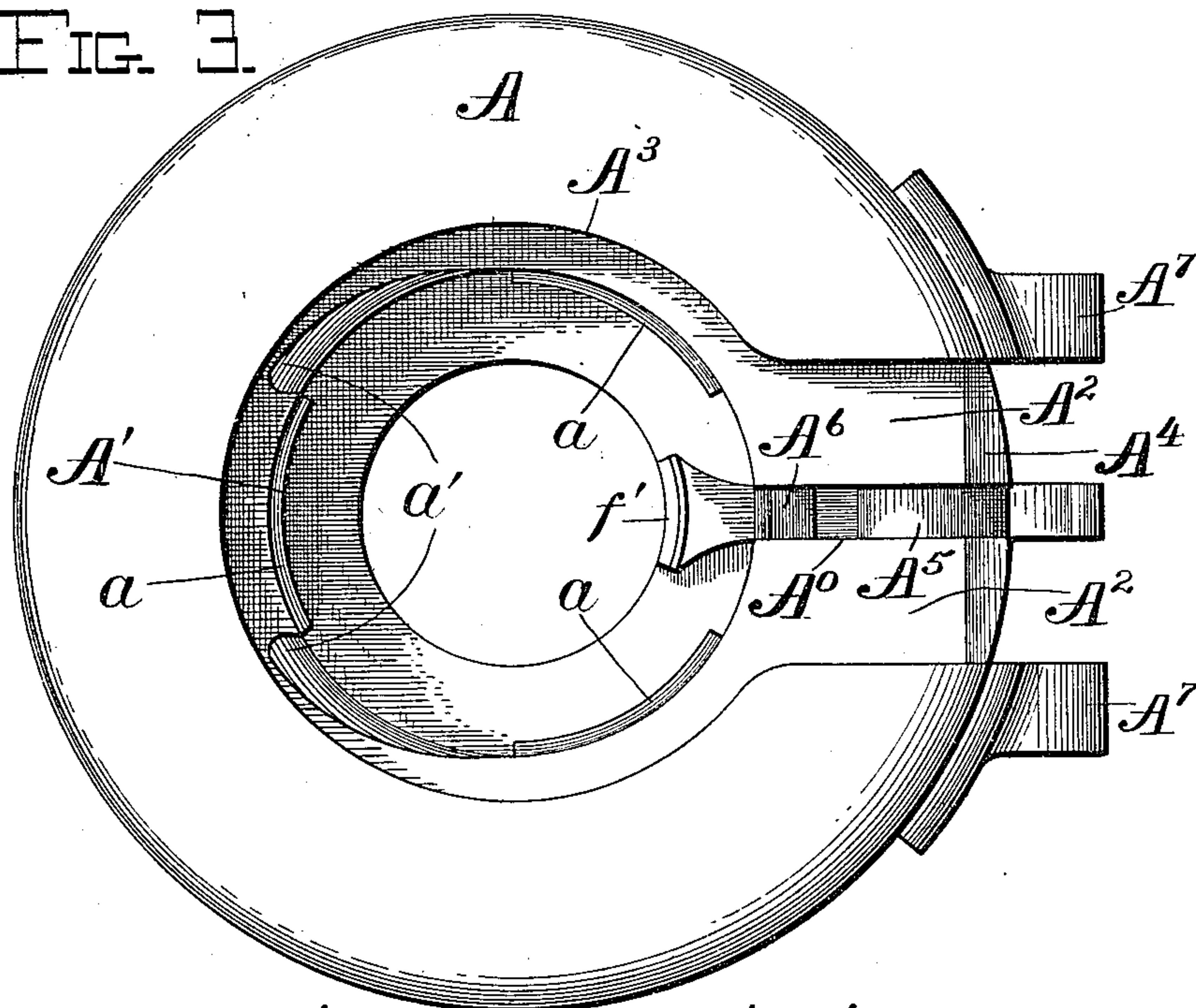
# BREECH MECHANISM FOR RAPID FIRE GUNS.

(Application filed Apr. 13, 1898.)

(No Model.)

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FIG. 3.



Witnesses

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FIG. 5.

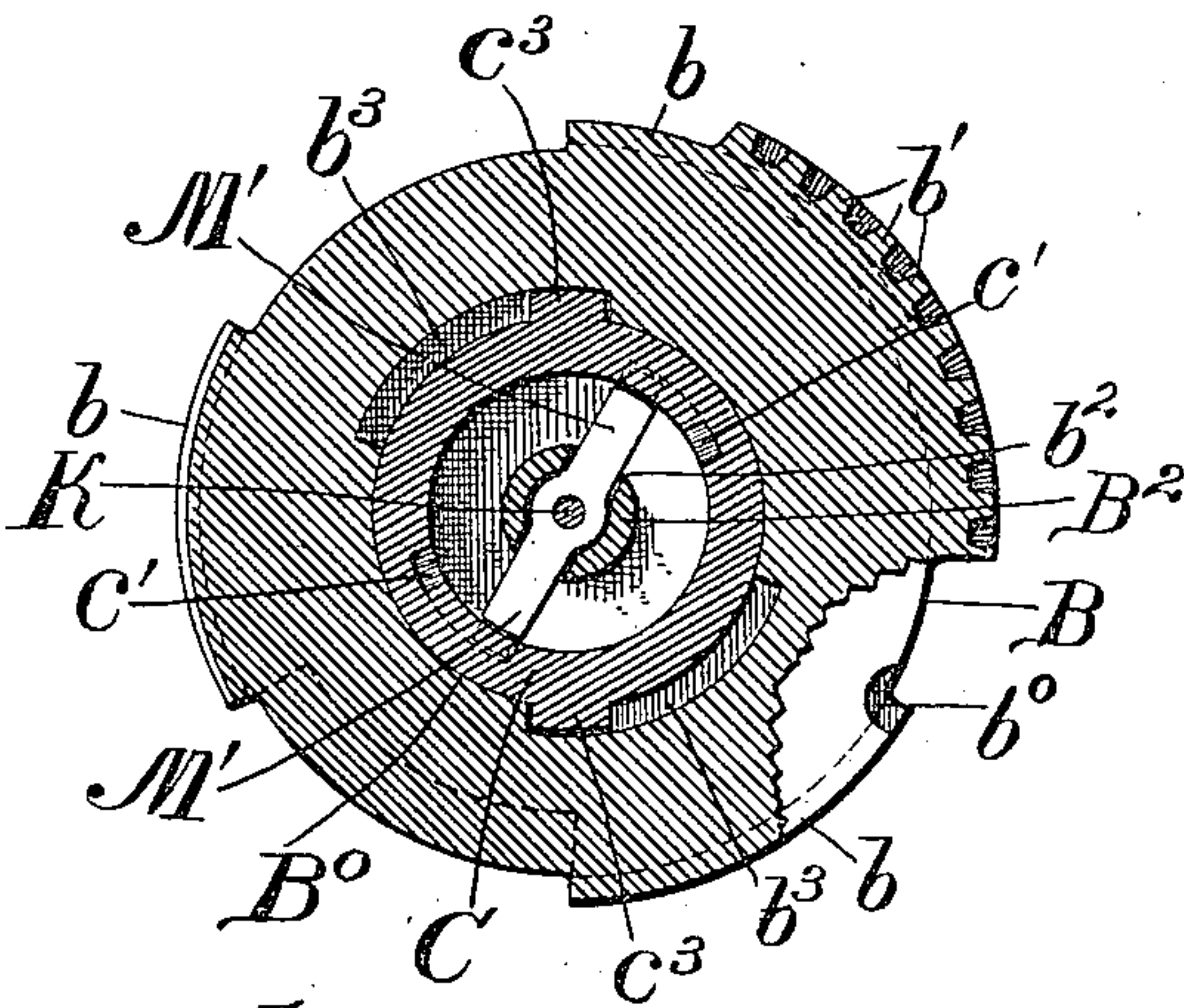


FIG. 6.

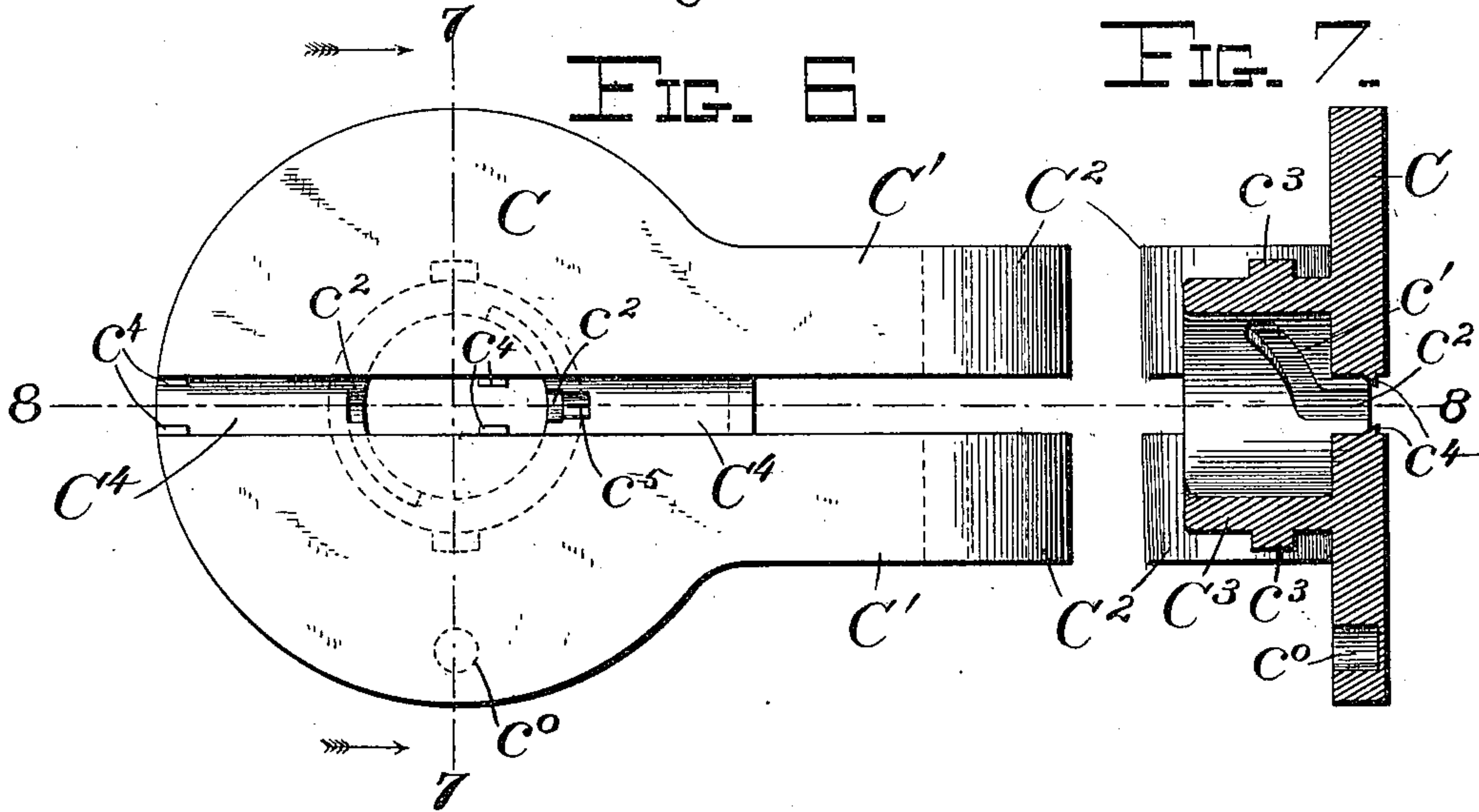


FIG. 7.

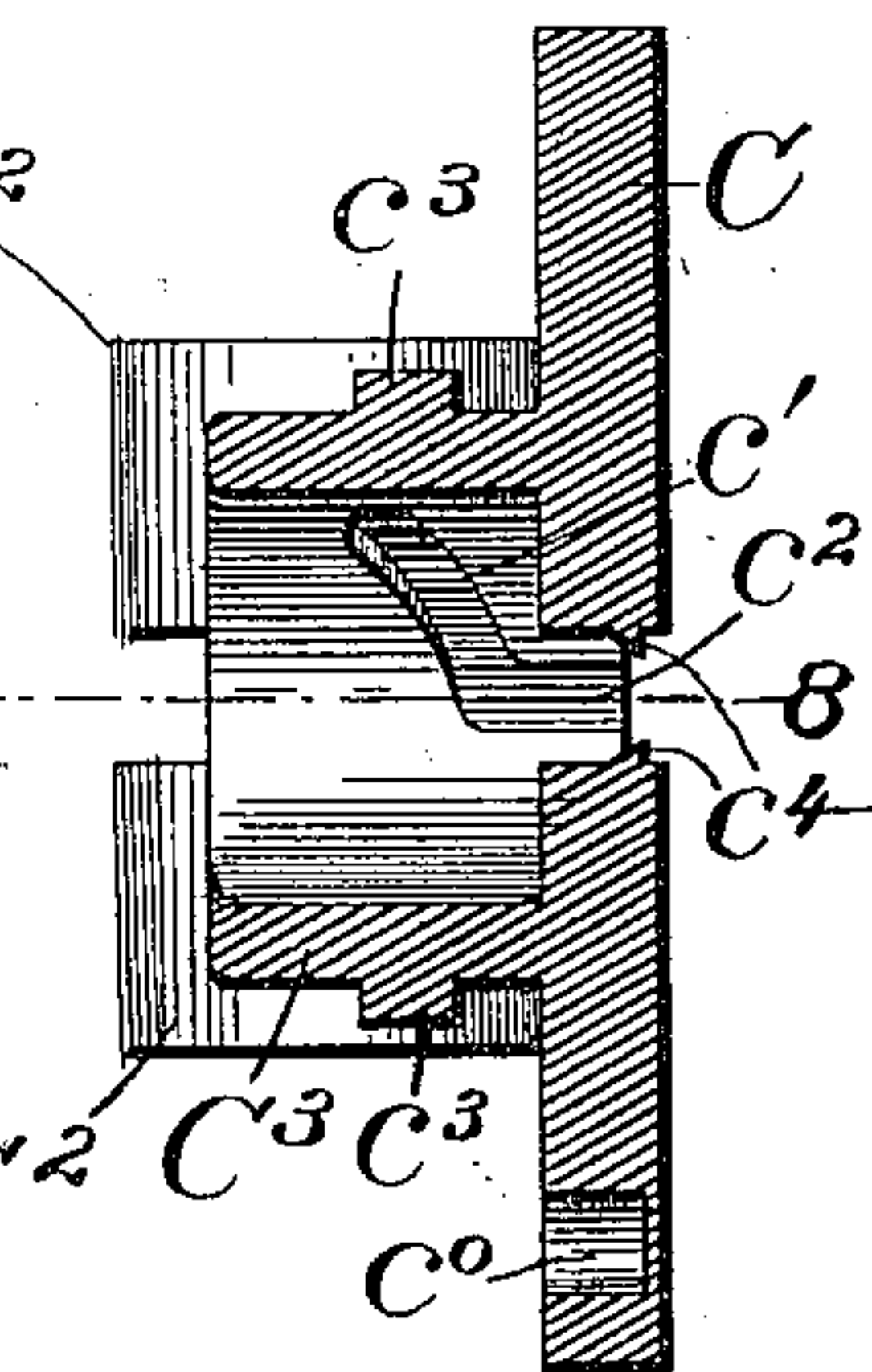
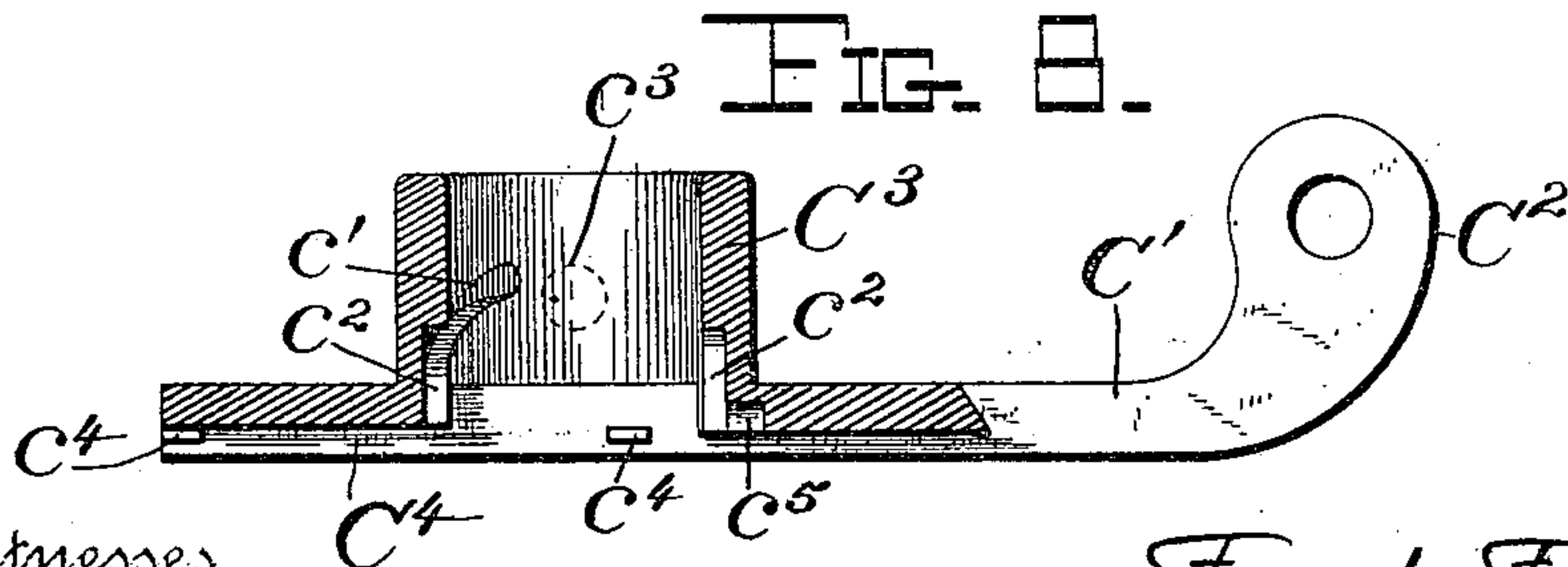


FIG. 8.



Witnesses

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No. 629,673.

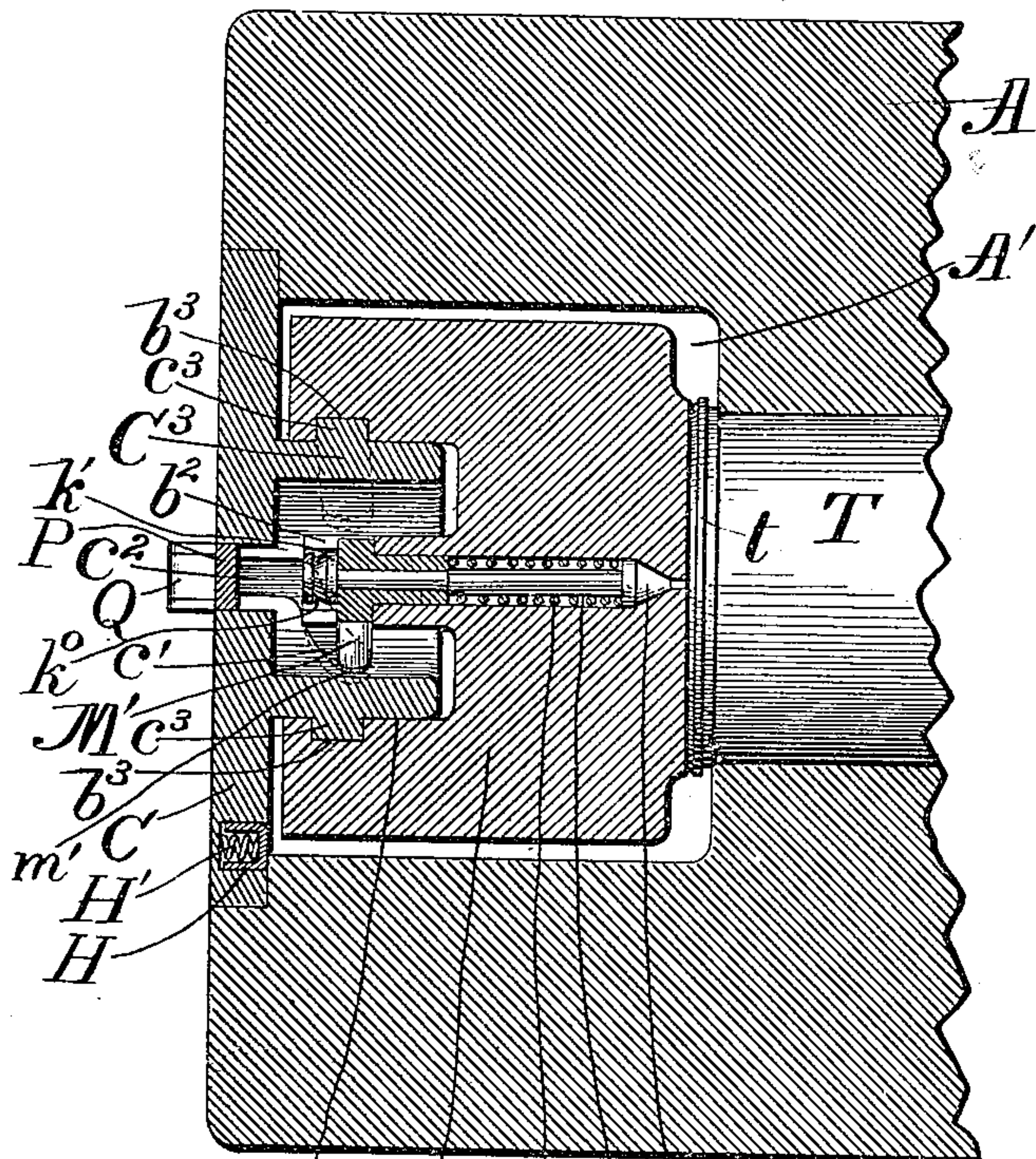
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B<sup>0</sup> B K' K k  
FIG. 9.

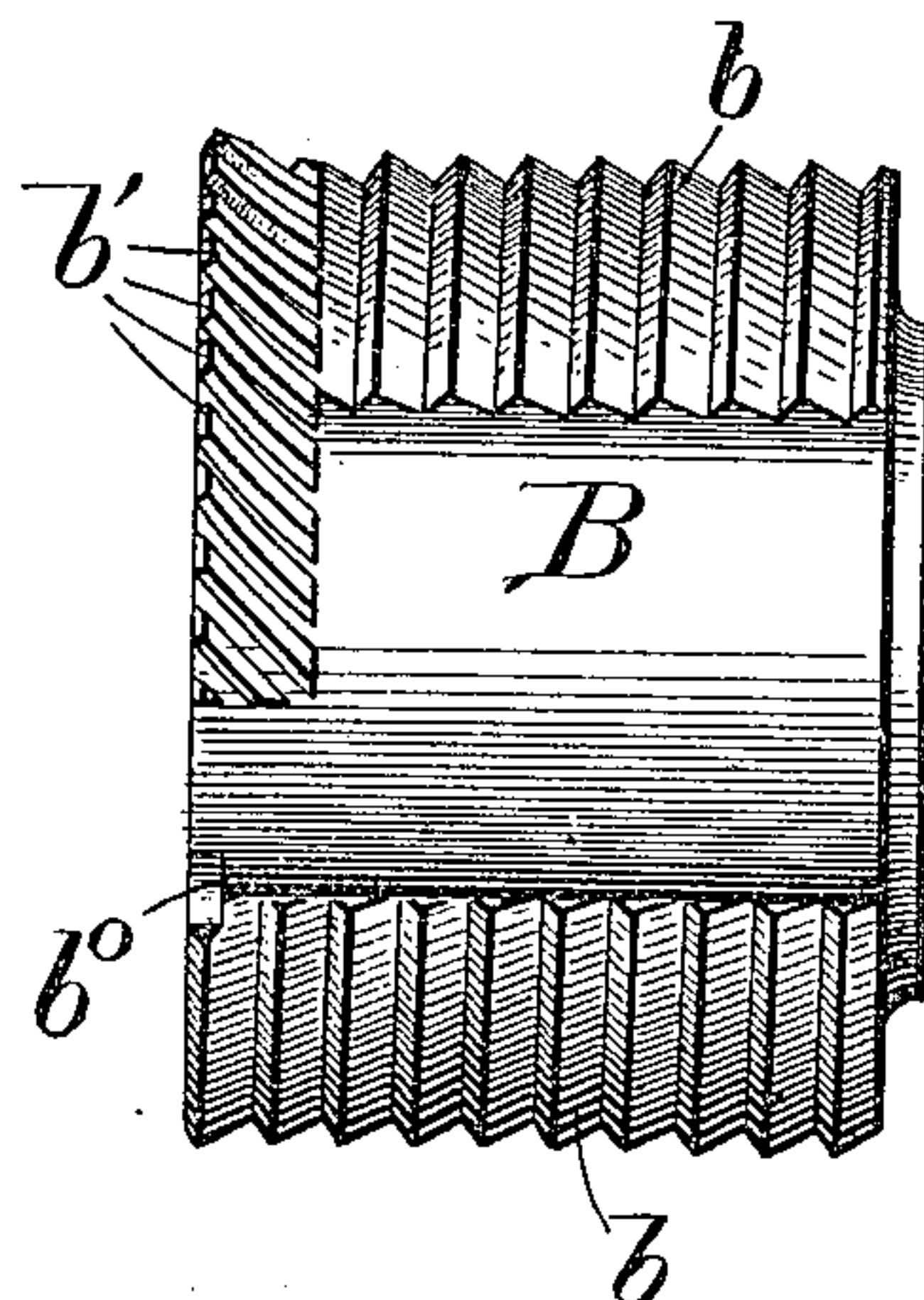


FIG. 10.

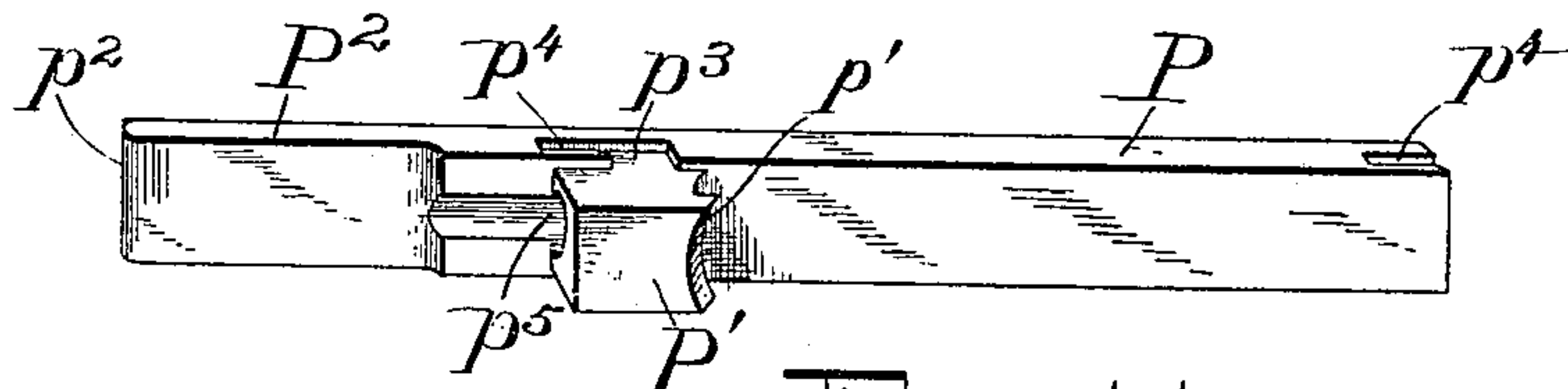


FIG. 11.

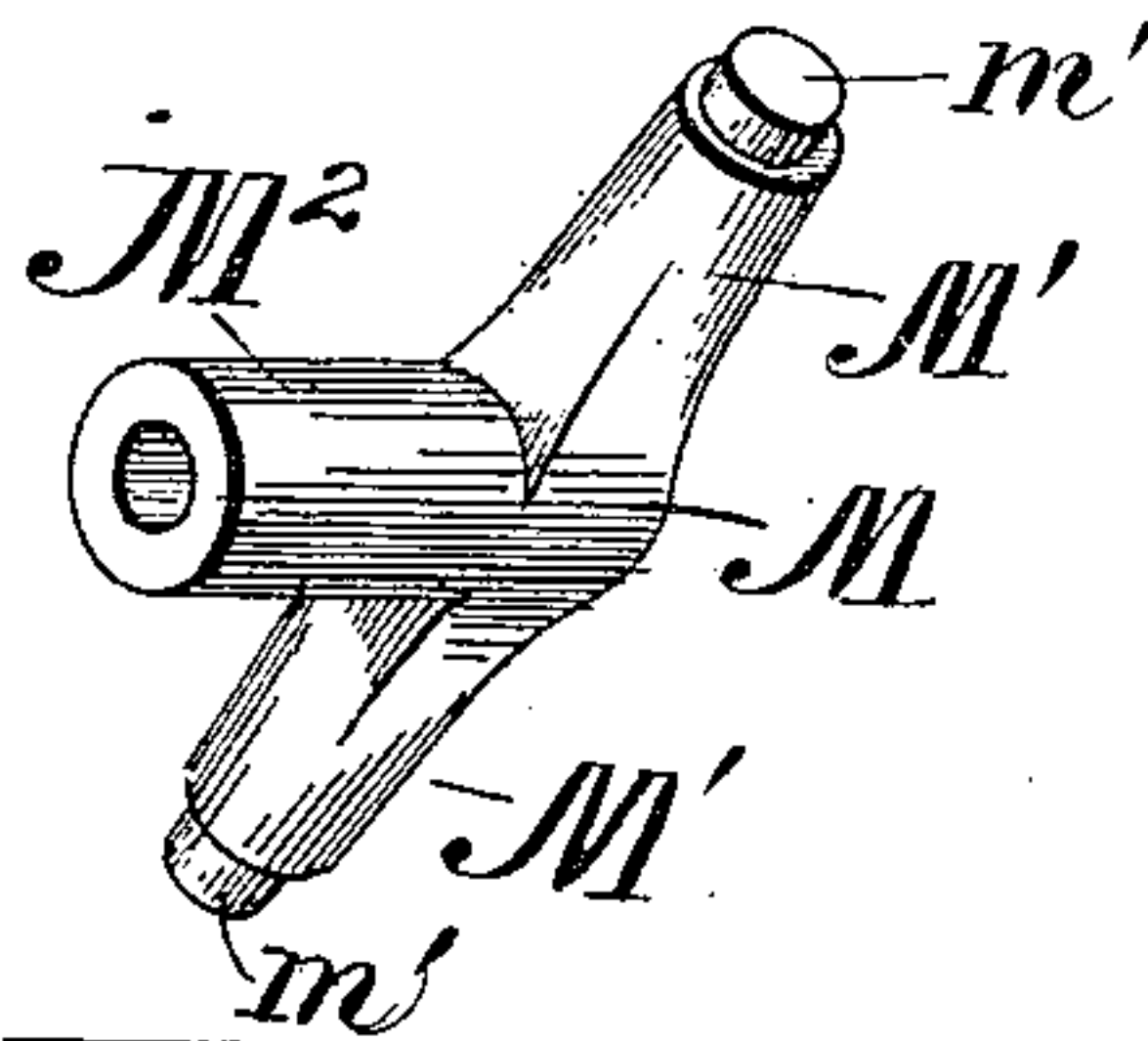


FIG. 12.

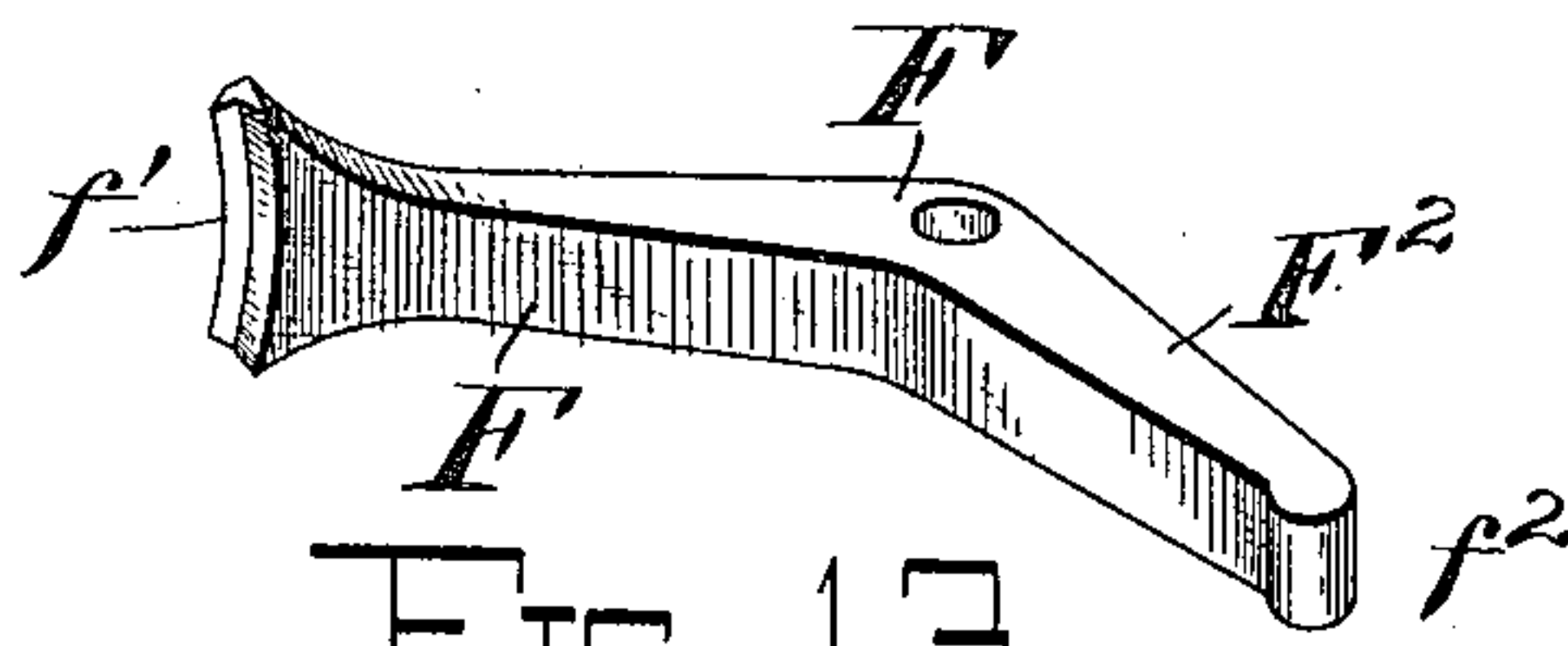


FIG. 13.

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# UNITED STATES PATENT OFFICE.

FRANK F. FLETCHER, OF WASHINGTON, DISTRICT OF COLUMBIA.

## BREECH MECHANISM FOR RAPID-FIRE GUNS.

SPECIFICATION forming part of Letters Patent No. 629,673, dated July 25, 1899.

Application filed April 13, 1898. Serial No. 677,464. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK F. FLETCHER, lieutenant in the United States Navy and a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Breech Mechanism for Rapid-Fire Guns; 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.

My invention relates to breech mechanism for rapid-firing guns of the slotted-screw system of fermeture, and particularly relates to the construction and relation of the screw-plug and the screw-box, the manner of operating the screw-plug, the firing mechanism, and the means for protection against premature discharges.

In my present invention the breech-block is mounted in a swinging carrier that swings in flush with the breech of the gun and is pivoted on a hinge-bolt and operated by a single motion of the hand-lever for opening or for closing the breech. The firing mechanism is also automatically cocked and put in the firing position upon closing the breech.

The said invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 represents a rear view of the breech of the gun with the breech closed. Fig. 2 represents a horizontal section along the line 2 4 of Fig. 1 and looking down, the operating-lever, extractor, and part of the breech-block being shown in plan. Fig. 3 represents a rear view of the breech of the gun with the extractor in position, but the other parts of the breech mechanism removed. Fig. 4 represents a section along the line 2 4 of Fig. 1 when the breech-block has been revolved to that position where its screw-threads are disengaged from those in the screw-box and just before the hinged carrier and the screw-plug carried thereby are swung outward. The open position of the breech-plug and operating-lever are as indicated in dotted lines in said figure. Fig. 5 represents a section through the breech-block on the line 5 5 of Fig. 2, a part of the rear face of the breech-block being

shown in elevation. Fig. 6 is a detail view showing the rear face of the hinged carrier as detached from the gun. Fig. 7 represents a section along the line 7 7 of Fig. 6 and looking in the direction of the arrows. Fig. 8 represents a section along the line 8 8 of Figs. 6 and 7. Fig. 9 represents a section along the line 9 9 of Fig. 1, looking in the direction of the arrows and shows the breech-block and hinged carrier in the closed position. Fig. 10 represents a side elevation of the breech-block as detached from the other parts. Fig. 11 represents a perspective view of the sear for holding the firing-pin in the cocked position and for guarding against the premature operation of the firing mechanism. Fig. 12 represents a perspective view of the T-shaped cocking-bar for drawing the firing-pin to the cocked position and then for compressing the firing-spring. Fig. 13 is a perspective view of the cartridge-case extractor.

A represents the body of the gun, provided with a screw-box A', divided into three groups or segments of interrupted screw-threads *a*, with corresponding blanks between. One of these groups of screw-threads is directly opposite the axis of the hinge-bolt relative to the axis of the gun, and the blanks on either side of these interrupted screw-threads are cut away, as at *a'* in Fig. 3.

The rear face of the gun, as shown in Fig. 3, is recessed at A<sup>2</sup> and A<sup>3</sup>, so that the hinged carrier may swing in flush with the rear face of the breech; but this is not necessary, as the hinged carrier may swing against the rear face of the breech itself and not into any recess therein, if preferred.

The side of the breech is curved, as at A<sup>4</sup>, for the bosses on the hinged carrier, and the gun is cut away, as at A<sup>5</sup>, leaving the metal tie-pieces A<sup>5</sup> and A<sup>6</sup> to furnish additional strength to the breech of the gun.

B represents the breech-block, which is provided with interrupted teeth *b*, engaging the teeth *a* of the screw-box, and is also provided with the worm-teeth *b'*, attached to or integral therewith, to engage the worm-sector on the operating-lever. The breech-block is also recessed, as at *b''*, to receive the spring-stop for locking the same in the hinged carrier. That blank of the breech-plug that is farthest from the hinge-bolt when the plug is out of en-



gagement with the screw-box is cut away toward the face of the breech-plug, as shown at  $b'$  in Fig. 4, and thus it will be seen that this blank  $b'$  will swing into the screw-box without striking the teeth  $a$ , while the teeth on either side of this blank will swing into the cut-away portion  $a'$  of the blanks in the screw-box, and thus the breech-block may be swung directly out of the screw-box as soon as the screw-threads are disengaged without the necessity of moving the breech-block to the rear in the carrier, as is commonly done.

By cutting away the blanks between some of the screw-threads only, as I have shown in Figs. 3 and 4, the strength of the teeth in holding the breech-block against the pressure of the powder charge is not sensibly decreased, and thus the maximum strength of the joint is maintained.

The breech-block is cylindrically recessed, as at  $B^0$ , to receive the cylinder  $C^3$ , projecting from the hinged carrier  $C$ , and this cylinder  $C^3$  is provided with lugs  $c^3$ , engaging in the grooves  $b^3$  in the breech-block, which grooves are parallel to the screw-threads on the block. By means of these guide-grooves  $b^3$  and lugs  $c^3$  the breech-block is securely held on the hinged carrier. In order to insert the lugs  $c^3$  in the grooves  $b^3$ , the latter open at their outer ends to the rear, similar to the grooves  $c'$  and  $c^2$ , hereinafter to be described. This hinged carrier is made in the form of a plate, slotted, as at  $C^4$ , and provided with laterally-extending arms  $C'$ , with perforated bosses  $C^2$ , between which arms and bosses the operating-lever is pivoted. These bosses  $C^2$  are pivoted on the hinge-bolt  $D$ , which is held in the lugs  $A^7$ , secured to the side of the breech. The operating-lever  $E$  is also pivoted on this hinge-bolt and is provided with an arm  $E'$ , terminating in a handle  $E^2$ . Projecting into the opening  $A^0$  between the metal tie-pieces  $A^6$  and  $A^7$  is the worm-sector  $E^3$ , integral with or secured to the operating-lever. This worm-sector is provided with worm-teeth  $e^3$ , engaging the worm-teeth  $b'$  on the breech-block.

The worm-sector is cut away, as at  $e$ , to move clear of the metal tie-piece  $A^5$ , and the operating-lever is curved inward, as at  $e^0$  and  $e^2$ , for purposes that will be hereinafter described.

The cartridge-case extractor  $F$  is pivoted on the pin  $f$  forward of the tie-piece  $A^5$ , and its inner arm  $F'$  bears against the wall  $a^2$  at right angles to the axis of the gun, when the nib  $f'$  of the extractor is in front of the rim  $t$  of the cartridge-case  $T$ , as shown in Fig. 4. The opposite arm  $F^2$  of the extractor is rounded, as at  $f^2$ , and engages the cam-face  $e'$  of the operating-lever  $E$ . As this lever is swung outward from the position shown in full to that shown in dotted lines in Fig. 4 the rounded end  $f^2$  of the extractor rides up this cam-face  $e'$ , starting the cartridge-case slowly and imparting to the same an increasing velocity, and when the breech-block and con-

nected parts have acquired considerable momentum this rounded end  $f^2$  of the extractor strikes in the recess or grooved portion  $e^2$  of the operating-lever and throws the cartridge-case rearward out of the powder-chamber and quickly checking the outward swing of the operating-lever and the hinged carrier. This extractor is somewhat similar to that described and claimed in my Patent No. 451,042, dated June 11, 1895.

The operation of the breech mechanism is as follows: The breech being in the closed position shown in Figs. 1, 2, and 9, the first motion of the operating-lever to the rear is to turn the breech-block about its axis and to unlock it from engagement with the threads in the gun. At this time the parts are in the position shown in Fig. 4. A further motion outward of the operating-lever causes the hinged carrier to swing outward, carrying with it the breech-block and opening the breech. At that time the extractor is first started, slowly prying the cartridge-case from its seat, and then the extractor is struck a hard blow by the operating-lever, assisted by the momentum of the breech mechanism moving therewith, and the cartridge-case is thrown to the rear, and the further movement of the breech mechanism outward is arrested. With this mechanism for opening and closing the breech and with this extractor various forms of devices for locking the breech-block in the carrier when the latter is clear of the gun and various forms of firing mechanism may be adopted.

One form of device for locking the breech-block in the carrier when the threads of the latter are disengaged from the gun is shown in Figs. 1, 5, and 9, where  $b^0$  represents a recess in the rear face of the breech-plug, into which the hollow stop  $H$  is pressed by means of the spring  $H'$  when the carrier is clear of the gun. As soon as the carrier is swung into place on closing the breech the face of this stop  $H$  strikes against the body of the gun, as shown in Fig. 9, and is pressed backward out of engagement with the recess  $b^0$  in the breech-block. Various other means for accomplishing the same result may be provided by any one skilled in the art.

The firing mechanism includes a firing-pin, a spring for operating the same, a bar for cocking the pin, a sear for holding the pin in the cocked position, and a trigger or lever for releasing the said sear when desired.

$K$  represents the firing-pin, which is provided with the usual shouldered head  $k$  and is normally pressed forward by the spring  $K'$ .

$M$  represents a T-shaped bar, having the arms  $M'$ , with lugs  $m'$ , and the sleeve  $M^2$ , which sleeve slips over the firing-pin between the spring  $K'$  and the cap  $k'$ . The arms  $M'$  travel in the slot  $b^2$  of the stem  $B^2$ , projecting through the center of the cylindrical recess  $B^0$ . These lugs  $m'$  engage in the cam-grooves  $c'$  of the cylinder  $C^3$ , which cam-grooves are open toward the face of the car-



rier, as at  $c^3$ , to permit the insertion of the lugs  $m'$ . The rear end of the firing-pin is provided with a detachable cap  $k'$ , with the annular notch  $k^0$ , adapted to engage the catch  $p'$  on the lug  $P'$  of the sear  $P$ . This sear slides in the guideway  $C^4$  in the carrier  $C$  and is held in place by the dovetailed ribs  $c^4$ , engaging in the guide-grooves  $b^4$ , one of which guide-grooves opens at the end of the sear, while the walls of the other is cut away inward, as at  $p^3$ , to permit the insertion of the sear in the guideway  $C^4$ . The outer face of the lug  $P'$  is recessed, as at  $p^5$ , to receive one end of the sear-spring  $S$ , the opposite end of which engages in the recess  $c^5$  in the carrier. This spring tends to press the catch  $p'$  into the annular groove  $k^0$  of the cap  $k'$ , and thus to hold the firing pin in the cocked position. The inner arm of the sear is preferably reduced in thickness, as at  $P^2$ , and terminates in a rounded end  $p^2$ , which is normally held just clear of the worm-teeth  $e^3$ , as shown in Fig. 4, by means of the spring  $S$  and the annular notch  $k^0$ . Thus when the sector  $E^3$  is in any but the closed position this sear cannot be pressed backward far enough to allow the catch  $p'$  to become disengaged from the notch  $b^0$ , and thus the firing-pin cannot be released except when the sector is in the closed position, as shown in Fig. 2. When in this position, the end  $p^2$  of the sear is free to pass into the curved recess  $e^0$  in the operating-lever, and thus the firing-pin can only be released when the breech is closed and locked.

The operation for cocking the firing-pin is automatically effected as follows: Fig. 9 represents the position of the firing mechanism after the gun has been fired, but before the breech-block has been moved after firing. In this position the firing-pin is released from engagement with the sear and is pressed forward by means of the spring  $K'$ , and the T-shaped bar has its lugs  $m'$  at the forward end of the cam-grooves  $c'$ . Now the operation of turning the breech-block will cause these lugs  $m'$  to ride up the cam-grooves  $c'$ , bringing the lugs  $m'$  back to the position shown in Fig. 4 and drawing the cap  $k'$  far enough to the rear to cause the catch  $p'$  to engage in the annular groove  $k^0$  and hold the firing-pin in the rear position, as shown in Fig. 4. In order to permit the necessary motion of the sear to enable it to pass clear of the cap  $k'$ , the worm-sector  $E^3$  should have a straight notch  $e^4$  cut across the face thereof, as shown in Figs. 2 and 4. In this position, which is effected simply by unlocking the screw-threads of the breech-block, the point of the firing-pin is drawn back clear of the face of the breech-plug and is protected against injury. The further motion of opening the breech does not disturb the relative position of the parts of the firing mechanism. In closing the breech the parts of the firing mechanism still remain undisturbed until the breech-plug is swung into the screw-box and the carrier is on its seat. The parts are then in the position shown

in Fig. 4. Now the motion of turning the breech-plug in closing the breech causes its screw-threads to engage with those in the screw-box and also causes the lugs  $m'$  to ride forward in the cam-grooves  $c'$ , subjecting the spring  $K'$  to considerable pressure, and when the breech-plug is locked in the gun the parts are in the position shown in Fig. 2 and ready for firing.

The sear is operated by the trigger  $Q$ , which has the form of a bell-crank lever pivoted at  $q$  and having the arm  $q'$  engaging the end of the sear  $P$ . The opposite arm of the trigger is pulled by the lanyard  $R$  or may be moved in any convenient way. The spring  $S$  will normally hold the trigger in the position shown in Fig. 2; but, if desired, a spring may be inserted between the outer arm of the trigger and the frame  $Q'$ , in which it is inserted, although this is unnecessary.

It will be seen that as the carrier is swung to the closed position, no matter what may be the position of the bell-crank lever, the end of the sear  $P$  will strike the short arm of the bell-crank lever  $Q$  and will swing the same about the pivot  $q$  until it assumes the position shown in Fig. 2. At that time the opposite end  $p^2$  of the sear cannot be pressed far enough to the right to allow the catch  $p'$  to pass out of the groove  $k^0$  on account of the engagement of said end  $p^2$  with the face of the worm-teeth  $e^3$ , as has been already described.

The various parts of the firing mechanism are so arranged that they may be readily removed and repaired or fresh parts inserted, or electric firing mechanism may be inserted, as desired.

It will thus be seen that I provide an extremely simple firing mechanism which is automatically cocked and put in the operative position by opening and closing the breech-block and which cannot be fired except when the breech is closed and the plug is locked in the gun.

It will be obvious that various modifications in the herein-described apparatus might be made which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a firing mechanism for use in guns of the slotted-screw system, the combination of a hinged carrier having a hollow cylinder projecting from the front thereof and engaging in a recess in the breech-block, with cam-grooves on the interior of said hollow cylinder, a cocking-bar with lugs projecting into said cam-grooves, a spring-operated firing-pin automatically operated by said bar in opening and closing the breech, and means for holding the firing-pin in the cocked position, and for releasing same when desired, substantially as described.

2. In a firing mechanism for use in guns of the slotted-screw system, the combination of



a hinged carrier having a hollow cylinder projecting from the front thereof and engaging in a recess in the breech-block, with cam-grooves on the interior of said hollow cylinder, a spring-operated firing-pin concentric with said cylinder, a T-shaped cocking-bar loosely mounted on said firing-pin and provided with lugs projecting into said cam-grooves, and means for holding the firing-pin in the cocked position, and for releasing same when desired, substantially as described.

3. In a firing mechanism for use in guns of the slotted-screw system, the combination of a hinged carrier having a hollow cylinder projecting from the front thereof and engaging in a recess in the breech-block, with cam-grooves on the interior of said hollow cylinder, a spring-operated firing-pin concentric with said cylinder, a T-shaped cocking-bar traveling in guides attached to or integral with the breech-block and loosely mounted on said firing-pin and provided with lugs projecting into said cam-grooves, and means for holding the firing-pin in the cocked position, and for releasing same when desired, substantially as described.

4. In a firing mechanism for use in guns of the slotted-screw system, the combination with a hinged carrier provided with cam-grooves, of a T-shaped cocking-bar with oppositely-disposed lugs projecting into said cam-grooves, and a spring-operated firing-pin automatically controlled by said cocking-bar in opening and closing the breech, substantially as described.

5. In a firing mechanism for use in guns of the slotted-screw system, the combination with a hinged carrier provided with cam-grooves, of a spring-operated firing-pin, a T-shaped cocking-bar loosely mounted on said firing-pin and engaging said cam-grooves, and means for holding the firing-pin in the cocked position and releasing same when desired, substantially as described.

6. In a firing mechanism for use in guns of the slotted-screw system, the combination with a hinged carrier provided with cam-grooves, of a spring-operated firing-pin, a T-shaped cocking-bar loosely mounted on said firing-pin and engaging said cam-grooves, and a sliding sear engaging said firing-pin when in the cocked position, substantially as described.

7. In a breech-loading gun of the character described, the combination with a sear sliding transversely with the axis of the gun, of a combined worm-sector and hand operating-lever having a worm-sector arm adapted to rotate the breech-block, and to hold the sear in a locked position, and a recess exterior to said worm-sector arm adapted to allow the free end of the sear to pass thereinto when the breech-block is closed and locked, substantially as and for the purposes set forth.

8. In a breech-loading gun of the character described, the combination with a breech-block provided with worm-threads, of a worm-sector arm adapted to engage in said worm-threads, and provided with a recess at the outer end of said worm-threads, of a sliding sear normally held locked by said worm-threads but free to pass into said recess when the breech-block is closed and locked, substantially as described.

9. In a breech-loading gun of the character described, the combination with a breech-block provided with worm-threads for operating the same, of a hand-lever provided with a worm-segment integral therewith for rotating said breech-block, and with a recess at the outer end of said worm-segment, and a sear operating transversely across the breech-block and free to project into said recess when the breech-block is closed and locked, substantially as described.

10. In a breech-loading gun of the character described, the combination with a breech-block provided with worm-threads for rotating the same, of a hand-lever pivoted to the side of the gun and having a worm-sector engaging said worm-threads on the breech-block, and a recess exterior to said worm-threads, of a sliding sear mounted against the rear face of said breech-block and traveling transversely thereto, the said sear being held in the locked position by said worm-threads but being free to pass into said recess at the end of the worm-threads when the breech is closed and the breech-block is locked, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK F. FLETCHER.

Witnesses:

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J. STEPHEN GIUSTA.