

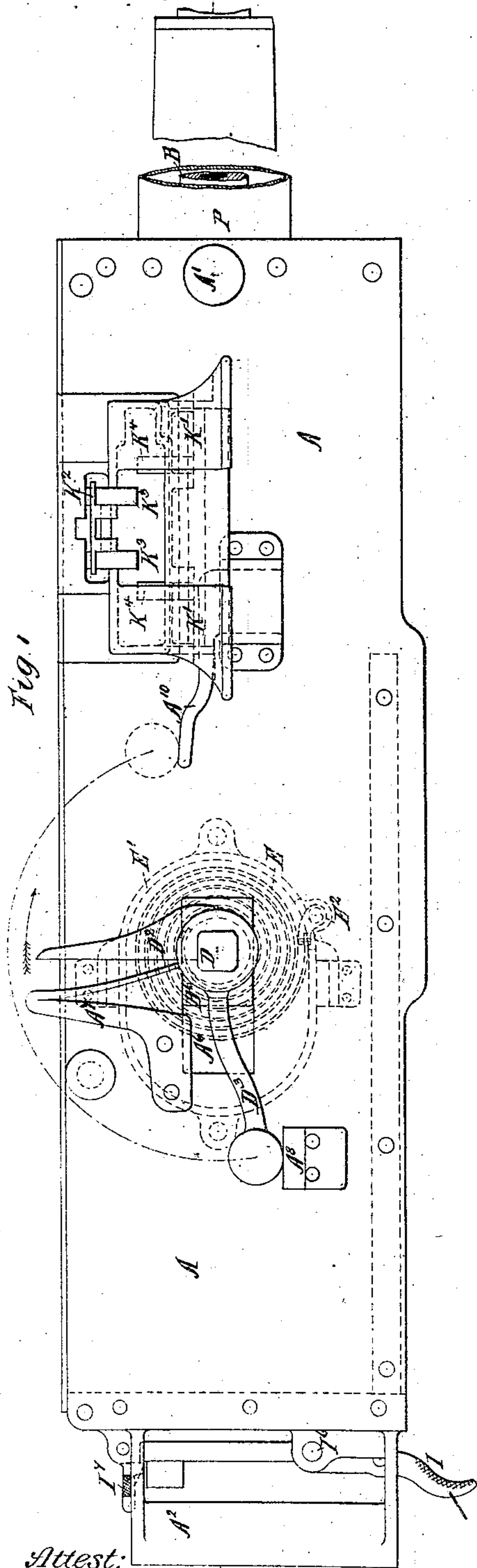
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6 Sheets—Sheet 1.

H. S. MAXIM.
MACHINE GUN.

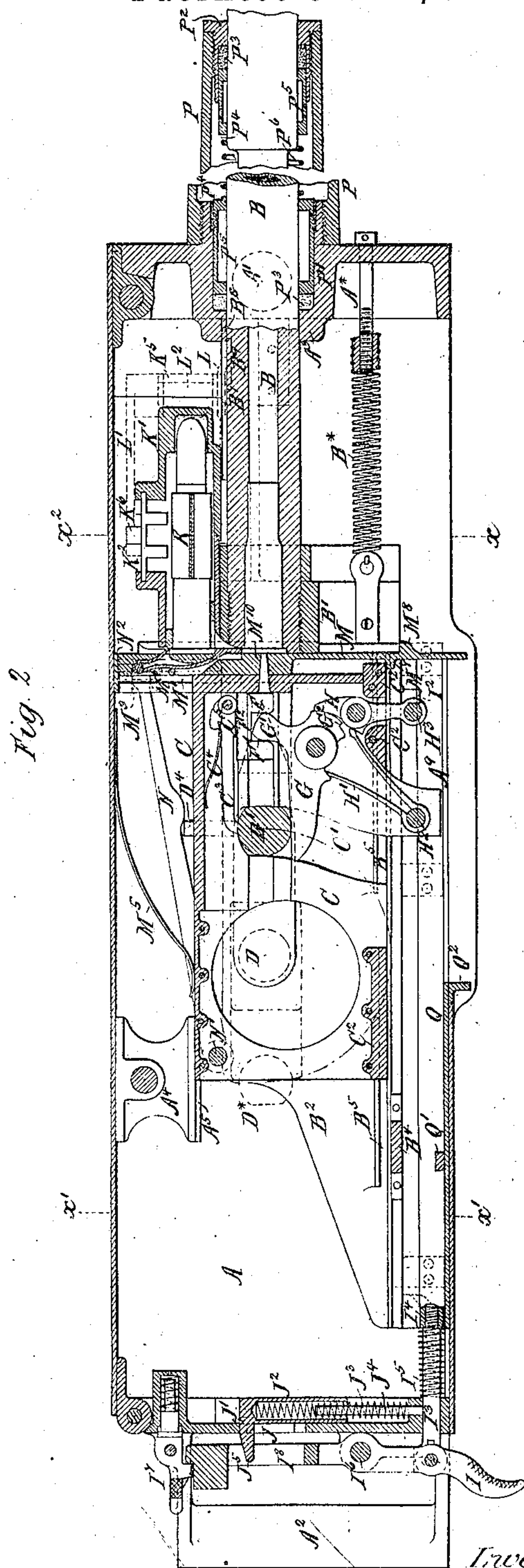
No. 395,791.

Patented Jan. 8, 1889.



Attest:

12. Hartley
J. Daniel Compton.



Inventor.

Hiram S. Maxim.

by Patrick. Page, his Att'y.

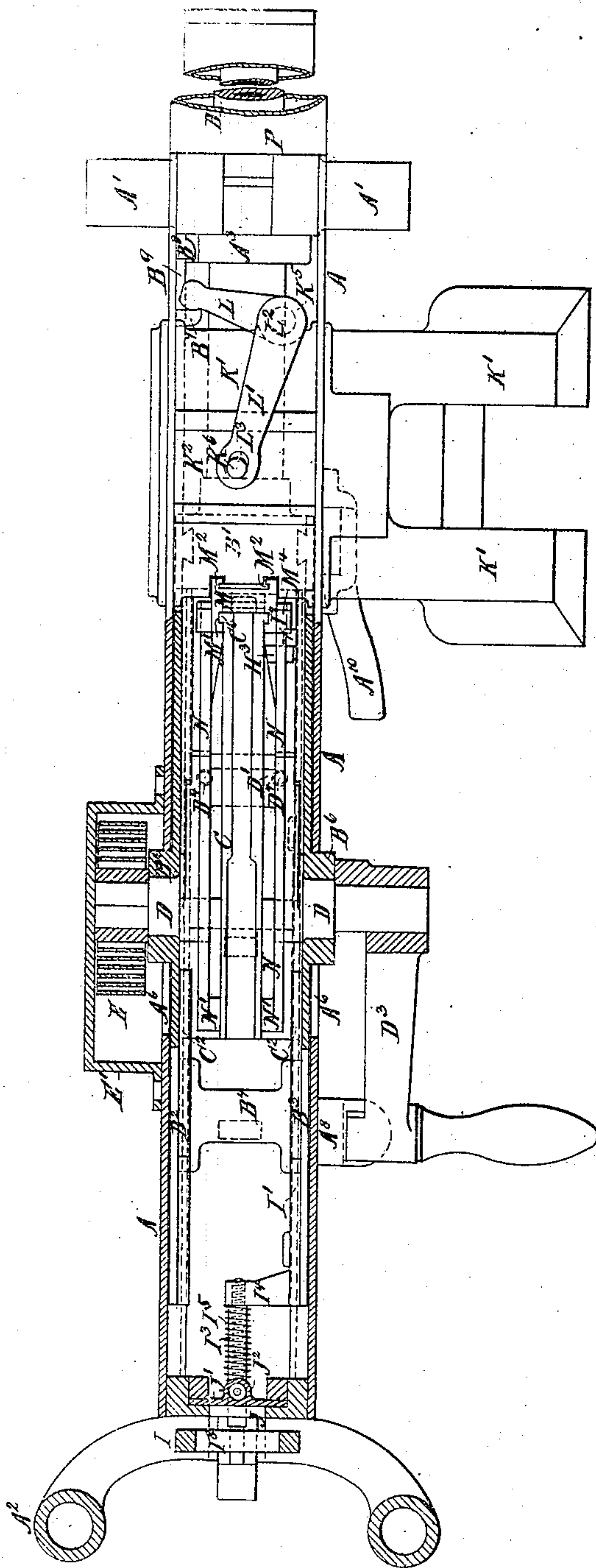
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H. S. MAXIM
MACHINE GUN.

No. 395,791.

Patented Jan. 8, 1889.



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6. Sheets—Sheet 3.

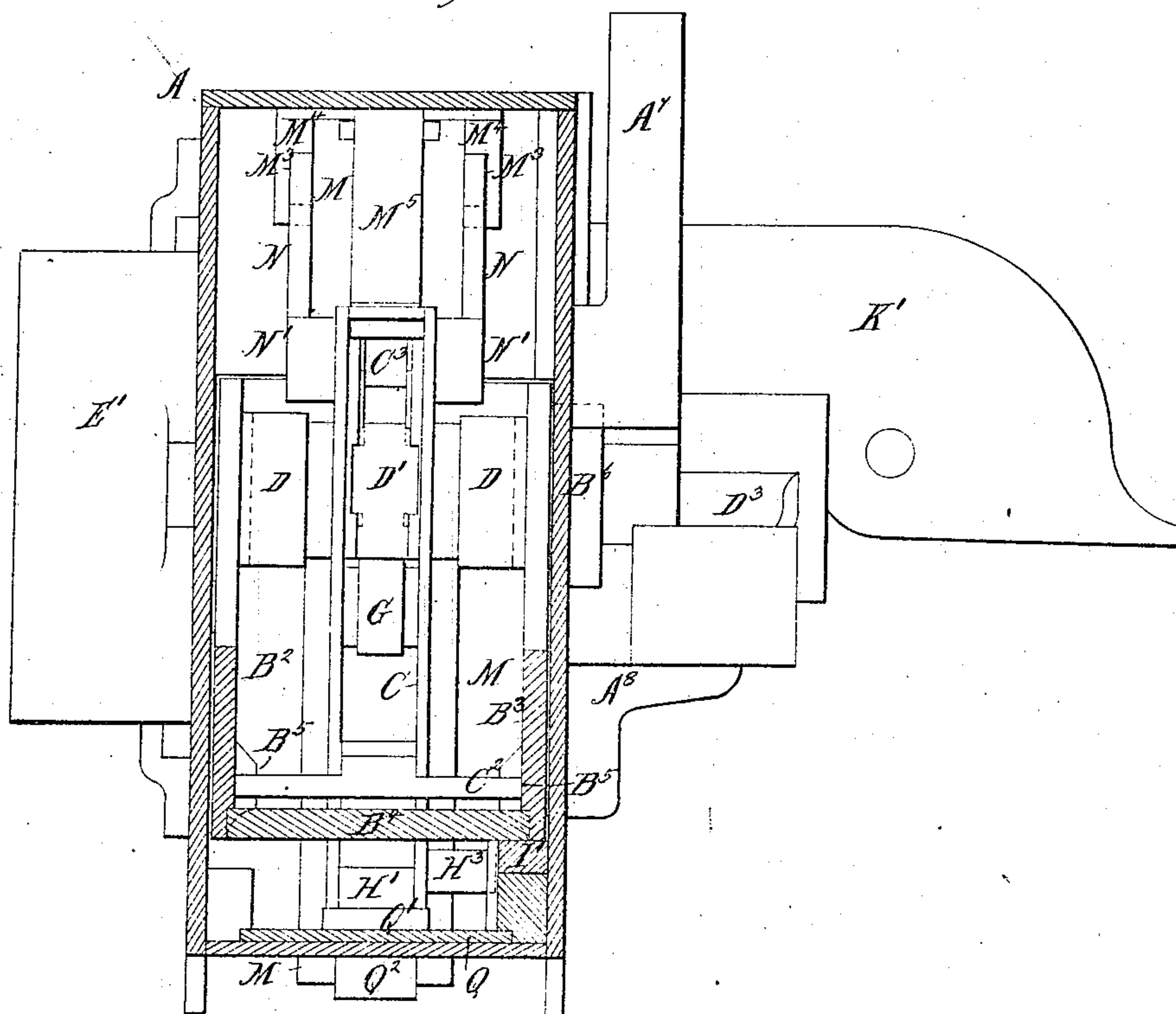
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Fig. 4.



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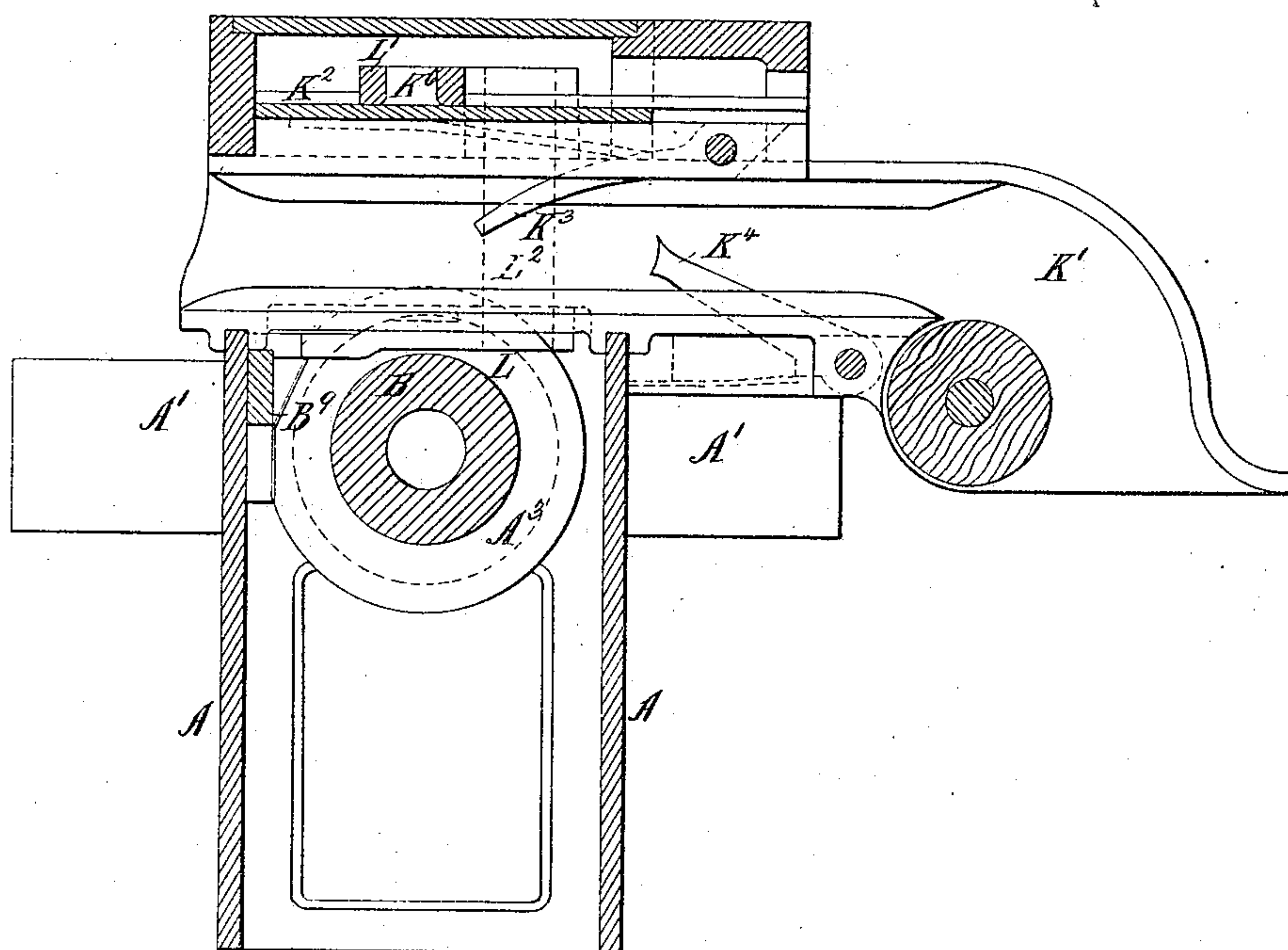
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Fig. 5.



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Fig. 6.

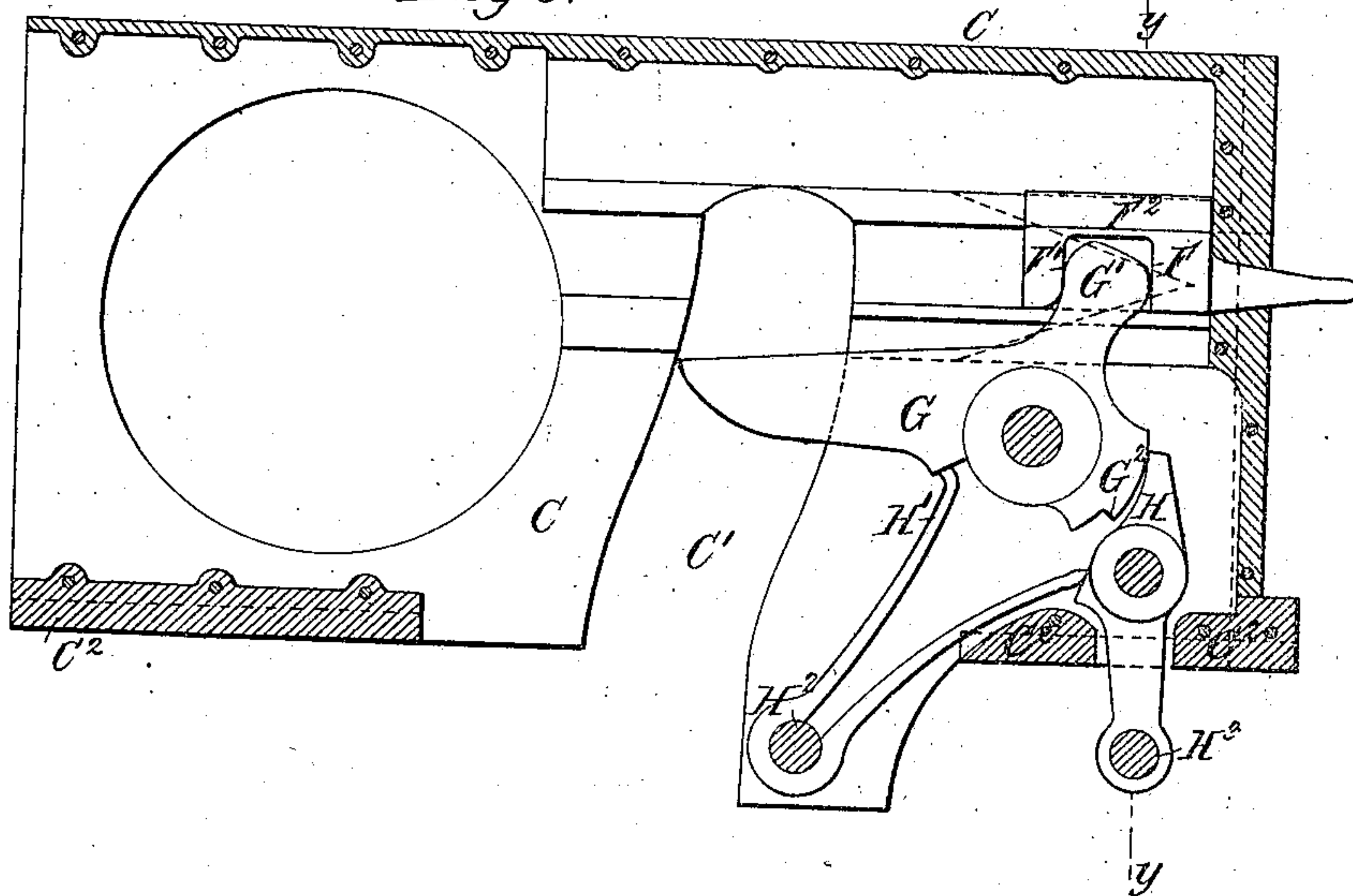


Fig. 7

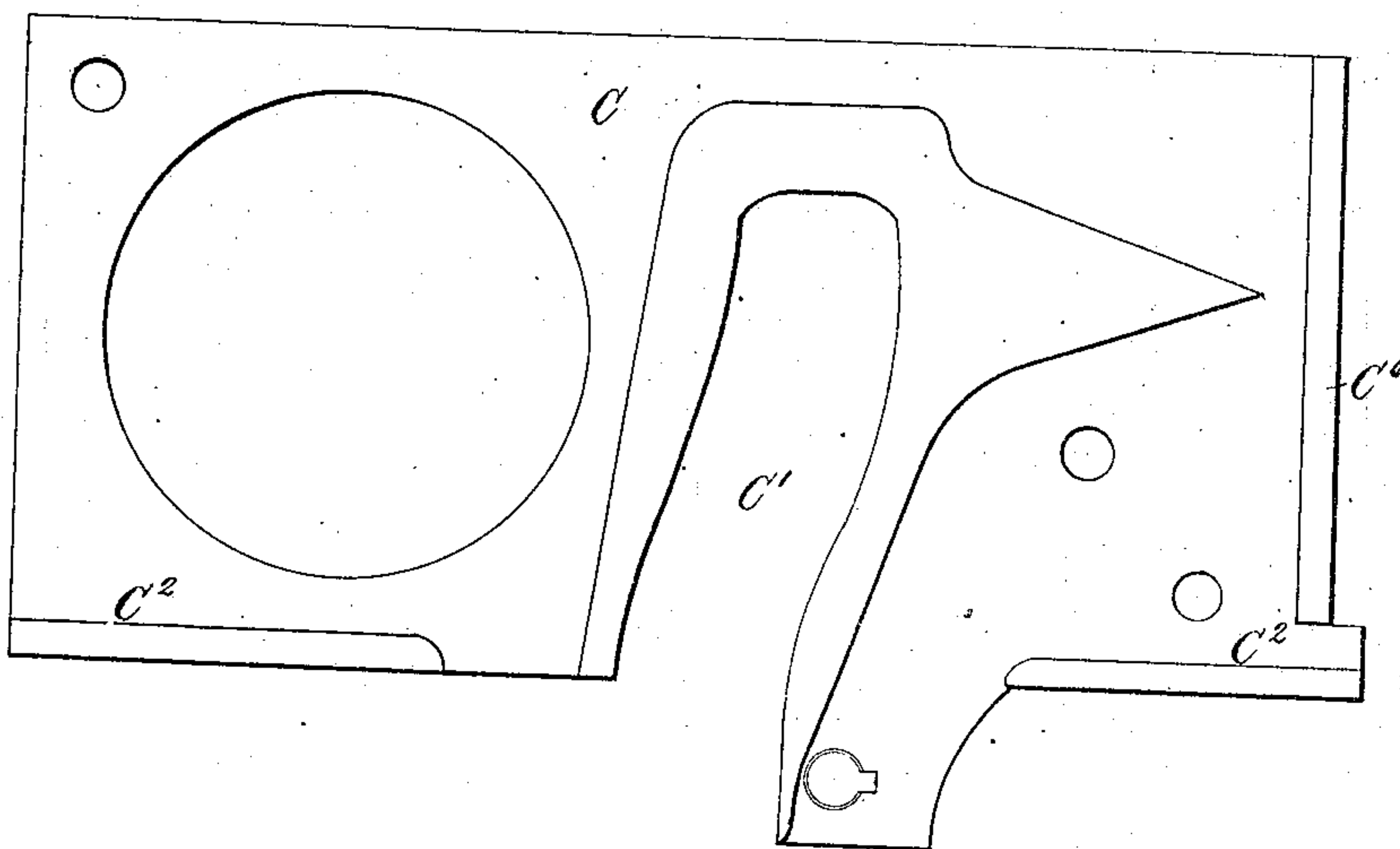
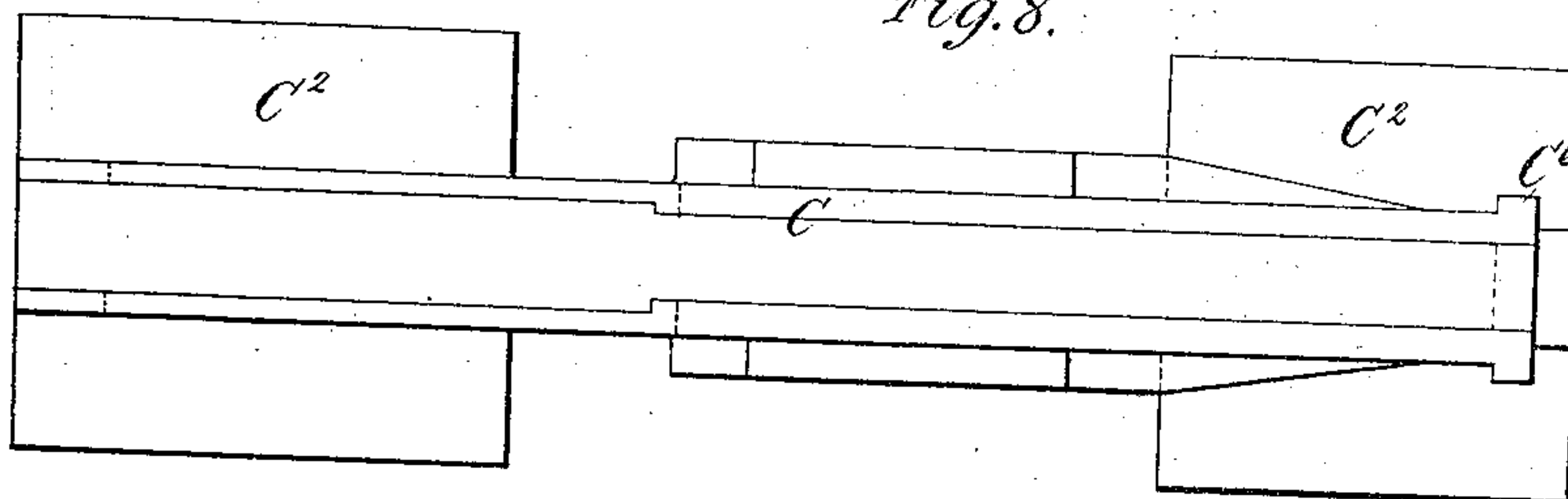


Fig. 8.



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Fig. 8^u

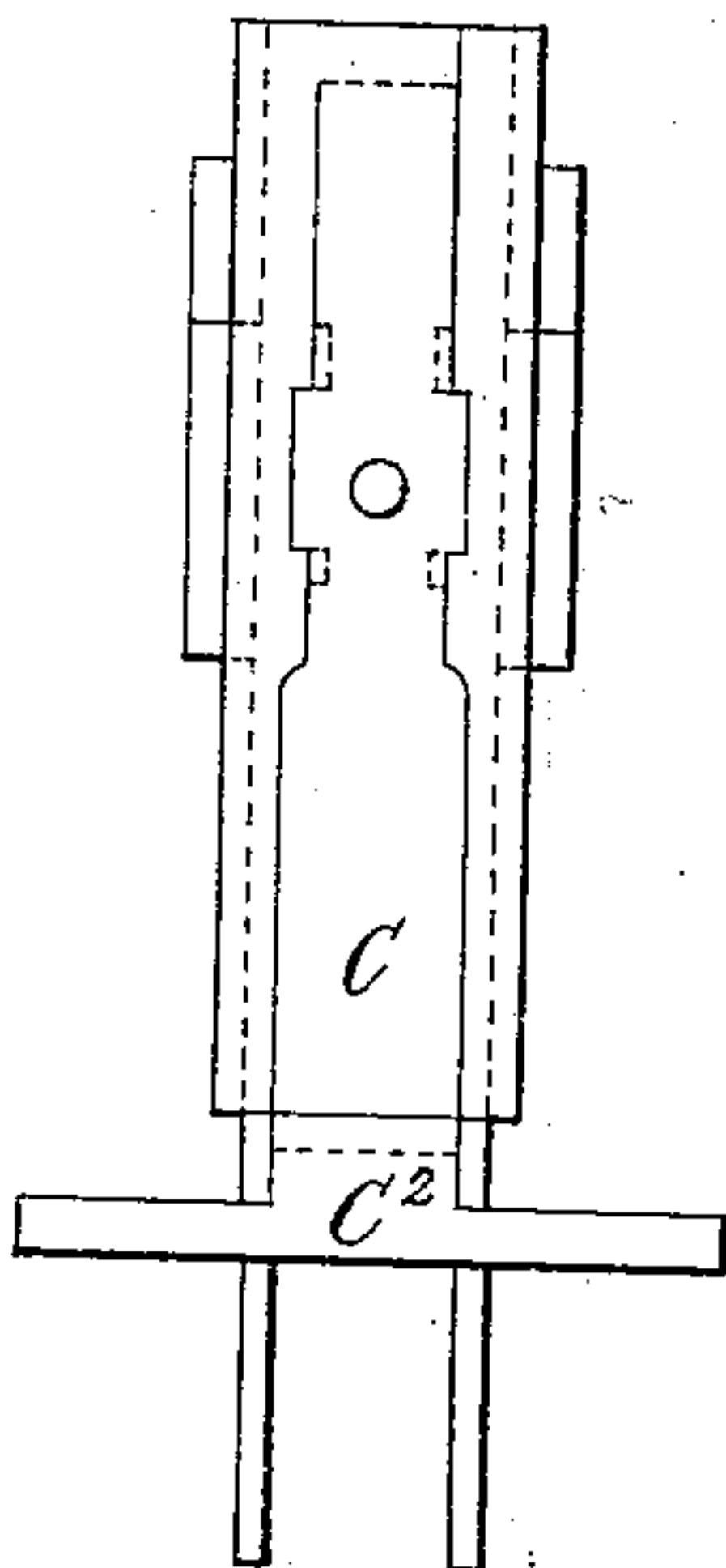


Fig. 9.

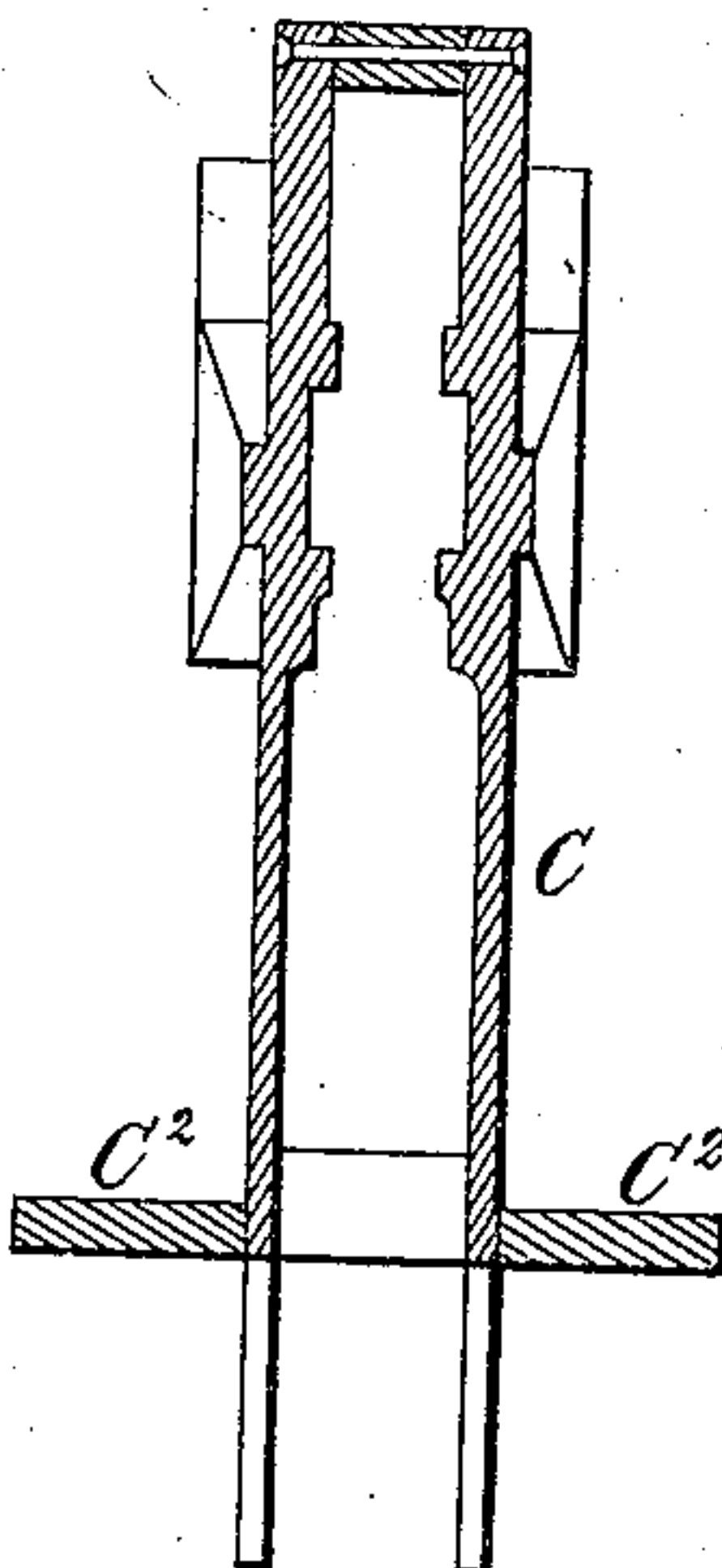


Fig. 10.

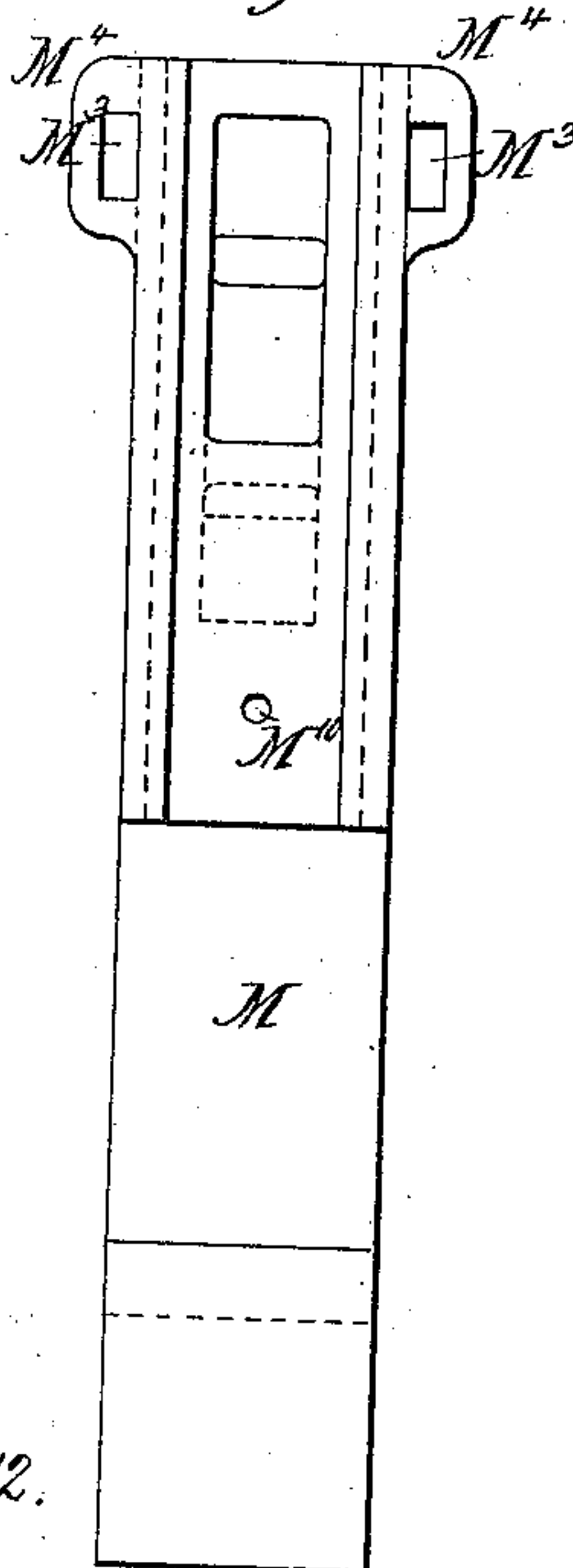


Fig. 11.

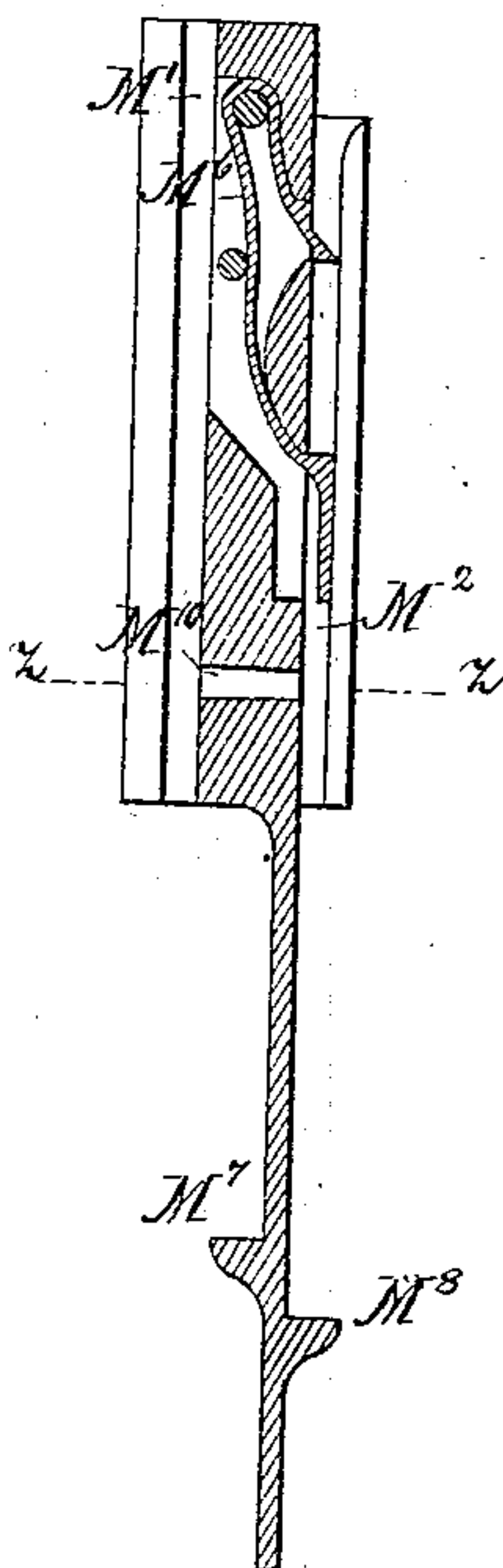


Fig. 12.

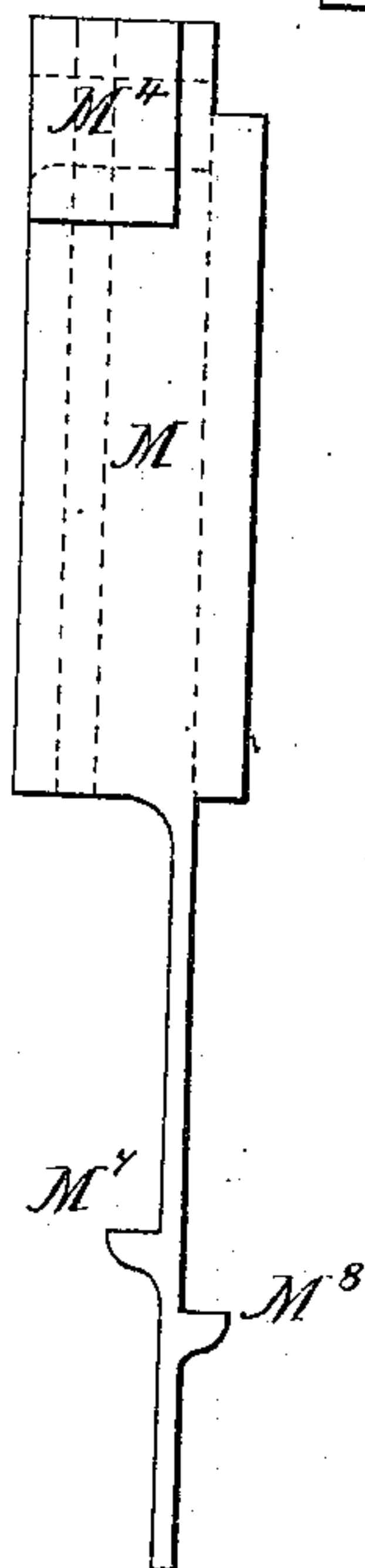
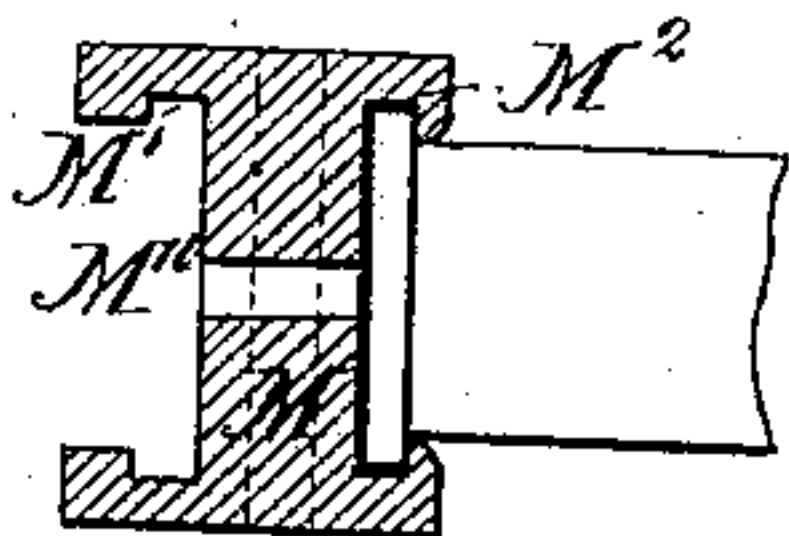


Fig. 11^a



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UNITED STATES PATENT OFFICE.

HIRAM STEVENS MAXIM, OF LONDON, ENGLAND.

MACHINE-GUN.

SPECIFICATION forming part of Letters Patent No. 395,791, dated January 8, 1889.

Application filed October 10, 1885. Serial No. 179,484. (No model.) Patented in England July 8, 1885, No. 8,281.

To all whom it may concern:

Be it known that I, HIRAM STEVENS MAXIM, mechanical engineer, a citizen of the United States of America, and a resident of London, England, have invented new and useful Improvements in Machine and other Guns, (for which I have obtained a patent in Great Britain, No. 8,281, bearing date July 8, 1885,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to automatic guns, and comprises the improvements hereinafter set forth, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, a vertical longitudinal central section; and Fig. 3, a plan, partly in horizontal section on the line $x\ x$, Fig. 1, of a gun constructed according to my present improvements. Fig. 4 is a transverse section on the line $x'\ x'$, Fig. 2. Fig. 5 is a transverse section on the line $x^2\ x^2$, Fig. 2. Figs. 6 to 9 are different views showing the breech-block detached. Figs. 10 to 12 are different views showing the cartridge-carrier, hereinafter described.

A indicates a strong metal frame, which is provided with trunnions A' , whereby it can be supported in or upon a suitable carriage or tripod. The said frame is also provided with handles A^2 , to facilitate the aiming or pointing of the gun.

B is the barrel, which is firmly secured in a block, B' . Two plates, $B^2\ B^3$, are firmly secured to the block B' , one on each side thereof. These plates are connected near their rear ends by a cross-bar, B^4 , and, in combination with the said cross-bar and the block B' , form a frame, which is fitted to slide to and fro within the frame A. The barrel B is fitted to slide in a guide, A^3 , formed on the frame A, to permit the to-and-fro movement of the said barrel with the inner sliding frame above described.

B^5 is a spring, the tension of which is adjustable by means of a screw, A^4 . This spring is attached to the block B' and serves to effect, or assist in effecting, the return movement of the said inner frame after it has been moved backward by the recoil.

C is the breech-block, which is made with

an open-ended slot, C' , to receive and permit the movement of the pin D' of the crank-shaft D. The said breech-block is made with cross-pieces C^2 , which are fitted to slide in grooves or channels B^5 in the side plates, $B^2\ B^3$. The said block is, moreover, fitted to slide to and fro in a groove or channel, A^5 , in a cross-bar, A^4 , formed on or secured to the cover or top of the frame A.

The crank-shaft D is carried in bearings B^6 , which are formed on the side plates, $B^2\ B^3$, and are fitted to slide in slots A^6 in the sides of the frame A. On one end of the said shaft is fixed an arm, D^2 , which operates, in the manner hereinafter described, in combination with a spring, A^7 , or other point of resistance fixed or formed on the frame A. The shaft D is also provided with a crank-handle, D^3 , whereby the said shaft can be rotated by hand when necessary. This crank-handle is arranged to strike against one or the other of two stops, $A^8\ A^{10}$, fixed or formed on the frame A, when the crank arrives at either of its extreme positions.

E is a spring for storing energy during the recoil, and then reacting to effect the return movement of the crank-shaft, the breech-block, and other parts. This spring is arranged within a casing, E' , secured to the frame A, one end of the said spring being secured to the crank-shaft D and the other end thereof to the pin or stud E^2 , fixed in the casing E' .

F is the firing-pin, which is made with a slot or notch, F' , and with a rib or projection, F^2 .

G is the hammer, which is carried by and pivoted to the breech-block C, and is made with an arm, G' , which extends upward into the notch F' in the firing-pin.

H is a lever or sear, which is also carried by and pivoted to the breech-block, and is adapted to engage with a shoulder, G^2 , on the hammer G.

H' is a spring, which is fitted upon a pin, H^2 , fixed in the breech-block, and which acts upon the said hammer and sear.

C^3 is a lever or sear, which is carried by and pivoted to the breech-block C, and is acted upon by a spring, C^4 . This sear bears at its free end upon the crank-pin D' when in the

position shown. It is made with a shoulder, C^5 , to engage with the projection F^2 on the firing-pin when the latter is in its cocked position. The release of the firing-pin from this sear is effected by the crank-pin D' when, but not until, the breech is closed.

I is a trigger, and I' a sliding bar connected therewith and provided with a projection, I^2 , to put upon a pin or stud, H^3 , fixed in the sear.

10 H. The sliding bar I' is connected with the trigger I by means of a rod, I^3 , which is screwed into an arm or projection, I^4 , on the bar I' , and is coupled to the trigger by a pin-joint.

I^5 is a spring, which is placed upon the rod I^3 , and tends to push the bar I' forward. The trigger I is pivoted at I^6 to the frame A, and is provided with a safety-catch at I^7 .

To provide for facilitating the cleaning or inspection of the barrel or bore, or the extraction of part of a broken cartridge by hand when necessary, the trigger I is made with a hole, I^8 , and a hole, J, is formed in the frame A. To close the hole J and permit the opening of the same when necessary, a plate or valve, J' , is fitted to slide up and down in suitable guides within the frame A. This valve is made with a hollow or tubular lug or projection, J^2 , in which is inserted a spring, J^3 . The said spring and lug are fitted to slide upon a rod, J^4 , fixed in the frame A. The spring J^3 holds the valve J' in position to close the hole J. The valve is provided with a projection, J^5 , whereby it can be pressed down by hand to open the said hole.

35 K is a belt of cartridges, which is to be fed or moved intermittently through a chamber or passage, K' , extending through the frame A above the barrel. This intermittent movement of the cartridge-belt is effected by a slide, K^2 , carrying pawls K^3 , and acting in combination with retaining-pawls K^4 . The means employed, according to one form or modification of the present invention for operating the said slide, are as follows, viz:

45 L L' are two arms or levers connected by a rod or shaft, L^2 , passing through a lug, K^5 , on the chamber K' . The arm L' is made with a slot, L^3 , to receive a pin or stud, K^6 , projecting upward from the slide K^2 . The arm L extends between two shoulders or projections, B^7 B^8 , on a bar, B^9 , secured to or forming an extension of side plate, B^2 , so that the said levers and slide will be reciprocated by the said side plate in its to-and-fro movement.

55 I provide very simple and efficient means for drawing the cartridges out of the belt K and bringing them into position to be thrust into the barrel and for extracting the empty cartridge-cases. For this purpose I employ what I term a "sliding carrier," which has four distinct movements—viz., a backward movement with the breech-block to draw a cartridge from the feed-belt and simultaneously extract an empty cartridge-case from the barrel-chamber, a downward movement to lower the cartridge thus drawn from the belt into position to be thrust into the barrel-chamber,

a forward movement with the breech-block to thrust the said cartridge into the barrel-chamber; and an upward movement to engage 70 with another cartridge in the feed-belt.

M indicates the said carrier, which is formed with grooves or channels M' , and is fitted to slide up and down upon the forward end of the breech-block C, the said block being made 75 with ribs or projections C'' , which fit into the said grooves or channels. The said carrier is, moreover, formed with grooves or channels M^2 to engage with the flange of the cartridge in the belt and that of the cartridge in the 80 barrel-chamber. These grooves are clearly shown in Fig. 11^a, which is a section on the line $z z$, Fig. 11, and in which I have shown a cartridge in position in the grooves M^2 .

The carrier M fits into grooves or channels 85 in the block B' and in the chamber K' . Two levers, N, are pivoted at N' to the breech-block, one on each side thereof. The free ends of these levers enter slots M^3 , formed in two lugs or projections, M^4 , on the carrier M. 90 A pin or projection, D^4 , is fixed in or formed on each web of the crank-shaft D. These pins or projections are designed to act upon the levers N, and thereby cause the upward movement of the carrier M, as hereinafter de- 95 scribed. A spring, M^5 , is attached to cover or top of the frame A, and is arranged to depress the carrier M, as hereinafter described, when the breech-block moves backward. A spring, M^6 , is so arranged within the carrier M that 100 when the said carrier is moved from its lowest to its highest position and engages with a cartridge in the belt K the said spring will press upon the flange of the said cartridge and thus hold the same in position in the car- 105 rier.

As the carrier is forced up very rapidly by the pins or projections D^4 in the forward movement of the crank-shaft D, it is necessary to provide one or more stops to arrest its 110 movement at the proper time without injury to any of the parts. For this purpose a plate or projection, N^2 , is provided upon the cover or top of the frame A, and the carrier is provided with projections M^7 M^8 . When the car- 115 rier reaches the top of its stroke, its upper end strikes the plate or projection N^2 , the projection M^7 strikes the forward cross-piece C^2 on the breech-block, and the projection M^8 strikes the under surface of the block B' . 120

In order to fire the gun, the point of the firing-pin F must pass through an aperture, M^{10} , in the carrier M. Therefore, as the raising of the carrier is effected by the crank-shaft, the gun cannot be fired until the said crank-shaft 125 is in position to resist the force of the explosion—that is to say, until the crank is on its forward "dead-center."

The barrel B is provided with a water-chamber, P, which is kept water-tight by means of 130 the stuffing-boxes P' P^2 . These stuffing-boxes are of peculiar construction—that is to say, each stuffing-box has a recess, P^3 , for the packing, into which recess is fitted a kind of pis-

ton, P¹. These pistons at each of their extremities fit closely around the barrel; but each piston is made with an intermediate cavity, P⁵, which surrounds the barrel, and which preferably communicates with the interior of the water-chamber P by perforations in the said piston. Between these pistons a spiral spring, P⁶, is placed upon the barrel, so that it will exert equal pressure upon the pistons, and consequently upon the packing in the two stuffing-boxes. To more effectually insure this equality of pressure, I make the barrel of the same external diameter at the muzzle as at the breech end thereof.

Q is a plate or shutter for closing the aperture A⁹ in the frame A. To insure the opening of this aperture to permit the empty cartridge-cases to fall out of the gun when extracted, the said plate Q is provided with a projection, Q', so that when the breech-block moves backward it will come in contact with the said projection and push the said plate back. The plate Q is also provided with a projection, Q², whereby it can be readily closed by hand. If desired, a spring is combined with this plate to keep the same in its closed position except when acted upon by the breech-block.

When a cartridge is exploded in the barrel, the said barrel and the inner frame, consisting of the block B', side plates, B² B³, and cross-bar B⁴, recoil, together with the breech mechanism, the bearings B⁶ sliding in the slots A⁶ in the frame A. The arm D² then strikes the spring A⁷, whereby the said arm and the crank-shaft D are rotated in the direction indicated by the arrow in Fig. 1 until the crank-pin D' reaches the position indicated by the dotted lines at D* in Fig. 2. The breech-block C and the sliding carrier M are thus moved backward. In this backward movement a cartridge is drawn out of the feed-belt K by the carrier M, which simultaneously extracts a cartridge-case from the barrel-chamber.

The breech-block opens the door or shutter Q, and the empty cartridge-case, extracted by the carrier M, drops through the aperture A⁹. The cartridge drawn out of the belt K is held or supported in the grooves or channels M² by the spring M⁶. As soon as the said cartridge has been removed backward a sufficient distance to be clear of the barrel, the spring M⁵, acting upon the top of the carrier M, moves the same downward, and thus brings the said cartridge into position to be thrust into the barrel. In the rearward movement of the breech-block and other parts the spring E is wound up or compressed. The said spring, by its reaction, effects the return movement of the various parts, and the said cartridge is thrust into the barrel by the carrier M. At or near the termination of the forward movement of the crank-shaft D the pins or projections D' act upon the levers N and raise the carrier M so that it engages with the flange of another cartridge in the belt, which car-

tridge has been fed forward during the to-and-fro movement of the breech-block by the means hereinafter described. It will therefore be seen that the flange of a cartridge remains in the grooves M² of the carrier M from the moment when the carrier is moved upward by the levers N until the said cartridge has been lowered, thrust into the barrel, exploded, and the empty shell or case extracted. The said shell or case then drops freely from the said carrier.

The slot C' in the breech-block, for a short distance from its upper end, is made concentric with the shaft D, and the lower part of the said slot is so formed that the crank-pin D' will drive the breech-block home before completing its forward movement. Therefore during the latter part of its forward movement the crank-pin will not act upon the said block, but will merely travel freely in that part of the slot which is concentric with the crank-shaft. By these means I am enabled to use the power of the spring E, after the breech-block is driven home, entirely for raising the carrier M and releasing the firing-pin F from the sear C³.

The carrier above described, which holds the cartridges and lowers them into position to be thrust into the barrel, is an important feature of my present invention. Its construction and the means employed for operating it will be varied according to the construction of the gun to which it is applied.

What I claim is—

1. In a machine-gun, the combination, with a reciprocating breech-block, of a carrier arranged to slide vertically in said breech-block, and adapted to engage with the cartridges in a belt or feed mechanism, and a spring in the path of movement of the carrier by which, in the backward movement of the breech-block, the carrier will be depressed to bring the cartridge retained thereby into line with the breech, as set forth.

2. In a machine-gun, the combination, with a reciprocating breech-block, of a carrier arranged to slide vertically in said breech-block and adapted to engage with the cartridges in a belt or feed mechanism, levers pivoted to the reciprocating breech mechanism and engaging with the carrier, a crank connected with the breech mechanism and adapted to be turned by the to-and-fro movement of the same, and pins or projections on the said crank adapted to encounter the levers and raise the carrier at a given point in the forward movement of the carrier, all substantially as herein set forth.

3. The combination, in a machine-gun, with a reciprocating breech-block movable in line with the barrel, of a cartridge-feed belt adapted to be intermittently moved through the gun above the breech, a carrier movable vertically in the breech-block and formed to engage with a cartridge in the feed-belt and that in the breech when the breech-block is in its forward position, and shifters or devices

adapted to operate in conjunction with the moving breech-block to encounter the said carrier and raise or depress the same according to its position relatively to the breech, as set forth.

4. In a gun, a fire-arm having a reciprocating breech-block movable in line with the barrel, the combination, with the said breech-block and a cartridge-feeding mechanism, of a carrier movable vertically in said breech-block and adapted to engage with the shells in the breech and feed mechanisms, and shifters or devices placed in positions to encounter the carrier for depressing or raising it according to the position of the breech-block relatively to the breech, as set forth.

5. The combination, with the reciprocating breech-block C, the carrier M, arranged to slide vertically therein, the levers N, pivoted to the carrier, the crank-shaft D, provided with pins or projections D⁴, which are adapted to encounter and move the levers N, the spring M⁵, in position to bear upon and depress the carrier M, and the cartridge-retaining spring M⁶, secured to the carrier, as set forth.

6. The combination, with the frame A and a resisting-spring, A⁷, secured thereto, of an inner frame comprising the block B', the side plates, B² B³, and the cross-bar B⁴, secured together and supporting the breech mechanism, the barrel B, fixed in the block B' of the inner frame and adapted to slide to and fro there-with in the frame A, the crank-shaft and pin for reciprocating the inner frame and thereby operating the breech mechanism, and the arm

D², carried by the shaft and adapted to encounter the spring A⁷, to aid the return or forward movement of the inner frame and breech mechanism, as set forth.

7. The combination, with the reciprocating breech-block, of the slide K², provided with the stud K⁶, and the pawls K³, adapted to act in conjunction with pawls K⁴ for imparting an intermittent rotary movement to the cartridge-feeding mechanism, the arms L L', mounted on a shaft in the chamber K', and the lugs B⁷ B⁸ on an extension or arm from the plate B², forming part of the reciprocating breech mechanism, the lugs B⁷ B⁸ being arranged to operate the arms L L' and impart movement to the slide K² through the stud K⁶, to which the arm L' is connected, as set forth.

8. The combination, with the sliding barrel B of an automatic machine-gun, of a water-chamber, P, surrounding the barrel, the stuffing-boxes P' P², and pistons P⁴, surrounding the barrel at opposite ends of the water-chamber, and the intermediate coiled spring, P⁶, acting upon the said pistons with equal pressure, as and for the purpose set forth.

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

HIRAM STEVENS MAXIM.

Witnesses:

GEO. J. B. FRANKLIN,

W. J. NORWOOD,

Both of 17 Gracechurch Street, London.