

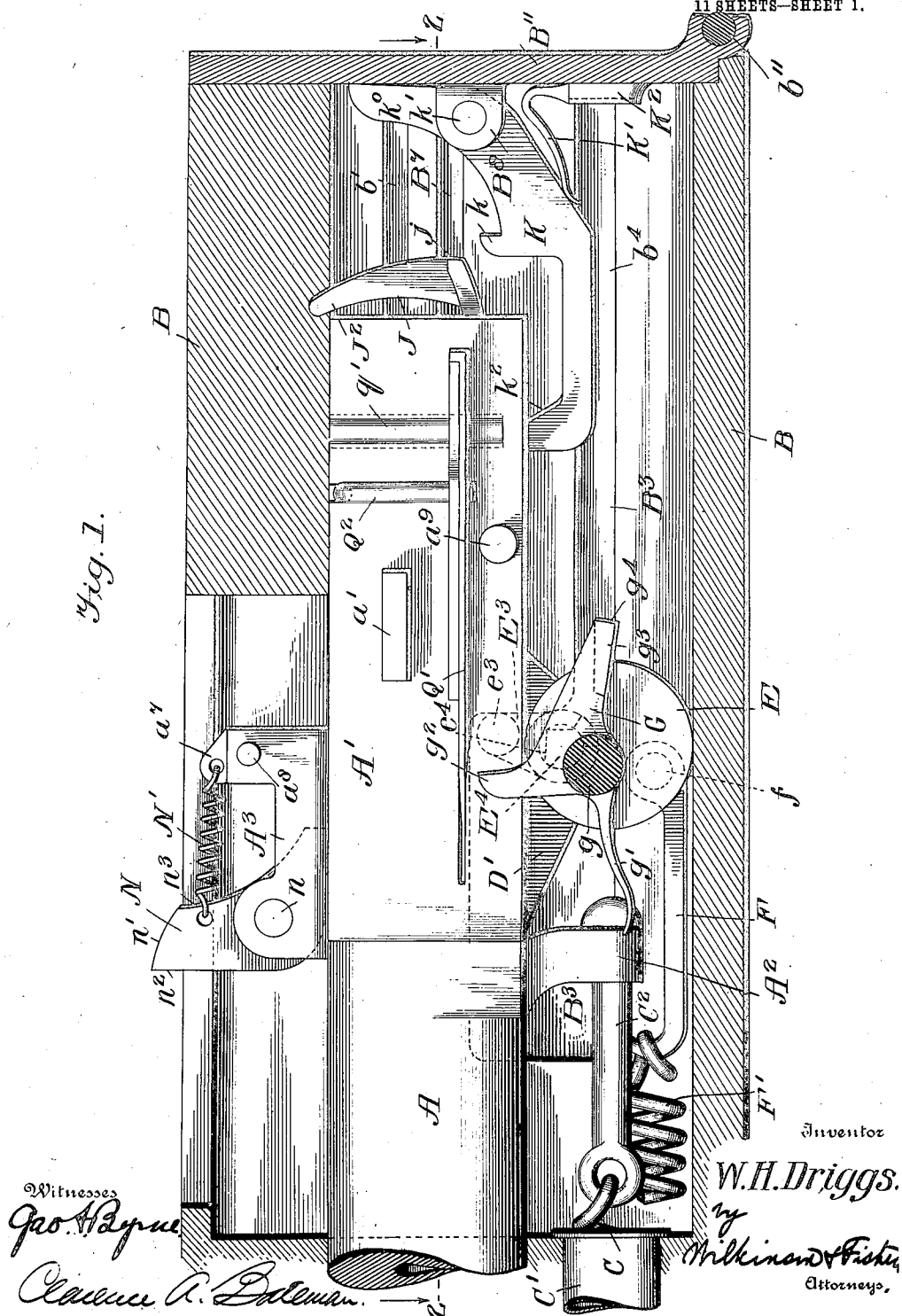
No. 781,503.

PATENTED JAN. 31, 1905.

W. H. DRIGGS.
AUTOMATIC GUN.

APPLICATION FILED MAR. 26, 1903.

11 SHEETS--SHEET 1.



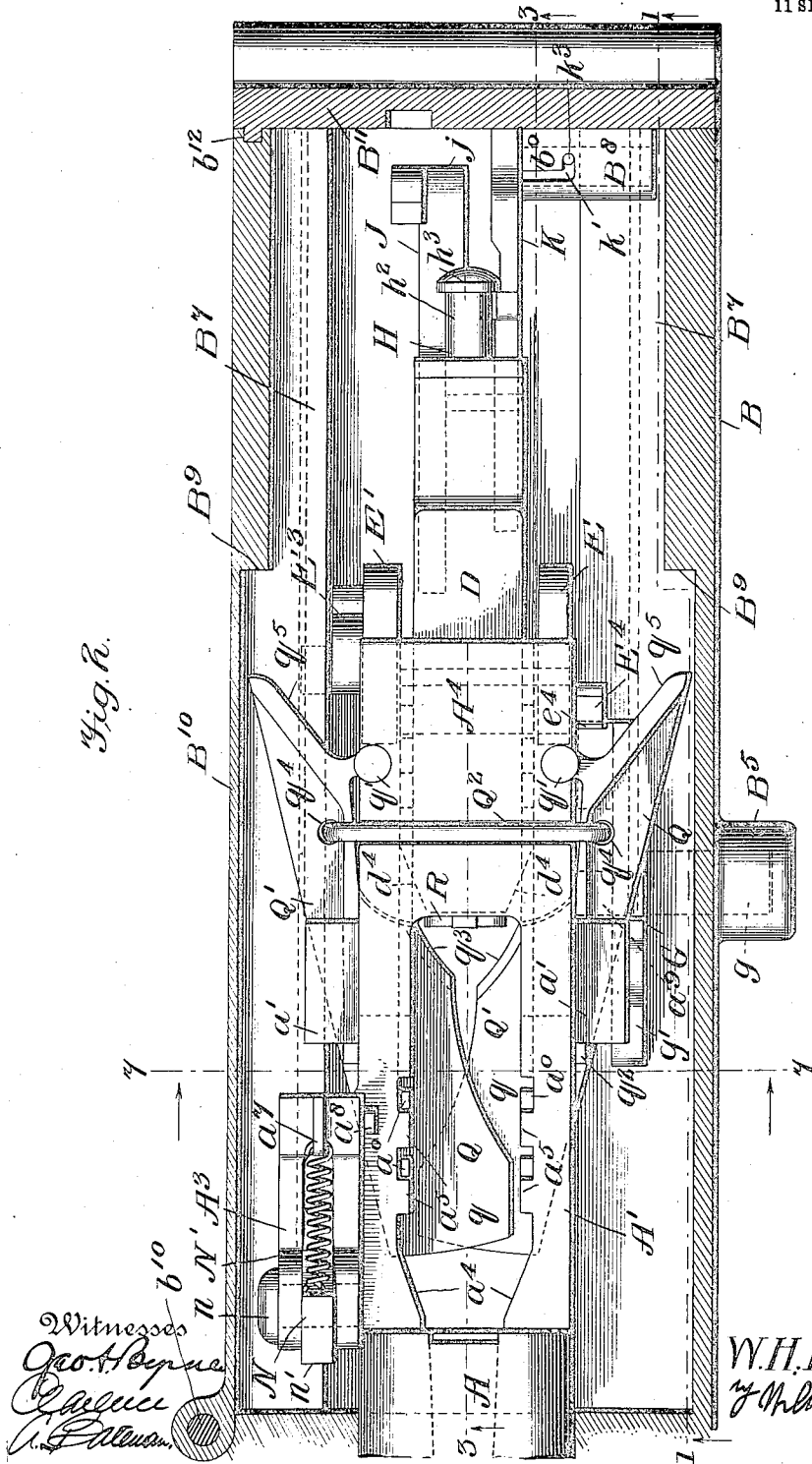
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11 SHEETS—SHEET 2.



No. 781,503.

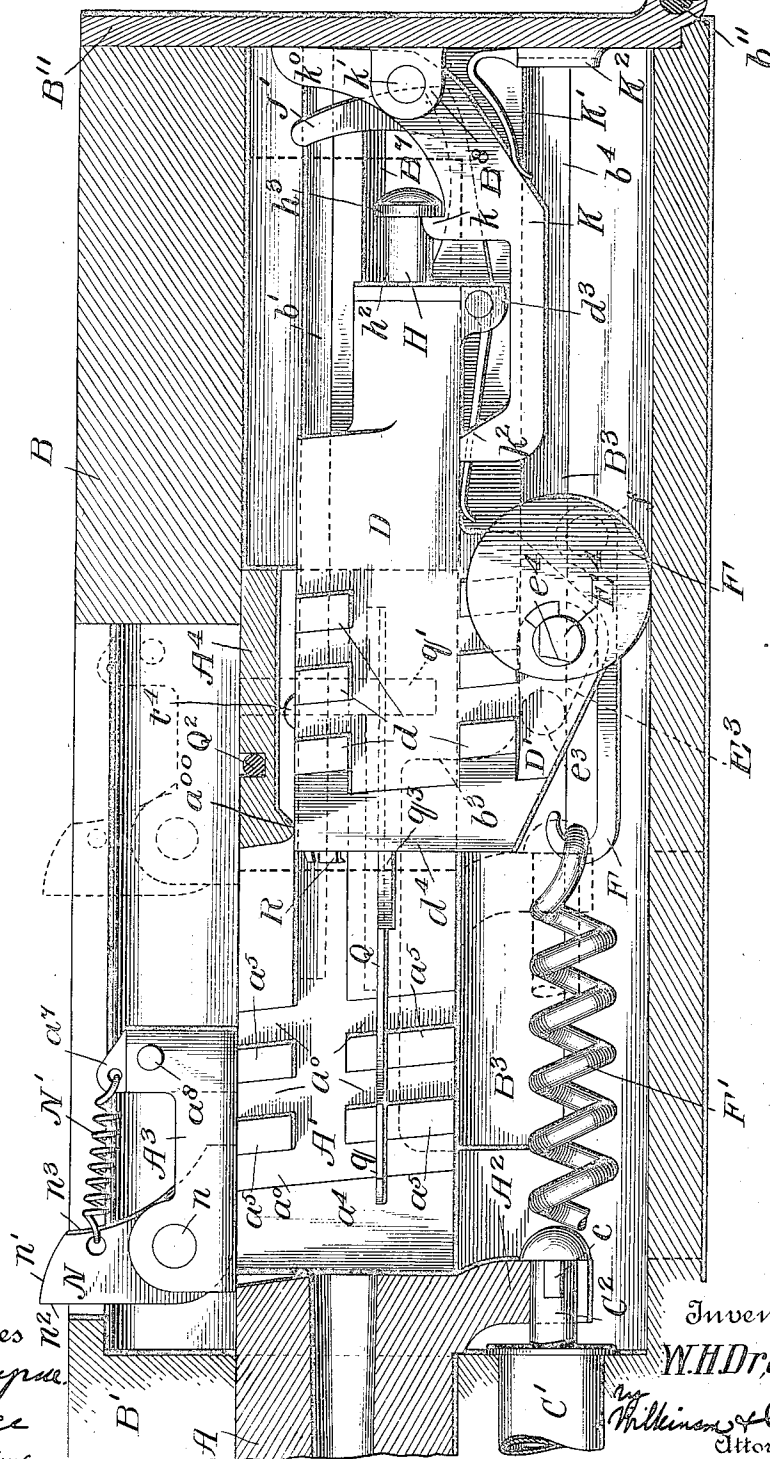
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11 SHEETS—SHEET 3.

Fig 3.



Witnesses
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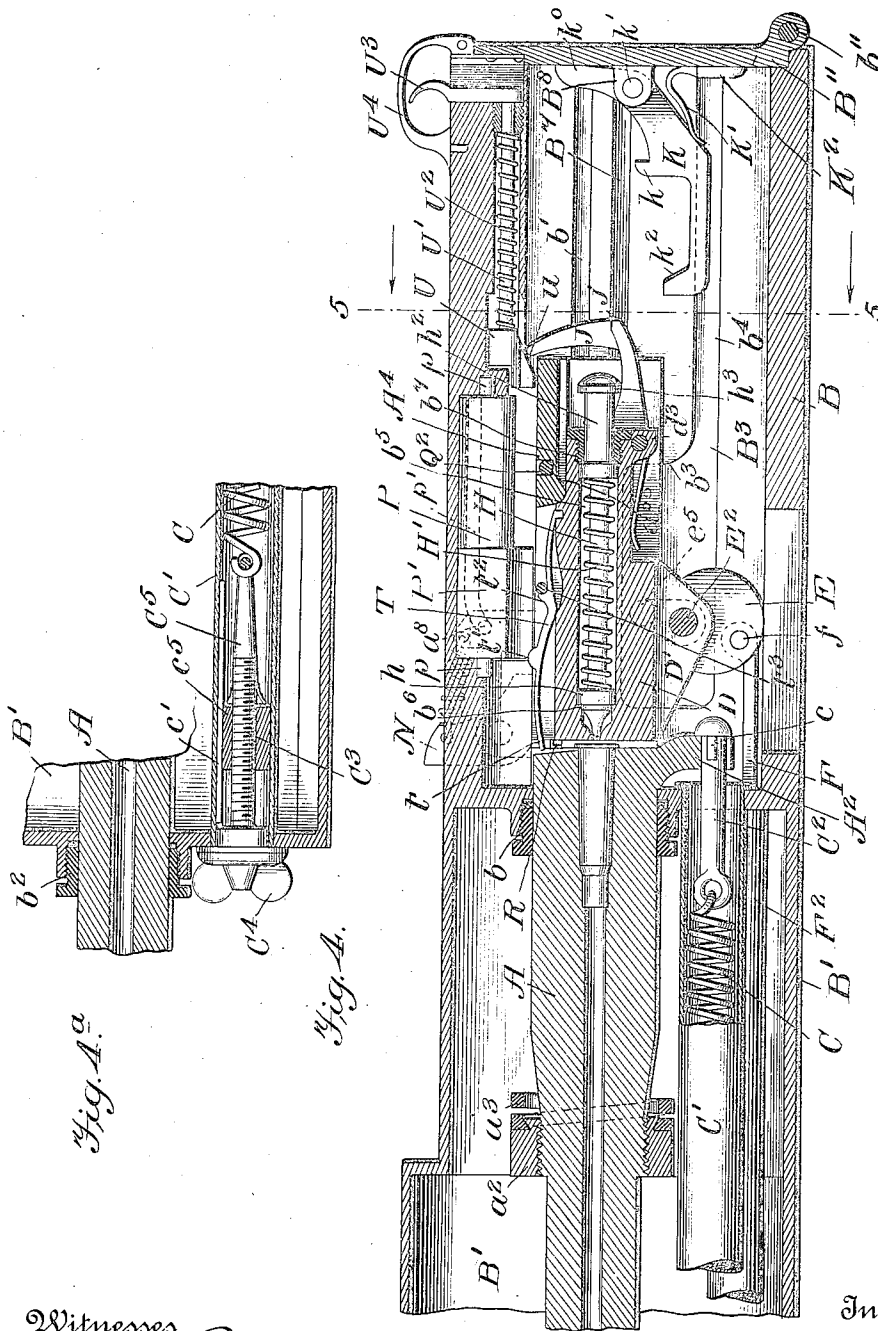
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11 SHEETS—SHEET 4.



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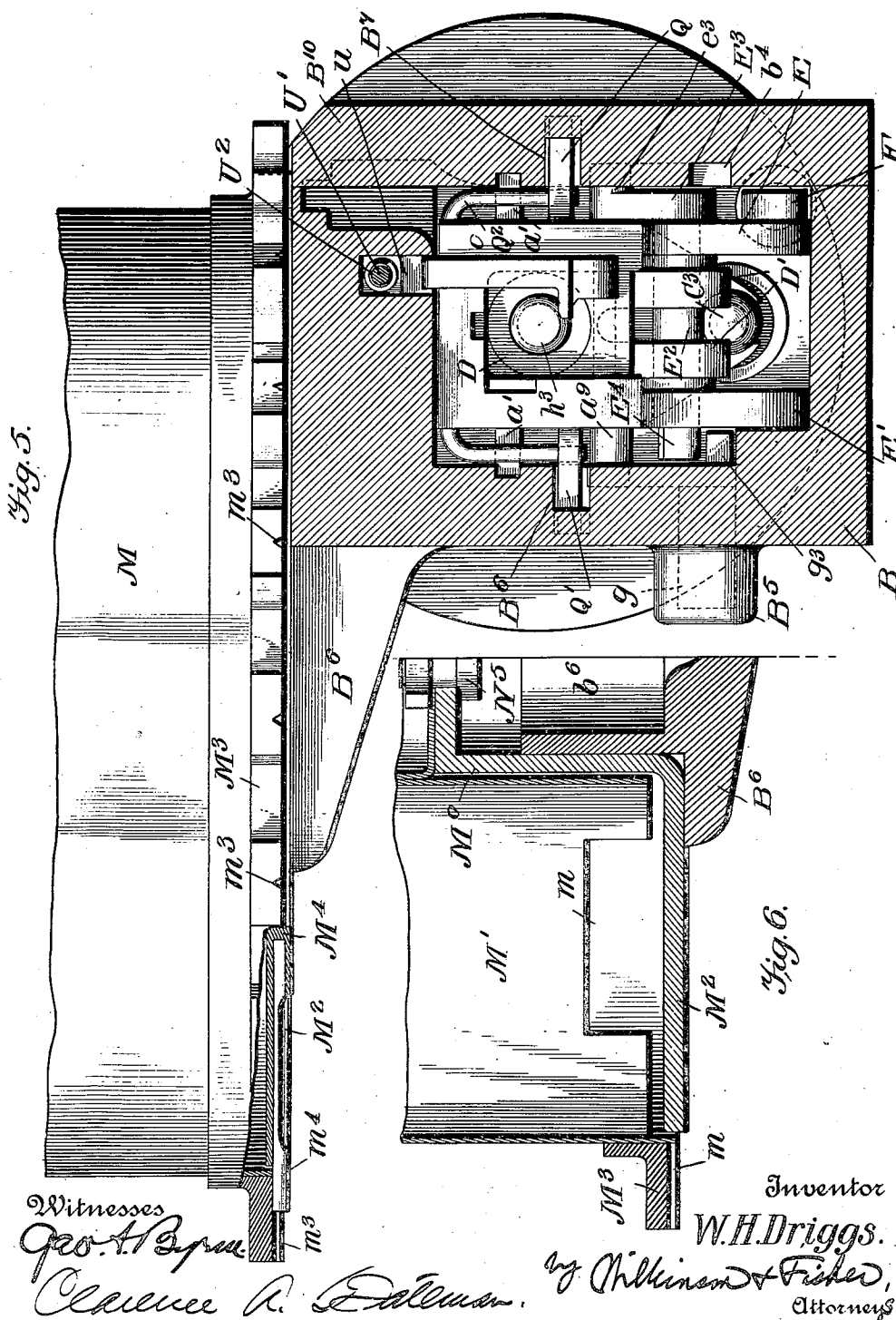
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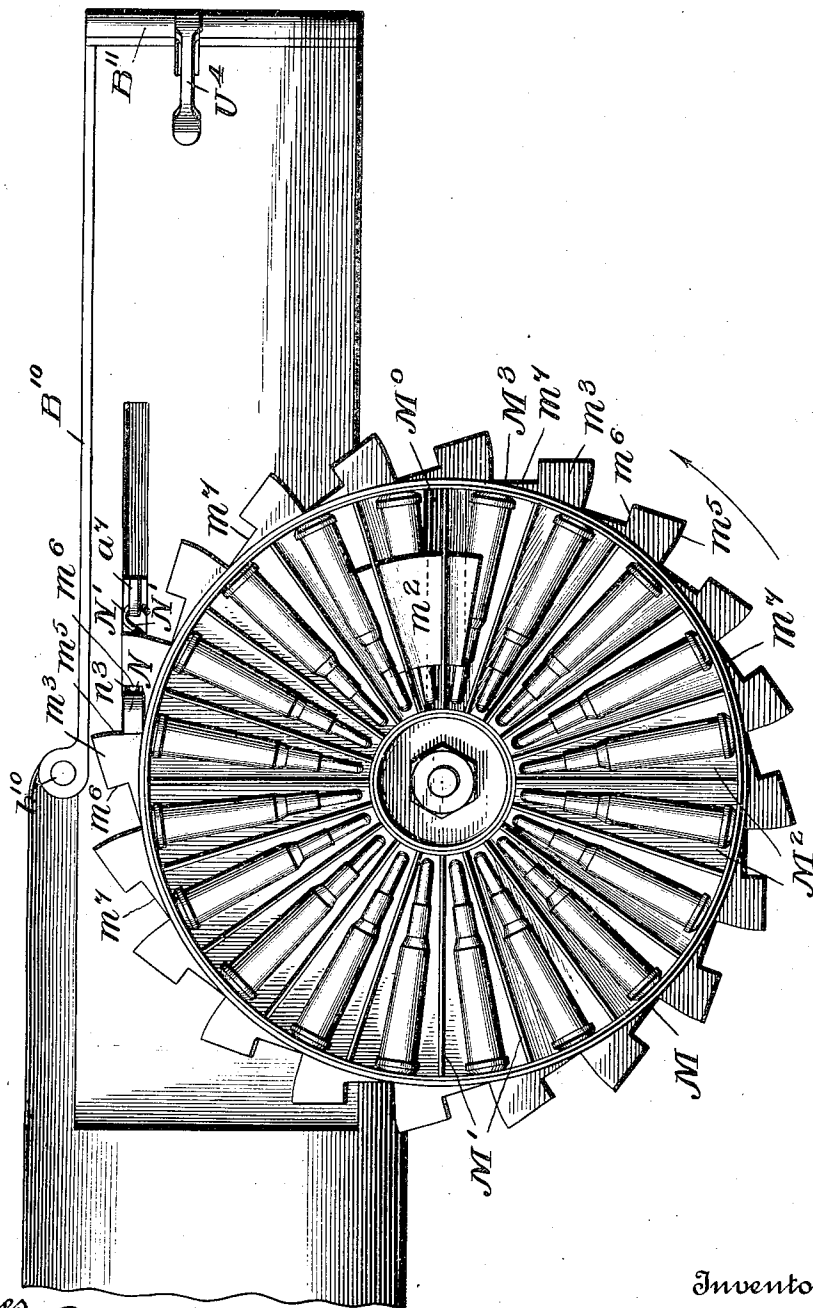
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Fig. 8.



Witnesses

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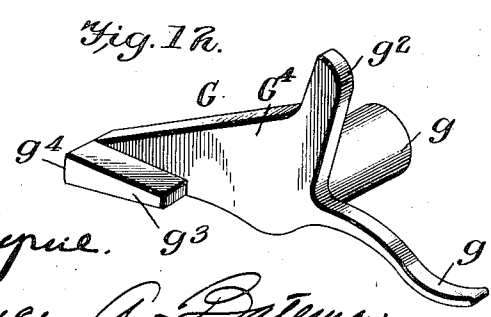
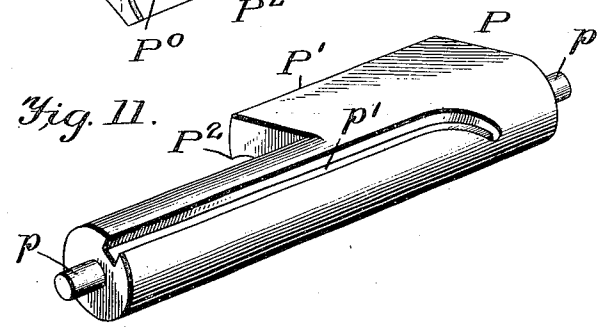
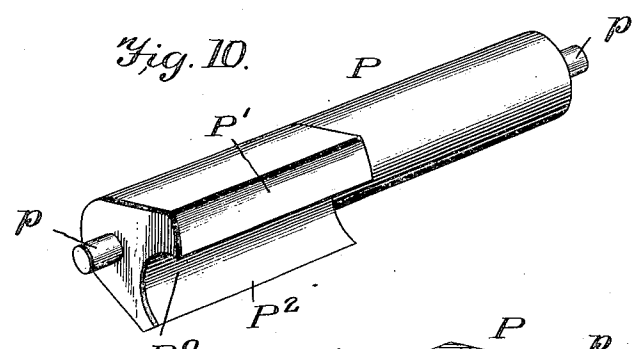
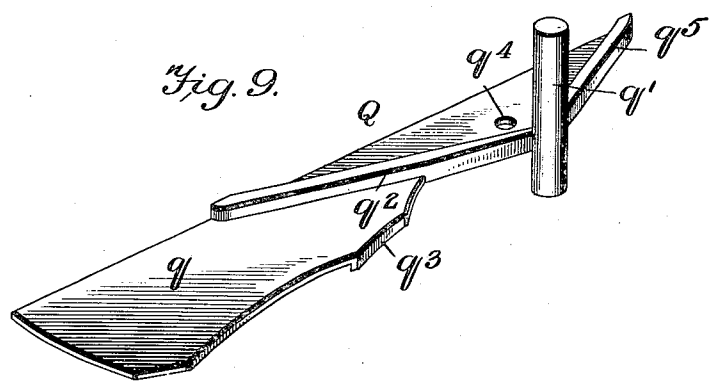
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11 SHEETS—SHEET 8.



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Fig. 13.

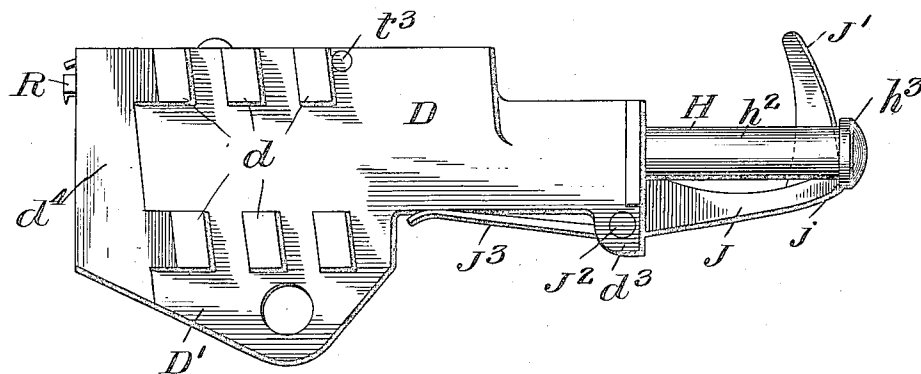
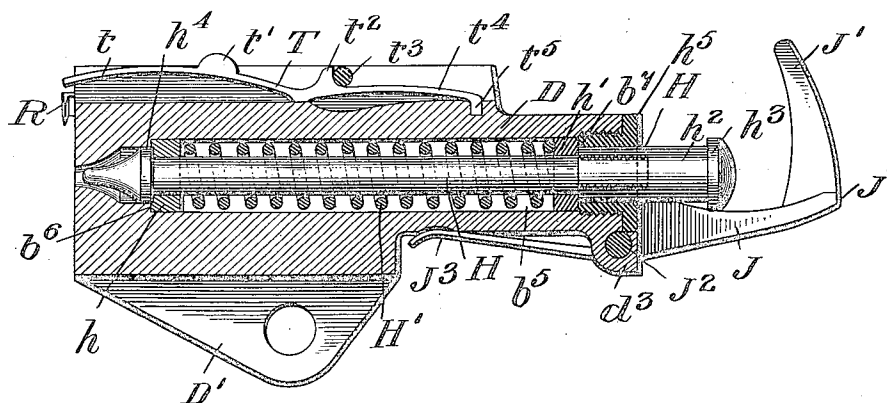


Fig. 14.



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Fig. 15.

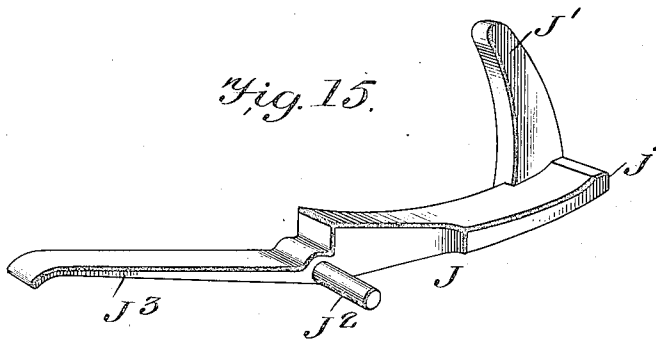


Fig. 16.

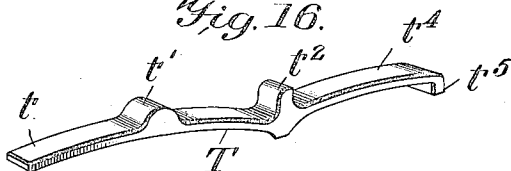


Fig. 17.

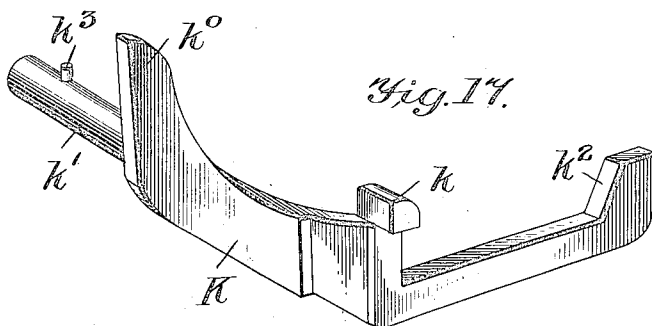
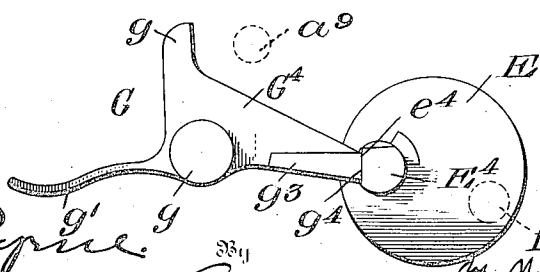


Fig. 18.



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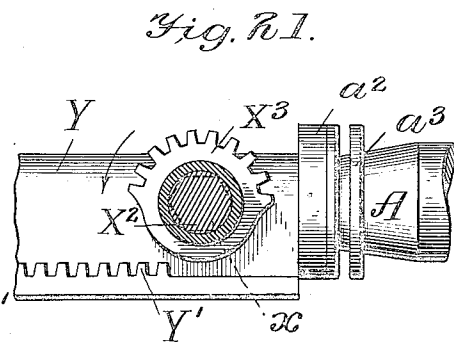
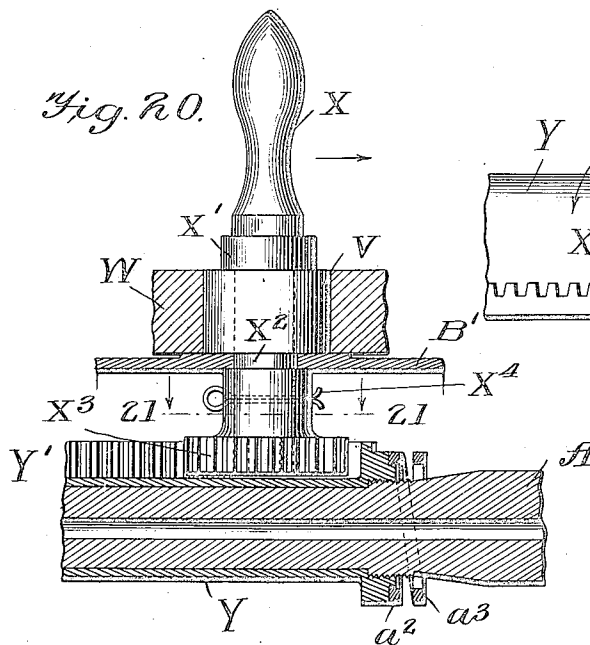
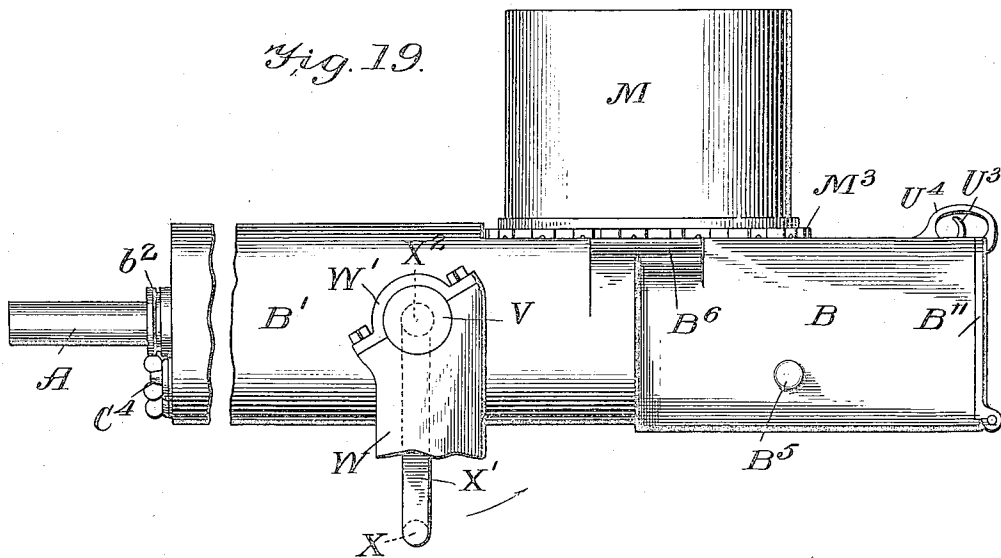
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11 SHEETS—SHEET 11.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM HALE DRIGGS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO THE DRIGGS-SEABURY ORDNANCE CORPORATION, OF SHARON, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

AUTOMATIC GUN.

SPECIFICATION forming part of Letters Patent No. 781,503, dated January 31, 1905.

Application filed March 26, 1903. Serial No. 149,757.

To all whom it may concern:

Be it known that I, WILLIAM HALE DRIGGS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Automatic Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in automatic guns, and especially automatic guns of small caliber; and it consists of certain novel features that will be hereinafter described and claimed.

Reference is had to the accompanying drawings, in which the same parts are indicated by the same letters throughout the several views.

Figure 1 is a vertical section through the casing along the line 1 1 of Fig. 2 and looking in the direction of the arrows. Fig. 2 shows a horizontal section through the casing along the broken line 2 2 of Fig. 1, the gun and breech-block and other mechanism contained in the casing being shown in plan. Fig. 3 shows a section along the broken line 3 3 of Fig. 2 and looking in the direction of the arrows. Fig. 4 is a central vertical section through the gun and casing on a smaller scale, parts being shown in elevation. Fig. 4^a is a fragmentary view showing the end of the water-jacket near the muzzle of the gun with the parts contained therein, the same being a continuation of the left end of Fig. 4. Fig. 5 shows a cross-section along the line 5 5 of Fig. 4 and looking in the direction of the arrows, the scale being larger than in Fig. 4. Fig. 6 is a detail sectional view showing the construction of the hopper. Fig. 7 is a transverse section showing the mode of feeding the cartridges to the gun. This section is taken on the line 7 7 of Fig. 2 and looking in the direction of the arrows. Fig. 8 is a plan view of the hopper and of the breech of the gun. Fig. 9 is a detail showing in perspective one of the pivoted plates used to obstruct the feed of the cartridges until the parts are

in the proper position. Figs. 10 and 11 are details showing in perspective the rocking toe for feeding the cartridges singly to the gun. Fig. 12 is a detail showing in perspective the catch for holding the breech-block in the open position and for releasing same at the proper time. Fig. 13 is a side elevation of the breech-block, showing the firing-pin cocked and the sear in engagement therewith. Fig. 14 is a central vertical section through the breech-block, showing the firing-pin and sear in the position assumed after the gun has been fired. Fig. 15 is a detail showing the sear in perspective. Fig. 16 is a detail of the ejector. Fig. 17 is a detail showing the cocking-plate. Fig. 18 is a detail showing the engagement of the catch and eccentric and illustrates the manner in which the breech is held open after the gun recoils and during the operation of loading. Fig. 19 represents a side elevation of the gun, parts being broken away and parts being omitted. Fig. 20 is a detail showing the mechanism for running the gun in and out by hand so as to start the firing, and Fig. 21 is a section along the line 21 21 of Fig. 20 and looking in the direction of the arrows.

A represents the body of the gun, which is provided with a chambered breech A', a downwardly-projecting lug A², and an upward extension A³. The chamber of the breech is walled over near its rear end, as at A⁴. The gun is mounted in the casing B, the forward portion of which, B', is used as a water-jacket. The breech and muzzle of the gun are cylindrical and fit close in the stuffing-boxes b and b², (see Fig. 4 and Fig. 4^a.) so that the gun may recoil through the water-jacket. The recoil of the gun is positively limited by means of the bands a² and a spring-buffer a³, attached thereto, which brings up against the casing when the gun has recoiled to the predetermined limit. The gun is restored to the initial position by means of the spring C, which is connected to the bolt C², fast to the lug A² on the breech of the gun. This pin is connected to said lug by a bayonet-joint arrangement c. (Shown in Fig. 4.) The spring C is

inclosed in a hollow tube C' , which passes through the water-jacket, and the forward end of the spring is connected to a yoke C^5 , having a nut c^5 splined, as at c' , in the tube C' , in which nut the screw C^3 engages. This screw is turned by means of the butterfly-head C^4 , and thus the tension of the spring may be adjusted as desired. Thus it will be seen that the gun recoils through glands in the water-jacket and is brought back to the initial position by means of the spring C .

The breech-block D is mounted in the chamber in the breech of the gun and is provided with ribs d , which engage in the grooves a^0 between the ribs a^0 on the inner walls of the gun-breech when the breech-block is in the closed position. To open the breech, the breech-block is moved downward and is automatically held in the rear position after full recoil, while to close the breech the block is brought forward by a spring and is cammed up into the locked position, as will now be described. The breech-block is provided with two downwardly-projecting lugs D' , in which lugs is journaled the shaft E^2 , carrying the two eccentrics E and E' , which rest on the floor of the casing. (See Fig. 7.) The eccentric E carries a wrist-pin f , to which the hook F is connected, the said hook engaging the end of a coil-spring F' , which spring projects forward into the tube F^2 , passing through the water-jacket. The tension of this spring is adjusted in a similar way to the tension on the spring C , which has already been fully described. The tension on this spring F' tends to bring the eccentric E to the initial position, with the breech closed, as shown in Fig. 1, and the breech-block is opened and held opened against the action of the spring with a mechanism that will now be described.

G , shown in detail in Fig. 12, represents a pivoted locking-plate which has a pivot-arm g extending into a boss B^5 in the casing, as shown in Fig. 2. This plate has a spring-arm g' , that normally engages in a notch in the casing B . It is also provided with an arm G^4 , having a holding-face g^4 , adapted to engage the face e^4 of the stud E^4 on the eccentric E , as shown in Fig. 18, the eccentric then being in the position indicated in Fig. 3 and the breech being open. When the gun counter-recoils, the stud a^0 strikes the rounded face of the arm g^2 of the plate G , rocks the said plate slightly about its pivot g , and the stud rides under the said arm without affecting the operation of any of the parts. As the gun recoils the wrist-pin e^3 on the arm E^3 , which projects from and is integral with the eccentric E , strikes the shoulder b^3 on the casing, and further movement rearward of the gun rocks the eccentric down to the position indicated in Fig. 3, causing the shaft E^2 to pull the breech-block downward out of engagement with the grooves of the breech-block chamber of the gun. At the same time the

head h^3 of the firing-pin is engaged by the catch k of the plate K , which plate is normally pressed upward about its pivot h' by means of the spring K' . The said plate K has an arm h^0 abutting against the casing, as shown in Fig. 3, and also an inclined face h^2 near the forward end adapted to be struck by the lug d^3 on the breech-block D for releasing the firing-pin, as will be hereinafter more fully described. When the gun carrying the breech-block has reached the rearward position, the spring g' throws the locking-arm g^4 of the plate G in front of the shoulder e^4 on the pin E^4 fast to the eccentric E , and thus the breech-block is held against motion forward, while at the same time the gun itself is free to return to the initial position under the action of the spring C . As the gun nears the closed position, having in the meantime been loaded, as will be hereinafter described, the pin a^0 , carried by the breech of the gun, strikes the arm g^2 of the plate G , rocks the same against the action of the spring g' , and causes the face g^4 to release the shoulder e^4 , (see Figs. 7 and 18,) thus allowing the spring F' to rock the eccentric E and with it the shaft E^2 ; but this eccentric cannot be rocked by the spring F' until the ribs d register with the grooves a^0 in the gun-breech. The nose of the breech-block is so shaped, as shown in Figs. 2, 3, and 13, that the face d^4 must strike the face a^4 on the gun before the block can be cammed up to the locked position. As soon as the block has been dragged far enough forward by the spring F' to cause the ribs d to register with the grooves a^0 the tension of the said spring will rock the eccentric and will cam the block up into the locked position, as shown in Fig. 4. As the breech-block moves forward the shoulder k on the plate K holds the head H^3 of the firing-pin, thus cocking the latter, and when the lug d^3 on the breech-block strikes the inclined face h^2 of the plate the catch k is released from the head h^3 of the firing-pin; but just before this is done the sear J passes in front of the flange on the head of the firing-pin, and thus holds the same, as shown in Fig. 13, the arm J' of the sear being normally pressed upward by the action of the spring J^2 , causing the face j on said arm to engage the flange h^3 , as before stated. The sear is pivoted to the breech-block, as at J^2 , and is on the opposite side of the firing-pin from the plate K , already referred to.

The firing mechanism is shown in detail in Fig. 4 and Fig. 14, the pin being of the rebounding type, so as to clear the head of the breech-block after the gun is fired, and thus prevent premature discharge or injury to the pin. This is accomplished by having the rings h and h' loose on the body of the pin H and between which rings is a firing-spring H' under compression. The forward ring h is pressed by the spring against a shoulder b^6 of

the breech-block, and the rear ring h' also engages part of the breech-block. After the firing-pin has been cocked and released the inertia of the pin will carry it forward far enough to strike the primer of the cartridge before the tension of the spring causes the head of the firing-pin to be withdrawn into its chamber in the breech-block, as shown in Fig. 14. For convenience of assembling the rear end of the firing-pin is made in the form of a sleeve h^2 , screwed onto the main body, and this sleeve passes through a bushing h^5 , screwed in the breech-block. When the breech-block reaches the closed position, the gun may be fired either single fire by hand or automatically. To fire single fire by hand, pull back on the trigger U^3 when the breech is closed. This will cause the block U to press the sear downward and release the firing-pin, or by keeping the trigger in the rear position the gun will fire automatically when the breech is closed. To prevent accidents, the block U is normally pressed forward to the inoperative position by means of the spring U^2 on the bar U' , which connects the trigger U^3 with the said block. The trigger-guard B^7 serves also as a catch to hold the hinged door B^{11} in the closed position, and thus keep the end of the casing closed.

To get rid of the empty cartridge-case, extractors R are provided on the front of the breech-block, which extractors are preferably made in two segments with a slot between, into which slot the free end t of the ejector T is automatically thrown on account of recoil. This ejector (shown in detail in Fig. 16) is in the form of a curved spring having an operating-lug t' , a shoulder t^2 , adapted to engage the pin t^3 on the breech-block, and a swinging arm t^4 with a catch t^5 , adapted to engage in the recess in the breech-block, as shown in Fig. 14. The arm t^4 is pressed under the pin t^3 and the catch t^5 is swung into its recess, and thus the ejector is firmly held in place, but at the same time may be readily removed or assembled should occasion require.

The operation of the ejector is as follows: When the gun is fired, it carries the breech-block with it on recoil until the breech-block is cammed downward. Now on counter-recoil the breech-block remains fast; but the gun moving forward causes the lug a^{10} on the transom A^4 over the breech-block to strike the lug t' on the ejector. This will give a quick blow to the ejector, causing the arm t to knock the cartridge out of the extractor, whence it will drop through the opening in the bottom of the frame. Ordinarily the cartridge is dropped out; but in case it should get jammed in the extractor the cartridge-case will be positively ejected by the ejector, as hereinbefore described. It will be obvious that the extractors will grip the rim of the cartridge-case as the breech-block is cammed in the first operation of opening the breech and that when the breech-block is held fast

and the gun moves forward the empty cartridge-case will be dragged out of the powder-chamber.

I have thus described the opening and closing of the breech, the firing of the gun, and the ejection of the empty cartridge-case. The loading apparatus will now be described.

The cartridges are stored in a revolving hopper which is divided by radial partitions into a plurality of chambers and in each chamber are piled one above another with the small end pointing in toward the center of the hopper. M indicates the hopper, and M' the radial partitions, which radial partitions are cut away, as at m . (See Figs. 6 and 7.) The hopper M is mounted above a base-plate M^2 , which is provided with a socket M^0 , which socket fits over the cylindrical lug b^6 on the part B^6 of the casing B . The hopper is revolutely connected to the base by means of the bolt N^5 . (See Fig. 6.) To the outer edge of the hopper is secured a rack M^3 , having teeth m^3 , which teeth have faces m^5 and m^6 with a flat face m^7 between the two, as shown in Fig. 8. The base-plate M^2 of the hopper has a curved tongue m^2 with a throat M^6 to receive the cartridges, which throat opens into the throat B^0 in the frame B . Between each fire the hopper is rotated one tooth, causing the tongue m^2 to pass over another cartridge, allowing the cartridge to fall in through the throat M^6 , as indicated in dotted lines in Fig. 7. This step-by-step motion is given to the hopper by means of the arm N , which is pivoted, as at n , to the projection A^3 on the gun, and it carries a rounded face n' , an engaging face n^2 , and a locking face n^3 . This arm is normally drawn upward to the position shown in Fig. 3 by means of the spring N' , attached to the lug a^7 on the projection A^3 . This projection also carries a pin a^8 . When the gun is fired, this arm N recoils to the position indicated in dotted lines in Fig. 3, the curved face n' on the arm N then passing under one of the teeth on the hopper, the spring N' being of light tension and readily yielding. When the gun returns on account of recoil, the face n^2 strikes the face m^5 of one of the teeth m^3 of the hopper (see Fig. 8) and rotates the hopper through the angle subtended by one tooth. At the same time the arm N will project into the space between two teeth and abutting against the flat face m^7 will prevent the hopper from turning any farther than a single tooth. To steady the hopper in place while the arm N' is out of operative relation with the teeth on the edge of the hopper, I provide a spring-stop m^4 , which is held in a bracket M^4 , attached to the base-plate m^2 and engages in notches m^3 in the base of the hopper, which notches have inclined edges, so that the stop m^4 automatically rides out of these notches. It will be seen that as the hopper revolves the lower cartridges of each column will roll along the base-plate M^2 and

the tongue m^2 will lift the column of cartridges from off of the lower cartridge, allowing this to fall into the throat M^6 and thence to pass to the breech of the gun. Thus one cartridge from the bottom of each radial chamber will be fed to the gun during each revolution of the hopper, so that the feed will be continuous as long as there are cartridges in the hopper. To prevent the cartridges from crowding down into the breech of the gun, I provide the block P, which is journaled on pins p and has an arm P' normally adapted to project down and block the throat B^0 of the frame, as shown in Fig. 7.

This block is curved, as at P^0 , between the arms P' and P^2 to receive a single cartridge when the block is rocked upward and then to deposit the single cartridge in the breech of the gun when the block is rocked down again. The block is rocked by means of a pin a^8 on the gun which engages in the cam-groove p' of the block P. As the gun recoils, this pin rocks the block up and allows it to receive one cartridge in the groove P^0 and on counter-recoil the pin locks the block down again, depositing the cartridge on top of the guard-plates Q. These plates open and close like the blades of a pair of scissors and are operated by the breech-block, as will now be described. There are two of these blades Q and Q', both substantially alike, but having the parts reversed and one mounted above the other. One of the blades is shown in detail in Fig. 9. Each of these blades has a long journal q' , which is mounted in the groove in the side of the breech of the gun, as shown in Fig. 2, and the two blades are normally pressed together by means of a loop-spring Q^2 , which passes over the top of the breech of the gun and engages in holes q^4 in the blades. Each of the blades is provided with ribs or flanges q^2 , q^3 and q^5 , which not only serve to stiffen the blades, but the former prevents the blades from closing in too far, while the flanges q^3 are for the face of breech-block to work on in loading, and the flange q^5 limits the opening of the plate. The plate swings in and out of the slot in the side of the gun-breech, as shown in Fig. 7. It will be seen that if a cartridge is fed above these plates it will remain resting thereon until the plates are open, and this is accomplished by the action of the breech-block, as will be hereinafter described. When the breech-block is in the closed position, it projects between these blades and holds them open. Now if the gun be fired these blades will move back with the gun on recoil and will pass into the grooves B^7 in the casing (see Figs. 2 and 7) and the outer wall of these grooves will hold the blades in the open position against the action of the spring Q^2 until when on counter-recoil the rear end of the blades passes the shoulder B^9 . Then the blades will snap to the closed position under the influence of the spring Q^2 . In the mean-

time the empty cartridge-case has dropped through the opening between the blades. On counter-recoil the pin a^8 on the gun causes the block P to feed another cartridge above the blades, and it remains resting on these blades until the breech-block starts forward again. As soon as the edges d^4 at the side of the nose of the breech-block strike the cam-faces q^3 on the plates Q and Q' these plates are spread apart and the breech-block shoves the cartridge home.

In order that the parts may be put in position for automatic firing, it will be necessary to move the gun-barrel to the rear one or more times before firing begins. This is accomplished by the mechanism shown in Figs. 19 to 21, in which the water-jacket B', inclosing the gun, is mounted on the trunnions V, supported on the mount W beneath the cap-square W'. Any desired form of mount may be used, so that details of the mount are omitted. Fig. 19 shows the left side of the gun; but on the opposite side of the gun and passing through the hollow trunnion is a shaft X^2 , carrying the crank X' , provided with a handle X. The end of this shaft is made angular, as at x , to fit in a socket in the hub of the gear X^3 , which gear may be attached to the shaft X^2 by means of a cotter-pin X^4 or in any other convenient way. This gear X^3 is in segmental form, as shown in Fig. 21, and is so constructed that when the handle X is down, as indicated in Fig. 19, it will be out of engagement with the rack Y', secured to or integral with the sleeve Y on the gun-barrel. Thus the gun-barrel may normally recoil without any engagement with the gear X^3 . In beginning the operation of firing, however, it will be necessary to move the gun-barrel one or more times to the rear, in which case the handle X is swung upward in the direction of the arrow in Figs. 19 and 21, causing the teeth on said gear to engage in the teeth of the rack Y' and moving the gun to the rear to the desired distance. As soon as the gun-barrel has been moved far enough to the rear the teeth of the gear will become disengaged from those of the rack, allowing the spring C to restore the barrel to the initial position. The cycle of operations then is as follows: Supposing there are no cartridges in the gun and it is desired to commence firing, one or more cartridges are conveyed into the throat B^0 of the casing, as indicated in Fig. 7. The cartridges may subsequently be fed in by hand or the hopper N may be put in place. There being one or more cartridges in the throat B^0 , the gun-barrel is moved to the rear by means of the handle X, as has just been described, until the gear X^3 passes over the rack Y', allowing the spring C to restore the gun-barrel to the initial position. While this is being done a cartridge is fed above the plates Q and Q' and is shoved home by the breech-block in the operation of closing the

breech, and when the breech is closed the gun is either fired automatically or by hand, as before described. The motion of the gun on recoil and counter-recoil automatically opens the breech, causing the breech-block to withdraw and eject the empty cartridge-case, cocks the firing-pin, feeds a fresh cartridge, closes the breech-block, and fires the gun. This cycle of operations is automatically repeated indefinitely as long as the supply of cartridges is maintained.

It will be seen that the various parts are so constructed that they may be readily assembled and dismantled without the use of any special tools. Thus the side B^{10} of the casing swings outward about a hinge b^{10} , as shown in Fig. 2. Also the end plate B^{11} of the casing swings about the hinge b^{11} and is held in place by tenon b^{12} and locked by the trigger-guard U^4 . Thus the interior of the casing containing the breech mechanism is readily accessible. Again, the catch K is connected to the plate B by a bayonet-joint. Again, the spring K' steps in a housing K^2 and may be readily inserted or removed when desired. Again, the sear J may be placed in the breech-block or removed therefrom at a single operation. Also the ejector T is held in place by the resiliency of the material of which it is made and may be readily removed. Also the plates Q and Q' may be taken out of their bearings by simply removing the loop-spring Q^2 . Also the bolt C^2 is attached to the gun by a bayonet-joint. The block H may also be removed from its journal-bearings, and, in fact, all of the various parts of the gun may be readily assembled and rapidly dismantled without the use of any special tools and without requiring any high degree of mechanical skill. Moreover, it will be seen that the various parts are comparatively heavy and strong and are not apt to get out of order; but if they do get out of order repairs or alterations can be readily made.

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

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

1. In an automatic gun, the combination with the gun-body with a breech-block chamber having intersecting grooves in the walls thereof, of a breech-block having ribs adapted to slide upward and downward and longitudinally in said grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, means for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for restoring the breech-block to the initial position, substantially as described.

2. In an automatic gun, the combination with the gun-body and a breech-block chamber provided with grooves, of the breech-block having ribs adapted to slide upward and downward in said grooves and also to slide longitudinally relative to said gun-body, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

3. In an automatic gun, the combination with the gun-body free to recoil and a recoil-spring for restoring the same to the initial position, of a breech-block chamber secured to or integral with said gun-body and provided with grooves therein, a breech-block having ribs engaging in said grooves and adapted to slide up or down and longitudinally relative to said breech-block chamber, automatic means for releasing the ribs on said breech-block from engagement with said grooves when the gun nears the end of the recoil, automatic means for holding the breech-block in approximately the rear position while the gun-body returns to the initial position, means actuated by the counter-recoil of the gun for releasing said breech-block, and means for automatically moving said breech-block, when released, forward and then upward to the closed position, substantially as described.

4. In an automatic gun, the combination with the gun-body provided with a breech-block chamber having slightly-inclined transverse grooves and longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for restoring the breech-block to the initial position, substantially as described.

5. In an automatic gun, the combination with the gun-body provided with a breech-block chamber having slightly-inclined transverse grooves and longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, a spring for restoring the gun to

the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and a spring and cam automatically actuated by the later movement of the gun on counter-recoil for restoring the breech-block to the initial position, substantially as described.

6. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves, and guide-ribs on said gun-body engaging said casing, a breech-block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

7. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves, and guide-ribs on said gun-body engaging said casing, a breech-block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and a spring with cam mechanism operated thereby, actuated by the counter-recoil of the gun for releasing the breech-block and restoring it to the initial position, substantially as described.

8. In an automatic gun, the combination with the gun-body free to recoil and a recoil-spring for restoring the same to the initial position, of a breech-block chamber secured to or integral with said gun-body and provided with grooves therein, a breech-block having ribs engaging in said grooves and adapted to slide up or down and longitudinally relative to said breech-block chamber, means for releasing the ribs on said breech-block from engagement with said grooves when the gun nears the end of the recoil, automatic means for holding the breech-block in approximately the rear position while the gun-body returns to the initial position, means actuated by the counter-recoil of the gun for releasing said breech-block, and a spring and cam mechanism for automatically moving said breech-block, when released, forward and then upward to the closed position, substantially as described.

9. In an automatic gun, the combination

with the gun-body free to recoil and a recoil-spring for restoring the same to the initial position, of a breech-block chamber secured to or integral with said gun-body and provided with grooves therein, a breech-block having ribs engaging in said grooves and adapted to slide up or down and longitudinally relative to said breech-block chamber, means for releasing the ribs on said breech-block from engagement with said grooves when the gun nears the end of the recoil, a spring-controlled toe for holding the breech-block in approximately the rear position while the gun-body returns to the initial position, but tripped by the gun on counter-recoil, and automatic mechanism for moving said breech-block, when released, forward and then upward to the closed position, substantially as described.

10. In an automatic gun, the combination with the gun-body with a breech-block chamber having intersecting grooves in the walls thereof, of a breech-block having ribs adapted to slide upward and downward and longitudinally in said grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, means for restoring the gun to the initial position on counter-recoil, a pivoted catch for holding the breech-block back temporarily, means actuated by the counter-recoil of the gun for tripping said catch, and means for restoring the breech-block to the initial position when released, substantially as described.

11. In an automatic gun, the combination with the gun-body and a breech-block chamber provided with grooves, of the breech-block having ribs adapted to slide upward and downward in said grooves and also to slide longitudinally relative to said gun-body, a cam and mechanism operating same for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun and for restoring the same to the closed position, a pivoted catch for holding the breech-block temporarily in the rear position, means for returning the gun-body to the initial position, and automatic means actuated by the counter-recoil of the gun for tripping said catch and releasing the breech-block, allowing it to return to the initial position, substantially as described.

12. In an automatic gun, the combination with the gun-body and a recoil-spring for restoring the same to the initial position, of a breech-block chamber secured to or integral with said gun-body and provided with grooves therein, a breech-block having ribs engaging in said grooves and adapted to slide up or down and longitudinally relative to said breech-block chamber, of a cam and mechanism operating same for releasing the ribs on said breech-block from engagement with said grooves when the gun nears the end of the recoil and for restoring the breech-block to the

closed position, a spring-impressed catch for holding the breech-block in approximately the rear position while the gun-body returns to the initial position, means actuated by the counter-recoil of the gun for tripping said catch and releasing said breech-block, allowing said breech-block to move forward and then upward to the closed position when released, substantially as described.

13. In an automatic gun, the combination with the gun-body provided with a breech-block chamber, of a breech-block adapted to slide upward and downward in and to slide rearward in said chamber, of automatic means for moving said breech-block downward and out of engagement with the walls of said chamber near the end of the recoil of the gun, automatic means for restoring the gun to the initial position on counter-recoil, automatic means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for releasing said breech-block, and means for restoring the same to the initial position, when released, substantially as described.

14. In an automatic gun, the combination with the gun-body and a breech-block chamber provided with downwardly-inclined transverse grooves, and also with rearwardly-extending grooves, of a breech-block having ribs adapted to slide upward and downward in said grooves and also to slide longitudinally in said rearwardly-extending grooves, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, automatic means for holding the breech-block temporarily in the rear position, means for returning the gun-body to the initial position, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

15. In an automatic gun, the combination with the gun-body free to recoil and a recoil-spring for restoring the same to the initial position, of a breech-block chamber secured to or integral with said gun-body and provided with downwardly-inclined, and also with rearwardly-extending grooves therein, a breech-block having ribs engaging in said grooves and adapted to slide up or down and longitudinally relative to said breech-block chamber, of a cam and mechanism operated by the recoil of the gun for releasing the ribs on said breech-block from engagement with said grooves when the gun nears the end of the recoil, automatic means for holding the breech-block in approximately the rear position while the gun-body returns to the initial position, means actuated by the counter-recoil of the gun for releasing said breech-block, and a coil-spring automatically moving said breech-block forward when released, and also operating said cam to move the breech-

block upward to the closed position when said ribs and grooves register with each other, substantially as described.

16. In an automatic gun, the combination with the gun-body provided with a breech-block chamber having slightly-inclined transverse grooves and also longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, an extractor mounted on the nose of the breech-block and engaging the rim of the cartridge-case when the breech-block moves down, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for restoring the breech-block to the initial position, when released, substantially as described.

17. In an automatic gun, the combination with the gun-body provided with a breech-block chamber having slightly-inclined transverse grooves and longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, an extractor mounted on the nose of the breech-block and engaging the rim of the cartridge-case when the breech moves down, a resilient ejector mounted on the breech-block and operated by the gun on counter-recoil, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for restoring the breech-block to the initial position, when released, substantially as described.

18. In an automatic gun, the combination with the gun-body provided with a breech-block chamber, having slightly-inclined transverse grooves and also longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, an extractor mounted on the nose of the breech-block and engaging the rim of the cartridge-case when the breech moves down, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and a spring and cam auto-

matically actuated by the latter movement of the gun on counter-recoil for restoring the breech-block to the initial position, substantially as described.

19. In an automatic gun, the combination with the gun-body provided with a breech-block chamber, having slightly-inclined transverse grooves and also longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves, and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, an extractor mounted on the nose of the breech-block and engaging the rim of the cartridge-case when the breech moves down, a resilient ejector mounted on the breech-block and operated by the gun on counter-recoil, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and a spring and cam automatically actuated by the later movement of the gun on counter-recoil for restoring the breech-block to the initial position, substantially as described.

20. In an automatic gun, the combination with the gun-body with a breech-block chamber having slightly-inclined transverse grooves, and also longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block forward out of engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block and provided with a head, a spring-catch adapted to engage said head and cock said pin during the first part of the forward movement of said breech-block, with means operated by the further movement of the breech-block for releasing said catch, a sear holding said pin in the cocked position when released by said catch, means for tripping said sear when the breech is closed, means for restoring the gun to the initial position on counter-recoil, and means for subsequently restoring the breech-block to the initial position, substantially as described.

21. In an automatic gun, the combination with the gun-body provided with a breech-block chamber, having slightly-inclined transverse grooves and longitudinal grooves in the walls thereof a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun,

a spring for restoring the gun to the initial position on counter-recoil, a spring-impressed firing-pin mounted in said breech-block and provided with a head, a spring-catch adapted to engage said head and cock said pin during the first part of the forward movement of said breech-block, with means operated by the further movement of the breech for releasing said catch, a sear holding said pin in the cocked position when released by said catch, means for tripping said sear when the breech is closed, means for holding the breech-block back temporarily during the counter-recoil of the gun, and a spring and cam automatically actuated by the later movement of the gun on counter-recoil for restoring the breech to the initial position, substantially as described.

22. In an automatic gun, the combination with the gun-body provided with a breech-block chamber having slightly-inclined transverse grooves and also longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves, and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block, means for cocking same during the early forward movement of the breech-block, and for releasing same when the breech-block returns to the closed position, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and means for restoring the breech-block to the initial position when released, substantially as described.

23. In an automatic gun, the combination with the gun-body provided with a breech-block chamber, having slightly-inclined transverse grooves and longitudinal grooves in the walls thereof, of a breech-block having inclined ribs adapted to slide upward and downward in said inclined transverse grooves and backward and forward in said longitudinal grooves, automatic means for moving said breech-block downward out of engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block, means for cocking same during the early forward movement of the breech-block, and for releasing same when the breech-block returns to the closed position, a spring for restoring the gun to the initial position on counter-recoil, means for holding the breech-block back temporarily during the counter-recoil of the gun, and a spring and cam automatically actuated by the latter movement of the gun on counter-recoil for restoring the breech-block to the initial position, substantially as described.

24. In an automatic gun, the combination

with the gun-body having a breech-block chamber provided with grooves, of a breech-block having ribs adapted to slide upward and downward and rearward in said grooves, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block, means for cocking same during the early forward movement of the breech-block, and for releasing same when the breech-block returns to the closed position, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

25. In an automatic gun, the combination with the gun-body having a breech-block chamber provided with grooves, of a breech-block having ribs adapted to slide upward and downward and rearward in said grooves, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block and provided with a head, a spring-catch adapted to engage said head and cock said pin during the first part of the forward movement of said breech-block, with means operated by the further movement of the breech-block for releasing said catch, a sear holding said pin in the cocked position when released by said catch, means for tripping said sear when the breech is closed, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

26. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves, and guide-ribs on said gun-body engaging said casing, a breech-block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block, means for cocking same during the early forward movement of the breech-block, and for releasing same when the breech-block returns to the closed position, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and a spring with cam mechanism

operated thereby, actuated by the counter-recoil of the gun for releasing the breech-block and restoring it to the initial position, substantially as described.

27. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves, and guide-ribs on said gun-body engaging said casing, a breech-block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body, of automatic means for releasing said breech-block from engagement with said grooves near the end of the recoil of the gun, a spring-impressed firing-pin mounted in said breech-block and provided with a head, a spring-catch adapted to engage said head and cock said pin during the first part of the forward movement of said breech-block, with means operated by the further movement of the breech-block for releasing said catch, a sear holding said pin in the cocked position when released by said catch, means for tripping said sear when the breech is closed, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, and a spring with cam mechanism operated thereby, actuated by the counter-recoil of the gun for releasing the breech-block and restoring it to the initial position, substantially as described.

28. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves and guide-ribs on said gun-body engaging said casing, spring-impressed guard-plates pivoted on said gun-body and projecting into grooves in said casing, and also into said block-chamber, a breech-block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body, and to project between said plates when in the closed position, of automatic means for releasing said breech-block from engagement with said grooves in the breech-block chamber near the end of the recoil of the gun, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, means for feeding cartridges *seriatim* above said plates, and means actuated by the counter-recoil of the gun for releasing the breech-block, and means for restoring it to the initial position, substantially as described.

29. In an automatic gun, the combination with a casing with guide-grooves therein, of the gun-body having a breech-block chamber provided with grooves and guide-ribs on said gun-body engaging said casing, spring-impressed guard-plates pivoted on said gun-body and projecting into grooves in said casing, and also into said breech-block chamber, a breech-

block having ribs adapted to slide upward and downward in the grooves in said breech-block chamber and also to slide longitudinally relative to said gun-body and to project between said plates when in the closed position, of automatic means for releasing said breech-block from engagement with said grooves in the breech-block chamber near the end of the recoil of the gun, automatic means for holding the breech-block in the rear position, means for returning the gun-body to the initial position, means for feeding cartridges *seriatim* above said plates, and a spring with cam mechanism operated thereby, actuated by the counter-recoil of the gun for releasing the breech-block and restoring it to the initial position, substantially as described.

30. In an automatic gun, the combination with a casing provided with guide-grooves therein, of a gun-body mounted to recoil in said casing and having lugs projecting into said guide-grooves, said gun-body being provided with breech-block chamber with slots through the side walls thereof, a breech-block adapted to be moved upward, downward, and rearward relative to said chamber, guard-plates pivoted to said gun-body and projecting into said slots in the walls of the breech-block chamber and also in the grooves in the casing, of a spring normally tending to snap said plates together when the breech is open, but allowing the breech-block to spread said plates apart in closing the breech, with means for feeding cartridges *seriatim* to the top of said plates when the breech is open, substantially as described.

31. In an automatic gun, the combination with a casing provided with guide-grooves therein, of a gun-body mounted to recoil in said casing and having lugs projecting into said guide-grooves, said gun-body being provided with a breech-block chamber with slots through the side walls thereof, a breech-block adapted to be moved upward, downward, and rearward relative to said chamber, guard-plates pivoted to said gun-body and projecting into said slots in the walls of the breech-block chamber and also in the grooves in the casing, of a spring normally tending to snap said plates together when the breech is open, but allowing the breech-block to spread said plates apart in closing the breech, extractor mechanism carried by the breech-block and ejecting the empty cartridge-case before said plates snap to, with means for feeding cartridges *seriatim* to the top of said plates when the breech is open, substantially as described.

32. In a breech-loading gun, the combination with the gun-body provided with a rearward extension and a breech-block chamber therein, of a breech-block reciprocating in said chamber with means for locking said breech-block in said chamber, guard-plates pivoted to the gun-body and projecting through slots

in the walls of said chamber and normally forming a bottom therefor when the breech is open, but spread apart by the breech-block when the latter is in the closed or partially-closed position, and a spring normally tending to snap the said plates together against the wedging action of said breech-block, with means for feeding cartridges *seriatim* on said plates when the breech is open, substantially as described.

33. In a breech-loading gun, the combination with the gun-body provided with a rearward extension and a breech-block chamber therein, of a breech-block reciprocating in said chamber with means for locking said breech-block in said chamber, guard-plates pivoted to the gun-body and projecting through slots in the walls of said chamber and normally forming a bottom therefor when the breech is open, but spread apart by the breech block when the latter is in the closed or partially-closed position, and a spring normally tending to snap the said plates together against the wedging action of said breech-block, extractor mechanism carried by the breech-block and ejecting the empty case while the plates are spread apart by the breech-block, with means for feeding cartridges *seriatim* above said plates when the breech is open, substantially as described.

34. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith and stuffing-boxes in said water-jacket, of a gun-barrel recoiling in said stuffing-boxes, a tube extending through said water-jacket, and a recoil-spring mounted in said tube and connected to the gun-body, substantially as described.

35. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith and stuffing-boxes in said water-jacket, of a gun-barrel recoiling in said stuffing-boxes, a tube extending through said water-jacket, and a recoil-spring mounted in said tube and connected to the gun-body, with means for adjusting the tension on said spring, substantially as described.

36. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith and stuffing-boxes in said water-jacket, of a gun-barrel recoiling in said stuffing-boxes, a tube extending through said water-jacket, and a recoil-spring mounted in said tube and connected to the gun-body, with a screw projecting into the front end of said tube and secured to said spring, and means for setting up on said screw and thereby adjusting the tension on said spring, substantially as described.

37. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith and stuffing-boxes in said water-jacket, of a gun-barrel recoiling through said stuffing-boxes, a slotted lug projecting

from said gun-barrel, a tube extending through said water-jacket, a recoil-spring mounted in said tube, and a bolt and bayonet-joint connecting said spring with said lug, substantially as and for the purposes described.

38. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith and stuffing-boxes in said water-jacket, of a gun-barrel recoiling through said stuffing-boxes, a slotted lug projecting from said gun-barrel, a tube extending through said water-jacket, a recoil-spring mounted in said tube, and a bolt and bayonet-joint connecting said spring with said lug, with means provided at the opposite ends of said tube for adjusting the tension on said spring, substantially as described.

39. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith, with stuffing-boxes in said water-jacket, of a gun-barrel sliding in said stuffing-boxes, a breech-block and breech mechanism, and two tubes projecting through said water-jacket, a coil-spring in each tube, the one connected to the gun to restore it to the initial position and the other connected to the breech mechanism for operating the same, substantially as described.

40. In an automatic gun, the combination with a casing and a water-jacket secured to or integral therewith, with stuffing-boxes in said water-jacket, of a gun-barrel sliding in said stuffing-boxes, a breech-block and breech mechanism, and two tubes projecting through said water-jacket, a coil-spring in each tube, the one connected to the gun for restoring it to the initial position, and the other connected to the breech mechanism for operating the same, with means for adjusting the tension of the springs in said tubes, substantially as described.

41. The combination with the gun-body having a breech-block chamber in its breech, with a breech-block sliding longitudinally in said chamber and guard-plates pivoted to said gun-body, and projecting into said chamber and normally spread apart by said breech-block, with means for swinging said guard-plates together when the breech-block is withdrawn, substantially as described.

42. The combination with the gun-body having a breech-block chamber in its breech with a breech-block sliding longitudinally in said chamber and guard-plates pivoted to said gun-body, and projecting into said chamber and normally spread apart by said breech-block, with a spring for swinging said guard-plates together when the breech-block is withdrawn, substantially as described.

43. The combination with the gun-body having a breech-block chamber in its breech with a breech-block sliding longitudinally in said chamber and guard-plates pivoted to said gun-body, and projecting into said chamber and

normally spread apart by said breech-block, with a U-shaped spring passing over the breech of the gun and having its ends engaging said plates, substantially as and for the purposes described.

44. The means for arresting the cartridge in a breech-loading gun which consists of a pair of guard-plates pivoted to the gun-body and projecting into the breech-block chamber, and a spring tending to draw said guard-plates together and obstruct the passage for the cartridge through said chamber, substantially as described.

45. In an automatic gun, the means for beginning the cycle of operations by hand, which comprises a rack attached to the gun-barrel, and a shaft passing through one of the trunnions of the gun, a segmental pinion mounted on said shaft normally out of engagement with said rack, but engaging same when turned through the required angle, and a hand-crank for turning said pinion, substantially as described.

46. In an automatic gun, the combination with the casing and the gun-barrel mounted to recoil in said casing, of a hollow trunnion forming one of the bearings of said casing, a shaft projecting through said hollow trunnion, a segmental gear on one end of said shaft and a hand-crank on the other, and a rack attached to the gun-barrel and normally disengaged from but engaging with said segmental gear when said handle is turned, whereby the gun is moved to the rear against the action of the recoil-spring and is automatically released at the desired moment, substantially as and for the purposes described.

47. In a loading apparatus for guns of the character described, the combination with a casing with a throat therein opening above the breech-block chamber, of a block P pivoted in said casing and having an arm P' normally adapted to block said throat, and a curved groove P^o to receive a single cartridge, with a cam-groove p' on the back of said block, and a stud carried by the gun-body and engaging in said cam-groove to rock said block, whereby the cartridges are fed *seriatim* to the breech-block chamber after each fire of the gun, substantially as described.

48. In a loading apparatus for guns of the character described, the combination with the casing provided with a throat for the passage of cartridges, of the gun-body sliding therein, a revoluble hopper mounted above said casing and divided by a series of radial partitions into wedge-shaped chambers, each adapted to contain a column of cartridges, a circular rack on the base of the hopper having flat faces between the teeth, a spring-pawl carried by the gun for rotating the hopper through the angle subtended by the said chamber after each fire of the gun, the said pawl having a flat edge adapted to contact with one

of the flat faces between said teeth and thus arrest the further rotation of the hopper, means for withdrawing the cartridges *seriatim* from the bottom of each chamber as the hopper rotates, and feeding same to the gun, substantially as described.

49. In an automatic gun, the combination with a casing provided with guide-grooves and a shoulder on the inner walls thereof, of a gun-body mounted to slide in said casing, a breech-block mounted to slide up and down and longitudinally in the breech-block chamber of said gun-body and provided with downwardly projecting lugs, a shaft journaled in said lugs, eccentrics mounted on said shaft and normally bearing on the floor of said casing and supporting the breech-block, a spring under tension normally tending to hold said eccentrics with their maximum throw upward, thus holding the breech-block in the closed position, an arm carried by said shaft and adapted to strike said shoulder in said casing as the gun recoils, whereby said shaft is rocked, causing said eccentrics to draw said breech-block downward, a spring-catch locking said eccentrics against the action of said spring when the breech-block is in the open position, and means actuated by the counter-recoil of the gun for tripping said spring-catch and releasing said eccentrics, whereby the breech-block is dragged forward by said spring and then moved upward to the initial position, substantially as described.

50. In an automatic gun, the combination with a casing provided with guide-grooves and a shoulder on the inner wall thereof, of a gun-body mounted to slide in said casing, a breech-block mounted to slide up and down and longitudinally in the breech-block chamber of said gun-body and provided with downwardly-projecting lugs, a shaft journaled in said lugs, eccentrics mounted on said shaft and normally bearing on the floor of said casing and supporting the breech-block, a spring under tension normally tending to hold said eccentrics with their maximum throw upward, thus holding the breech-block in the closed position, an arm carried by said shaft and adapted to strike said shoulder in said casing as the gun recoils, whereby said shaft is rocked, causing said eccentrics to draw said breech-block downward, a spring-catch locking said eccentrics against the action of said spring when the breech-block is in the open position, a toe on said spring-catch, and a projection on the gun adapted to engage said toe on counter-recoil and trip said catch, whereby the said spring is free to drag said breech-block forward and to operate said eccentric, causing it to move the breech-block to the closed position, substantially as described.

51. In an automatic gun, the combination with a breech-block adapted to slide downward and longitudinally relative to the gun, of an extractor secured to the nose of said

breech-block and adapted to engage the rim of the cartridge-case in its downward motion and to draw the cartridge-case out on counter-recoil, substantially as described.

52. In an automatic gun, the combination with a breech-block adapted to move backward with the gun and then to slide downward, of a bifurcated extractor mounted on the nose of said breech-block, and a spring-ejector mounted on the top of said breech-block and adapted to be struck by the gun on counter-recoil prior to the return of the breech-block to the initial position, substantially as described.

53. In an automatic gun, the combination with a casing and a gun-body mounted to recoil therein, of a breech-block adapted to move downward and longitudinally relative to said gun, means for holding the breech-block temporarily in the rear position, and an extractor carried by the nose of said breech-block and adapted to engage the rim of the cartridge-case and to pull out the cartridge-case during the counter-recoil of the gun, substantially as described.

54. In an automatic gun, the combination with a casing and a gun-body mounted to recoil therein, of a breech-block adapted to move downward and longitudinally relative to said gun, means for holding the breech-block temporarily in the rear position, a bifurcated extractor secured to the nose of the breech-block and adapted to engage the rim of the cartridge-case when the breech-block descends and pull the cartridge-case out of the gun on counter-recoil, and a spring-ejector mounted on the top of the breech-block and pressed into the bifurcation of said extractor by the gun-body on counter-recoil, substantially as described.

55. The combination with a breech-block adapted to move downward and longitudinally relative to the gun, of an extractor operated by the breech-block and a resilient ejector formed of a single spring fitting in a groove on the top of the breech-block with a tongue engaging in a notch in said breech-block and a pin on the breech-block engaging said ejector and holding the same in place, substantially as described.

56. The combination with the breech-block D grooved on its top, of an extractor carried by the breech-block and a resilient ejector T having the tongue t^b fitting in a notch in the top of the breech-block, a shoulder t^2 , and a lug t' adapted to be struck by the gun-body on counter-recoil, and a pin t^3 in the top of the breech-block engaging the said shoulder t^2 , substantially as described.

57. The combination with a casing and a gun mounted to recoil therein, of a breech-block mounted in said gun and adapted to move backward therewith and then to move downward, a lug on said breech-block, a spring-impressed firing-pin provided with a head and mounted in said breech-block, a spring-

impressed catch adapted to engage the head of said firing-pin when the breech-block is moved down, a toe on said catch engaging said lug when the breech-block moves forward, a spring-sear carried by the breech-block and adapted to engage the head of said firing-pin and hold the same in the cocked position after it has been released from said catch, and means for tripping said sear when the breech-block reaches the closed position, substantially as described.

58. A casing for automatic guns consisting of a substantially rectangular box having grooves in the side walls thereof, one side of said box being hinged to swing out freely,

the end of said box being closed by a hinged plate, tenoned to register with a groove in the end of the hinged side, with a firing mechanism controlled by a trigger mounted in said casing, and a combined latch and trigger-guard for holding said end plate to said hinged side and for protecting said trigger, substantially as described.

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

WILLIAM HALE DRIGGS.

Witnesses:

J. STEPHEN GIUSTA,
FRED W. ENGLERT.