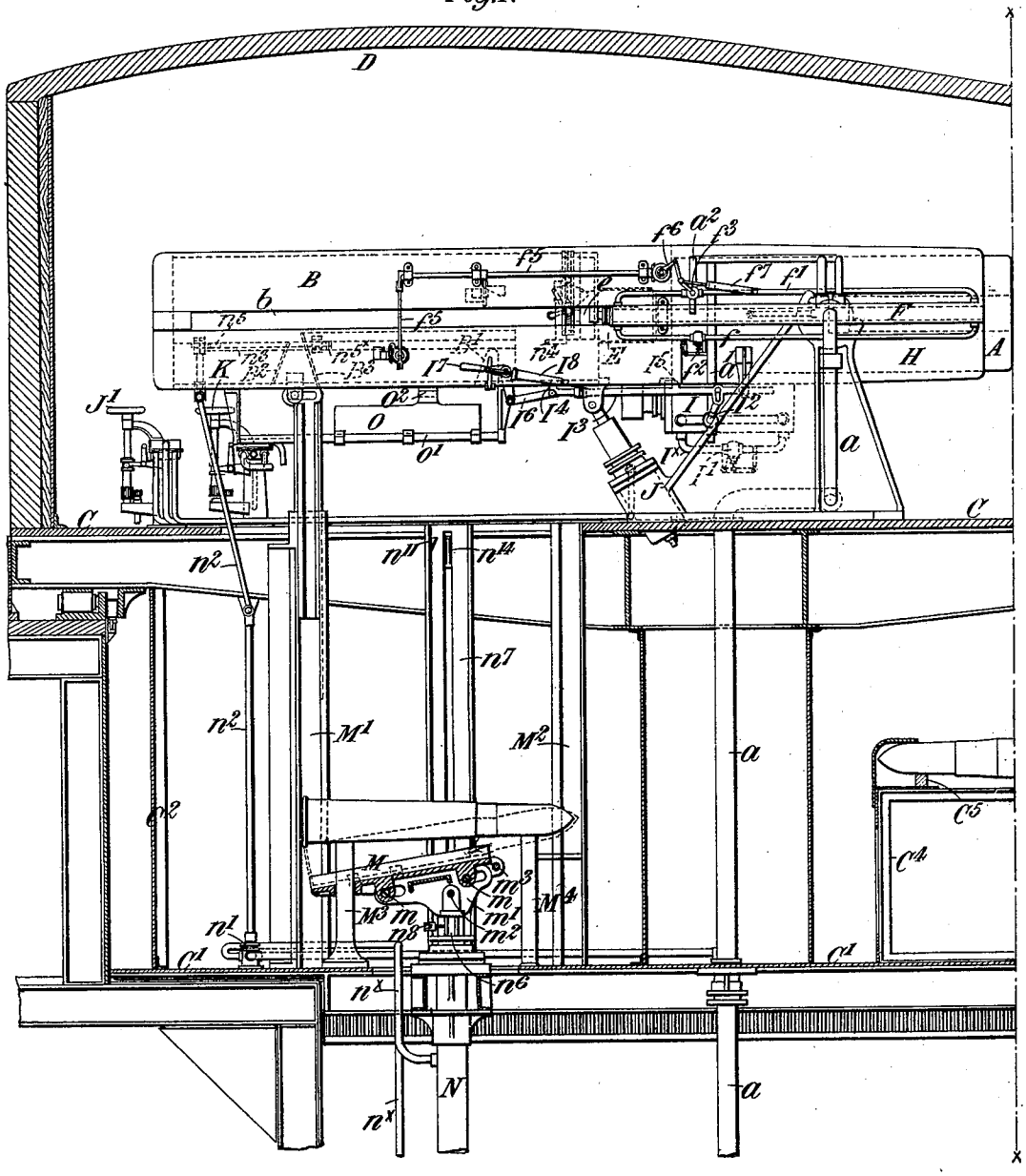
(No Model.) 11 Sheets—Sheet 1.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

No. 593,227. Patented Nov. 9, 1897.

Fig. 1.



Witnesses:
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James K. Gatlow.

Hiram S. Maxim, Inventor
by Parker W. Page, Atty.

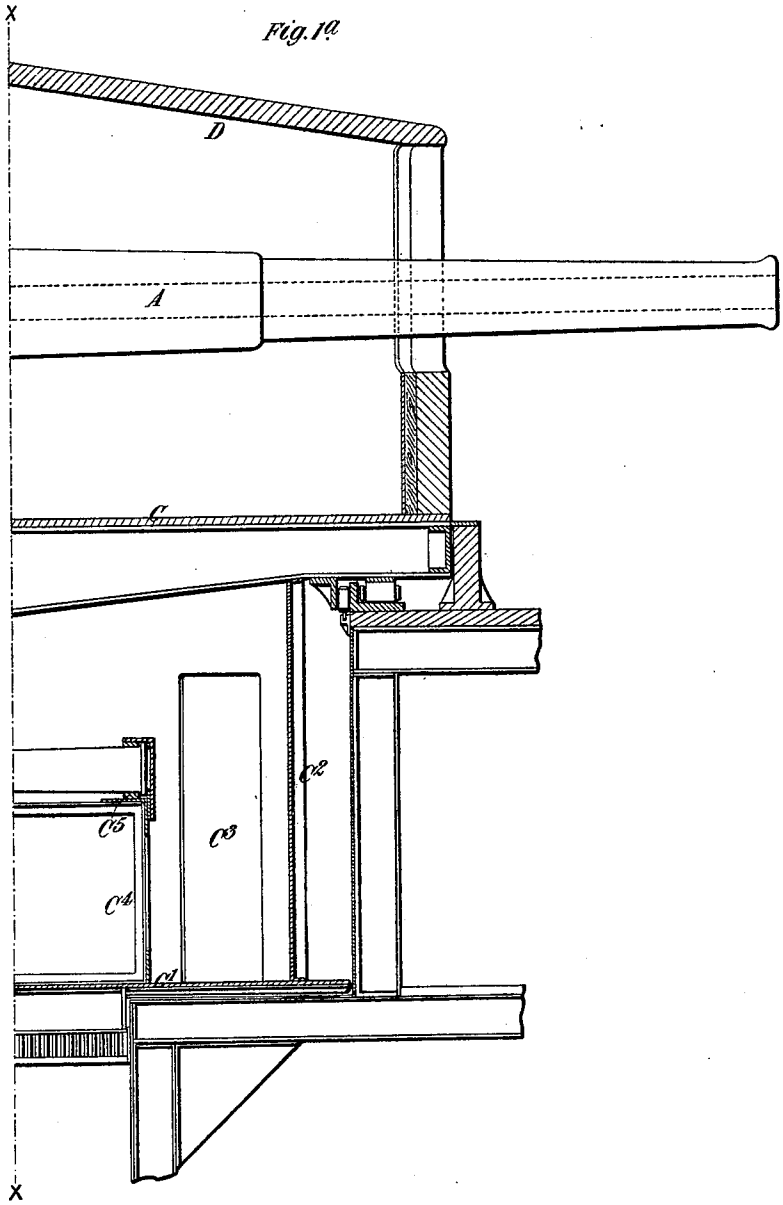
(No Model.) 11 Sheets—Sheet 2.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

No. 593,227. Patented Nov. 9, 1897.

Fig. 1a.



Witnesses:
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(No Model.) 11 Sheets—Sheet 3.

H. S. MAXIM.

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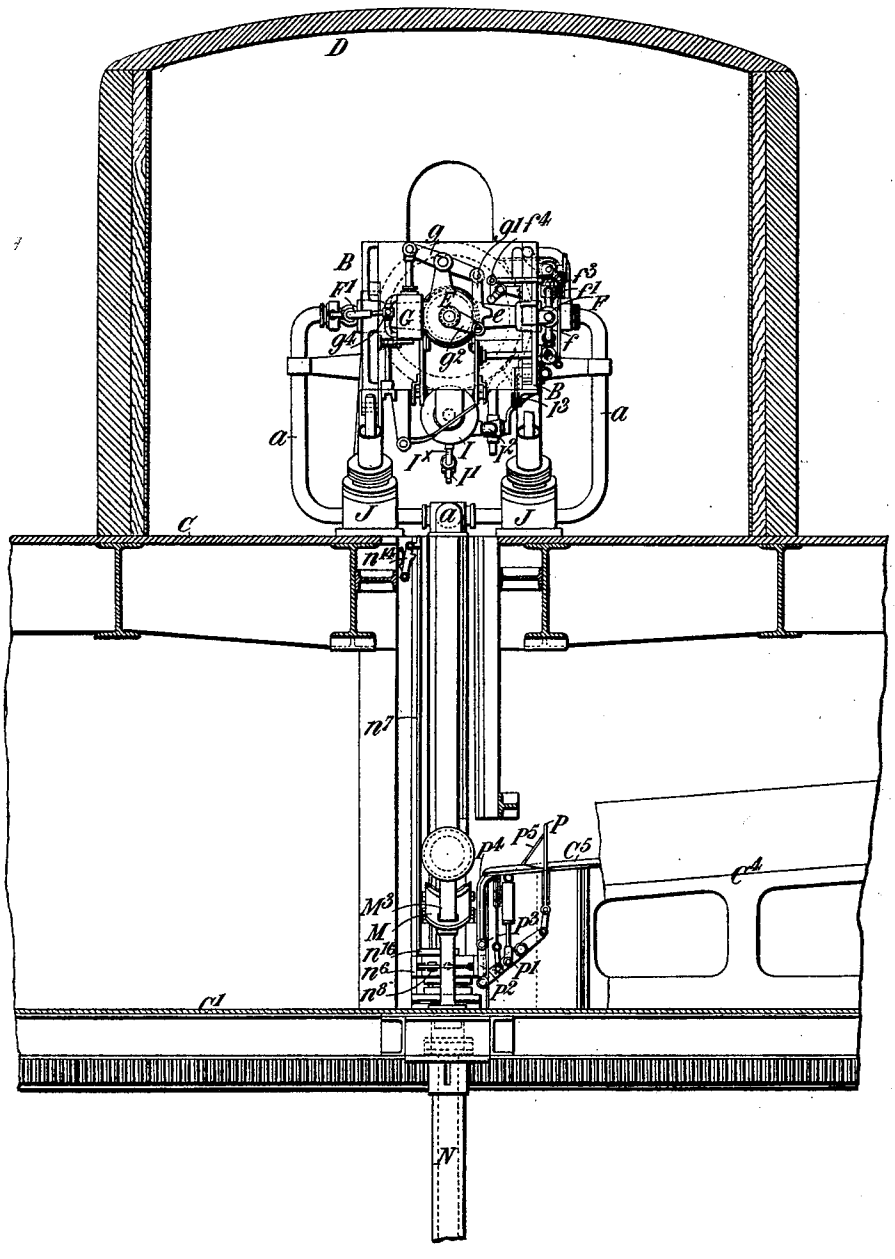
Fig. 2.



Witnesses:
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(No Model.) 11 Sheets—Sheet 4.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

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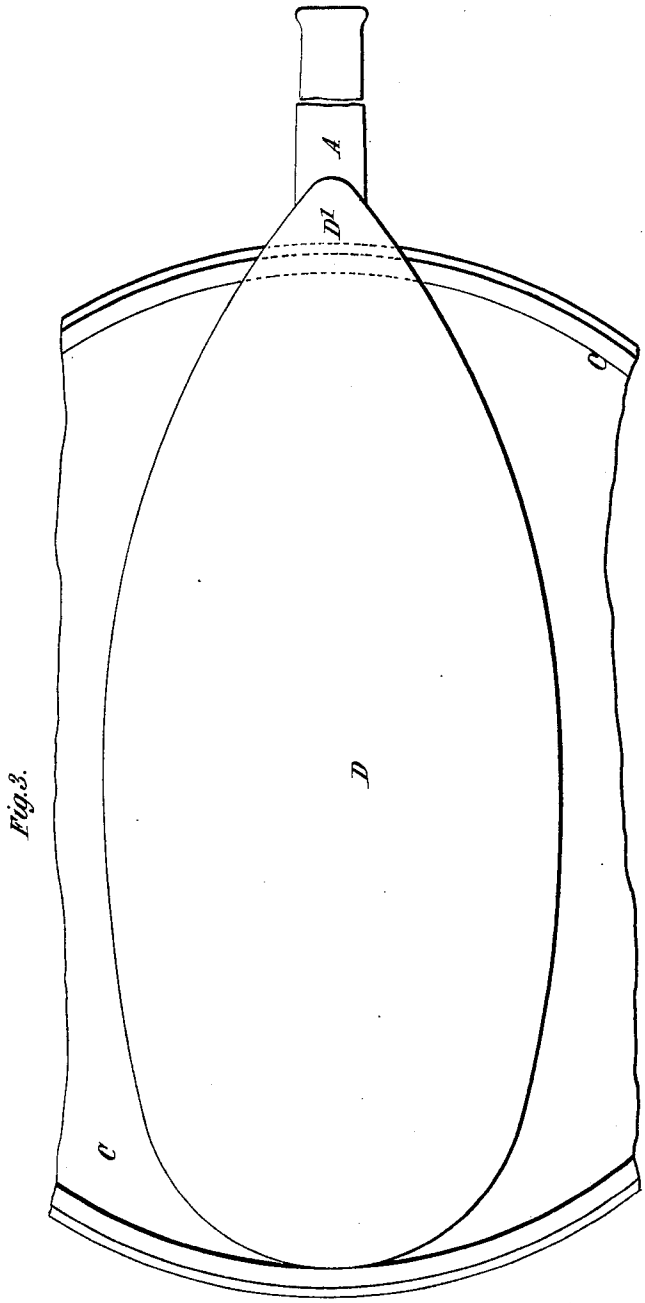

Fig. 3.

Witnesses:
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(No Model.) 11 Sheets—Sheet 5.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

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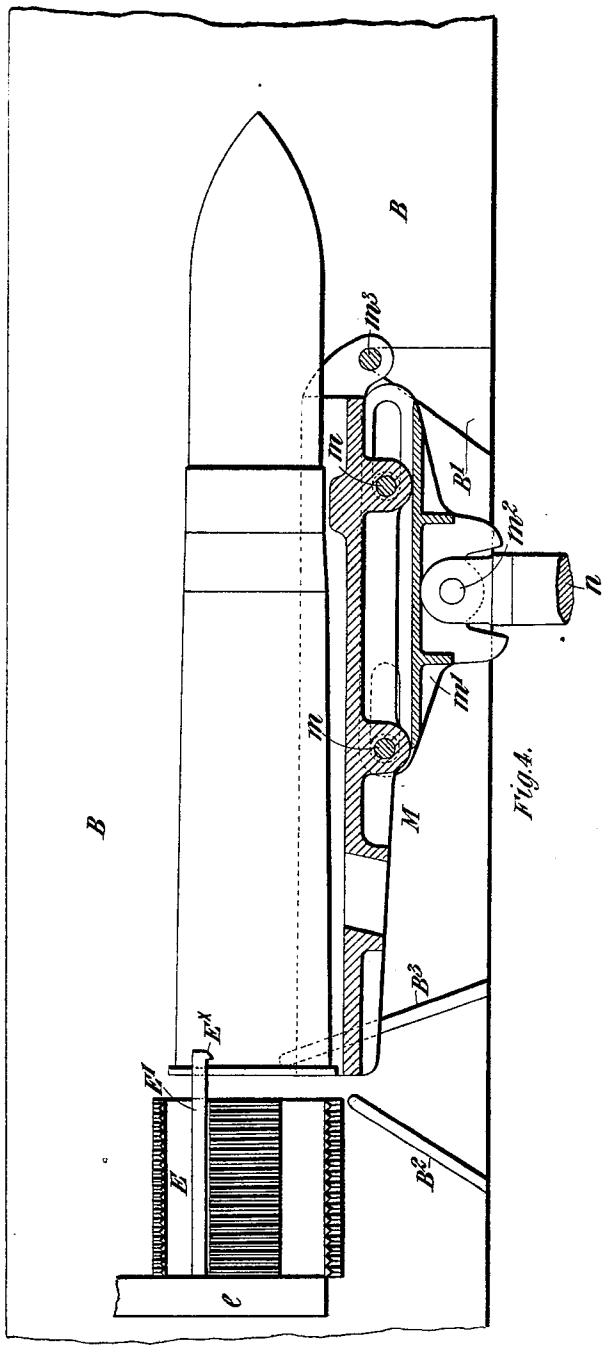

Fig. 4.

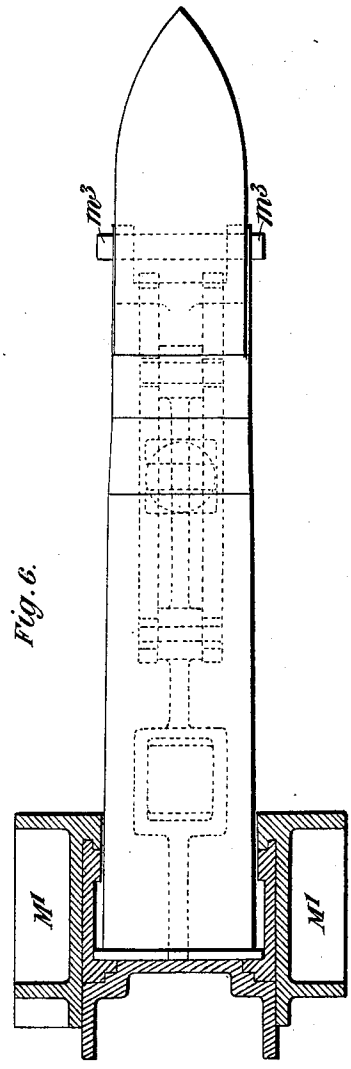

Fig. 6.

Witnesses
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(No Model.) 11 Sheets—Sheet 6.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

No. 593,227. Patented Nov. 9, 1897.

Fig. 5.

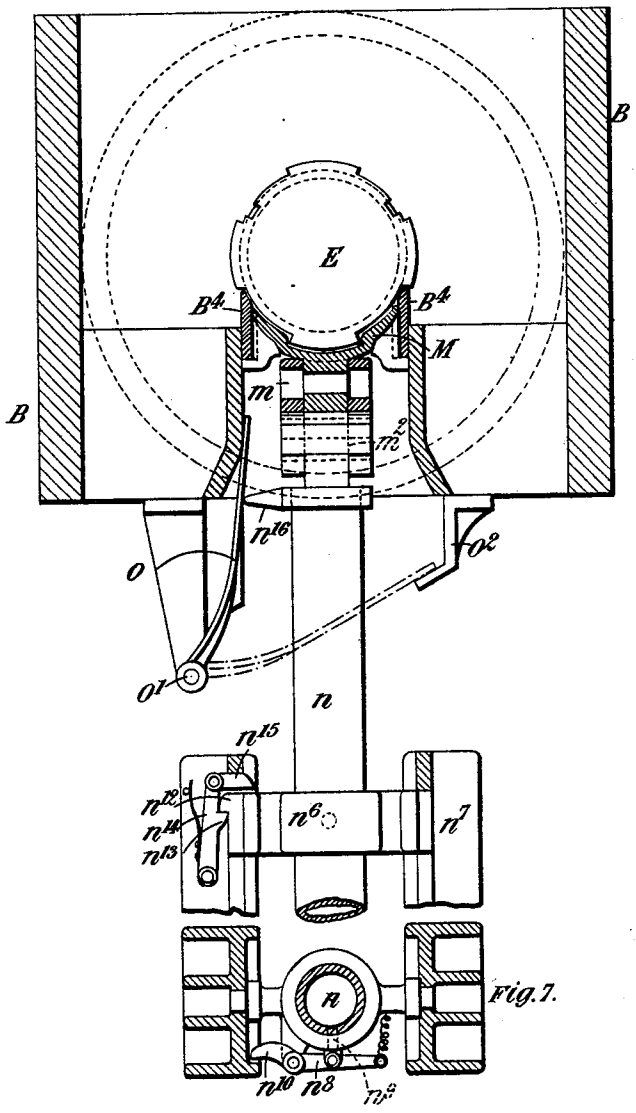

Fig. 7.

Witnesses:
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(No Model.) 11 Sheets—Sheet 7.

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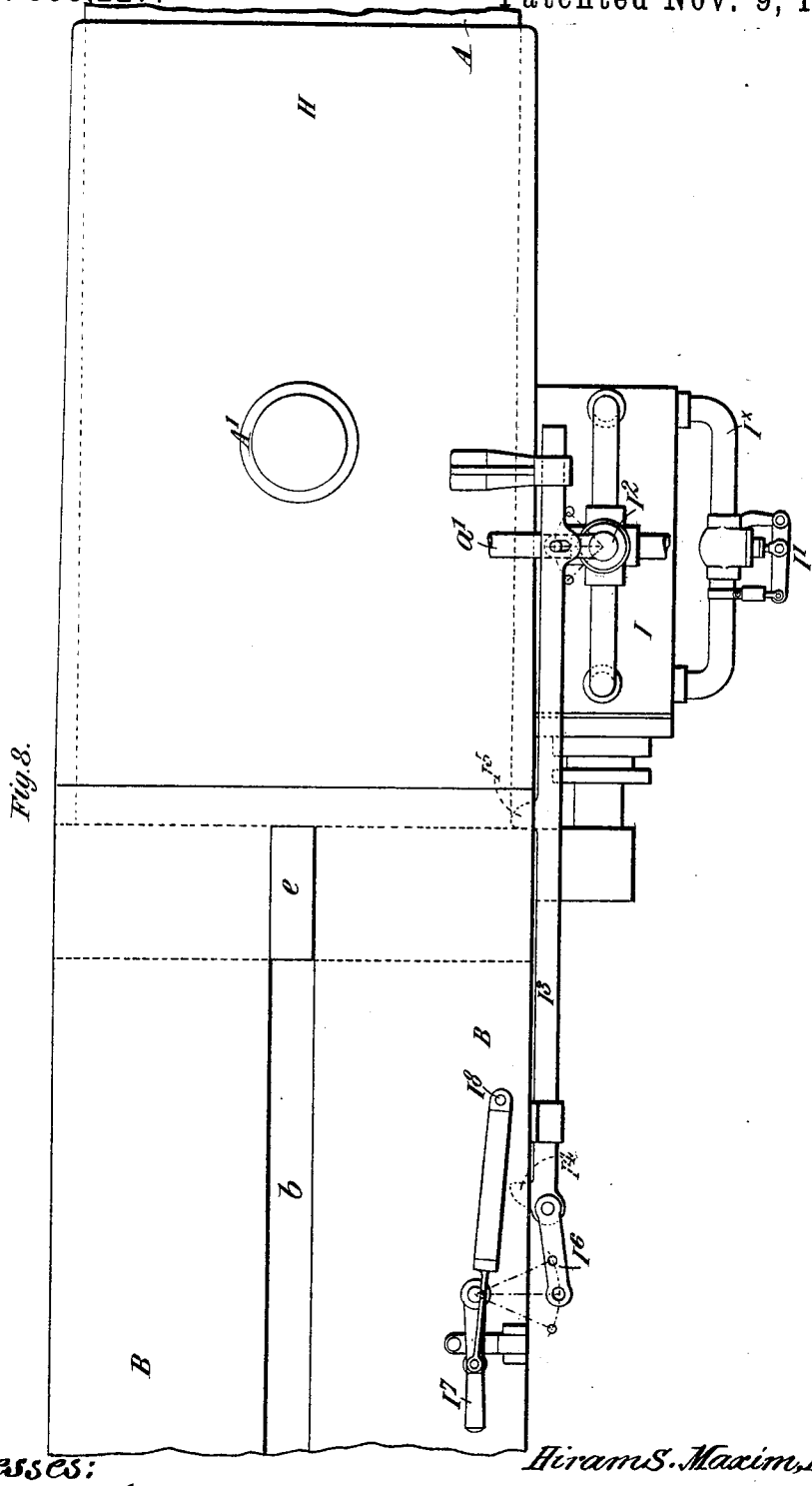

Fig. 8.

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(No Model.) 11 Sheets—Sheet 8.

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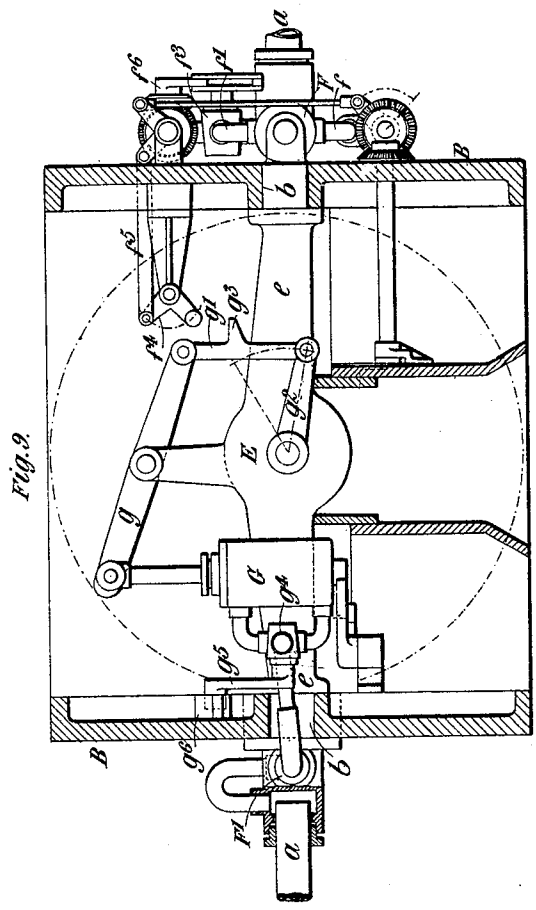
AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

No. 593,227. Patented Nov. 9, 1897.

Fig. 9.



Witnesses:
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(No Model.) 11 Sheets—Sheet 9.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

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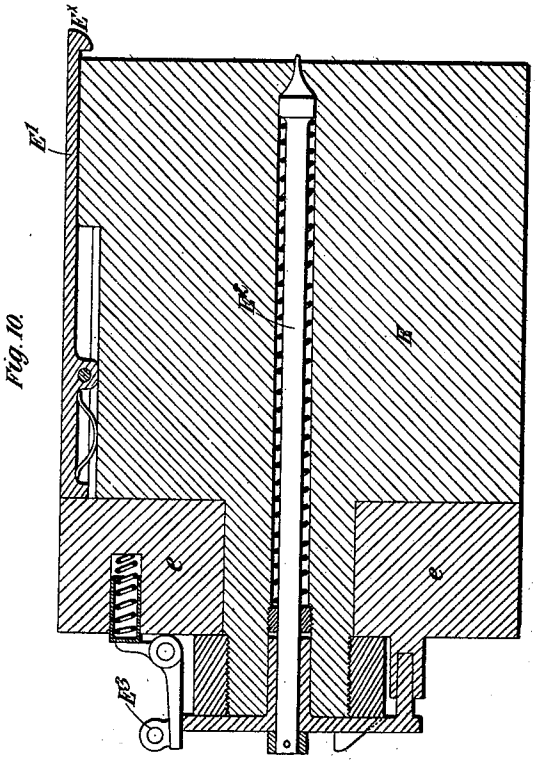

Fig. 10.

Witnesses:
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(No Model.) 11 Sheets—Sheet 10.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

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Fig. 11.

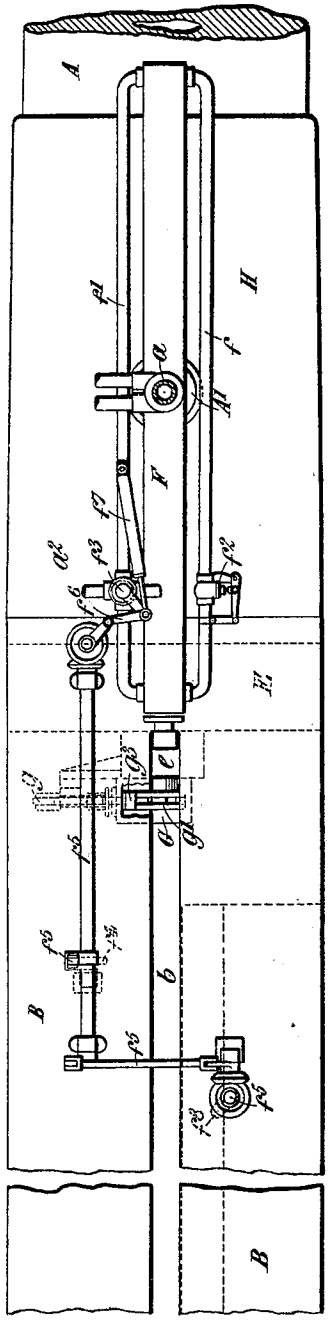
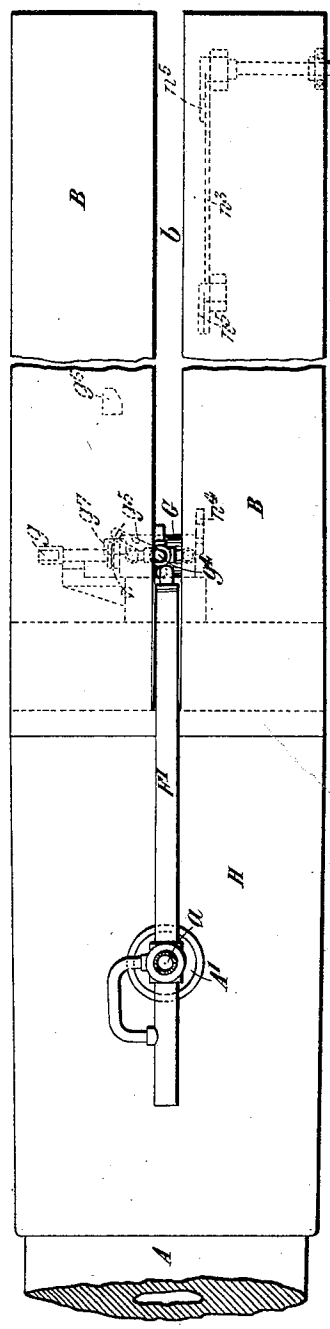


Fig. 12.



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Benjamin Miller,

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By Parkerson Page
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(No Model.) 11 Sheets—Sheet 11.

H. S. MAXIM.

AUTOMATIC LOADING MECHANISM FOR QUICK FIRING ORDNANCE.

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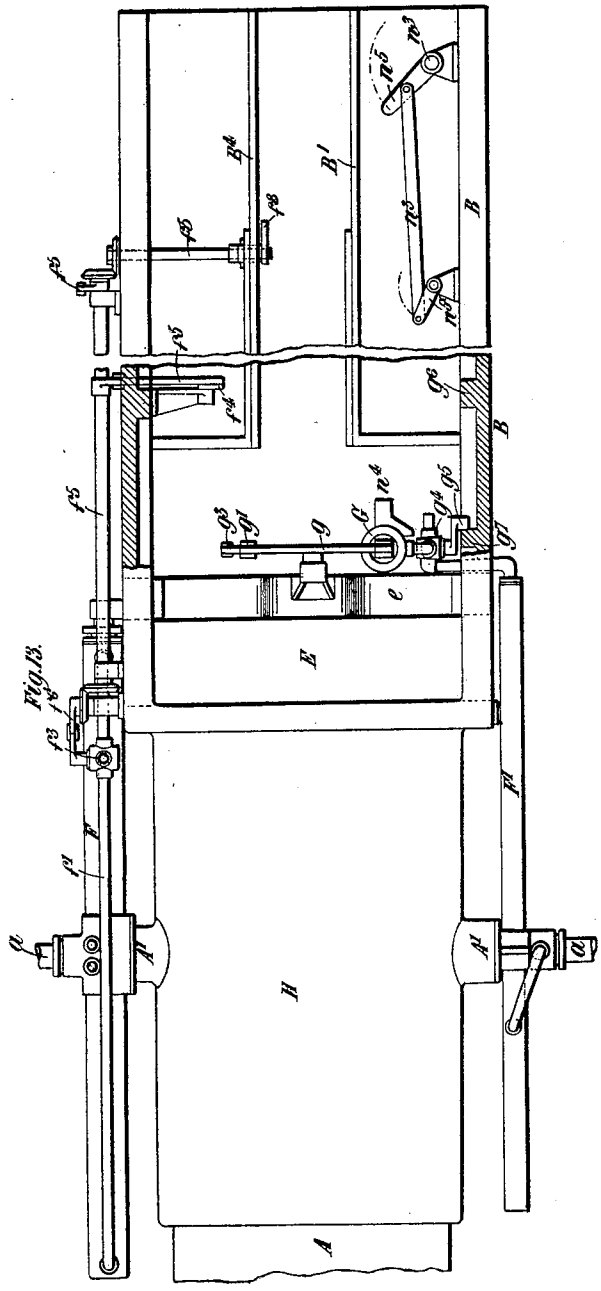

Fig. 13.

Witnesses:
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Hiram S. Maxim.
By Parkinson. Page atty.

UNITED STATES PATENT OFFICE.

HIRAM STEVENS MAXIM, OF LONDON, ENGLAND, ASSIGNOR TO THE MAXIM-NORDENFELT GUNS AND AMMUNITION COMPANY, LIMITED, OF SAME PLACE.

AUTOMATIC LOADING MECHANISM FOR QUICK-FIRING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 593,227, dated November 9, 1897.

Application filed February 8, 1896. Serial No. 578,488. (No model.) Patented in England January 17, 1895, No. 1,166, and in France January 10, 1896, No. 253,118.

To all whom it may concern:

Be it known that I, HIRAM STEVENS MAXIM, mechanical engineer, a citizen of the United States, residing at 18 Queens Gate Place, London, in the county of Middlesex, England, have invented certain new and useful Improvements relating to Quick-Firing Ordnance, of which the following is a specification, reference being had to the accompanying drawings.

I have obtained patents for this invention in the following countries: Great Britain, No. 1,166, dated January 17, 1895, and France, No. 253,118, dated January 10, 1896.

Very large naval guns—*i. e.*, guns with a caliber of from nine to fourteen inches—as usually worked can only be fired at a very moderate rate. In an engagement the time that must elapse after one shot has been fired before another can be delivered would be sufficient for the whole aspect of affairs to have changed, and in the case of a gun mounted in a fort the ship at which the gun is firing might be completely out of range by the time that the gun could be reloaded after firing. Moreover, by reason of the time required for loading the gun the gunner cannot profit by observation of the result of the previous shot. For instance, if he could find that the previous shot fell short of the object the gunner would not be able to correct this error at the next shot because of the alteration in the distance or range due to the ship's movements. The very large guns now in the service will probably be exceedingly unreliable in an actual engagement, especially if the ship should be in a seaway, the excitement of the men and the motion of the ship being both conducive to errors in the manipulation of the numerous valves and handles that are necessary to perform the functions of loading and firing. By my invention I propose to obviate these difficulties by providing for performing all the functions except the firing by machinery, so that the gunner has only to pull a lanyard or manipulate some equally simple device in order to discharge the piece—that is to say, assuming the gun to be loaded, the gunner aims and fires, and in a few seconds after the discharge the gun is automatically reloaded and ready for another shot, the gunner having only to sight the object and again pull the lanyard.

The working of the gun may be effected by water, compressed air, steam, or electricity. I prefer, however, to employ water or other liquid under a high pressure.

One of the essential features of this invention is that in the working of the gun one part of the mechanism having partly or completely finished its action actuates a valve or switch in such a manner as to start another part of the mechanism, which in its turn, after having having partly or completely finished its action, starts another part of the mechanism, and so on throughout the entire cycle of operations that take place between one discharge and the next discharge of the gun, except the firing.

Another feature of my invention is the manner of testing the action of the mechanism without firing. In the Maxim gun the automatic mechanism is operated by energy developed within the gun. This method of working requires that a preliminary shot would be fired with a fully-loaded cartridge in order to test the gun's action. This would not be practicable with large guns. The action must be tested without the necessity of firing a single shot. I therefore employ fluid-pressure for performing all the functions of the mechanism except pulling the trigger.

These and other features of my invention are hereinafter set forth and illustrated in the accompanying drawings, which illustrate a gun provided with hydraulic power for bringing the various parts of the machinery into operation. These drawings I will now proceed to describe.

Figures 1 and 1ª together show a side elevation of a gun mounted, according to my invention, in a turret, which is shown in vertical section. Fig. 2 is a rear elevation of the gun, also showing the turret in vertical section. Fig. 3 is an outline plan or top view of the turret. Figs. 4 to 7 illustrate, on a larger scale, details of the cartridge-carrier hereinafter more fully referred to, Fig. 4 being a longitudinal section of the carrier in its fully-elevated position with a cartridge thereon

ready to be pushed into the breech of the gun, Fig. 5 a transverse section showing the breech-block in end elevation, Fig. 6 a plan of the cartridge-carrier and its cartridge, and Fig. 7 a sectional plan of the ram of the cartridge-carrier, showing a device hereinafter referred to. Fig. 8 is an enlarged elevation showing more clearly the arrangement of the recoil-cylinder and parts connected therewith. Fig. 9 is a transverse section of the gun-frame and showing, also on an enlarged scale, the means for actuating the breech-block. Fig. 10 is a central longitudinal section, also on an enlarged scale, showing the breech-block, the firing mechanism, and one of the extractors. Fig. 11 is a side elevation, on a larger scale, showing the right-hand side of the gun. Fig. 12 is likewise a side elevation, on a larger scale, but showing the left-hand side of the gun. Fig. 13 is a plan, also on a larger scale.

Like letters indicate similar parts throughout the drawings.

A is the gun.

B B are side plates or frames in which the gun recoils.

C is a revolving platform upon which the gun is mounted, and C′ is another revolving platform or floor connected to the platform C by a cylindrical structure C^2, which extends downwardly through one or more of the decks of the ship and has doorways C^3 therein. The platform C is provided with rollers or balls to enable it to revolve on a suitable track or race-path which is arranged in proximity to the hole or space through which the cylindrical structure C^2 passes.

D is the turret, which, being designed to contain only one gun, is made elliptical in horizontal section with a comparatively sharp or thin edge at D′, through which the muzzle of the gun projects, as shown in Fig. 3, so that while the muzzle of the gun is kept pointing in the direction of the enemy there is no surface on which the enemy's projectiles can strike, except at a very small angle. The gun is trained, as usual, by rotating the platform and turret and is elevated by any suitable means. The said elliptical turret or casing D may have its least diameter considerably less than the diameter of the platform C and its greatest diameter considerably more than that of the said platform, so that the said turret will project over the deck.

The two side plates or bars B constitute a frame similar to the inner recoiling frame or side bars of a Maxim gun. E is the breech-block which is supported between the said bars B and slides to and fro therein to open and close the breech. The aforesaid frame or bars B extends beyond the rear of the gun to a sufficient distance to permit the breech-block to be withdrawn from the breech far enough to allow a cartridge to be introduced between the breech and the forward face of the breech-block. The breech-block may be of any suitable type or form, but I prefer to use a screw plug or block with divided or interrupted screw-threads. The breech-block is mounted on a cross-head *e*, which is fitted to slide in grooves *b*, formed in the aforesaid frame or side bars B, and the breech-block is free to be rotated in this cross-head sufficiently to lock and unlock it from the divided or interrupted screw-threads in the breech of the gun. The breech-block cross-head is moved endwise by means of a hydraulic cylinder F and is rotated to lock it to the gun and unlock it thereform by a hydraulic cylinder G.

The before-mentioned cylinder F is fixed longitudinally on one side of the frame B and is provided with pipes *f* *f*′, communicating with the front and rear ends of the said cylinder F, (see Fig. 1,) the former of these pipes being furnished with a relief-valve f^2 and the latter with a four-way valve f^3. The said valve f^3 controls the flow of liquid to and from the cylinder F, the said liquid coming from the pipe a^2, which communicates with the main supply-pipe *a*. On the inner side of the frame B is an arm or lever f^4, Fig. 9, which is connected by suitable rods, shafts, and gearing f^5 to a lever f^6, which actuates the aforesaid valve f^3.

f^7 is a casing inclosing a spring which tends to keep the valve f^3 in its closed position.

The ends of the cross-head *e*, carrying the breech-block, project through the grooves *b* in the frame B and are connected on one side to the rim of the cylinder F and on the other side to a telescopic cylinder F′. The aforesaid cross-head also carries the vertically-arranged hydraulic cylinder G, whose piston is connected to one end of a rocking arm *g*, (see Fig. 9,) the other end of this arm being connected to a rod *g*′, linking the rocking arm *g* to an arm g^2, fixed to the breech-block. The said rod *g*′ has a nose g^3 projecting therefrom, which is capable of actuating the crank-arm f^4.

g^4 is a valve controlling the entrance of liquid under pressure to the cylinder G, this valve being provided with a lever g^5, whose free end lies in the path of a projection g^6, standing out from the frame B, so that as the gun recoils the lever is operated by the said projection and allows liquid to enter the lower part of the cylinder G and turn the breech-block to disengage it from the breech of the gun.

During the unlocking of the breech-block, as above stated, the aforesaid nose g^3 on the link *g*′ operates the arm f^4, and thus turns the valve f^3 into position to allow liquid to enter the cylinder F, thereby withdrawing the breech-block from the gun.

The gun may be mounted with trunnions A′ or upon a pivoted beam or frame. When provided with trunnions, they are in a non-recoiling part of the mounting and carry junction-boxes to receive the pipes *a*, which conduct the liquid under pressure to the various hydraulic cylinders used for working the gun. I prefer to construct the non-recoiling part of

the mounting with a jacket H, through which the gun can slide freely to and fro, the said jacket serving as the trunnion-piece.

A hydraulic brake-cylinder I is provided to check the recoil, the piston of which cylinder, instead of fitting loosely or having openings through it to allow the liquid to pass from one end of the cylinder to the other, is made to fit the cylinder fluid-tight, the piston being provided with some kind of hydraulic packing, preferably leather cups. A pipe $I^{\times}$ is provided on the side of the cylinder, through which pipe the liquid is driven by the piston from one end of the cylinder through a relief-valve I′ to the other end of the cylinder during recoil after firing the gun, the relief-valve being loaded by a weight or spring to the required pressure. This cylinder is also provided with a four-way valve I^2 for controlling the entrance of liquid under pressure to either the front or the rear part of the cylinder I. The aforesaid valve I^2 is operated by means of a sliding rod or bar I^3, (see Fig. 8,) having thereon two tappets I^4 I^5, which are so arranged that one of them—viz., I^4—is operated when the gun recoils and the other—viz., I^5—when the gun returns to its firing position. The inner end of this rod or bar I^3 is connected by a link I^6 to a pivoted crank-handle I^7, which is controlled by a spring contained in a casing I^8, pivoted to one of the side plates B. During the recoil of the gun after discharge the liquid in the cylinder I is driven from one side of the piston to the other past the relief-valve I′, and the recoil of the gun actuates the rod I^3 and starts the cycle of operations that are performed by the various mechanisms; but when it is desired to cause the gun to recoil without firing the rod I^3 is actuated by operating the crank-handle I^7 by hand, whereby liquid under pressure is allowed to flow from the pipe a' and to enter the front of the cylinder I through the valve I^2, no liquid then passing the relief-valve I′.

The gun is mounted in such a manner as to have a very large amount of preponderance—that is, the trunnions are as far forward as possible. I am thus enabled to diminish the size of the embrasure. I provide hydraulic cylinders J and pistons for supporting the rear end of the gun, the piston-rods being attached to the frame B or other non-recoiling part of the mounting. These cylinders J are controlled by means of a hand-wheel J′, which is situated in convenient reach of the gunner and may operate in any ordinary and well-known manner. In some cases it may not be practicable through lack of space to arrange the hydraulic cylinders J at the extreme end of the non-recoiling plates or bars B, in which cases the hydraulic cylinders may be placed in the position indicated in the drawings or in any other convenient position, so long as they do not interfere with other parts of the mechanism.

K is another hand-wheel similar to the one J′ above referred to and is employed for operating the mechanism for turning the turret.

The vertical cylinder or cylindrical part C^2 of the turret, which extends through the upper deck and which is attached to the turret or platform carrying the gun, is provided with a bottom floor C′, as above described, which is level or approximately level with the deck below, or is in any convenient position relative to the cartridge-magazine, which will permit it to be supplied with the cartridges through the openings C^3 in its side. I prefer to provide this floor with an inclined guide-way C^4, having rails C^5 for supporting the cartridges and for conducting them to the cartridge-carrier M. This carrier is so arranged as to sink slightly below the rails supporting the cartridges and as it reaches its lowermost point to actuate mechanism which will allow a cartridge to be transferred from the rails to the carrier. The said cartridge-carrier is connected by pins m (see Figs. 4 to 7) to a slotted head m', which is pivoted at m^2 to the upper end of the ram n of the hydraulic cylinder N, by which the carrier is raised and lowered. The fore end of the cartridge-carrier is provided with a transverse pin m^3, whose ends when the cartridge-carrier is fully elevated come into engagement with the upper portion of recesses B′, formed in the frame B.

On reference to Fig. 1 it will be seen that the cartridge-carrier normally occupies an inclined position so long as it is out of engagement with the recesses B′. When, however, the ends of the pin m^3 engage with the upper portions of the said recesses B′, the front end of the carrier is prevented from rising any higher, with the result that the ram n, still continuing to ascend, the carrier turns about the pin m^3 as a fulcrum and brings the axis of the cartridge into alinement with the axis of the gun, (see Fig. 4,) so that when the breech-block advances toward the breech the cartridge will be pushed into the gun. The ascent and descent of the cartridge-carrier are controlled by a valve n', which regulates the admission of the liquid under pressure through the pipes $n^{\times}$ to the cylinder N. This valve is operated by rods n^2, connected with lever mechanism n^3, carried on the inner side of the frame B. This mechanism is actuated by a projection n^4 on the breech-block coming against arms n^5 $n^{5\times}$, forming part of the aforesaid mechanism n^3.

M′ and M^2 are vertical guides by which the flange of the cartridge and the nose of the projectile are respectively guided during the ascent of the cartridge-carrier M.

M^3 M^4 are two standards projecting from the table C′ and arranged in such a manner that when a cartridge is allowed to pass from the rails C^5 it does not fall directly upon the cartridge-carrier, but rests upon these standards in a horizontal position immediately above the said cartridge-carrier, so that as the latter ascends it receives the cartridge without experiencing any undue shock.

The before-mentioned ram n of the cylinder N is provided with a cross-head n^6, Figs. 5 and 6, which works in a vertical guide n^7 and is furnished with a pivoted spring-controlled lever n^8, having a pin n^9, adapted to normally engage with a hole in the aforesaid cross-head and a recess in the ram, whereby the said cross-head and ram are locked together. This lever n^8 is also formed with a dog n^{10}, which when the cross-head arrives almost to the top of the guide n^7 strikes against a projection n^{11}, which causes the lever n^8 to remove its pin n^9 out of engagement with the ram and thereby release the cross-head, so that the ram can continue its ascent without the cross-head. Simultaneously with this disengagement a projection n^{12} on the cross-head strikes against a tooth n^{13} on a spring-catch n^{14}, provided with a hinged projection n^{15} at its upper end. This catch n^{14} thus gives way as the cross-head ascends and brings its tooth beneath the projection n^{12}, so that the cross-head is supported thereby when it is released from the ram, as above stated. The upper end of the ram n has a finger n^{16}, which serves to retain a flap O in its raised position—that is to say, in the position represented by the full lines in Fig. 5—while the carrier M descends after leaving the cartridge in proper position in the space existing between the breech-block and the breech of the gun. The aforesaid flap O is hinged at O′ and is adapted to fall by the action of gravity into the position indicated by the dotted lines in Fig. 5, so that when an empty cartridge-case is withdrawn from the gun by the extractors e' on the breech-block the said cartridge-case will fall onto the flap O and be directed thereby to a suitable chute or the like for leading the empty cartridge-cases to any desirable place. This flap is retained in the before-mentioned dotted position by the bracket O^2. As the ram n descends the finger n^{16} strikes against the hinged projection n^{15}, thereby causing the catch n^{14} to release the cross-head n^6 and allow it to descend with the ram, the aforesaid lever n^8 at the same time leaving the projections n^{11} and permitting its pin n^9 to again lock the cross-head to the ram.

B^2 B^3 are guiding-fins on the frame B, which act to direct the base of the cartridge into proper position relatively to the breech-block, so as to insure that the flange of the cartridge will enter behind the nose $E^\times$ of the extractor. (See Fig. 4.)

B^4 B^4 are longitudinal guiding-strips which assist in directing the cartridge into the breech of the gun when the said cartridge is pushed forward by the breech-block.

In order that only one cartridge at a time shall pass onto the cartridge-carrier, I may provide reciprocating guard-plates P $P^\times$, whose positions are regulated by a spring-controlled lever P′. The inner end of this lever has a link P^2, furnished with a pin P^3, working in a guide P^4. As the carrier M ascends the outer end of the lever P′ is caused to descend by the action of the cross-head n^6 and to carry the plate P out of the path of the cartridges on the rails C^5, the inner end of said lever P′ meanwhile causing the guard-plate $P^\times$ to ascend. The said guide P^4 is so shaped or bent at its upper part that the aforesaid pin P^3 can move out of the way of the ascending cross-head n^6 to allow the latter to pass by. When the carrier M again descends, the link P^2 is caught by the cross-head n^6 and caused to turn the lever P′ about its pivot, so as to lower the plate $P^\times$ and bring the plate P into its raised position. As this plate P rises an inclined piece P^5 thereon comes against the cartridge that is in front of it and pushes said cartridge onto the standards M^3 M^4.

The breech-block, Fig. 10, is provided with the firing-pin E^2 and a spring-controlled trigger E^3, to which a lanyard is attached for firing the gun. These parts may be of the ordinary and well-known construction.

When the gun is discharged, it recoils in the ordinary way, forcing the liquid from one end of the brake-cylinder I to the other past the relief-valve I. As the gun in its rearward movement reaches or nearly reaches the limit of this movement it operates the rod I^3 by coming against the tappet I^4, whereby the valve I^2 is turned into position to allow liquid under high pressure to enter the cylinder I and force the gun again into the firing position. While the liquid is entering the said cylinder I to drive the gun forward into its firing position, liquid is at the same time entering the hydraulic cylinder G, that operates the breech-block and releases it from the gun, this being accomplished very quickly and before the gun has fairly commenced to return into the firing position. As soon as the breech-block is unlocked liquid is automatically allowed to enter the cylinder F by the nose g^3, operating the arm f^4 and mechanism connected therewith, whereby the breech-block is carried back to its extreme rearward position. The breech-block as it reaches this position opens the valve n' through the intervention of the lever n^5 and rods n^2 and allows the liquid to enter the cylinder N of the hydraulic lift, which supports the cartridge-carrier M. The cartridge-carrier will then commence to rise. In combination with the carrier I arrange devices, as already stated, whereby it will be tilted to adapt itself to the angle at which the gun is being fired.

The cartridge-carrier may be made considerably shorter than the cartridge. As the loaded cartridge is raised into the loading position and presents itself to the breech approximately coaxial with the bore of the gun the breech-block is liberated by a projection m^4 on the carrier striking against a lever f^8, forming part of the mechanism $f^5 f^6$ for actuating the valve f^3. Liquid thus enters the cylinder F and causes the breech-block to advance toward the breech of the gun. In com-

bination with the breech-block I may arrange one or more projections which support and guide the cartridge, the cartridge-carrier being provided with grooves or being curved, as shown in the drawings, so as to allow these projections or supports to freely pass. The carrier will remain in its elevated position until the breech-block has advanced far enough to completely support the cartridge and to thrust the projectile into the bore far enough to hold it safely therein. At this moment the breech-block again operates the valve n' of the hydraulic lift by acting upon a lever $n^{5\times}$, forming part of the mechanism $n^2\,n^3$, whereby the cartridge-carrier is caused to descend for another cartridge. The breech-block then continues its forward movement, forcing the cartridge completely home in the barrel and closing the breech by the motion of the lever g, the liquid at this time entering the top of cylinder G by the reversal of the valve g^4. This reversal takes place by reason of the arm g^5 striking against a stop or projection g^7 on the frame B as the breech-block advances toward the breech of the gun. The gun can then be fired by pulling the before-mentioned lanyard.

The spent cartridges are extracted by the breech-block in the ordinary manner and fall onto the flap O, as hereinbefore explained.

Suppose now that it is necessary to try the action of the gun without actually firing a cartridge. The only difference between the working of the gun with loaded cartridges and with blanks would be that in the recoil of the gun after it has been fired with a loaded cartridge a certain amount of liquid passes through the aforesaid relief-valve I′, whereas when all the functions are performed without firing no liquid passes through this relief-valve, the work done by the relief-valve being always equal to the amount of work necessary to bring the gun to a state of rest after firing. If the gun should be fired with a half-charge and with half-recoil, it would be necessary to complete the recoil movement by manipulating the lever-handle I′, thereby allowing more liquid to enter the cylinder I. All the functions would then be performed as before.

By reason of the cylinder G having to travel with the cross-head e, carrying the breech-block, the liquid for supplying this cylinder is conveyed to it from the main supply-pipe a through either a flexible pipe or a telescopic tube F′. The gunner has, as already stated, conveniently at hand the two hand-wheels J′ and K, one for rotating the turret and the other for operating the elevating-gear. He will therefore be able with a slight motion of the hand to point the gun accurately and instantly pull the trigger.

If I use electricity instead of liquid under pressure for working the gun, the movements of the parts above described are made to open and close electric circuits.

What I claim is—

1. The combination of mechanisms for effecting the several operations necessary for reloading a gun, means for independently impelling the mechanisms, and means actuated by a predetermined movement of each mechanism for applying an impelling means to the next mechanism, whereby the performance of the functions of the several mechanisms is effected automatically in a given order.

2. The combination of mechanisms for effecting the several operations necessary for reloading a gun, a source of power for independently impelling the mechanisms, and means operated by a predetermined movement of each of the mechanisms for applying the source of power to the next mechanism, whereby the performance of the functions of the several mechanisms is effected automatically in a given order.

3. In a gun-mounting, the combination with a brake-cylinder and piston for receiving the force of recoil, of a passage between the two parts of the cylinder on opposite sides of the piston, a relief-valve therein for controlling the flow of fluid through the same, passages for the entrance and exit of fluid under pressure to and from the said brake-cylinder, and means for controlling the same, adapted to be actuated or controlled by hand or by a part of the gun mechanism movable under the force of recoil, as and for the purpose set forth.

4. In a gun-mounting, the combination with a brake-cylinder provided with an external passage joining its two ends, a relief-valve therein, and means, operated either by hand or by the recoil of the gun, for controlling the entrance and exit of fluid under pressure to and from the cylinder, of hydraulic cylinders and pistons for unlocking and locking the breech-block, for moving the same away from and toward the breech, and for bringing a cartridge into position for insertion into the breech, and valve mechanism controlling the application of fluid-pressure in said cylinders, the valve mechanism for one cylinder being operated or controlled by the mechanism actuated by another cylinder in a given order, as set forth.

5. In a gun-mounting the combination with the breech-block, of two hydraulic cylinders one movable with the breech-block and acting to turn the said block to unlock it from the gun as the latter recoils and the other fixed and acting to withdraw the said block after it has been unlocked substantially as described.

6. In a gun-mounting, the combination with breech mechanism actuated or set in operation by the force of recoil, of a cartridge-carrier operated by hydraulic power, to raise a cartridge from the hold or magazine into position for insertion into the breech, and valve mechanism for regulating the application of the power to the carrier, operated or controlled by the movement of the breech mechanism, as set forth.

7. In a gun-mounting the combination with

the gun-frame having inclined surfaces thereon, of a cartridge-elevating mechanism, a cartridge-carrier pivoted near one of its ends to the same, and provided with projections which come in contact with the inclined surfaces on the framing as the carrier ascends, whereby the carrier is adjusted to bring the cartridge thereon into line with the bore of the gun whatever may be the angle of elevation of the gun, as set forth.

In witness whereof I have hereunto set my hand this 8th day of January, 1896.

HIRAM STEVENS MAXIM.

Witnesses:
PERCY H. BADGER,
JOSEPH LAKE.