

No. 679,114.

Patented July 23, 1901.

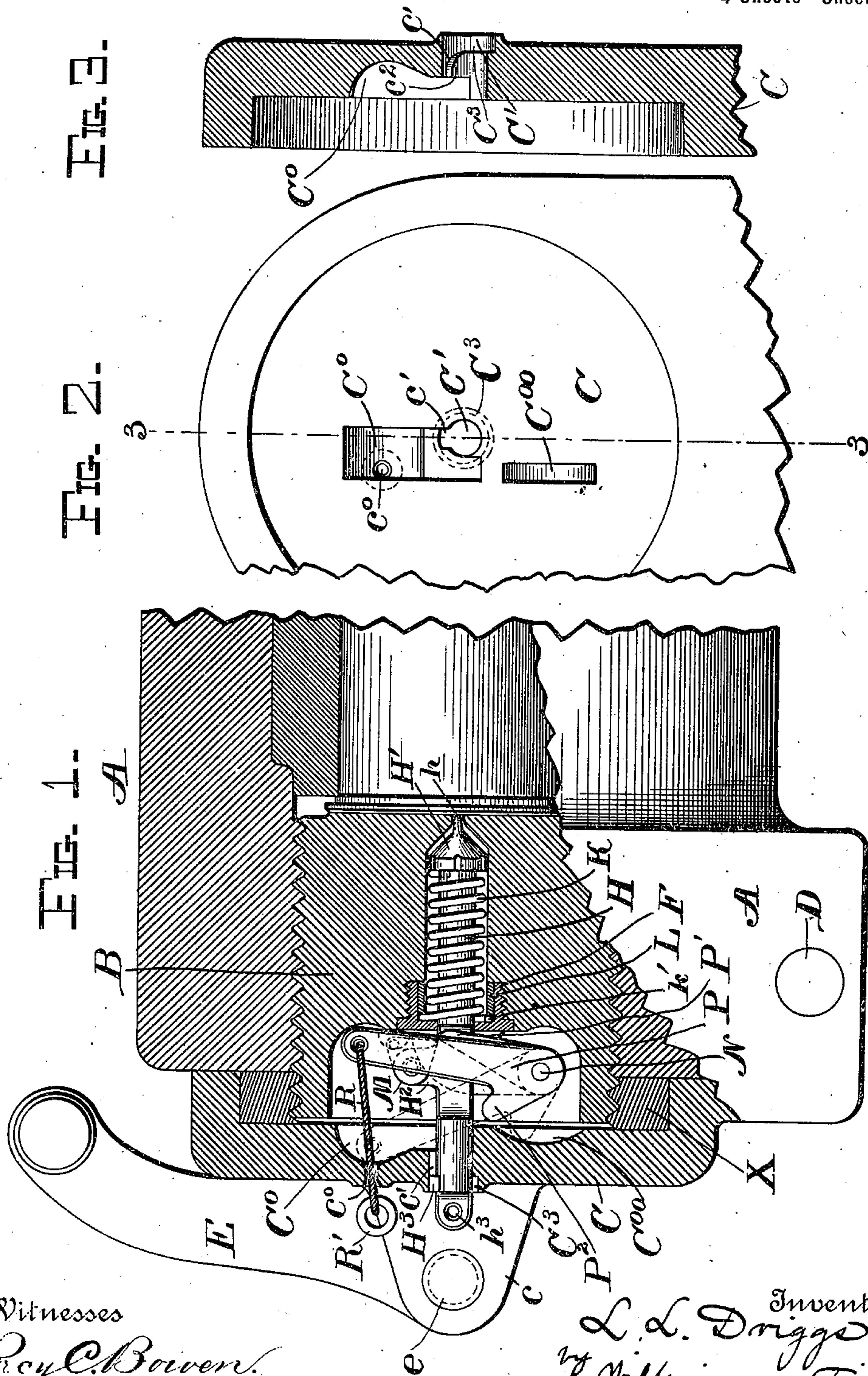
**L. L. DRIGGS.**

**FIRING MECHANISM FOR BREECH LOADING ORDNANCE.**

(No Model.)

(Application filed Dec. 9, 1899. Renewed Feb. 12, 1901.)

4 Sheets—Sheet 1.



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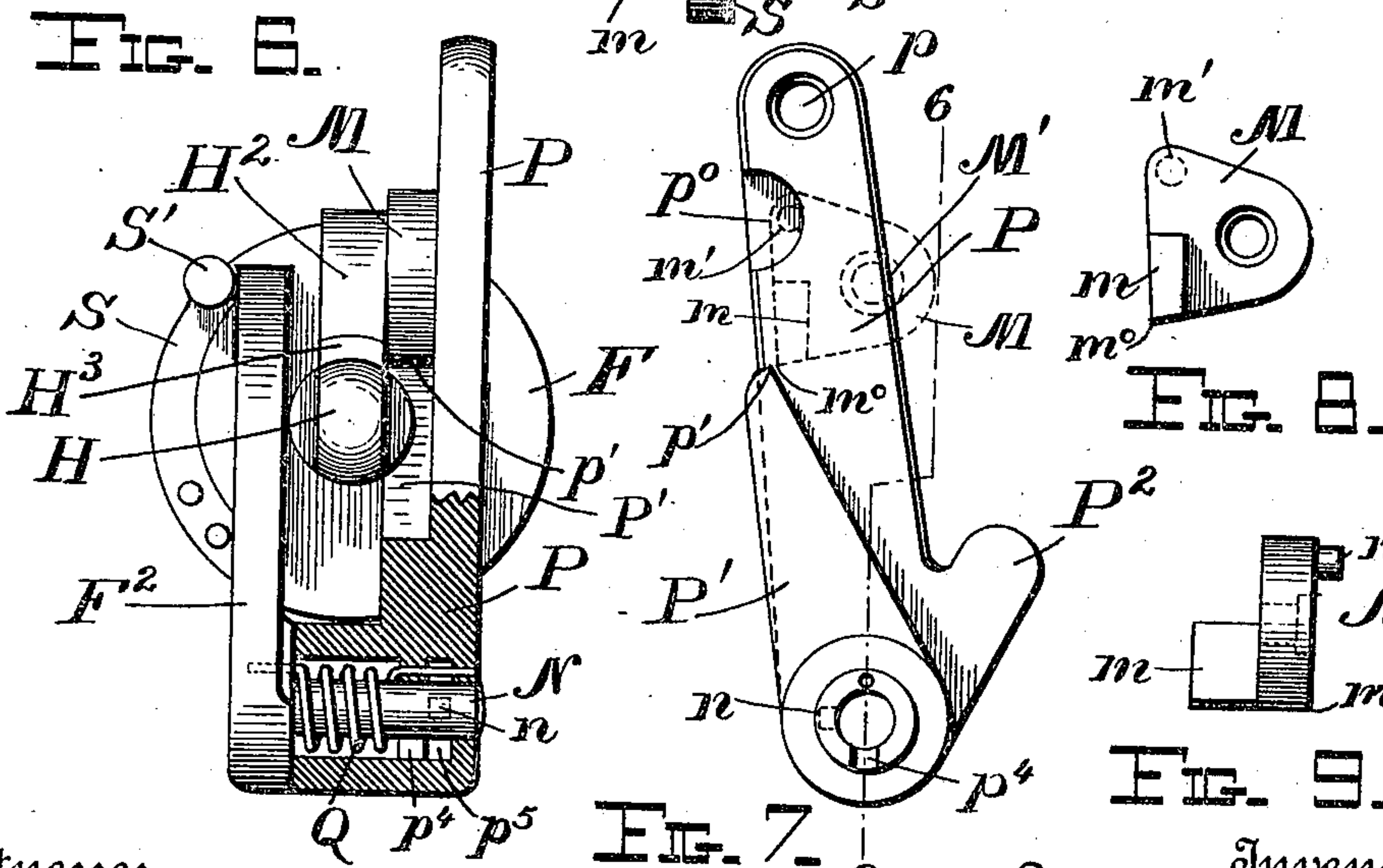
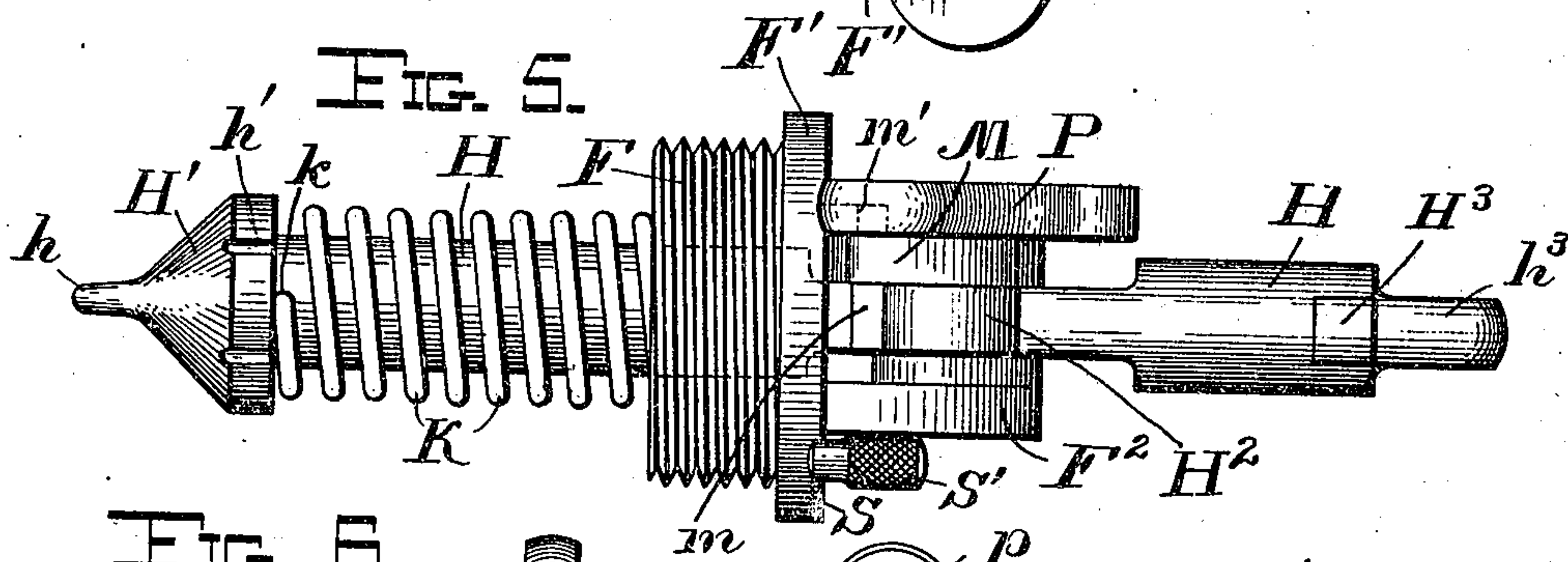
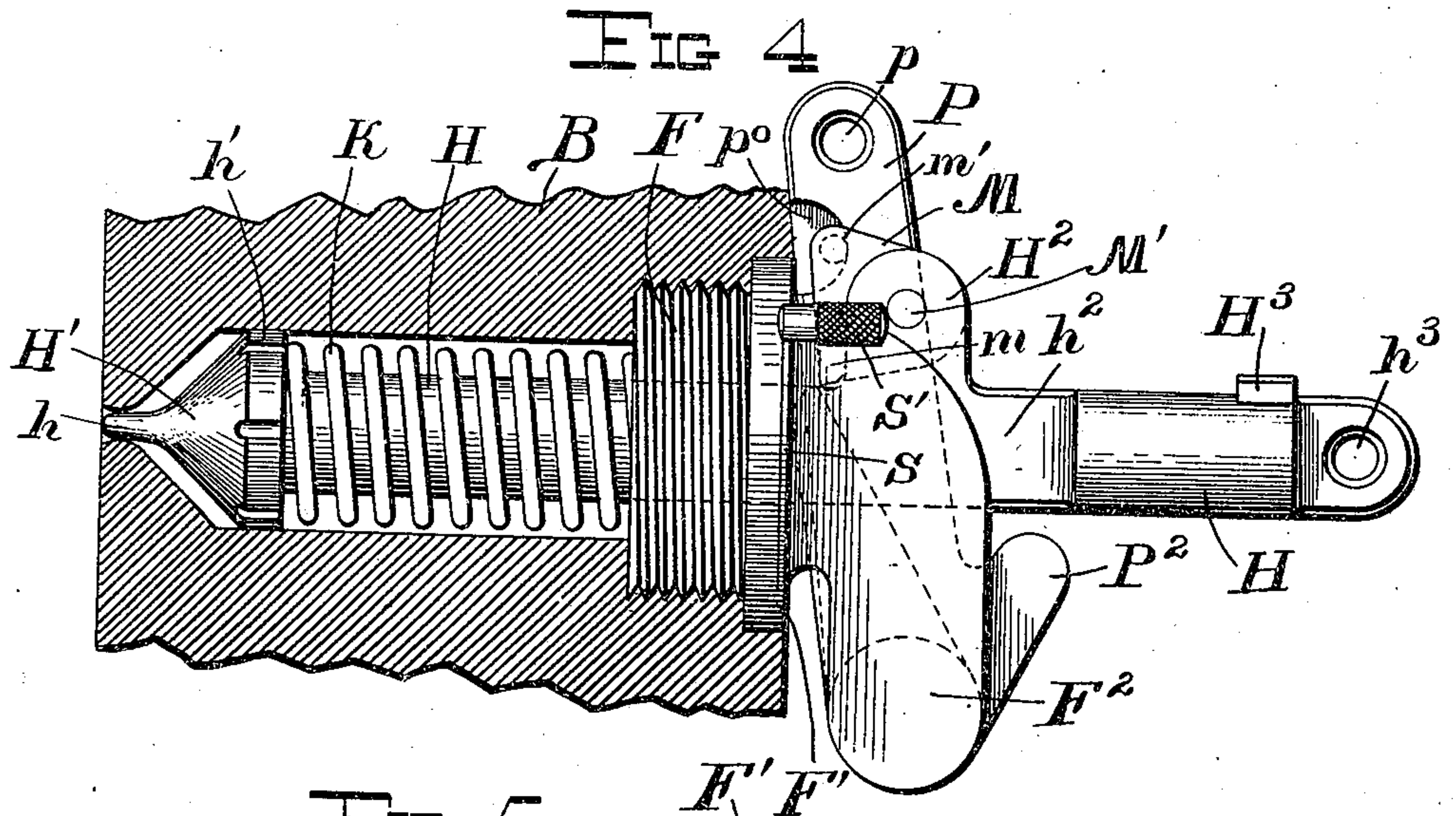
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4 Sheets—Sheet 2.



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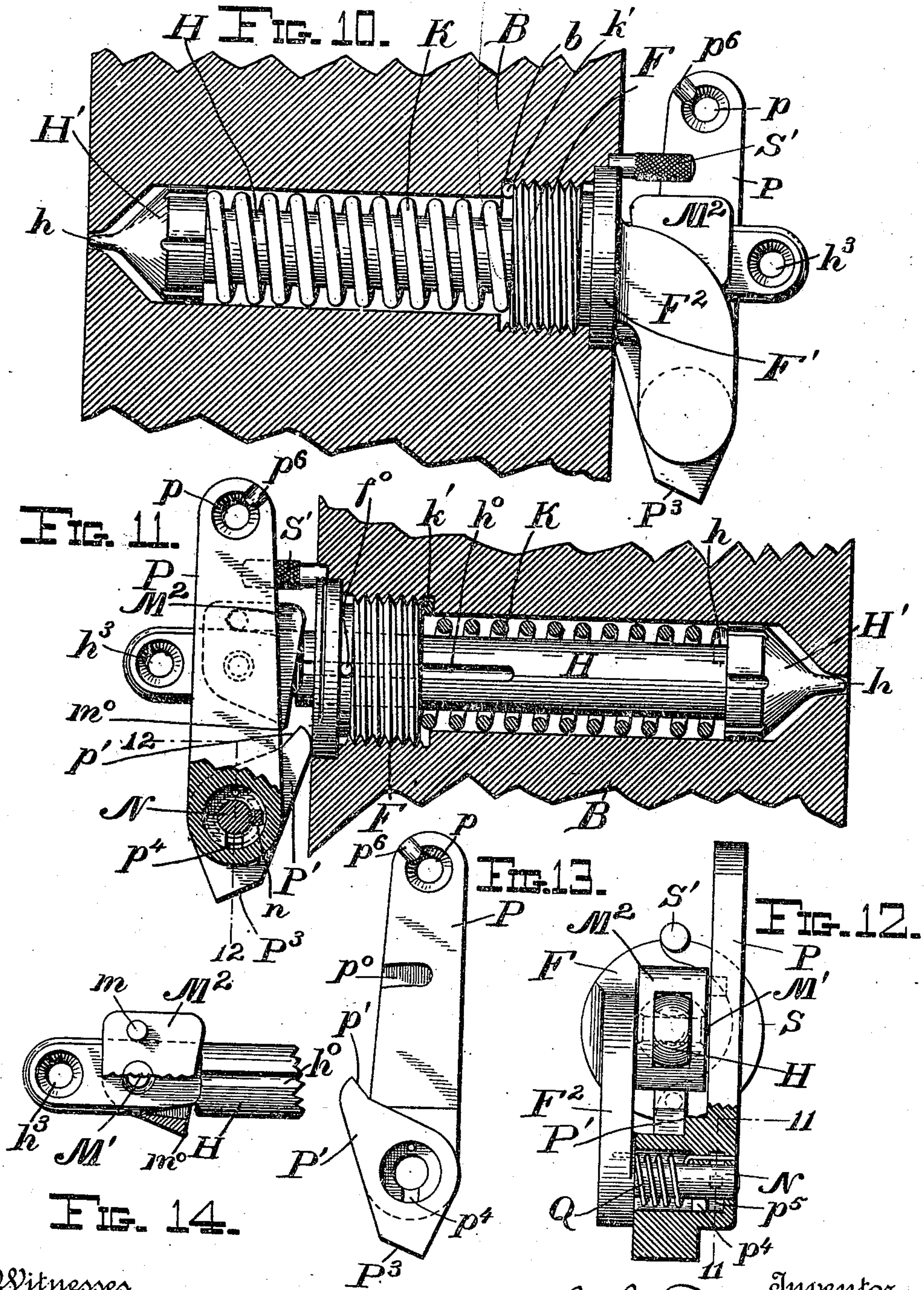
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(No Model.)

(Application filed Dec. 9, 1899. Renewed Feb. 12, 1901.)

4 Sheets—Sheet 3.



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FIRING MECHANISM FOR BREECH LOADING ORDNANCE.

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4 Sheets—Sheet 4.

FIG. 15.

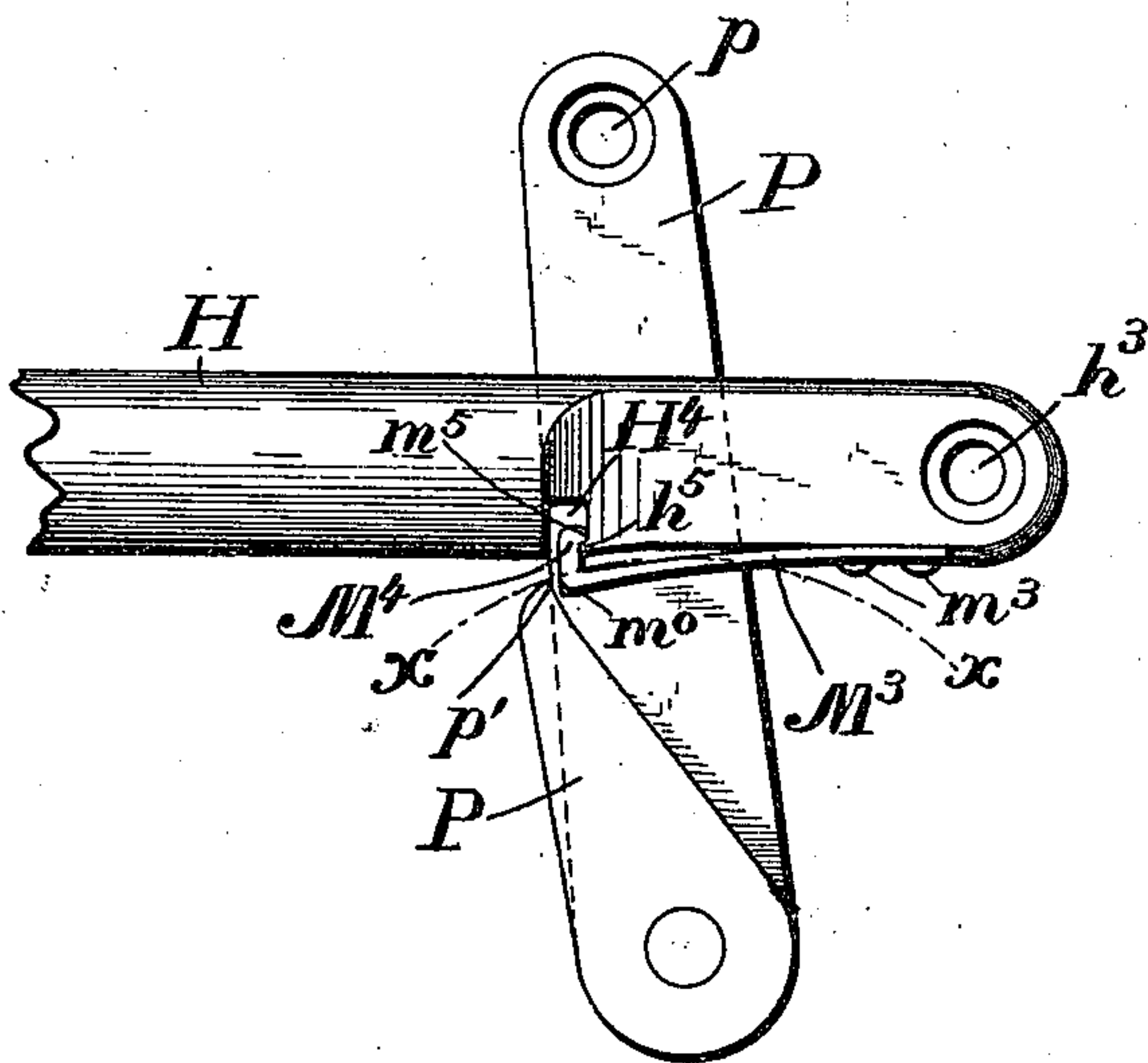
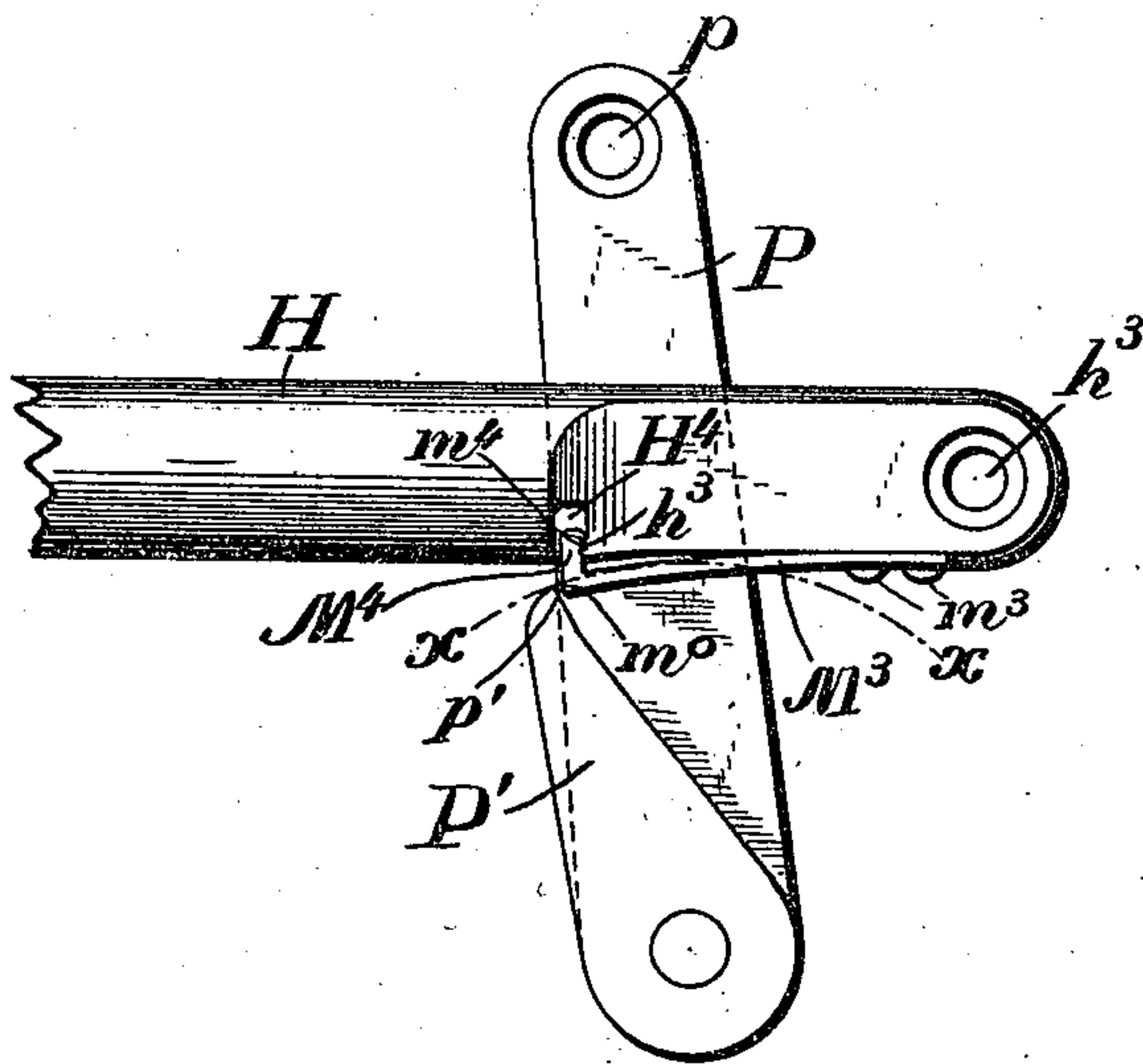


FIG. 16.

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# UNITED STATES PATENT OFFICE.

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## FIRING MECHANISM FOR BREECH-LOADING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 679,114, dated July 23, 1901.

Application filed December 9, 1899. Renewed February 12, 1901. Serial No. 47,049. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS L. DRIGGS, a citizen of the United States, residing at New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Firing Mechanism for Breech-Loading Ordnance; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as it will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in firing mechanism for use in breech-loading ordnance; and it consists of a certain form of "pull-off" or self-cocking mechanism, which 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 is a sectional elevation showing the gun-breech and firing mechanism, the latter being in the normal or half-cocked position. Fig. 2 represents an interior view of the hinged carrier on which the breech-block is mounted, but with the breech-block removed therefrom. Fig. 3 represents a section along the line 3 3 of Fig. 2. Fig. 4 is an enlarged detail view showing the other side of the firing mechanism and a part only of the breech-block. Fig. 5 is a plan view of the firing mechanism detached from the breech-block. Fig. 6 is an end view of the firing mechanism, partly in section, along the line 6 6 of Fig. 7. Fig. 7 is a side elevation of the firing-lever and cocking-arm as detached from the mechanism and as seen from the left in Fig. 6. Figs. 8 and 9 are detail views of the pivoted catch carried by the firing-pin. Fig. 10 shows a modification of the device shown in Fig. 4. Fig. 11 is a view of the reverse side of the device shown in Fig. 10; and Figs. 12, 13, and 14 are detail views of part of the apparatus shown in Figs. 10 and 11, Fig. 12 being partly in section along the line 12 12 of Fig. 11. Figs. 15 and 16 are detail views of the rear end of the firing-pin and the firing-lever, showing modifications in which the pivoted latches are dispensed with and simple spring-latches are used in place thereof.

The device shown in Figs. 1 and 9 contains many of the features shown in Figs. 10 to 14,

and the differences will be pointed out in due course; but we will first describe the preferred form of the device shown in the earlier figures and will then point out the differences shown in the modification.

The gun and hinged carrier shown in Fig. 1 is that patented to Charles H. Tompkins by Patent No. 628,870, granted July 11, 1899; but I do not mean to confine myself to any particular form of gun, the invention being applicable to most of the varieties of breech-loading cannon now in use.

A represents the gun-body, B the breech-block, and C the hinged carrier, hinged to the side of the breech of the gun on the hinge-pin D.

X represents a ring secured to the hinged carrier, in which the rear screw-threads of the breech-block engage, as described in the patent to Tompkins aforesaid; but this ring is not a part of the present invention and may be omitted, if desired. The hinged carrier is preferably recessed, as at  $C^0$  and  $C^{00}$ , and perforated, as at  $c^0$ , the perforation  $c^0$  and the recess  $C^0$  being to receive the lanyard R and the firing-lever P, while the recess  $C^{00}$  registers with the arm  $P^2$ , integral with the firing-lever P, which arm passes into this recess only when the breech-block is in the closed and locked position. The breech-block is also perforated, as at  $C'$ , with a winged slot  $c'$  or keyway to permit the passage therethrough of the firing-pin H and its guide-lug  $H^3$ .

E represents the hand-lever for operating the breech-block, which is pivoted by means of the pin  $e$  to the lugs  $c$  on the hinged carrier C, and the operation of this lever is as in the patent aforesaid; but this also is not a part of the present invention and will not be further discussed herein. Moreover, any other preferred form of device for locking or unlocking the block may be adopted, if desired.

F represents a sleeve screwed into the block and holding between its inner head and the ring L the end  $k'$  of the firing-spring K, the opposite end of which spring is attached to the firing-pin H, as shown in Figs. 1 and 5. The firing-pin is provided with the usual point  $h$ , and the head  $H'$  is grooved, as at  $h'$ , to permit the escape of gas rearward in case of



blow-backs, and the spring K is so adjusted that it will withdraw the point of the firing-pin inside of the nose or face of the breech-block after the gun has been fired, the inertia of the firing-pin and parts carried thereby being sufficient when the firing-pin is released to carry it beyond the limit of the pressure of the spring when the gun is fired.

The firing-lever and cocking-toe are pivoted on the pin N, rigidly secured to the arm F<sup>2</sup>, projecting rearward and laterally from the sleeve F, and the firing-lever and cocking-toe are normally pressed toward the sleeve F by means of the coil-spring Q, surrounding the said pin N and fitting in a cylindrical recess in the heel of the firing-lever. This firing-lever is held on the pin N against accidental displacement by means of a bayonet-joint arrangement consisting of an annular slot p<sup>5</sup>, with an opening p<sup>4</sup> leading thereto, through which opening passes the stud n on the pin N, which stud projects into the annular groove p<sup>5</sup>, as shown in Fig. 6. The cocking-toe P' is either integral with or rigidly attached to the firing-lever P and terminates in a point p', adapted to engage the catch m<sup>0</sup> of the latch M, which latch is pivoted, as at M', on the lug H<sup>2</sup>, projecting from the firing-pin H. A stop-lug m' projects from the latch M into the recess p<sup>0</sup> in the firing-lever P, and the firing-lever in returning to the initial position shown in Figs. 1 and 4 engages this lug m' and restores the latch M to the engaging position shown in Figs. 4 and 7. The latch M is provided with a lug m, projecting across the firing-pin, as shown in Figs. 4 and 5, and this lug brings up against the front face of the arm H<sup>2</sup> when the cocking-toe presses the latch backward, and thus causes the firing-pin to move back with it. On the return to the initial position the cocking-toe swings the latch forward about its pivot and passes in front of the catch m<sup>0</sup>.

The firing-lanyard R is attached to the eye p. The firing-pin also may be cocked by hand, as by a hook engaging in the eye h<sup>3</sup>, provided for this purpose.

In order to lock the sleeve F in the proper position in the breech-block, I provide a spring locking attachment consisting of a spring S, secured to the sleeve F, and a stop S', having a boss at its point adapted to project into a groove partly in the breech-block and partly in the arm F' of the sleeve F when the said sleeve is in the proper position. This stop S' is preferably provided with a milled head, so that it may be readily withdrawn in case it is desired to substitute a new firing mechanism, as either in drilling or in case of accident.

The operation of the device is as follows: Suppose the breech to be closed and locked and the gun to be fired and it is desired to reload the gun and subsequently fire the same. The first motion of the breech-block in turning to unlock will cause the breech-block to move slightly to the rear, owing to the pitch

of the threads. At the same time the lug H<sup>3</sup> on the firing-pin will ride up the cam c' at the rear of the hinged carrier (see Fig. 3) until the said lug passes into the annular recess c<sup>3</sup>, at which time the firing-pin will be held back and the point of the firing-pin will be positively prevented from projecting forward beyond the face of the breech-block. Moreover, it will be impossible for the firing-pin to spring forward to the firing position until this lug H<sup>3</sup> registers with the slot c', which will only happen when the breech-block is closed and locked. Therefore this lug H<sup>3</sup> has a positive safety action whereby premature discharges are prevented until the breech-block is closed and locked. It will be obvious that this lug H<sup>3</sup> does not register again with the groove c' until on the reverse motion the breech-block is rotated to the closed and locked position.

The firing-pin may be said to be normally at the position of half-cock (shown in Figs. 1, 4, 11, and 12) and is not cocked until immediately before the gun is fired. This is accomplished by pulling back on the lanyard R, which causes the cocking-toe p' to engage under the catch m<sup>0</sup>, drawing the firing-pin back to the rear, and as soon as it is drawn sufficiently to the rear this toe p', following an arch-shaped path, passes from under the catch m<sup>0</sup>, and the firing-pin flies forward, striking the primer. If the firing-lanyard now be eased up, the parts will return to the initial position, and the firing-pin may be drawn back, as before. In this way, in case of a misfire the first time, a second fire may be had by simply pulling back on the lanyard without any further manipulation of the parts.

As will be seen, the apparatus is normally in the safety position and is only cocked at the instant of firing and is then cocked automatically by pulling back on the firing-lanyard.

As an additional safety device, I provide an arm P<sup>2</sup>, which registers with the recess C<sup>00</sup> in the hinged carrier only when the breech-block is in the closed and locked position. Thus it will be seen that it will be impossible to pull the cocking-lever back far enough to fire the gun, except when this arm P<sup>2</sup> registers with the recess C<sup>00</sup>, and therefore a second safeguard is provided against premature discharges.

The apparatus shown in Figs. 1 to 9 of the drawings is specially adapted for breech mechanism of the slotted-screw system, in which the breech-block first rotates for unlocking and then is swung out of the breech by means of a pivoted carrier—such, for instance, as is shown in the patent to Tompkins aforesaid or in other well-known slotted screw-guns fitted with two-motion breech mechanisms.

In Figs. 10 to 14 I show a firing mechanism adapted for use with other types of guns in which the block has a locking motion trans-



verse to the bore—such, for instance, as that shown in the patent to Driggs and Tasker, No. 613,195. The firing mechanism shown in these figures differs only very slightly from that shown in Figs. 1 to 10, already referred to. All of the parts included within the block itself are practically the same, except the firing-pin is shown with a longitudinal slot  $h^c$ , into which projects a guide-pin  $f^0$ , while the shank of the firing-pin is made somewhat shorter, owing to the fact that there is no hinged carrier in the rear. Moreover, the rear end  $k'$  of the spring K is shown as held between the sleeve F and shoulder on the breech-block, (see Fig. 11;) but this material is substantially the equivalent of that shown in Fig. 1. The bayonet-joint connection between the lever P and the pin N is the same as already described and is shown clearly in Fig. 11. The latch  $M^2$  differs slightly from that shown in the other figures in that it extends around the firing-pin and is provided with a stud  $m$ , that projects into the curved recess  $p^0$  on the firing-lever P. There is no provision made for the safety devices secured by the lug  $H^3$  and the arm  $P^2$  in the device shown in the earlier figures; but with guns having sliding blocks the firing-pin does not register with the primer until the block is closed, and therefore the necessity for safety devices is not so important as with slotted screw-blocks, where the firing-pin is brought immediately in the rear of the primer when the block swings into the bore, and the tendency of the inertia of the firing-pin and the parts carried thereby is to move forward and strike the primer unless a positive lock is provided to prevent this until the breech-block is rotated to the locked position.

In the device shown in Figs. 1 to 9 the rearward swing of the firing-lever is limited by the surface of the recess  $C^0$ , and therefore the firing-lever cannot be drawn back far enough in use to have the lugs  $n$  pass into the slot  $p^4$ , thus locking the mechanism or tending to break off the said lug, causing the firing-lever and cocking-toe to joint or work loose.

In the device shown in Figs. 10 to 14 the firing-lever is provided with a shoulder  $P^3$ , that brings up against the face of the breech-block before the firing-lever has been pulled back too far.

In Figs. 15 and 16 I show a spring-latch  $M^3$ , which may be used in place of either of the pivoted latches M or  $M^2$ , the said latch  $M^3$  consisting of a spring secured to the under side of the firing-pin H, as at  $m^3$ , the forward end  $M^4$  of the said spring being bent at right angles to form the catch  $m^0$ , against which the point  $p'$  of the cocking-toe  $P'$  is arranged to impinge, as in the foregoing forms of this device. The forward-end  $M^4$  of the latch  $M^3$  is received in a recess  $H^4$  in the firing-pin, which recess is deep enough to allow the spring-catch to be pressed closely against the under side of the firing-pin when the cocking-toe  $P'$  moves forward, its point  $p'$  travel-

ing in the arc of a circle indicated by the dotted line  $x x$ ; thus allowing the said point  $p'$  to pass in front of the catch  $m^0$ . The tendency of the spring-catch  $m^3$  is to spring away from the firing-pin for a limited distance—far enough to bring the catch  $m^0$  behind or in the path of the point  $p'$  of the cocking-toe  $P'$ . The outward movement of the spring-catch  $M^3$  is limited in the form shown in Fig. 15 by ratchet-teeth  $m^4$ , which impinge against similar teeth  $h^4$  on the rear side of the recess  $H^4$ , and in the form shown in Fig. 16 by a lug  $m^5$ , which engages a lug  $h^5$  at the rear side of the mouth of the recess  $H^4$ . Thus the spring-catch is prevented from springing too far out of the recess or from being pulled out by the friction of the point  $p'$  as it moves downwardly off of the catch  $m^0$  as it nears the end of its rearward movement. The operation of the firing mechanism with the spring-latch being otherwise the same as in the foregoing instances will not be further described.

A special feature of my improved firing mechanism is that the mechanism complete is carried by a sleeve which may be removed from the block, and thus at a single operation the entire firing mechanism may be taken out and by a like operation a new firing mechanism may be inserted. While I have shown the threads on the sleeve F as continuous, it will be obvious that I may make these threads interrupted, so that the said sleeve may be unlocked by a partial turn and then withdrawn to the rear. In this way the entire firing mechanism might be removed and a new mechanism inserted in a very brief interval of time. This feature, however, is more important in competitive tests and in drilling than in actual practice.

It is my intention to claim this improved firing mechanism as applied to any type or class of breech-loading gun for which it is suitable or to which it may be applied without the exercise of inventive skill.

It will be obvious that various modifications might be made in the herein-described apparatus 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. A firing mechanism for breech-loading ordnance comprising a firing-pin mounted in the breech-block, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch carried by the firing-pin, a pivoted cocking-toe engaging said latch and releasing the same when drawn to the rear, and means for drawing said cocking-toe rearward; substantially as described.

2. In breech-loading ordnance, a firing mechanism comprising a firing-pin mounted in the breech-block, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the



point of the firing-pin clear of the face of the breech-block, a yielding latch carried by the firing-pin, a cocking-toe engaging said latch when drawn to the rear and then passing from under said latch in its further rearward motion, and a firing-lever integral with or rigidly attached to said cocking-toe; substantially as described.

3. In a firing mechanism for use in breech-loading ordnance, the combination with a sleeve detachably mounted in the breech-block of the gun, of a firing-pin mounted in said sleeve, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch mounted on said firing-pin, and a cocking-toe pivoted on said sleeve and engaging said latch when drawn to the rear and passing out of engagement with said latch near the end of its rearward motion, with means for moving said cocking-toe rearward, about its pivot, substantially as described.

4. A firing mechanism for breech-loading ordnance comprising a firing-pin mounted in the breech-block, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch carried by the firing-pin, a pivoted cocking-toe engaging said latch and releasing the same when drawn to the rear, a spring normally pressing said cocking-toe forward, and means for drawing said cocking-toe rearward against the action of said spring; substantially as described.

5. In breech-loading ordnance, a firing mechanism comprising a firing-pin mounted in the breech-block, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch carried by the firing-pin, a pivoted cocking-toe engaging said latch when drawn to the rear and then passing from under said latch in its further rearward motion, and a firing-lever integral with or rigidly attached to said cocking-toe; and a spring normally pressing said firing-lever and cocking-toe forward; substantially as described.

6. In a firing mechanism for use in breech-loading ordnance, the combination with a sleeve detachably mounted in the breech-block of the gun, of a firing-pin mounted in said sleeve, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch mounted on said firing-pin, a cocking-toe pivoted on said sleeve and engaging said latch when drawn to the rear and passing out of engagement with said latch near the end of its rearward motion, and a spring normally pressing said firing-lever and cocking-toe forward, with

means for moving said cocking-toe rearward, about its pivot, substantially as described.

7. A firing mechanism for breech-loading ordnance comprising a sleeve detachably mounted in the breech-block, a firing-pin sliding in said sleeve and held against rotation therein, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch carried by said pin, a pivoted cocking-toe engaging said latch and releasing the same when drawn to the rear, a spring normally pressing said cocking-toe forward, and means for drawing said cocking-toe rearward against the action of said spring; substantially as described.

8. In breech-loading ordnance, a firing mechanism comprising a sleeve detachably mounted in the breech-block, a firing-pin sliding in said sleeve and held against rotation therein, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch carried thereby, a cocking-toe engaging said latch when drawn to the rear and then passing from under said latch in its further rearward motion, a firing-lever integral with or rigidly attached to said cocking-toe, and a spring normally pressing said cocking-toe forward; substantially as described.

9. In a firing mechanism for use in breech-loading ordnance, the combination with a sleeve detachably mounted in the breech-block of the gun, and provided with a rearwardly-projecting arm, of a firing-pin mounted to slide in said sleeve, but held against rotation therein, a spring secured at one end to the breech-block and at the other to the firing-pin and adapted to withdraw the point of the firing-pin clear of the face of the breech-block, a yielding latch mounted on said firing-pin, a cocking-toe pivoted on said arm of said sleeve and engaging said latch when drawn to the rear and passing out of engagement with said latch near the end of its rearward motion, and a spring normally pressing said firing-lever and cocking-toe forward, with means for moving said cocking-toe rearward, about its pivot, substantially as described.

10. In a breech-loading gun, the combination with a sleeve adapted to be screwed into the breech-block, a spring-stop adapted to project into a recess partly in said breech-block and partly in said sleeve, and firing mechanism carried by said sleeve, and removable therewith from the gun, substantially as described.

11. In a breech-loading gun, the combination with a sleeve adapted to be screwed into the breech-block, of a spring S secured to said sleeve, a roughened-headed stop S' secured to the end of said spring and adapted to project into a recess partly in said breech-block and partly in said sleeve, and firing mechanism



carried by said sleeve and removable there-  
with from the gun, substantially as described.

12. In a slotted-screw breech-loading gun,  
the combination with the breech-block and  
5 hinged carrier-plate projecting in rear of and  
covering the rear end of the breech-block, and  
being provided with a narrow recess in its  
front face, of a firing-lever pivoted on said  
breech-block, and having a rearwardly-pro-  
10 jecting arm registering with said narrow re-  
cess in the carrier only when the breech-block  
is rotated to the locked position, substantially  
as described.

13. In a slotted-screw breech-loading gun,  
15 the combination with the breech-block and  
hinged carrier-plate projecting in rear of and  
covering the rear end of the breech-block, and  
being provided with two narrow recesses in  
its front face, of a firing-lever carried by said  
20 breech-block, and provided with a rearwardly-

projecting arm, said lever and said arm reg-  
istering with said narrow recess only when  
the breech-block is rotated to the locked posi-  
tion, substantially as and for the purposes de-  
scribed.

14. A firing mechanism for breech-loading  
ordnance, comprising a firing-pin mounted in  
the breech-block, a spring secured at one end  
to the breech-block and at the other to the  
firing-pin and normally withdrawing the point 25  
of the firing-pin clear of the face of the breech-  
block, and means for cocking and for releas-  
ing said firing-pin, substantially as described. 30

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

LOUIS L. DRIGGS.

Witnesses:

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