

(No Model.)

4 Sheets—Sheet 1.

H. S. MAXIM & L. SILVERMAN.
AUTOMATIC MACHINE GUN.

No. 551,779.

Patented Dec. 24, 1895.

Fig. 1.

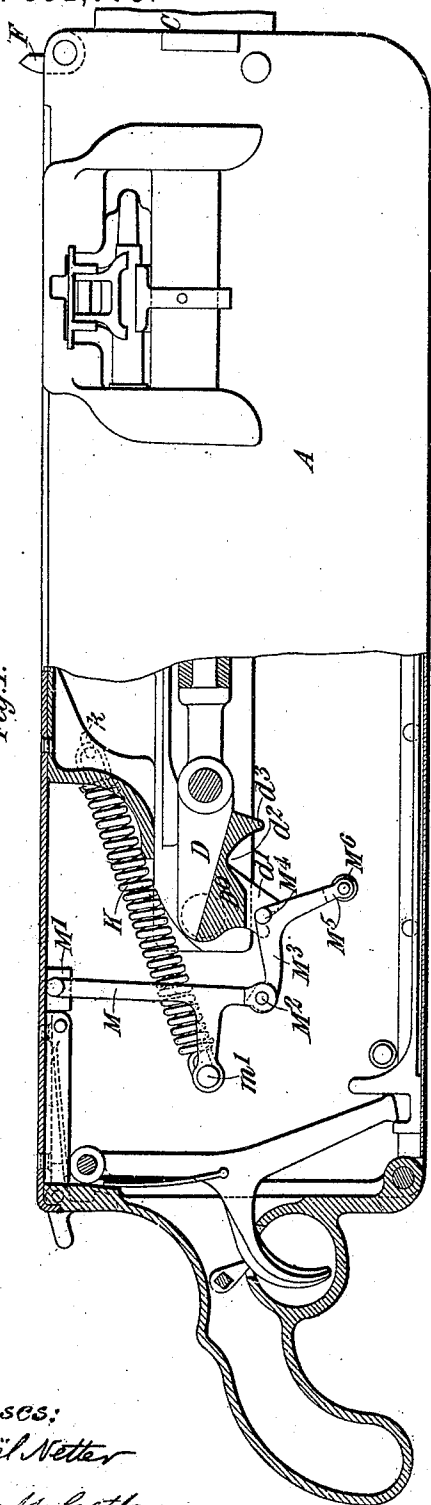
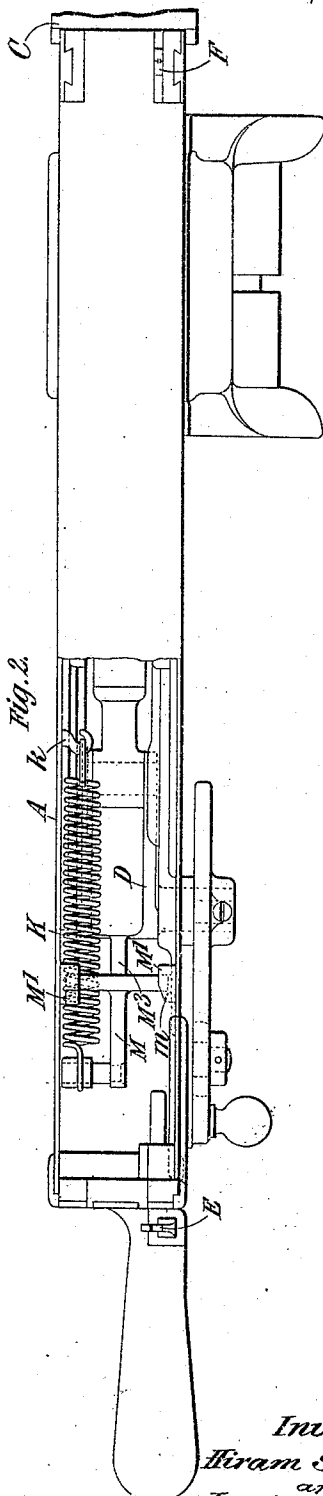


Fig. 2.



Witnesses:
Raphael Netter
James H. Catlow

Inventors
Hiram S. Maxim
and
Louis Silverman
by Duncan & Age,
Attorneys

(No Model.)

4 Sheets—Sheet 2.

H. S. MAXIM & L. SILVERMAN.
AUTOMATIC MACHINE GUN.

No. 551,779.

Patented Dec. 24, 1895.

Fig. 3.

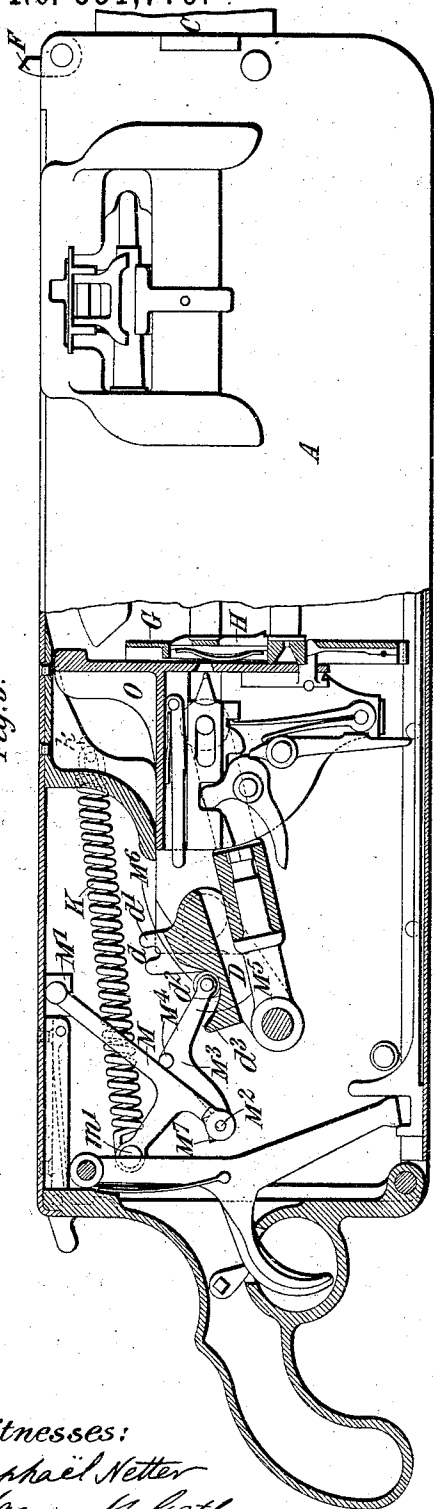


Fig. 9.

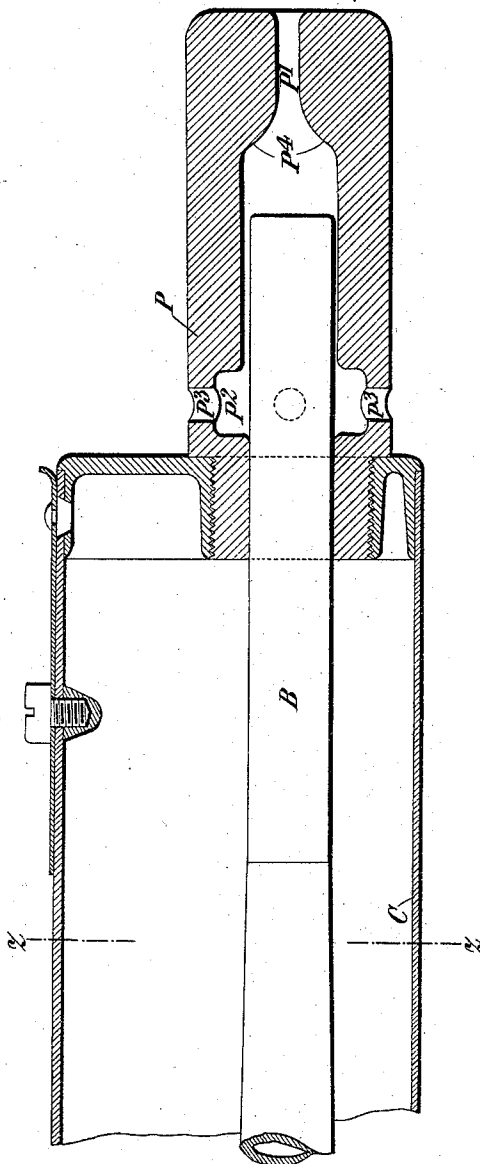
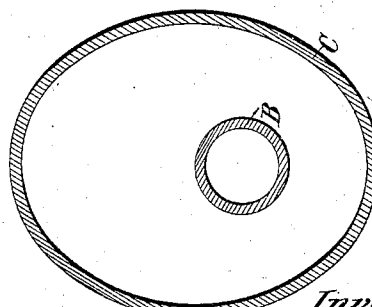


Fig. 10.



Witnesses:

Raphael Netter
James H. Catlow.

Inventors:

Hiram S. Maxim, and Louis Silverman
by Dureau & Sage, Attorneys

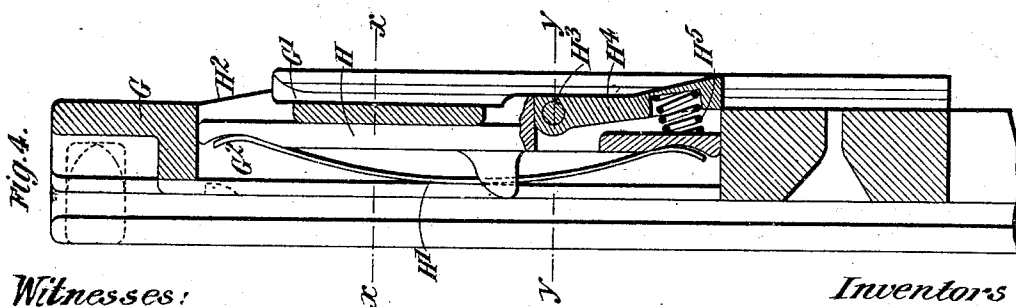
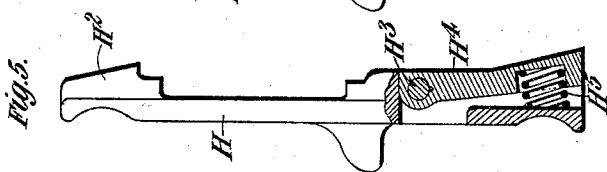
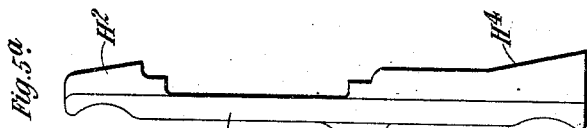
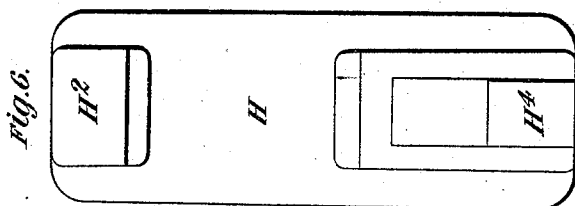
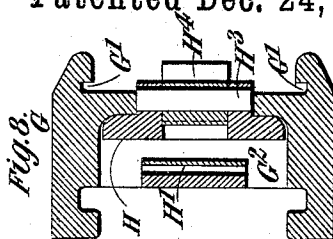
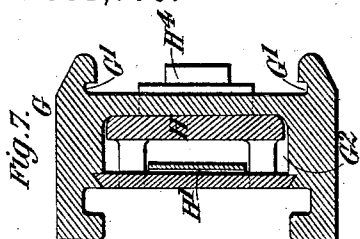
(No Model.)

4 Sheets—Sheet 3.

H. S. MAXIM & L. SILVERMAN.
AUTOMATIC MACHINE GUN.

No. 551,779.

Patented Dec. 24, 1895.



Witnesses:
Raphaël Netter
James W. Catton

Inventors
Hiram S. Maxim
and Louis Silverman
by *Duncan & Page,*
Attorneys

(No Model.)

4 Sheets—Sheet 4.

H. S. MAXIM & L. SILVERMAN.
AUTOMATIC MACHINE GUN.

No. 551,779.

Patented Dec. 24, 1895.

Fig. 11.

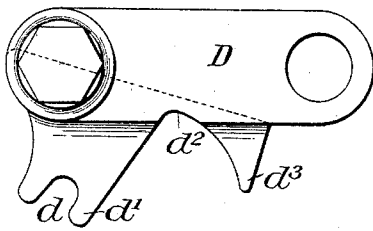


Fig. 12.

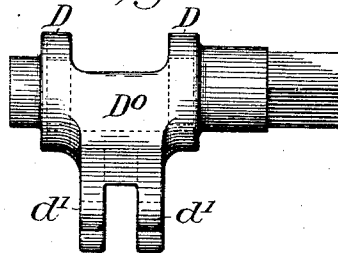


Fig. 13.

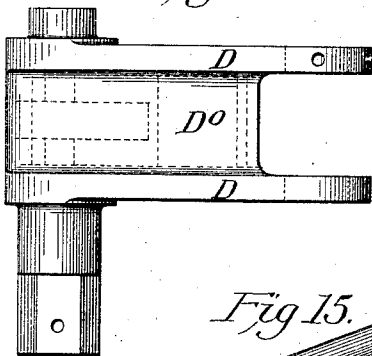


Fig. 14.

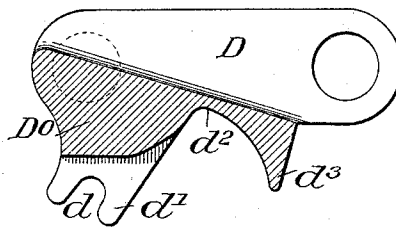
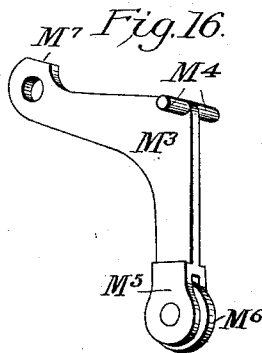
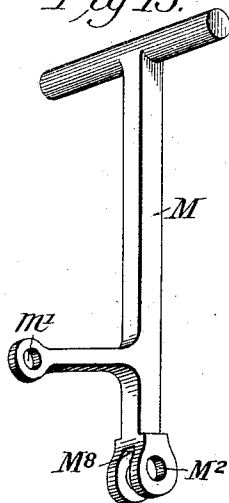


Fig. 15.



Witnesses.

L. M. Beehan.
Jessie B. Koy.

Inventors.

Hiram S. Maxim
& Louis Silverman
By Duncan & Page
Atty.

UNITED STATES PATENT OFFICE.

HIRAM STEVENS MAXIM, OF BEXLEY, AND LOUIS SILVERMAN, OF
CRAYFORD, ENGLAND.

AUTOMATIC MACHINE-GUN.

SPECIFICATION forming part of Letters Patent No. 551,779, dated December 24, 1895.

Application filed October 8, 1894. Serial No. 525,253. (No model.)

To all whom it may concern:

Be it known that we, HIRAM STEVENS MAXIM, mechanical engineer, a citizen of the United States, residing at Bexley, and LOUIS SILVERMAN, engineer, a subject of the Queen of Great Britain, residing at Crayford, Kent, England, have invented certain new and useful Improvements in and Relating to Automatic and Machine Guns, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates chiefly to improvements in automatic or "Maxim" guns of that class wherein the breech mechanism is operated by means of a crank which is turned in one direction about its axis by the force of the recoil and in the other direction by the reaction of a spring.

The said invention comprises an improved arrangement of the said spring and the connection of the same with the crank by means which insure the most advantageous effect of the spring upon the crank and through the crank upon the other parts of the mechanism.

It also comprises an improvement in the cartridge-carrier of the feed and extracting mechanism whereby we prevent the possibility of any obstruction to the action of the mechanism by an empty cartridge-case after the extraction of the same from the barrel.

It also comprises improvements in apparatus to be used at the muzzle of the gun for utilizing the pressure of the gases issuing therefrom after the discharge for actuating or assisting to actuate the breech mechanism.

In the accompanying drawings, Figure 1 is partly a side elevation and partly a longitudinal section of a portion of a gun constructed according to this invention, the working parts of the breech mechanism being in the position they occupy before firing. Fig. 2 is a sectional plan of the same. Fig. 3 is a view similar to Fig. 1, the working parts being, however, in the recoiled position. Fig. 4 is a vertical section of the cartridge-carrier of the feed and extracting mechanism. Fig. 5 is a side view partly in section, and Fig. 6 is a front view of a portion of the said carrier hereinafter described. Fig. 5^a shows a slight modification of the piece shown in Fig. 5. Figs. 7 and 8 are transverse sections taken

on the lines *xx* and *yy*, respectively, of Fig. 4. Fig. 9 is a longitudinal section of the water-jacket at the muzzle end of the gun and the attachment thereto for utilizing the pressure of the gases issuing from the muzzle for assisting to work the breech mechanism. Fig. 10 is a transverse section on the line *zz*, Fig. 9. Fig. 11 is a side elevation. Fig. 12 is a rear elevation, and Fig. 13 is a plan of the crank detached. Fig. 14 is a vertical central longitudinal section of the same. Figs. 15 and 16 are perspective views of two levers detached and hereinafter described. Figs. 4 to 16 are drawn to a larger scale than Figs. 1 to 3.

Like letters denote corresponding parts throughout the drawings.

A is the frame that incloses the mechanism of the gun. B is the barrel. C is the water-jacket. D is the crank. E is the rear sight. F is the fore sight. G is the cartridge-carrier of the feed and extracting mechanism. H is the gib in said carrier, and K is the main spring.

In various of the specifications of patents granted to Hiram S. Maxim for and relating to improvements in automatic guns it will be found that the spring K, which resists the backward turning of the crank D, and which by its reaction reverses the movement of the said crank after the recoil, is placed outside of the main frame A and is inclosed in a box or case attached to the same. According to the present invention this spring is now placed inside the said frame; and to allow this to be done in such a manner as to insure the efficient action of the said spring without increasing the width of the frame or otherwise causing inconvenience we employ the following devices—that is to say, we connect one end of the spring K with a hook or eye *k* fixed inside the frame, the said spring extending rearwardly therefrom and having its other end connected to a suspended link M. This link is T-shaped, as shown clearly in Fig. 15, the top or cross bar having its ends adapted to enter holes formed in small bearing-blocks M', attached to or formed with the inside of the cheeks of the frame, near the top or cover thereof, one of these blocks being cut away at one side, as shown at *m*, Fig. 2,

to facilitate the insertion of the cross-bar of the link therein. The link has jointed to its lower or free end at M^2 a bent or elbow lever M^3 , which connects the said link to the crank, so that the spring acts thereon through the medium of the said link and lever. On each side of the lever M^3 at the elbow is a pin M^4 , which engages with a notch or recess d , formed in an extension or arm d' of the crank. The crank is double, the two sides being joined by a web or center piece D^0 , from which the extensions d' project. In order that the force exerted by the spring on the crank shall be most effective at the time when the crank is forward and has to perform the severest part of its work, the said lever M^3 and crank D are constructed and arranged so that the lever will have at different parts of its movement two points of contact with the crank, as follows, viz: One point of contact is the aforesaid notch d , in which the pins M^4 lie at the commencement of the recoil. The other is a recess or corner d^2 , in which the outer extremity M^5 of the said bent lever M^3 finds a bearing at the time when the breech is open and the crank is terminating its backward movement. To guide the end of the lever into this notch, an extension d^3 is formed on the side of the crank, and to reduce the friction the end of the lever M^3 is furnished with a roller M^6 .

The end of the lever M^3 , which is jointed to the suspended link below the point m' of connection of the spring thereto, is formed with a projection at M^7 , (see Fig. 16,) which engages the inner face M^8 (see Fig. 15) of the jaw of the link M , so that the lever cannot drop or turn downward below the angle shown in Fig. 1. Therefore, although it has no other support than that afforded by the link, it will not fall below the position in which its pins M^4 can engage with the recesses d in the projecting arms d' of the crank. Moreover these recesses are inclined backwardly, as shown, as a further safeguard against the elbow-lever becoming accidentally disengaged therefrom. At the moment of firing and during the first part of the recoil the pins M^4 of the lever M^3 are in the recesses in the extensions d' , which therefore push back the suspended link and distend the spring K ; but in this movement the crank approaches the outer or lower end of the bent lever M^3 until the roller M^6 on the latter comes into contact with the aforesaid recess or corner d^2 , while the pins M^4 at the elbow of the lever at the same time move out of contact with the crank, and the parts at the end of the recoil assume the position indicated in Fig. 3. The order or sequence of these contacts is reversed in the return movement of the crank.

The cartridge-carrier of these guns is of the class which has four movements—viz., a backward movement whereby it withdraws a cartridge from the feed-belt and at the same time extracts a spent cartridge or empty case from the barrel, a downward movement

whereby it carries the fresh cartridge into line with the barrel and the empty case into line with the exit-aperture, a forward movement whereby it thrusts the fresh cartridge into the barrel and pushes the spent cartridge or empty case through the exit-aperture below the barrel, and an upward movement to engage with the next cartridge in the belt while remaining in engagement with the flange of the cartridge in the barrel. This carrier is a plate or piece G connected with the breech-block in such a manner that it can slide up and down upon the forward end or face of the block O and it has at its sides grooves G' for engaging with the flanges of the cartridges. The carrier has been usually heretofore constructed with a cavity behind its front surface or face, in which cavity is fitted a loose plate or "gib," the upper and lower portions of which project through the face of the carrier, being pressed forward by a spring. The projecting portions, by the pressure of the spring, hold the cartridges firmly in the carrier while they are being moved down, as above described, but they are curved or inclined so that they slip from under the head of the cartridges when the carrier rises.

With the carrier constructed as above described, in the larger classes of guns a difficulty has arisen from the fact that when the carrier is moving down the gib is liable to be pressed back or inward by the flange of the cartridge which has last been taken from the feed-belt, and the lower part of the projecting face of the gib is then nearly level with the face of the carrier, in which position the concussion sometimes causes the empty cartridge-case to bounce or jump up in front of the gib, where it remains so that when the carrier moves forward the said empty case which should then be pushed through the exit-aperture has its front edge jammed against the edge of the said aperture and the working of the gun is stopped. To obviate this difficulty we now construct the gib H as follows—i. e., we form the main portion thereof to fit within the cavity G^2 behind the face of the carrier and to be pressed outward by a spring H' substantially as heretofore and we curve or incline the upper edge H^2 for the purpose abovementioned; but in the lower part of the said gib we pivot at H^3 a catch or stop H^4 which is controlled by a spring H^5 . The edge of the said catch projects beyond the face of the carrier and forms a shoulder or stop which effectually prevents the rising of the empty cartridge-case above the position in which it will be in line with the exit-tube. The elastic force of the spring H^5 is sufficient to keep the catch or stop pressed outward, but it yields freely to allow the carrier, after it has carried down the empty case, to rise behind the cartridge in the barrel. We sometimes make the said stop solid with the gib, as shown in Fig. 5^a, and in that case the whole of the gib is pressed inward against the resistance of its

spring H' when the gib rises behind the cartridge in the barrel.

For utilizing the force or pressure of the gases issuing from the muzzle of the gun for operating or assisting to operate the breech mechanism, we have heretofore employed apparatus which has one portion attached to the barrel and another portion attached to a casing forming part of the frame. According to our present invention we simplify this apparatus so that we are enabled to dispense with the attachment of any part of it to the gun-barrel. For this purpose we provide a cylinder P, Fig. 9, which has one end screwed in or otherwise strongly secured to the forward end of the water casing or jacket C surrounding the barrel. The forward end of the said cylinder has the usual contracted aperture P' in line with the axis of the barrel for the passage of the projectile. The rear portion of the cylinder has an enlarged annular space or cavity P² from which extend small holes P³ through the wall of the cylinder to allow the gases to escape.

The muzzle end of the barrel B projects into the said cylinder and the gases issuing from the muzzle impinge against the forward end of the said cylinder at P⁴ and thereby force or assist in forcing the barrel backward to operate or assist in operating the breech mechanism as in other automatic guns.

We preferably make the water-jacket C of oval section and place the long axis of the oval vertical, and we fix the barrel B eccentric to the jacket below the center. Therefore the greater proportion of the water will lie above the barrel and thus have a very efficient cooling action. The jacket is preferably made of steel.

What we claim is—

1. In an automatic gun, the combination with the recoiling part of the breech mechanism, of a crank connected therewith, a spring arranged inside the frame of the gun, a link pivoted within the frame to which one end of the spring is connected while the other end is attached to a fixed support within the frame, and a lever intermediate to the said link and crank, whereby the effect of the spring is transmitted to the said crank, as set forth.

2. In an automatic gun, the combination, with the recoiling part of the breech-mechanism, of a crank, a link M suspended from the frame, a lever supported in the end of the said link and engaging with the crank, and a spring K connected at one end to a fixed piece and at its other end to the link M, substantially as described.

3. In an automatic gun, the combination, with the recoiling part of the breech-mechanism, of a crank, a link M suspended from the frame, a spring K connected at one end to a fixed piece and at its other end to the link M, a lever supported in the end of the said link and having two points of contact with the crank at different times during the recoil, sub-

stantially as described and for the purpose specified.

4. In an automatic gun, the combination, with the recoiling part of the breech-mechanism, of a crank, having extensions or arms d' notched at d , a recess or corner d^2 and an extension d^3 formed with an inclined face, a link M suspended from the frame, a spring K connected at one end to a fixed piece and at its other end to the link M, and a bent or elbow lever supported in the end of the said link, and furnished with pins M⁴ to engage with the notches d in the crank, and with a roller to slide during the latter part of the recoil down the inclined face of the extension d^3 into the recess or corner d^2 substantially as described and for the purpose specified.

5. In an automatic gun, the combination, with the recoiling part of the breech-mechanism, of a crank, having extensions or arms d' notched at d , a recess or a T-shaped link M suspended by its top bar in bearings in the sides of the frame, a spring K connected at one end to a fixed piece and at its other end to the link M, and a bent or elbow lever supported in the end of the said link, and furnished with pins M⁴ to engage with the notches d in the crank, and with a roller to slide during the latter part of the recoil down the inclined face of the extension d^3 into the recess or corner d^2 , a face M⁷ of the lever bearing against a face M⁸ of the link to prevent the lever falling into a position unsuitable for re-engagement with the crank, substantially as described.

6. In an automatic gun, the combination with the spring-controlled carrier gib H of a shoulder at its lower end, substantially as described for preventing the jumping up of the spent cartridge above the position in which it can enter the exit tube when the parts of the breech mechanism move forward after the recoil.

7. In an automatic gun, the combination with the spring-controlled carrier gib H of a spring catch H⁴ pivoted therein and having its lower edge projecting therefrom, substantially as described and for the purpose specified.

8. In an automatic gun, the combination with the barrel and with the water jacket of a cylinder P secured to the water jacket and surrounding the end of the barrel, and having a contracted aperture P' in line with the bore of the gun, and an enlarged annular space or cavity P² with openings P³ leading therefrom for the escape of the gases, substantially as described.

In witness whereof we have hereunto set our hands this 18th day of September, 1894.

HIRAM STEVENS MAXIM.
LOUIS SILVERMAN.

Witnesses:

GEO. HARRISON,
T. F. BARNES.