

(No Model.)

4 Sheets—Sheet 1.

H. S. MAXIM.  
AUTOMATIC GUN.

No. 447,836.

Patented Mar. 10, 1891.

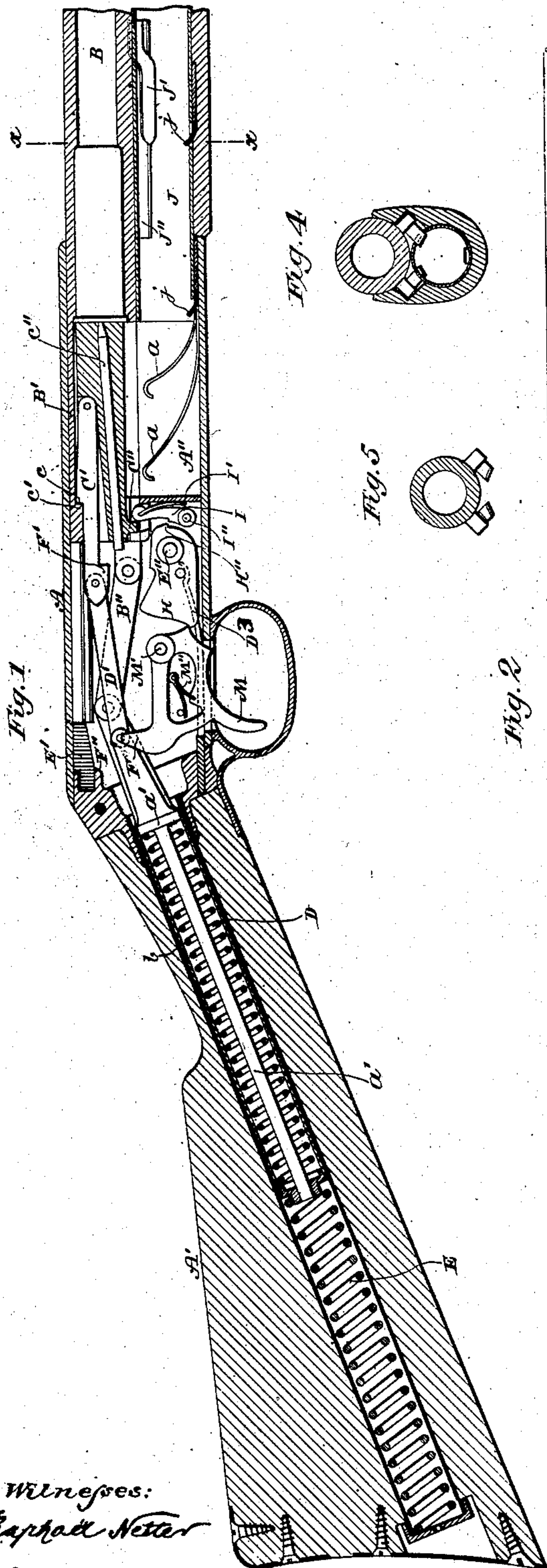


Fig. 1

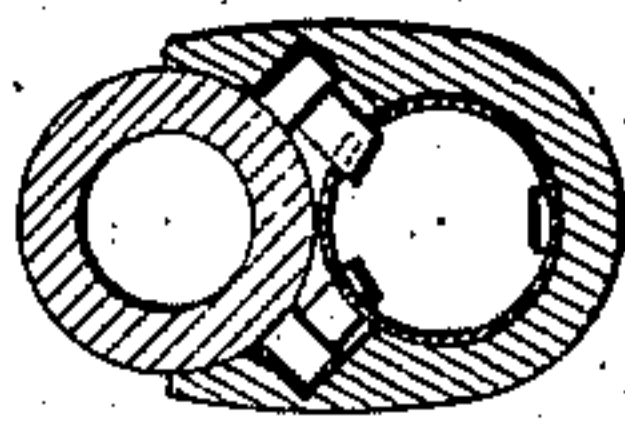


Fig. 4



Fig. 5

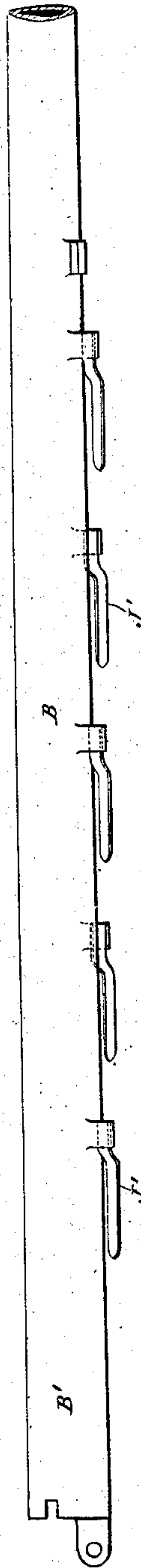


Fig. 2



Fig. 3

Witnesses:  
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Inventor  
Hiram S. Maxim  
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(No Model.)

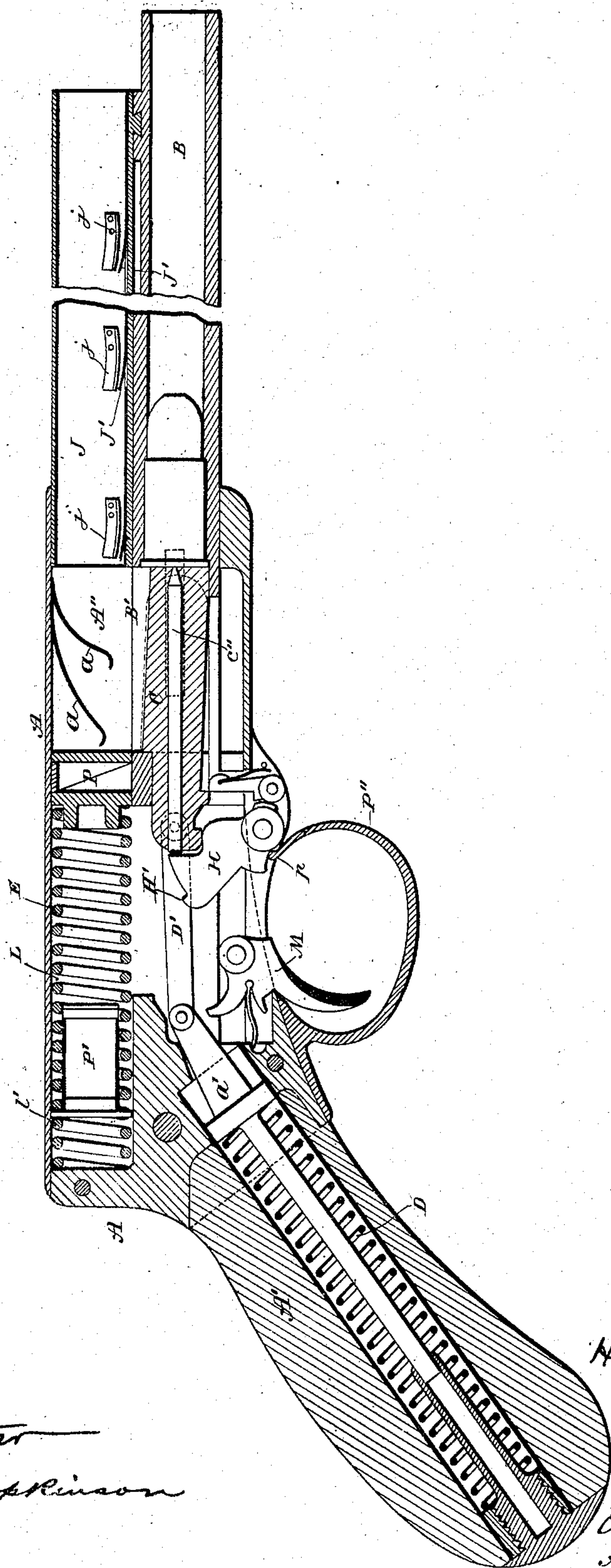
4 Sheets—Sheet 2.

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Fig. 6.



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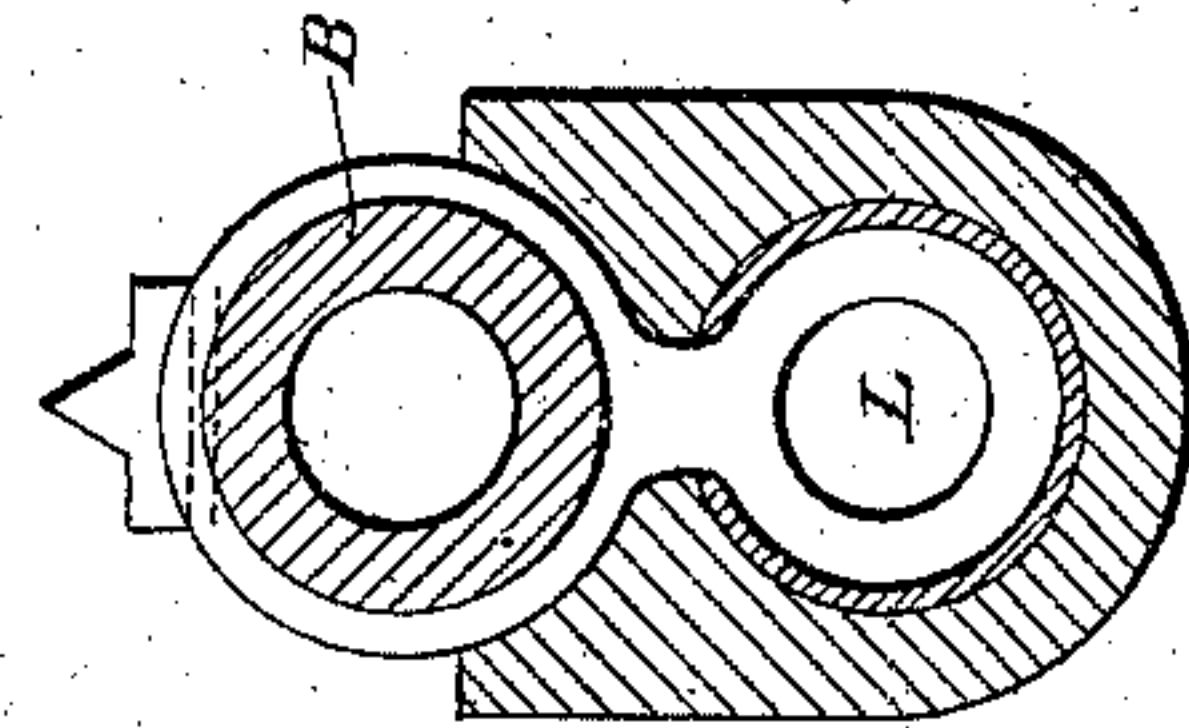
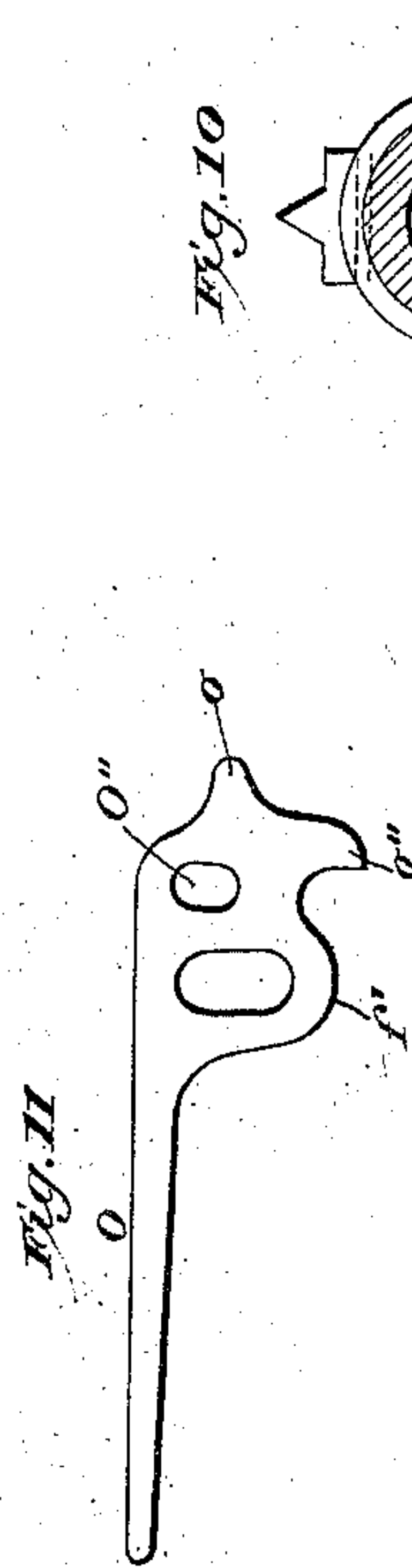
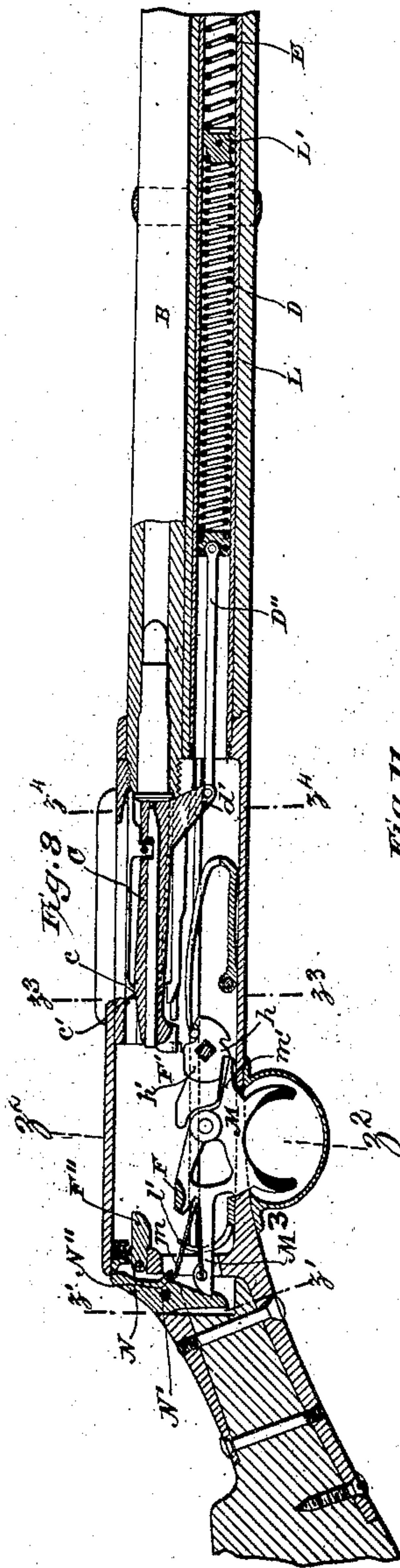
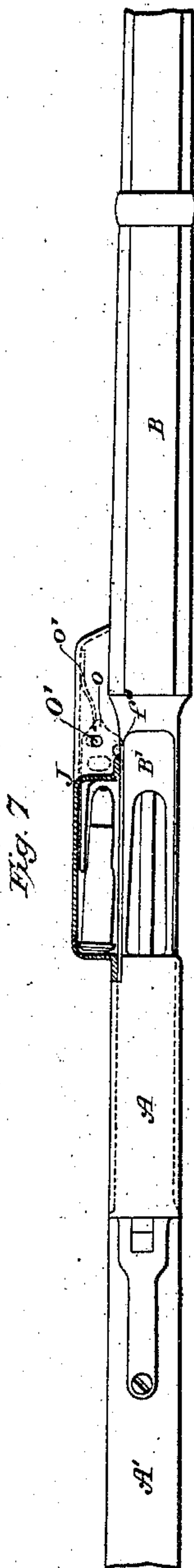
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4 Sheets—Sheet 3.

H. S. MAXIM.  
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No. 447,836.

Patented Mar. 10, 1891.



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4 Sheets—Sheet 4.

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Fig. 15

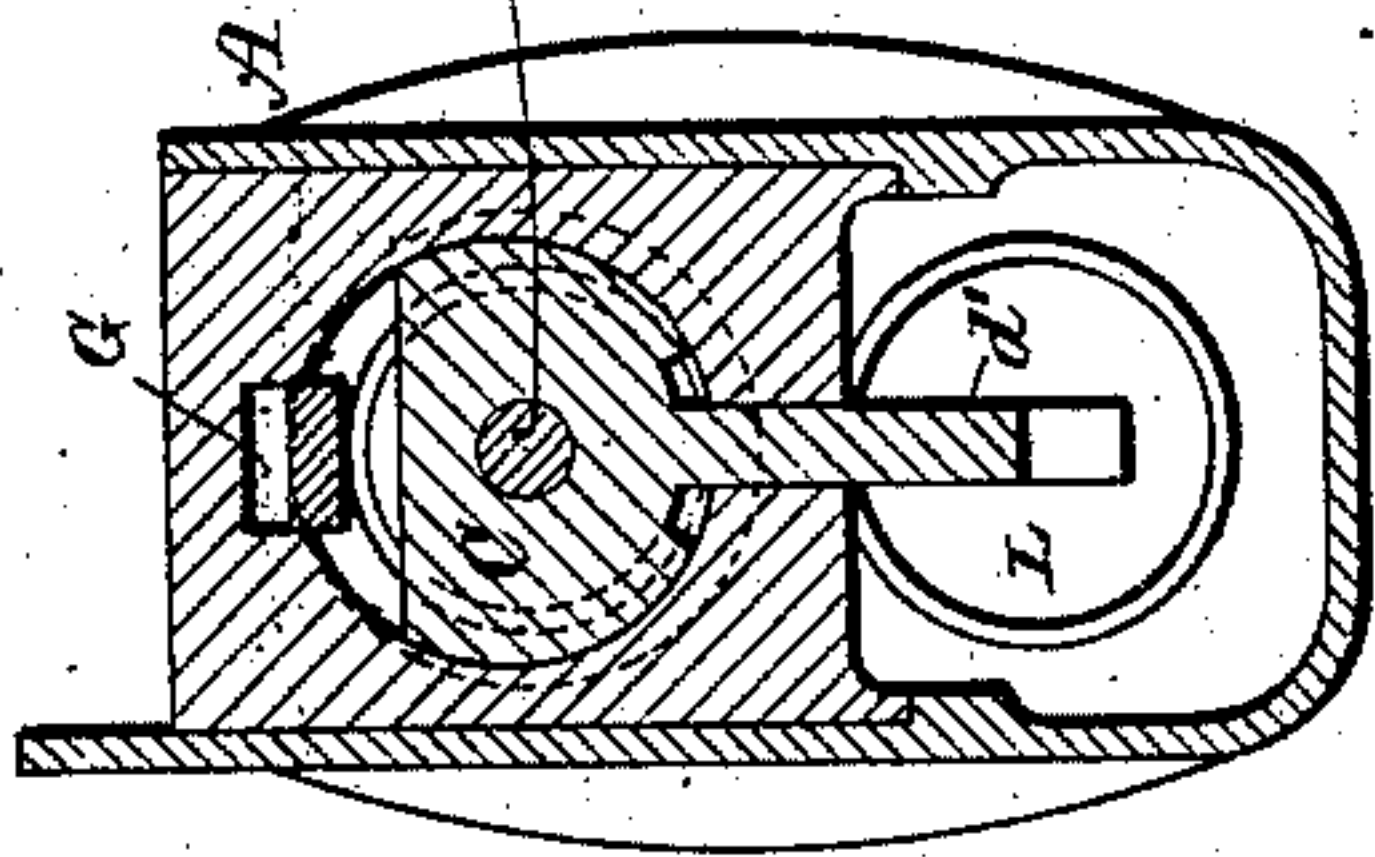


Fig. 14

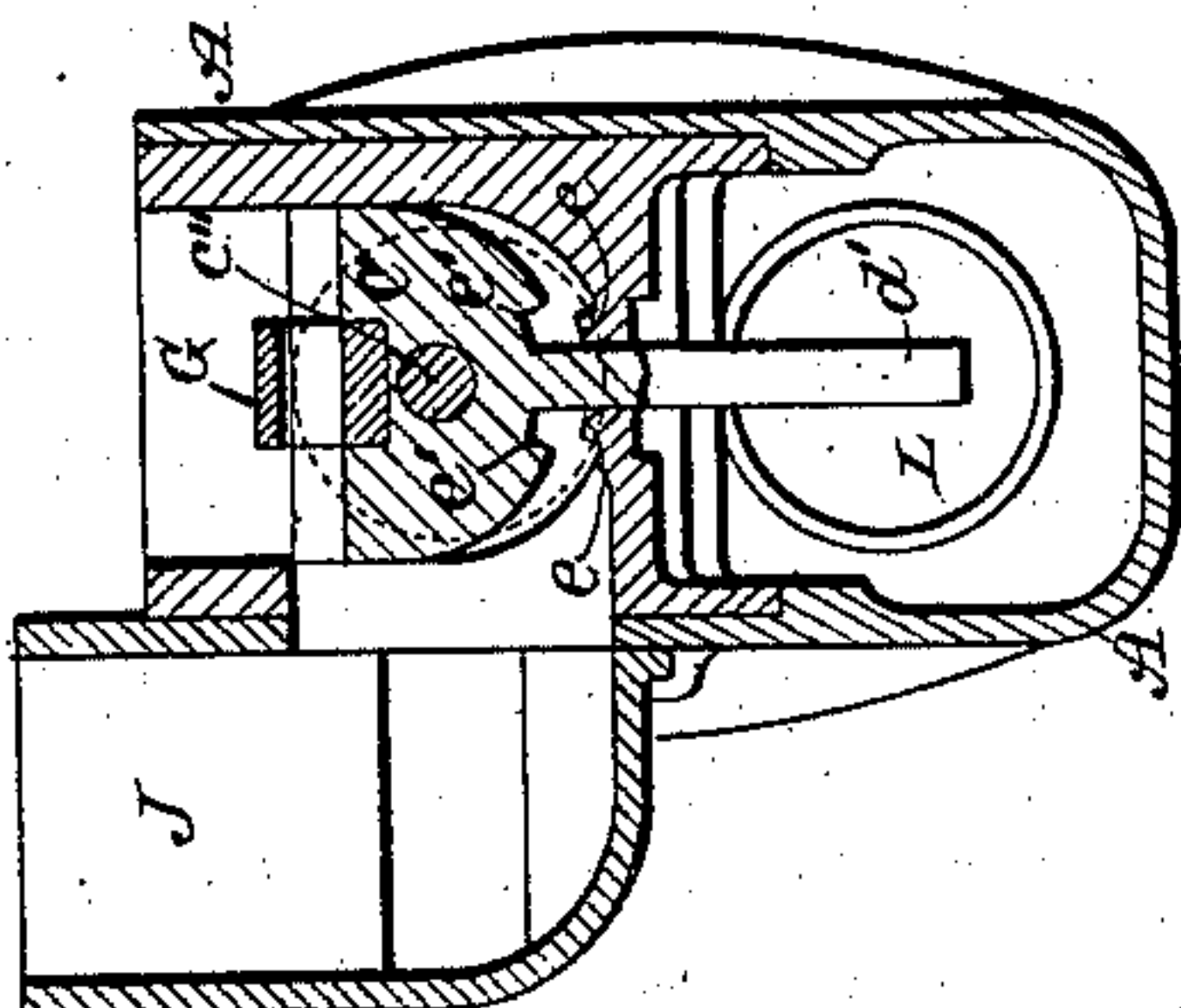


Fig. 13

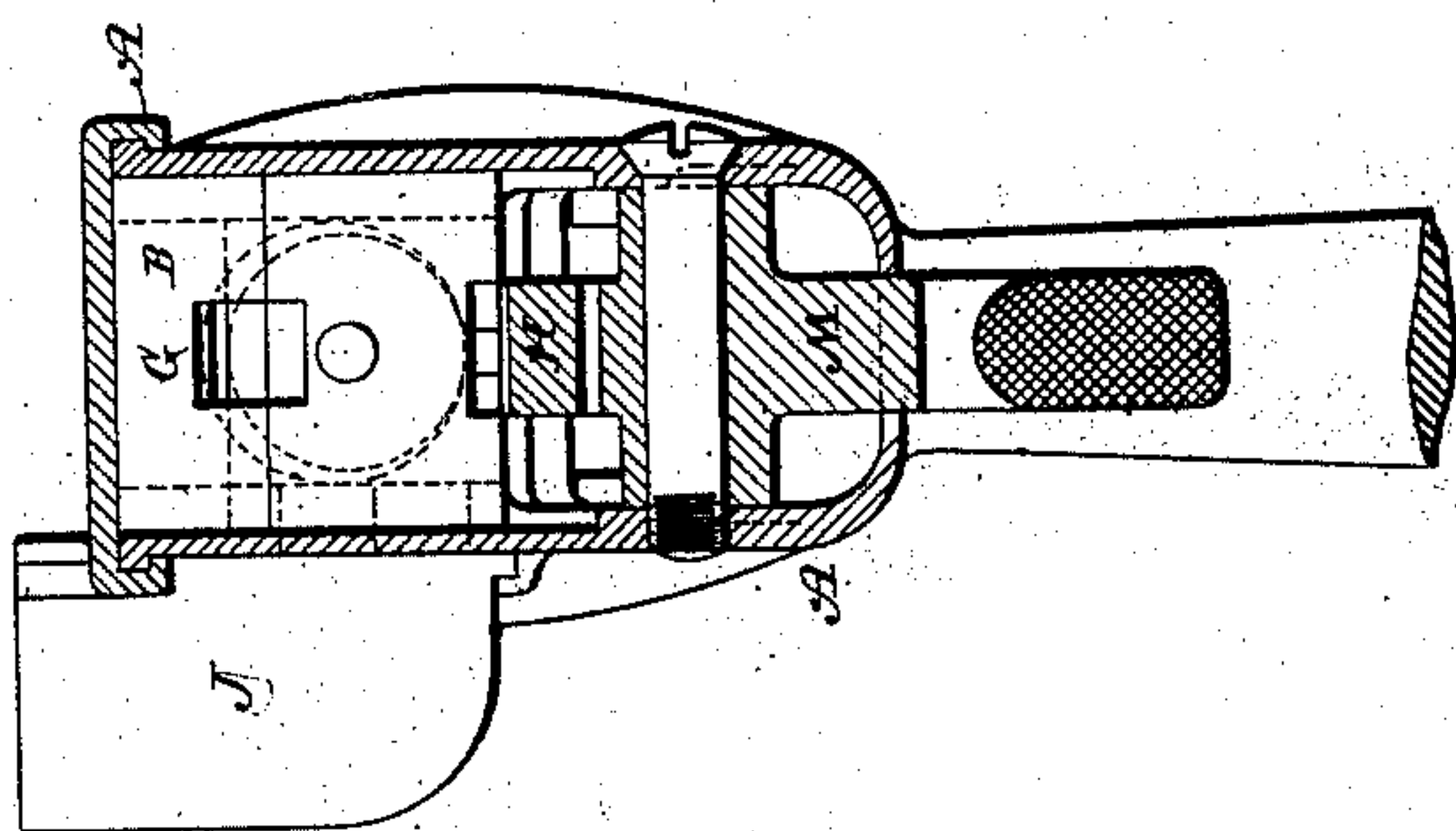


Fig. 12

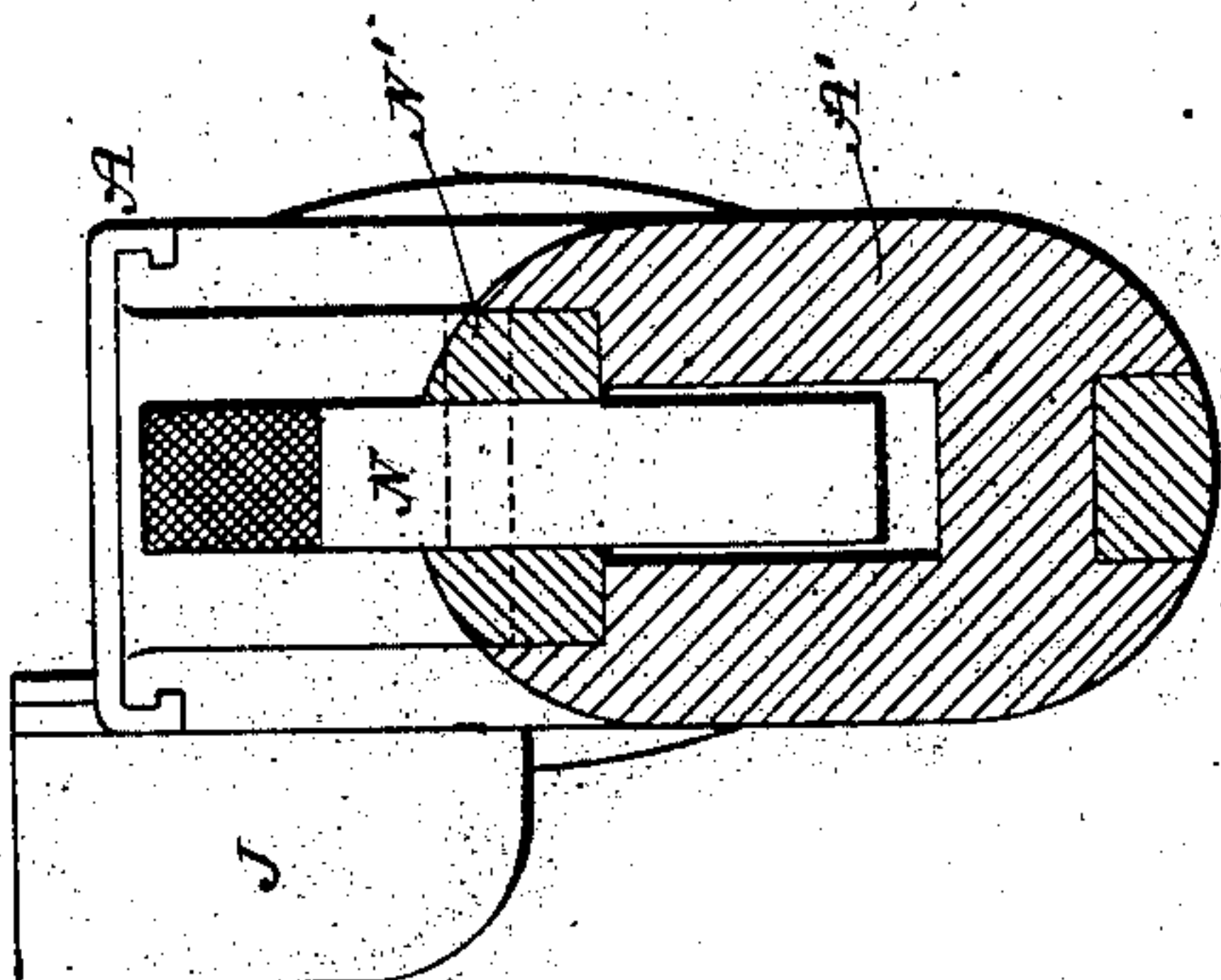


Fig. 17

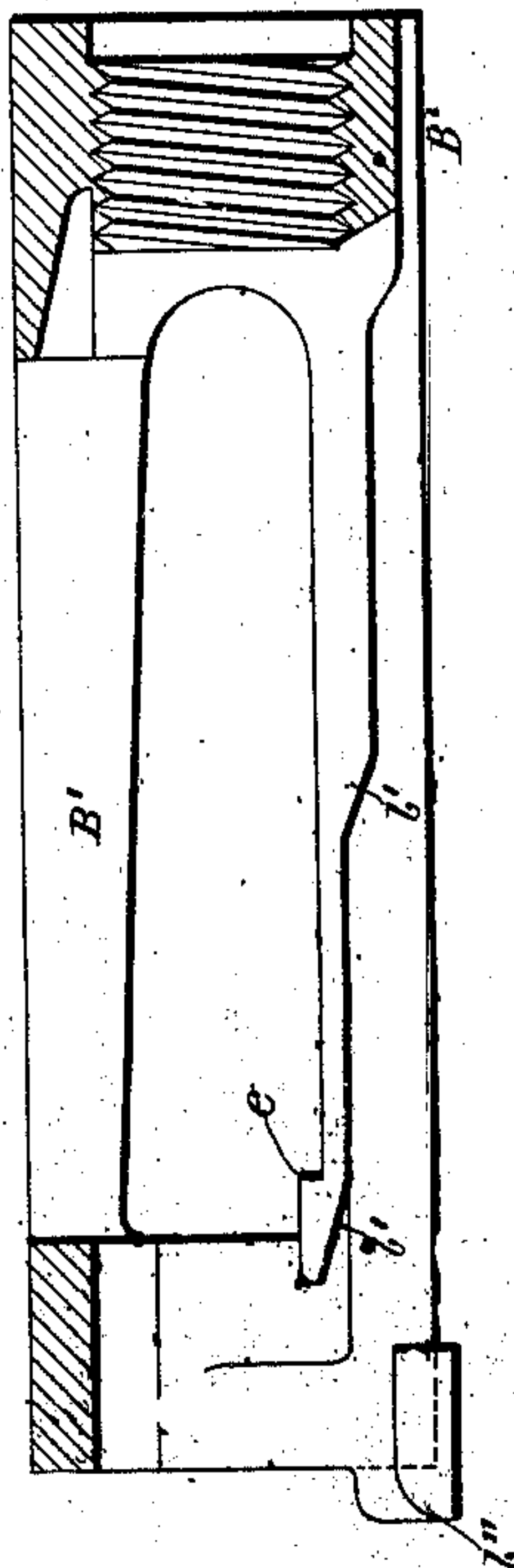
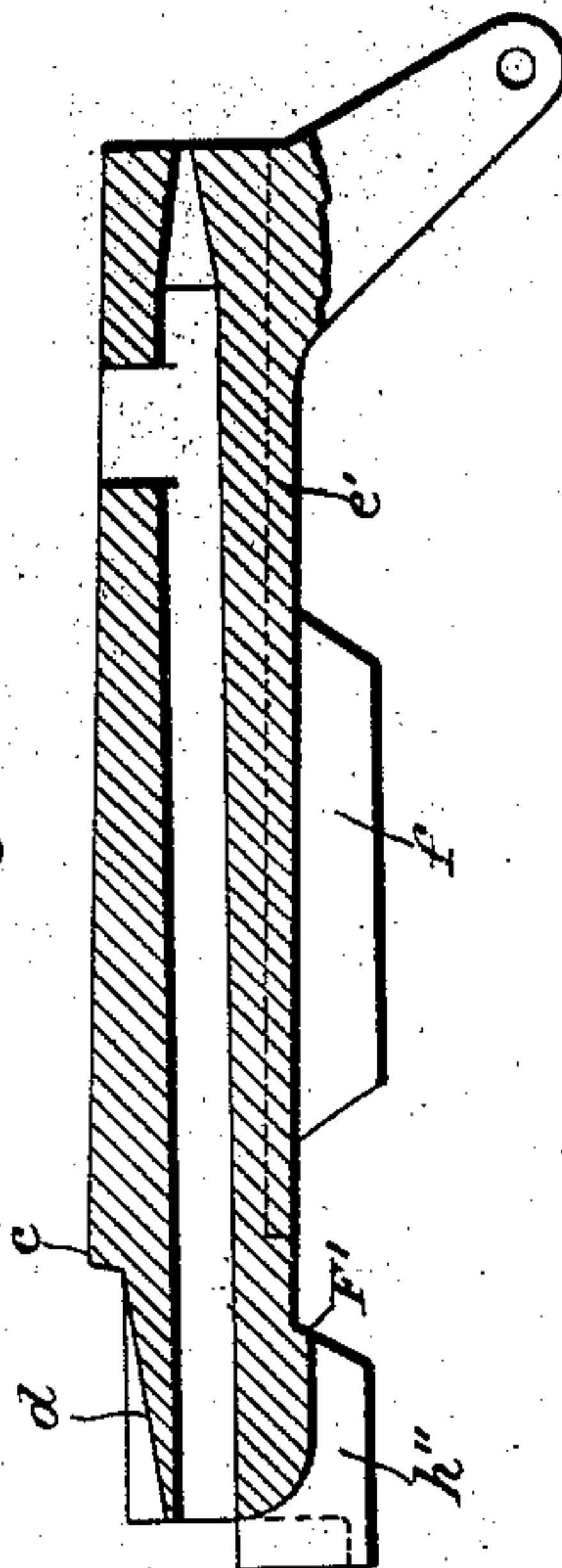


Fig. 16



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# UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF LONDON, ENGLAND.

## AUTOMATIC GUN.

SPECIFICATION forming part of Letters Patent No. 447,836, dated March 10, 1891.

Original application filed December 28, 1886, Serial No. 222,849. Divided and this application filed October 18, 1889. Serial No. 327,458. (No model.) Patented in France June 19, 1885, No. 169,647, and February 12, 1887, No. 181,516; in England June 1, 1886, No. 7,354; in Germany January 20, 1887, No. 41,870; in Belgium September 26, 1887, No. 79,005; in Italy November 26, 1887, No. 22,500, and in Austria-Hungary April 21, 1888, No. 34,166.

*To all whom it may concern:*

Be it known that I, HIRAM STEVENS MAXIM, mechanical engineer, a citizen of the United States, and a resident of London, England, have invented certain new and useful Improvements in Automatic Guns, (for which I have obtained patents in the following countries: in Great Britain, No. 7,354, dated June 1, 1886; in France, No. 169,647, dated June 19, 1885, certificate of addition to No. 169,647, dated October 15, 1886, and No. 181,516, dated February 12, 1887; in Belgium, No. 79,005, dated September 26, 1887; in Germany, No. 41,870, dated January 20, 1887; in Italy, No. 22,500, dated November 26, 1887, and in Austria-Hungary, No. 34,166, dated April 21, 1888,) of which the following is a specification, reference being had to the accompanying drawings.

The following specification is a full, clear, and exact description of my said improvements, reference being had to the drawings accompanying the same.

This application is a division of an application filed by me December 28, 1886, Serial No. 222,849.

In my said application above referred to I have shown and described a form of automatic gun characterized by the following general features of construction and mode of operation: The barrel and breech-block are both capable of a certain range of longitudinal movement which takes place after a discharge as the effect of the recoil. Normally and during the first part of the backward movement of these two members they are securely locked together, the breech-block in position to close the breech. Having reached a certain point in their recoil, the interposition of any suitable device unlocks or releases them from engagement, whereupon the barrel returns to its normal or forward position, while the breech-block is locked or restrained against forward movement, or by its momentum continues for a short distance its recoil and is then locked. Some device capable of storing the energy of the recoil of these parts is utilized to restore the barrel to its position, and another and similar device—such as a spring—is similarly employed in

connection with the breech-block, which is released and permitted to move forward when the barrel has reached its forward position, or nearly so. These movements or changes of position of the parts I have utilized in effecting automatically the operations of loading and firing the gun—that is to say, the recoil of the barrel withdraws a cartridge from a suitable feed mechanism and leaves it in position to be subsequently dropped or forced into line with the breech-block and breech. The operation of the breech-block and barrel extracts the empty shell from the latter and permits the loaded shell to move into line with the barrel. The forward movement of the breech-block drives the shell home and tips the hammer previously cocked by some of the moving parts.

My present form of fire-arm contains devices of the same general character. The invention relates, however, more particularly to small-arms, sporting-guns, pistols, and the like; and it consists in certain features of construction, which I have invented in the adaptation of the general principle to such arms.

In the accompanying drawings I have illustrated these improvements as applied to short guns and pistols.

Figure 1 is a vertical longitudinal central section of a sporting-gun embodying the invention. Fig. 2 is a side elevation of the barrel of the said gun. Fig. 3 is an under side view of the said barrel. Fig. 4 is a transverse section on the line  $x x$ , Fig. 1. Fig. 5 is a similar section through the barrel only. Fig. 6 is a vertical longitudinal central section of a pistol constructed according to my invention. Fig. 7 is a plan, partly in horizontal section, and Fig. 8 a vertical longitudinal central section, of a military rifle with my invention applied thereto. Fig. 9 is a side elevation, partly in vertical longitudinal central section, showing the forward part of the said rifle. Fig. 10 is a transverse section on the line  $z z$ , Fig. 9. Figs. 10 to 17, inclusive, are drawn to an enlarged scale. Fig. 11 is a plan showing a lever, hereinafter described, for transferring the cartridges from the magazine into the gun. Figs. 12, 13, 14, and 15



are transverse sections on the lines  $z'z'$ ,  $z^2z^2$ ,  $z^3z^3$ , and  $z^4z^4$  of Fig. 8, respectively. Fig. 16 is a vertical longitudinal central section of the breech-block detached. Fig. 17 is a vertical longitudinal central section of the inner frame, hereinafter described, detached.

A is a metal casing, hereinafter designated the "outer frame," that incloses the operative parts of the breech mechanism and is secured to the stock A'.

B is the barrel, and B' an extension thereof, which is hereinafter designated the "inner frame," both being arranged to slide back and forth in frame A.

C is the breech-block fitted to slide in the inner frame B'.

A tubular magazine J is arranged beneath the barrel, and a series of spring-pawls J' are attached to the barrel, so that in each recoil of the latter the said pawls will move the cartridges in the magazine toward the breech of the gun through a distance equal or about equal to the length of a cartridge. The said cartridges are thus pushed successively in a chamber A'' below the breech, whence they are raised by the springs  $\alpha$  as required into position in front of the breech-block. To effectually insure the proper working of this device, I prefer to arrange the pawls J' alternately on either side of the axis of the barrel, as shown more clearly in Fig. 3. These pawls project through apertures J'' in the magazine J. Retaining-pawls j are provided for preventing forward movement of the cartridges in the magazine.

In the gun shown in Fig. 1 the inner frame B' is an extension of the barrel B. It is connected by links B'' with a hollow or tubular plunger b, fitted to slide to and fro in a tubular chamber in the stock A', in which chamber is placed the spring E, for effecting the forward or return movement of the barrel and inner frame. The spring D, for effecting the forward or return movement of the breech-block, is placed in the said hollow plunger b and bears at its lower end against the said plunger and at its upper end against a shoulder or flange upon a rod  $a'$ , fitted to slide in the said plunger. The rod  $a'$  is connected with the breech-block by means of links D', coupled at one end to the pivoted bar or strut C' and at the other end to the rod  $a'$ . The spring E is in this case made considerably stronger than the spring D, so that after the recoil the spring D will be further compressed by the plunger b in the forward movement of the barrel and inner frame.

A sear I is pivoted at I'' to the outer frame A and is acted upon by a spring I', whereby it is caused to engage with the bent H'' of the hammer H, pivoted at E'' and acted upon by a spring D<sup>3</sup>. This sear extends upward, so that when the breech-block has nearly terminated its forward movement a projection C'' thereon will strike the said sear and disengage it from the hammer.

M is the trigger, which is pivoted at M' to

the outer frame A and is acted upon by a spring M'', whereby it is caused to engage with the shoulder or bent H' of the hammer and is held in engagement therewith until it is pulled to fire the gun. When the trigger is pulled to fire the gun, a projection or extension F of the trigger is moved up into position to engage with the hook F' of the bar C', when the latter is depressed by the arm F'', and thus holds back the breech-block. The spring M'' also serves to disengage the projection or extension F of the trigger from the hook F' when the trigger is released.

E' is a buffer, of leather, india-rubber, or other suitable material, for diminishing the shock produced by the recoil of the inner frame and parts carried thereby.

The gun in Fig. 1 is shown in condition to be fired by pulling the trigger M. The discharge causes the barrel to recoil and carry the breech-block C back with it, the latter being locked to the barrel by the engagement of the shoulder c on the strut C' with a shoulder c' on the inner frame B'. The hammer H, before striking the firing-pin c'', encounters the strut C' and insures its engagement with the frame B'. The recoil of the breech-block and barrel compresses springs D E and stores the energy therein that effects the return of these parts. The breech-block also encounters and cocks the hammer H by causing it to engage with the sear I. When the rear end of the strut C' encounters the part F'', the hook F' engages with the arm F, which is elevated by the pressure upon the trigger, and the strut is disengaged from the frame B'. The barrel therefore returns to its forward position, the empty shell is withdrawn, and a fresh cartridge forced up into line with the barrel. When the trigger is released, the spring M'' disengages the arm F from the strut C' and shifts the trigger, causing it to engage with the hammer H. The breech-block is returned to position by the spring D.

In the modification of my invention illustrated in Figs. 7 to 17 the breech-block, instead of being provided with a pivoted bar or strut, as hereinbefore described, is so arranged in the inner frame B' that it is free to move vertically therein upon or about its forward end as a pivot or fulcrum. It has a shoulder or projection c, which is adapted to engage with the shoulder c' on the inner frame B' to lock the said block therein when the breech is closed. The rear end of the breech-block has an inclined upper surface d and a hook or projection F' on its underside. An arm F'' is pivoted at its rear end to the frame A and is pressed down by a spring, so that when the barrel and other parts have nearly terminated their recoil the inclined surface d of the breech-block will strike the under side of the said arm F'', and the breech-block will thereby be moved downward and disengaged from the shoulder c' on the frame B'. The breech-block is then held back, as hereinafter described, while the



barrel and inner frame move forward. The spring D is arranged within the chamber L and is attached at its forward end to a stop L', fixed within the said chamber, and at its rear end to a rod D''. This rod is coupled to an extension d' of the breech-block C, so that in the recoil of the barrel and other parts the said spring will be extended and will be kept extended so long as the breech-block is held back. As soon as the breech-block is released the said spring will react to effect the forward or return movement thereof. The spring E is also arranged within the said chamber L and presses at its rear end against the stop L' and at its forward end against a plunger L'', fitted to slide in the said chamber. This plunger is firmly secured to the barrel B by means of the ring or annular piece l. In the recoil of the barrel and other parts the spring E is compressed. The said spring then reacts to effect or assist in effecting the return movement of the said frame and parts carried thereby. To diminish the shock produced by the recoil of the said inner frame and parts carried thereby, I provide a supplementary spring l', which is firmly attached to the frame A and extends upward, so that in the latter part of such recoil the inner frame will strike the said spring and compress the same. The said spring by its reaction assists in effecting the forward or return movement of the barrel and inner frame, while the breech-block is held back, and thus effectually insures the starting of the empty cartridge-shells from the barrel, as above specified.

The empty shells are ejected by projections e on the inner frame B', which projections slide in grooves e' in the breech-block, and which in the latter part of the forward movement of the said frame strike the base of the cartridge-shell and throw the said shell upward out of the gun through apertures provided for the purpose in the frames A and B'. The hammer is cocked in the recoil of the inner frame B' by means of the inclined surfaces b' on the said frame. The said frame is, moreover, provided with projections b'', which in the latter part of the backward movement of the said frame are brought under the projections F on the trigger, thus holding the said projections in engagement with the hook F' of the breech-block until the barrel has been moved forward through a sufficient distance to start the same from the empty cartridge-shell. By this means I provide for preventing the return of the barrel and breech-block together, which would otherwise occur if the trigger were released while an empty cartridge-shell was firmly held in the barrel. The breech-block is, moreover, provided with surfaces f, which hold down the hammer until the said block is moved forward to close the breech.

N is a hooked lever, which is pivoted at N' to the frame A and is adapted to engage with an extension M<sup>3</sup> of the trigger after the latter has been pulled to fire the gun, and thus

hold the said trigger, so that its projections F are in position to engage with the hook F' of the breech-block. A spring m is attached to the trigger M and bears against a shoulder N'' on the hooked lever N, so that the said spring tends to hold the said hooked lever in engagement with the trigger, and when the said hooked lever is disengaged from the trigger causes the extension m' of the latter (which forms the sear) to engage with the bent h of the hammer and disengages the projections F from the hook F'. The trigger is made with two finger-pieces, so that should the spring m fail to cause the release of the breech-block this operation can be positively effected by force applied to the forward finger-piece. The upper end of the hooked lever N extends through an opening in the top of the gun, so that pressure can be applied to the said lever by the thumb to disengage it from the arm M'' of the trigger. The hammer is released to fire the gun by pulling the rear finger-piece of the trigger, and thus disengaging the sear m' from the bent of the hammer. From the foregoing description it will be seen that in this modification of my invention the sear engages with the bent of the hammer when the trigger is released from the hooked lever N to permit the forward movement of the breech-block, and that when the trigger is pulled to fire the gun the projections F are raised into position to engage with the hook F' of the breech-block.

A cam h' is formed on each side of the boss or hub of the hammer H, so that when the hammer is released by the pulling of the trigger the said cams will act upon the surfaces h'' of the breech-block and will thus force the rear end thereof upward and lock it in the inner frame before the hammer strikes the firing-pin.

The magazine J is secured to the side of the gun, in which an aperture is formed to permit the transfer of the cartridges from the said magazine into the loading position.

O is a lever, which is pivoted at the forward end of the magazine upon a pin or bolt O', secured in the said magazine and passed through an elongated slot O'' in the said lever. This slot extends at right angles to the axis of the barrel. The long arm of the said lever extends rearward within the magazine. The said lever is provided with a tail-piece o, against which presses a spring o', attached to the magazine. This spring tends to hold the said lever in such a position that its long arm is clear of the cartridges in the magazine, but is ready to act upon the lowermost cartridge therein to transfer it therefrom. The said lever has a projection o'', which is acted upon by a shoulder f'' on the inner frame B' in the forward or return movement of the latter. The said lever is thus turned on its pivot and transfers the lowermost cartridge from the magazine into position in front of the breech-block, so that it will be thrust into the barrel by the said block in its forward movement.



The lever then holds up the remaining cartridges in the magazine until turned in the reverse direction, as hereinafter described. The said lever is provided with a projection 5- $f'$ , which, as soon as the said lever has thus transferred a cartridge from the magazine, will strike against the inner frame  $B'$  so that the lever will thereby be pushed outward on its pivot  $O'$ , and its spring  $o'$  will cause it to resume the position shown in Fig. 7. I thus provide for insuring that the cartridges in the magazine shall have ample time to descend before the said lever is again operated to transfer a cartridge from the said magazine. 15

The operation of the gun shown in Figs. 7, 8, and 9 is as follows, viz: The parts are shown in the positions which they occupy when the trigger has just been pulled to fire the gun, the breech-block being shown in the position which it occupies when it has been moved upward by the cams  $h'$  and while the hammer strikes the firing-pin. When a cartridge is exploded in the barrel, the said 25 barrel, the inner frame  $B'$ , and parts carried thereby recoil and cock the hammer, which is held back by the surfaces or projections  $f$  on the breech-block until the said block is disengaged from the projection  $F$  and the sear  $m'$  has engaged with the bent of the hammer. In the latter part of the recoil the breech-block strikes the arm  $F''$ , and is thereby unlocked from the inner frame, and the projections  $F$  engage with the hook 35  $F'$  of the breech-block and hold back the said block while the barrel and inner frame are moved forward by the reaction of the springs  $E'$ . In this forward movement the barrel is drawn off the empty cartridge-shell. 40 The projections  $e$  on the inner frame then strike the base of the said shell and eject the same from the gun. The shoulder  $f''$  on the inner frame then strikes the projection  $o''$  of the lever  $O$ , and thereby transfers a cartridge from the magazine into position in front of the breech-block. The said lever is immediately caused to resume the position shown in Fig. 7 by the striking of its projection  $f'$  against the inner frame, thus permitting the column of cartridges in the magazine to descend, so that another cartridge is brought into position to be transferred from the magazine into the gun. The hooked lever  $N$  must then be pushed inward to disengage the projections  $F$  from the hook  $F'$  and to permit the sear to engage with the bent of the hammer. The breech-block is then moved forward by the reaction of its spring  $D$  and pushes the cartridge into the barrel, and the gun is again 60 ready for firing. As the trigger, after being pulled to fire the gun, must be released to permit the disengagement of the projections  $F$  from the hook  $F'$ , it is obvious that successive shots cannot be fired by only once pulling the 65 trigger.

In Fig. 6 I have shown my improvements applied to a pistol. A tubular magazine  $J$  is

provided, which is arranged above instead of beneath the barrel in order to avoid or diminish any deviation of the bullet in its flight 70 due to the kick or recoil of the pistol by distributing the weight more equally than heretofore—that is to say, by placing a considerable portion of the weight above the axis of the barrel. The magazine is firmly attached 75 to the frame  $A$  and is provided with spring retaining-pawls  $j$ . The barrel  $B$  is provided with pawls  $J'$  for feeding the cartridges successively into the chamber  $A''$ , as above described with reference to Figs. 1 to 3. The breech- 80 block is arranged to turn vertically upon or about its forward end, as above described with reference to Figs. 7 to 17. It is coupled by means of links  $D'$  with a rod or plunger  $a'$ , fitted to slide to and fro in the stock or 85 butt  $A'$  and acted upon by the spring  $D$  inserted therein. The frame  $B'$  is extended upward, as at  $P$ , and the spring  $E$  is fitted within a chamber  $L$  behind and in line with the chamber  $A''$ . In the rear part of the 90 chamber  $L$  a strong supplementary spring  $l'$  is arranged. This spring bears at its rear end against one end of the chamber  $L$  and at its forward end against a plunger  $P'$ , fitting into the spring  $E$  and extending forward 95 within the same, so that when the barrel and inner frame have recoiled a certain distance the extension  $P$  of the said frame will strike the plunger  $P'$  and the spring  $l'$  will be compressed in the further backward movement of 100 the barrel and inner frame, as and for the purposes above specified.

The breech-block  $C$ , the hammer  $H$ , and the trigger  $M$  are all arranged relatively to each other substantially as above described with 105 reference to Figs. 7 to 17.

A novel feature of the pistol shown in Fig. 6 is the construction and arrangement of the trigger-guard in such a manner that it will serve also as the mainspring—that is to say, 110 the guard  $P''$  is a spring secured at one end to the butt. The other end  $p$ , of reduced size, bears against the hammer  $H$ .

What I claim is—

1. The combination of the outer frame, the 115 stock or handle to which it is secured, a barrel and inner frame fixed or formed on the barrel and arranged to slide in the outer frame, a breech-block adapted to slide in the inner frame, and springs placed in the stock 120 for returning the breech-block and barrel after recoil, as herein set forth.

2. The combination of the outer frame, the stock or handle to which it is secured, a sliding barrel, breech-block, and breech mechanism 125 connected therewith, adapted to be operated by the recoil of the barrel to reload the same after a discharge, a hammer adapted to be cocked by the movement or operation of the breech mechanism, and a trigger engaging 130 therewith to prevent the automatic discharge of the gun, as set forth.

3. In a fire-arm provided with a sliding barrel arranged to recoil at each discharge, a



tubular magazine parallel to said barrel, and pawls or projections from the barrel entering the magazine and adapted to engage with and move the cartridges backward to the breech at each discharge, as set forth.

4. The combination of a sliding barrel arranged to recoil at each discharge, a frame formed on or attached to said barrel, a tilting breech-block adapted to engage with the frame, whereby it is locked to the barrel, and means for releasing it from the frame, as set forth.

5. The combination of the outer frame A, the sliding barrel B, the inner frame B', secured thereto and provided with an engaging-shoulder c', the movable breech-block C, having a shoulder c, adapted to engage with the shoulder c' when the breech-block is in its forward position, and the arm F'', secured to the outer frame in position to move the breech-block out of engagement with the frame B' on their recoil, as set forth.

6. In a fire-arm, the combination of a sliding barrel, a breech-block normally locked to the barrel, but capable when released of independent movement, a trigger which when pulled to fire the gun is brought into a position to engage with the breech-block at the termination of its recoil, and a catch adapted to engage with the trigger when brought to such position and hold the same until the engagement therewith of the breech-block.

7. In a fire-arm, the combination, with the outer frame and stock, of a barrel and attached frame capable of sliding in said outer frame and a breech-block arranged to slide

in the inner frame, springs connected to the barrel and breech-block and the outer frame, respectively, and supplemental springs between the rear end of the inner frame and the stock or stationary part of the gun, as set forth.

8. In a fire-arm, the combination, with a reciprocating breech-block and breech mechanism for operating the same, of a trigger adapted to engage with and lock the breech-block in its rearmost position, the said trigger being provided with forward and rear finger-pieces for moving it positively in either direction, as set forth.

9. The combination, with the outer frame A, the stock A', the sliding barrel B, the inner frame B', attached thereto, and the breech-block C, movable in frame B', of the spring E, arranged within the gun-stock, the hollow plunger b and links B'', connecting the spring with the inner frame, the spring D, arranged within said plunger, and rod a' and links D', connecting it with the breech-block, as set forth.

10. The combination, with the sliding barrel, of the tubular magazine J, the pawls J', extending from the barrel into the magazine, and retaining-pawls placed within the magazine, as set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HIRAM S. MAXIM.

Witnesses:

DAVID YOUNG,  
CHAS. B. BURDON.