J. M. BROWNING.

AUTOMATIC MACHINE GUN.

APPLICATION FILED OCT. 13, 1916.

1,293,021.

Patented Feb. 4, 1919.

4 SHEETS—SHEET 1.

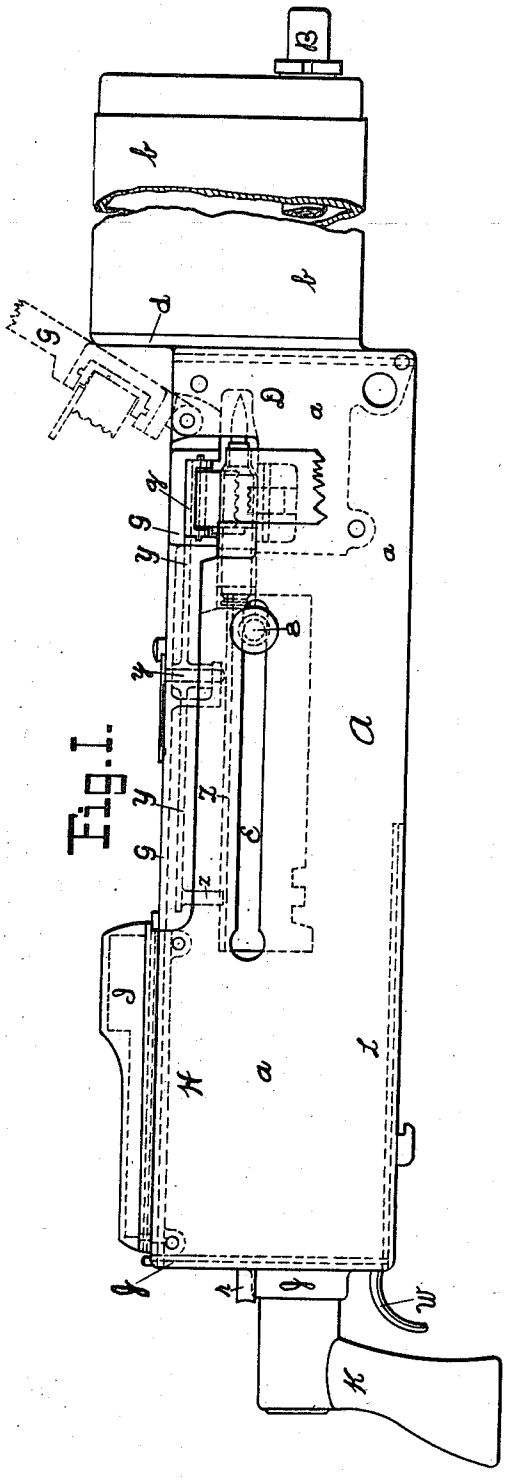

Fig. I.

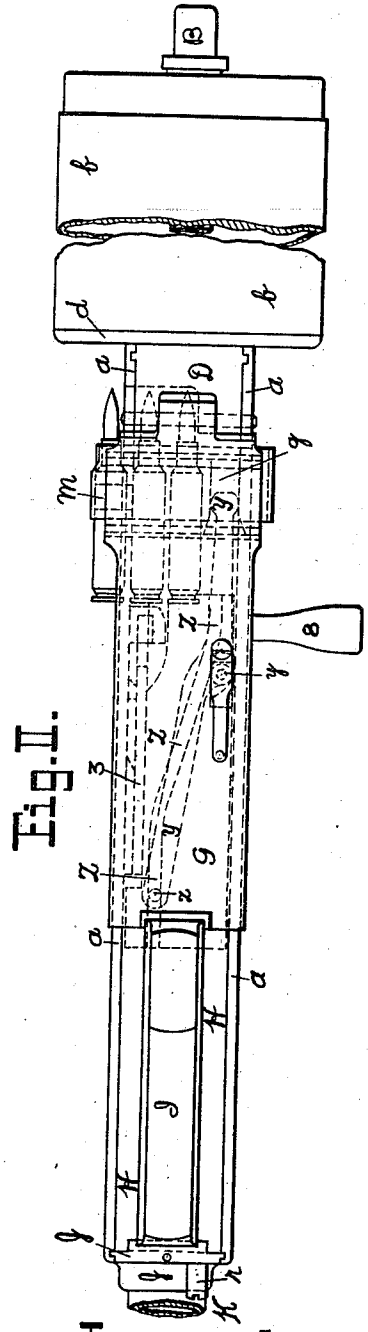

Fig. II.

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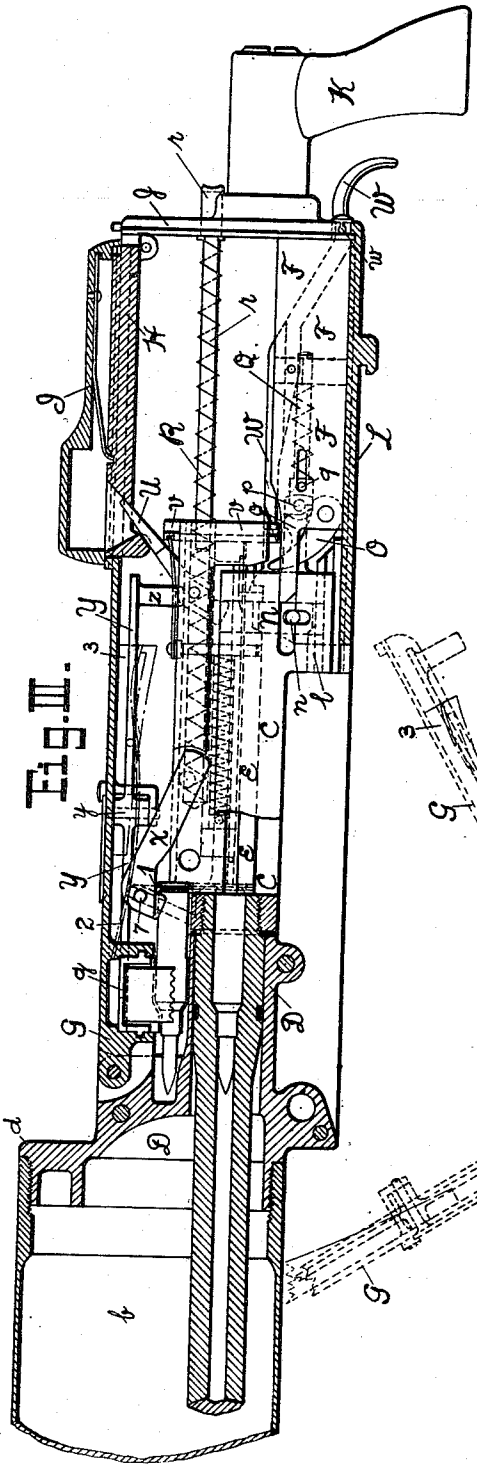

Fig. III.

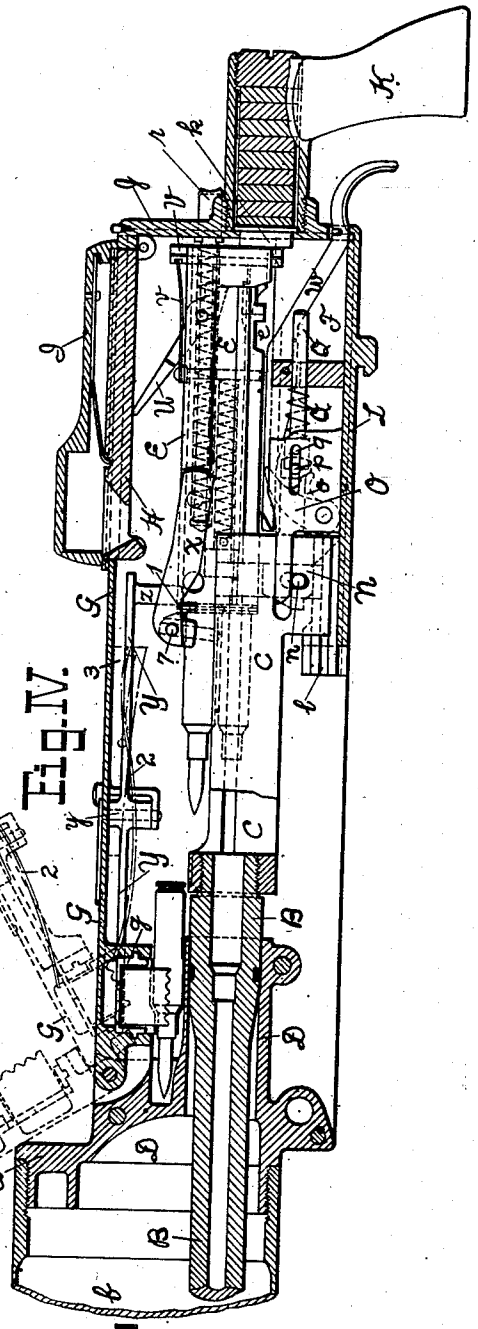

Fig. IV.

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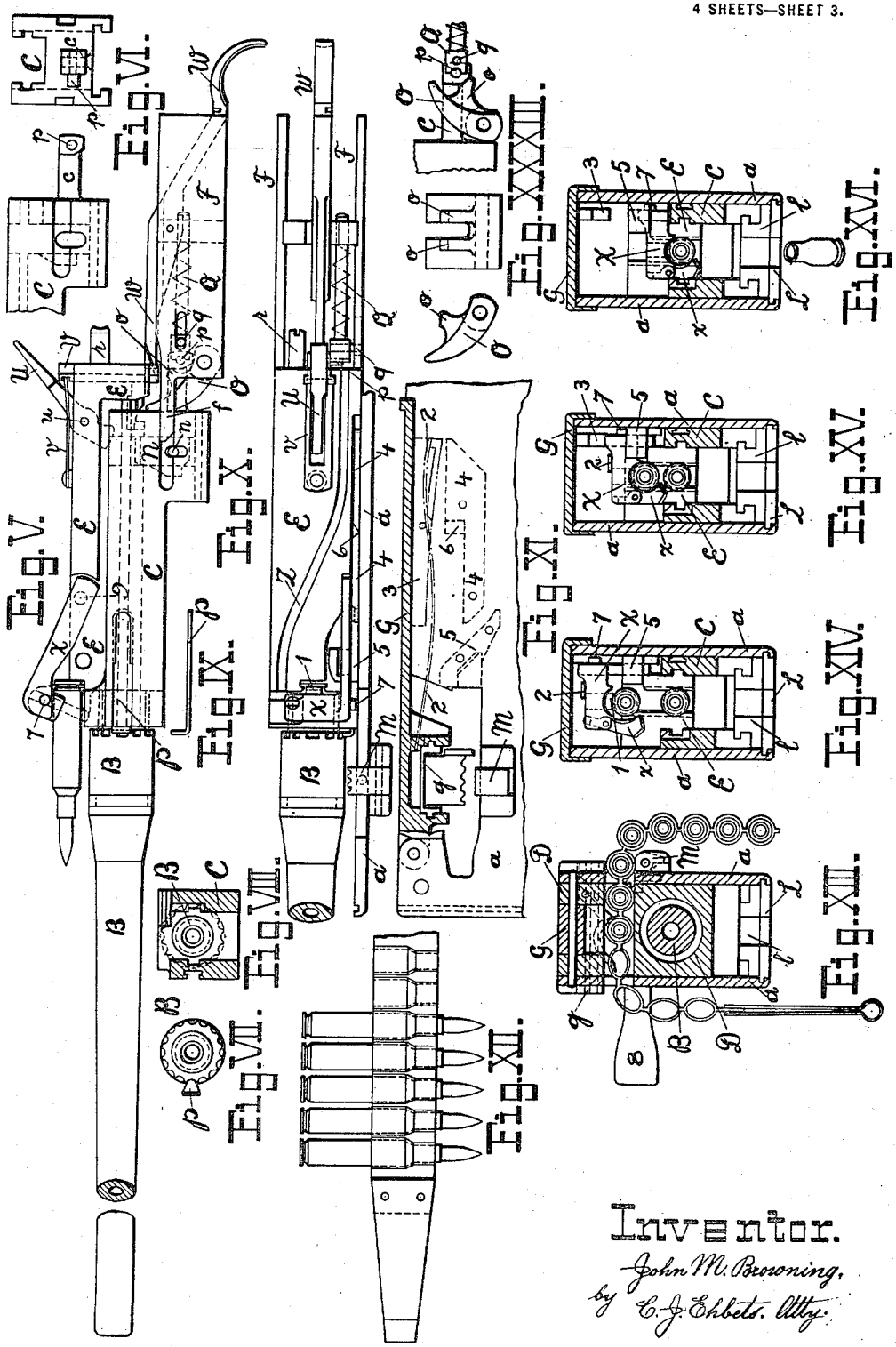

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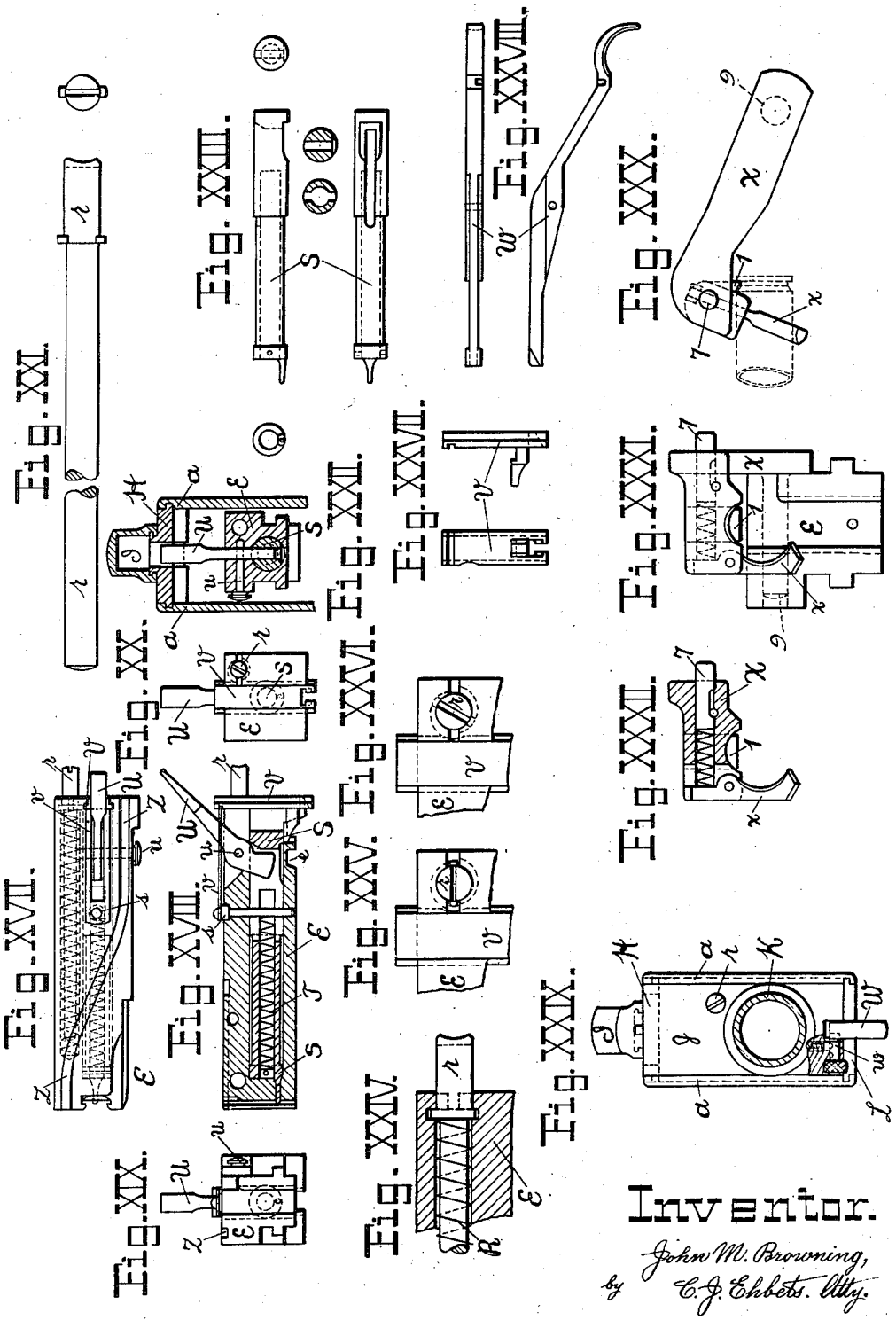

Inventor.

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UNITED STATES PATENT OFFICE.

JOHN M. BROWNING, OF OGDEN, UTAH.

AUTOMATIC MACHINE-GUN.

1,293,021. Specification of Letters Patent. Patented Feb. 4, 1919.

Application filed October 13, 1916. Serial No. 125,504.

To all whom it may concern:

Be it known that I, JOHN M. BROWNING, a citizen of the United States, residing in Ogden, in the county of Weber and State of Utah, have invented certain new and useful Improvements in Automatic Machine-Guns, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The invention relates generally to automatic machine guns of that description in which all operations of the mechanism are automatically effected by the energy of the recoil of the movable parts.

The invention particularly relates to novel improvements in recoil-operated machine guns in which the barrel and breech closing part recoil together while interlocked, a limited distance, are then unlocked, the movement of the barrel is arrested and the breech closing part alone continues its recoil, during which energy is stored in a reaction spring by which all parts are returned to the forward firing position.

The main object of the present invention is to produce an improved firearm of this class specially adapted for military service by being reliable, accurate, strong, and absolutely safe under all conditions, while very light in weight, simple in construction, not liable to get out of order, and inexpensive of manufacture. This object is attained by greatly simplifying the mechanism employed in machine guns of this class, by providing a novel improved construction of certain members of the mechanism, thereby enabling these parts to perform several distinct functions, and thus reducing the number of the component parts, and by giving to all parts such form that they may be placed or removed and the entire arm may be assembled or dismounted without requiring the use of any tools.

In the accompanying drawings:

Figure I, represents a right-hand side elevation of the gun.

Fig. II, is a top view of the gun.

Fig. III, is a central longitudinal section through the gun showing the breech mechanism in its forward firing position.

Fig. IV, is a sectional view similar to Fig. III, but with the breech mechanism in its recoiled rearmost position. In these four figures a portion of the cooling jacket surrounding the barrel is represented as broken away.

Fig. V, is a left-hand side view of the barrel and recoiling members of the breech mechanism and of their guide, withdrawn from the breech casing.

Fig. VI, is a side view and a rear end view of the rear portion of the barrel extension.

Fig. VII, is a rear end view of the barrel.

Fig. VIII, is a transverse section through the barrel extension in rear of the front wall in which the barrel is seated, looking forward.

Fig. IX, is a top view of the barrel adjusting pawl, detached.

Fig. X, is a plan of the recoiling parts of the breech mechanism and their guide, similar to Fig. V, but seen from above.

Fig. XI, is a left-hand side view of the upper forward portions of the breech casing showing the cams inside of the casing in dotted lines.

Fig. XII, is a top view of a portion of the feed belt showing some cartridges in the pockets thereof and some pockets empty.

Fig. XIII, is a transverse section through the gun at the feed channel above the barrel, showing a portion of the feed belt in the same, looking rearward.

Fig. XIV, is a transverse sectional view through the gun at a point in rear of the barrel, looking rearward, showing a front view of the breech bolt and of the feed extractor in its highest position.

Fig. XV, is a sectional view, similar to Fig. XIV but showing the breech bolt in its rear position and the feed extractor in a lower position.

Fig. XVI, is a sectional view similar to Figs. XIV and XV, but showing the breech bolt in a position after it has returned partly forward and the feed extractor in its lowest position.

Fig. XVII, is a top view of the breech bolt, detached.

Fig. XVIII, shows a longitudinal vertical section through the breech bolt, detached.

Fig. XIX, is a front end view of the breech bolt, detached.

Fig. XX, is a rear end view of the breech bolt, detached.

Fig. XXI, shows, on an increased scale, a side view and a rear view of the reaction spring guide rod, detached.

Fig. XXII, is a transverse vertical section through a portion of the breech casing, top plate and breech bolt showing the cocking lever.

Fig. XXIII, represents the firing pin, detached, in a side view, bottom view, front view, and rear end view, and two transverse sections of the same.

Fig. XXIV, represents a vertical longitudinal section of the upper rear portion of the breech bolt with the reaction spring guide rod locked therein, on an increased scale.

Fig. XXV, represents a rear end view of a portion of the breech bolt with the reaction spring guide rod in the released or unlocked position, on an increased scale.

Fig. XXVI, represents a view similar to Fig. XXV, but with the guide rod in its locked position, its lugs wedged in the eccentric recesses, on an increased scale.

Fig. XXVII, represents the vertically sliding sear, detached, in a front view and in a side view.

Fig. XXVIII, represents a side view and a top view of the trigger, detached.

Fig. XXIX, represents a rear end view of the gun with the handle removed and a portion of the rear plate broken away, showing the trigger safety lock.

Fig. XXX, represents the feed extractor in a side view, detached and on an increased scale.

Fig. XXXI, represents a front end view of the breech bolt with the feed extractor attached thereto, in its highest position, on an increased scale.

Fig. XXXII, represents a sectional view of the head of the feed extractor, and the cam pin and shell ejector attached thereto, on an increased scale.

Fig. XXXIII, shows the rocking lever detached in several views.

Similar letters refer to similar parts throughout the several views.

The machine gun represented by the drawings comprises the following main parts. The breech casing A, containing the breech mechanism, is rectangular in form, having two side plates *a*, *a* connected at the front by being firmly attached to the trunnion block D which closes the casing and carries a circular flange *d* to which the rear end of the cylindrical barrel cooling jacket *b* is attached in the usual manner.

The rear portion of the breech casing A is closed at the bottom by the bottom plate L and at the top by the top plate H both of which are secured to the side plates *a*, *a*.

The forward portion of the breech casing A is open at the bottom, at the top it is closed by the cover G which is hinged to the trunnion block D, so that the cover G may be at will raised for uncovering the breech casing or closed down upon the same.

In its closed position the cover G is secured by the spring-actuated cover latch I, which has a limited longitudinally sliding movement on the top plate H where a T-shaped rib is provided to receive and guide the latch I, the front end of which overlaps the cover G, but may be at will pressed to the rear to release said cover for opening same.

The rear of the breech casing is closed by the rear plate J which slides vertically between the side plates *a*, *a* and is provided with a circular hub for receiving and carrying the handle K of the gun. The rear end of the cover latch I slightly projects over the top of the rear plate J and normally the latch locks both the cover G and the rear plate J in position, but when the cover G is released and opened, the latch I may be pressed forward sufficiently to clear the plate J which may then be upwardly withdrawn, opening the rear of the breech casing A. See Figs. I, II, III, and IV.

The barrel B passes lengthwise through the cooling jacket *b* from the front of which its muzzle projects some distance; while the rear portion of the barrel is supported in a seat provided for it in the trunnion block D. The rear or breech end of the barrel carries an annular packing and the front end of the cooling jacket *b* is fitted with a stuffing box, both of the usual construction, so that the barrel may be firmly supported at both ends for longitudinal movement without allowing the cooling fluid in the jacket to escape therefrom.

The rear end of the barrel B is firmly attached by a screw thread to the barrel extension C, the rear portion of the barrel extension C having a downward projection, provided with internal grooves, which fit and are guided upon corresponding ribs provided on an upward projection *l* on the bottom plate L, thus holding and guiding the rear of the barrel extension, which moves longitudinally with the barrel.

Above the rear portion of the barrel, the trunnion block D has a recess which forms the transverse feed channel for receiving and guiding the feed belt with the cartridges in its movements from the left to the right side of the gun. The top of the feed channel in the trunnion block is open so that the feed belt with the cartridges may be readily placed into the channel from the top. The cover G of the breech casing is hinged in the trunnion block forward of the feed channel, so that the cover may be at will raised and turned upward and forward until it rests against the flange *d* of the trunnion block D, in which position the cover does

not close the feed channel and does not interfere with the placing of the feed belt into the feed channel. See Fig. IV.

By closing down the cover G upon the breech casing, the portion of the cover just in rear of the hinge closes the feed channel in the trunnion block thus confining the feed belt in the channel. In this portion of the cover G, adjacent to its hinge, the feed slide *g* is fitted to move transversely in the cover and in the feed channel; and the downward projection or pawl carried by said feed slide *g* serves to engage the feed belt for moving it and the cartridges stepwise through the feed channel from the left to the right side of the gun, in the well known manner usual in guns of this class.

On the outer left side of the breech casing below the feed channel a pawl M is pivotally attached so that its upper end is held by a spring yieldingly in the path of the feed belt in the feed channel. See Figs. I, II, X, XI, and XIII. This pawl M prevents, in the usual manner, the feed belt from moving in the wrong direction, from the right to the left side, but this pawl does not require the usual finger piece for at will moving it out of the path of the feed belt in case of a stoppage of the same; because the feed belt may be, if necessary, instantly and readily removed, raised, or adjusted in the channel by simply opening the cover G, which gives the free access to the feed belt.

In rear of the barrel the breech bolt E is fitted to move in the barrel extension C and in the breech casing A in rear of the extension. The breech bolt having ribs in its sides which are guided in corresponding longitudinal grooves in the barrel extension; and the rear end of the breech bolt in its rearmost position being guided upon the breech bolt guide F, located in the lower rear portion of the casing A.

In Fig. V these main parts of the gun mechanism, the barrel B, the barrel extension C, the breech bolt E, and the guide F are shown in their relative proper positions but withdrawn from the breech casing. This construction serves the important purpose of allowing the barrel and breech mechanism together to be at will removed from the breech casing after opening the rear of the same by the removal of the rear plate J with the handle K upwardly, as hereinbefore described, and withdrawing the bolt handle 8.

Besides facilitating the assembling and dismounting of the barrel and breech mechanism, another important object is attained. One of the most essential points in the operation of machine guns is the proper adjustment between the rear end of the barrel, the forward end of the breech bolt, and the locking device by which the breech bolt is locked in its firing position, so as to securely support the cartridge in the chamber of the barrel against rearward movement under the pressure of the powder gases when the gun is fired.

In the present construction, the breech bolt is locked to the barrel by the vertically sliding locking block N which is located in a vertical mortise in the rear portion of the barrel extension C, its vertical movements being limited by the transverse pin *n* extending through the block N and laterally from the same into slots through both sides of the barrel extension C.

In Figs. III and V the locking block N is shown in its operative raised position in which its top has entered a corresponding locking recess *e* in the lower side of the breech bolt, clearly shown in Fig. XVIII. In Fig. IV the locking block N is shown in its lowered position in which its top is withdrawn from the recess *e* in the breech bolt and has allowed the bolt to move rearward over it.

The locking block N is positively forced into its upper locking position by an incline on the upward projection *l* on the forward portion of the bottom plate L which the lower end of the locking block encounters in the last of the joint forward movement of the barrel extension and the breech bolt, so that on arriving at the forward firing position, the barrel extension and breech bolt are positively interlocked. See Figs. III and V. The lowering of the locking block N to unlock the breech bolt from the barrel extension takes place during the joint rearward movement of the barrel, barrel extension, and breech bolt under the energy of the recoil. For this purpose a forwardly projecting arm *f* is provided on each side of the breech bolt guide F which fits into a horizontal groove in each outer side of the barrel extension. The forward ends of these arms *f* are inclined downward and rearward and these inclines act upon the transverse pin *n* of the locking block extending through the slots in the barrel extension, so as to force the locking block down and hold it there. See Fig. IV.

In assembling and adjusting the barrel and the breech mechanism before they are inserted into the breech casing, the barrel is first screwed into the barrel extension. A cartridge is then inserted into the chamber of the barrel and the breech bolt is from the rear placed in the barrel extension C and brought forward until it pushes the cartridge fully home in the barrel then the locking block N must be raised by exerting considerable force from below against it, so as to firmly lock the breech bolt and support the cartridge. On the shoulder on the outside of the barrel just forward of the threaded portion of same, a series of party-circular recesses is cut and on the left side

of the barrel extension C a flat spring pawl P is seated. The rear end of this pawl fits into a T-shaped slot provided for its reception in the barrel extension and the forward end of said pawl is bent inward and carries a party-circular point for engaging one of the recesses in the barrel; when the barrel extension is in the breech casing, the latter holds the pawl so that it cannot yield outward to release the barrel. By these means the barrel will be locked against rotation in the extension, while the breech bolt is firmly locked by the locking block N against the head of the cartridge. See Figs. V, VII, VIII, and IX. In this condition the barrel, barrel extension, and breech bolt are together entered from the rear into the breech casing and pushed forward until the front end of the barrel extension C bears against the rear end of the trunnion block D. Then the breech bolt guide F is entered into the casing and the rear plate J replaced, so that it locks in place the guide F, the rear end of the guide bearing firmly against the front face of the rear plate J as shown in Fig. III. While these main parts are thus adjusted in their proper forward firing position, it is not unusual that by firing the gun the firmness of the adjustment may be affected, particularly if long series of shots, or volleys, are fired from the gun; because under the continuous strain exerted thereby the supporting parts may be forced into a slightly closer contact. In order to readjust the parts, the rear of the breech casing is opened and all the parts are drawn from the breech casing, and by simply attempting to screw the barrel farther into the barrel extension, with a cartridge in the chamber and while the locking block locks the breech bolt in its forward position, the adjustment may be readily tested. If found necessary, the adjustment may be corrected by screwing the barrel farther into the barrel extension and by allowing the pawl P to take its bearing in one of the next succeeding recesses on the barrel.

On firing, the barrel and barrel extension, and the breech bolt recoil together until the locking block is lowered as hereinbefore described, thus releasing the breech bolt.

The rearward movement of the barrel and barrel extension is arrested by the rocking lever O which is pivoted in the forward end of the bolt guide F, its upper end resting against the barrel extension when the same is in the forward position. As the barrel extension moves from the position shown in Figs. III and V to its rearmost position as shown in Fig. IV, the rocking lever O is turned on its pivot and its upper end is thrown rearward with an increasing speed, until the lever O absorbs the energy of recoil and stops the barrel and barrel extension. At the same time the upper end of the rocking lever takes hold against the front of the downward extension of the breech bolt near its rear end and the rocking lever transmits its momentum to the breech bolt which is thereby thrown to its rearmost position as shown in Fig. IV.

On its rear end, the barrel extension C carries a horizontal arm *c* which extends for some distance rearward and has a lateral projection on each side at its rear end. The arm *c* also carries a pin *p* which projects some distance from the left side of said arm. See Fig. VI which shows the rear portion of the barrel extension C with the arm *c* and pin *p* in a side view and rear view.

As shown in Figs. III, IV, V, and XXXIII, the upper portion of the rocking lever O occupies a position between the body of the barrel extension and the lateral projections on the rear end of the arm *c*, the rocking lever O having a central slot from the top downward to allow it to straddle the arm *c*, and also the trigger W. Upon its concave rear face the rocking lever O carries a web or rib *o* which is also slotted to admit the arm *c*. In rear of the rocking lever O a piston Q is mounted, its rear end being guided in a vertical central partition of the breech bolt guide F, and its front end forming a head which carries a laterally extending guide pin *q* fitted to slide in a corresponding horizontal slot in the left side of the guide F, and at a height which brings it in line with the projecting pin *p* on the arm *c*. See Figs. III, IV, and V.

Between the head of the piston Q and the partition guiding its rear end, a spiral spring is mounted by which the piston is yieldingly kept in its forward position. On its front face the head of the piston Q has a horizontal semi-circular recess which fits over the lateral pin *p* on the arm *c*, so that the tension of the spring on the piston Q is exerted to force this arm *c* and the barrel extension C forward, and so that the spring acts as a buffer to absorb any excess of recoil of the barrel extension.

In Fig. XXXIII, sheet 3, the rocking lever O is shown detached, in two left-hand side views and in a rear view. One of the side views shows the lever O turned forward and the web *o* on its rear face upward. And in the other side view the lever is turned rearward and the web *o* on its rear face downward, which two positions agree with those in which the rocking lever and its web are shown, respectively, in Figs. III and V, and IV. In Fig. IV the barrel extension is in its rearmost position in which the lever O has stopped it and in which the lateral projections of the arm *c* and the pin *p* on the same transmit the tension of the compressed spring on the piston Q to the web on the lever O. but as shown in Figs. IV, VI, and XXXIII the lower front

face of the lateral projections on the arm *c* is beveled downward and rearward and the rear face of the web on the lever O, when the lever is in the position shown in Fig. IV, is correspondingly beveled downward and rearward so that while the tension of the spring on the piston Q is normally exerted to move the barrel extension forward, these beveled faces, in the position shown in Fig. IV, serve to lock the rocking lever O and the barrel extension C and barrel B in their rearmost positions as the lowest part of the web cannot move upward and forward unless the piston Q and the arm *c* are moved slightly rearward.

The reaction spring R is mounted in a longitudinal seat in the breech bolt E above and at the right of its axis, with its rear end against the rear plate J of the breech casing. When the breech bolt is in the rearmost position as shown in Fig. IV, this spring is compressed and almost entirely contained in the breech bolt, whereby its tension is exerted to force the breech bolt forward. After the breech bolt has moved forward some distance under the tension of this spring R, the downward projection on the breech bolt near its rear end strikes the end of the rocking lever O thereby exerting sufficient force to turn the lever forward from its rearmost position, compelling the spring and the piston Q to yield and to allow the lever to turn forward, as the reaction spring R is stronger than the spring on the piston Q. This turning forward of the lever O causes the same to force the barrel extension and the barrel forward from their recoiled position, and the return movement of the barrel and barrel extension and breech bolt is thus accomplished under the tensions of both the spring on the piston Q and of the breech bolt reaction spring R.

The breech bolt E carries in its longitudinal axis the firing pin S and the mainspring T. In Fig. XXIII the firing pin S is shown detached, while in Figs. XVII, XVIII, and XIX the firing pin and the mainspring are represented as seated in the breech bolt. The firing pin S is confined in the breech bolt by a vertical locking pin *s* inserted through the top into the breech bolt and passing through a vertical slot in the firing pin. The forward portion of the firing pin S is bored out for receiving the mainspring T which is inserted from the front, the rear end of the mainspring bearing against the vertical locking pin *s* and the front end of the mainspring T bearing against a horizontal transverse pin inserted into the firing pin near its front end. See Figs. XVIII and XXIII. On the lower edge of the front face, the firing point of the firing pin is located, extending therefrom through the corresponding small opening to the face of the breech bolt. In this location the firing point does not interfere with the bore of the firing pin nor with the placing of the mainspring T therein.

In the rear portion of the breech bolt the cocking lever U is pivotally mounted in a vertical slot on a horizontal pin *u*. The lower arm of the cocking lever extends into the slot in the firing pin, and the upper arm of the cocking lever extends upward from the breech bolt, so that by moving the upper arm of the lever U to the rear it leaves the firing pin free to move forward in the breech bolt until its firing point protrudes from the face of the breech bolt sufficiently to transmit the igniting blow to the primer of the cartridge in front of the breech bolt. By moving the upper arm of the cocking lever U forward, the lower arm of the lever takes hold against the firing pin at the rear end of the vertical slot therein and moves the firing pin rearward to its cocked position. The location and operation of the cocking lever U are clearly indicated in the detached views of the breech bolt in Figs. XVII and XVIII.

In Fig. III where the breech bolt is in its forward firing position, the cocking lever U is shown as extending upward and rearward from the breech bolt into a slot in the top plate H of the breech casing A, the upper end of the lever U resting against the rear end of the slot which, as shown, is inclined upward and rearward. When the breech bolt E is moved rearward from the position shown in Fig. III to that shown in Fig. IV, the rear end of the slot in the top plate H causes the lever U to be turned upward and forward until the upper end of the lever U escapes from the slot in the top plate H and, during the last of the rearward movement of the breech bolt, the upper end of the lever U moves under the top plate H and is held in its forward position by the under side of the top plate, so that during the first of the rearward movement the lower arm of the lever U retracts the firing pin and during the remainder of the rearward movement holds the firing pin positively in its retracted position. The cocking lever U and the firing pin S remain in these relative positions during the first part of the forward return movement of the breech bolt until the upper end of the cocking lever U encounters the forward portion of the top plate H which projects downward so that the cocking lever will strike against it and will thereby be turned upward to reënter the slot in the top plate and be moved from its forward to its rearward position, or from the position shown in Fig. IV to that shown in Fig. III; so that, as the breech bolt reaches its firing position, the lower arm of the cocking lever is withdrawn out of the path of the firing pin leaving the same free to move forward, Figs. III and XVIII.

As shown in Figs. I, II, III, and IV, the slot in the top plate of the breech casing, and the cocking lever U extending into the same, are covered over by the sliding spring latch I which prevents dust or dirt from entering into the gun casing through said slot. The hollow inside of the spring latch carries a flat spring secured by a rivet to the latch and the forward end of this spring rests in a recess in the top plate H which recess inclines upward and rearward at its rear end so that the tension of the spring is exerted to yieldingly hold the latch in its forward cover-locking position. The front of this recess extends somewhat beyond the forward end of the spring, which allows the latch to be at will pushed forward sufficiently to release the rear plate J which the rear end of the latch slightly overlaps, as hereinbefore described.

When the cocking lever has retracted the firing pin, the sear V takes hold of the firing pin and holds it in its cocked position until the sear is moved to release the same. The sear V is a narrow sliding plate fitted into a vertical T-shaped slot in the rear face of the breech bolt so as to slide freely therein. See Figs. XVIII and XX. The sear V has near its lower end a forwardly projecting arm in the upper surface of which a shoulder is formed by which the sear takes hold of the cocking shoulder on the under side of the firing pin S near its rear end, see Figs. XXIII and XXVII, and thereby holds the firing pin in its cocked position. Said surface extends forwardly of said shoulder parallel to the axis of the firing pin, see Figs. XVIII and XXVII, and is of sufficient length to underlie the firing pin even when in its forward or firing position. This forwardly extending portion of the arm gives great strength to the sear shoulder, avoiding relatively thin or inclined cam surfaces forward of said shoulder, while insuring engagement of the sear shoulder with the cocking shoulder of the firing pin at the proper time; for while this flat top portion of the sear is depressed during the trigger's action on the sear, entirely out of contact with the firing pin during the forward stroke of the firing pin when firing, yet after the sear has been released by the trigger, during the recoil the flat portion of the sear arm will contact with the lower surface of the firing pin, thus keeping the sear depressed sufficiently so that its shoulder can snap over or in front of the cocking shoulder of the firing pin as soon as the two shoulders register. On top of the breech bolt, a flat sear spring v is located, its front end held down by the firing pin locking pin s to the top of which the forward end of the spring is riveted, the locking pin s itself being held in the breech bolt against moving upward by the tension of the mainspring T. The rear portion of the sear spring v is divided by a slot to allow the passage through it of the cocking lever U, and the ends of the spring v rest in a horizontal recess in the front face near the top of the vertically sliding sear V, so that the tension of the spring v holds the sear yieldingly in its operative upper position in which the shoulder on the arm of the sear holds the firing pin in its cocked position. The sear V is shown detached in Fig. XXVII, in a front view and in a side view.

The trigger W is shown detached in Fig. XXVIII in a top view and a side view.

The trigger W is pivoted in the vertical central partition of the breech bolt guide F and extends from the same forward into a T-shaped slot in the lower end of the sear V below the forward extending arm of the same, when the breech bolt is forward, the upper portion of the trigger being reduced in thickness to freely fit in the slot; the front end of the trigger W has two lateral projections which fit into the upper wider part of the T-shaped slot in the sear. The rear arm of the trigger extends from its pivot downward and rearward and carries at its rear end a finger piece by which the rear arm of the trigger may be raised and thereby the front arm and with it the sear be lowered to release the firing pin. With the breech bolt in its forward position, the sear spring v also serves to hold the forward arm of the trigger W in raised position. When the breech bolt moves rearward, its bottom sliding over the top of the trigger keeps the same in position.

As hereinbefore described, the forward portion of the reaction spring R is seated in the breech bolt while the rear end rests against the rear plate J of the breech casing; in order to keep the reaction spring R in this position when the breech bolt is forward, as seen in Fig. III, the guide rod r extends through the rear plate J and through the reaction spring R and for a short distance into the breech bolt in its forward position. In Fig. XXI the guide rod r is shown detached on an increased scale. The rear end of the guide rod r which extends through and some distance beyond the rear plate J, is of a larger diameter than the forward portion of the rod in the spring, and the spring pressing against the shoulder on the rod yieldingly holds the rod in the rear plate. The rear end of the rod is concave and has a slot, this construction allows the rod to be turned on its axis in the rear plate by using the head of a cartridge shell in place of a screwdriver. In front of the rear plate and in line with the slot, the rod r carries two small lugs which project from opposite sides of the rod. As shown in Fig. XX and on an increased scale in Figs. XXIV, XXV, and XXVI, the rear end of the breech bolt E, at

the end of the seat therein for the reaction spring R and the rod *r*, is provided with a horizontal slot through which these lugs may be made to enter the breech bolt when the same is moved fully to the rear, see Fig. IV. Slightly in front of the rear face of the breech bolt two party-circular recesses are cut in the breech bolt into which the lugs of the rod may be made to enter by the rotation of the rod. Figs. XXIV, XXV, and XXVI. The bottoms of these recesses are eccentric to the seat of the spring in the breech bolt, and when by the rotation of the rod the lugs are entered into these recesses, the outer ends of the lugs will come in contact with the eccentric bottoms of the recesses and may be by forcible rotation caused to wedge therein so as to lock the rod in the breech bolt; in this condition the rod *r* with the breech bolt may be moved forward so as to withdraw the rear end of the rod from the rear plate J of the casing for the removal of the plate; at the same time the reaction spring R is by the locking of the rod *r* confined in its compressed condition within the breech bolt, and the forcible ejection of rod and spring from the breech bolt is prevented, which otherwise would take place when the rear plate is removed. The wedging of the lugs in the eccentric seats still locks the spring and rod in the breech bolt against accidental ejection when the same is removed from the breech casing, but by a slight rotation the rod may be unlocked for the removal of spring and rod.

The handle K of the gun is by a screw thread fastened in the hub of the rear plate J and in the tubular horizontal portion of the handle a buffer plate *k* is seated, the reduced front end of which projects through a corresponding hole in the rear plate, so as to stand in the path of the breech bolt; the rear of this portion of the handle is closed by the screw plug and the space between the front of this plug and the rear of buffer plate *k* is filled with a number of washers of a resilient material, or with a spiral spring. By this means any excess of recoil of the breech bolt is absorbed by the buffer plate and the packing in the handle, the resiliency of which may be adjusted by screwing the rear plug more or less into the rear end of the handle. I do not, however, claim in this application this buffer construction and adjustment in the handle, reserving the right to claim this in a co-pending application filed by me, said application being Serial No. 183,841, for automatic machine rifles, filed August 1, 1917.

With the trigger W pivoted in the vertical central partition of the barrel guide F, as hereinbefore described and as shown in Figs. III and IV, the rear end of the trigger extends outside of the breech casing beyond the rear plate J and occupies a position in front of the handle K where it may be readily operated with a finger of the hand grasping said handle. The rear plate J has a central vertical recess in its lower end through which the trigger passes so that the plate may be raised and lowered without interfering with the trigger. See Fig. XXIX. At the left side of the trigger a small horizontal safety latch *w* is mounted in the rear plate J and provided on its rear with a thumb piece by which the safety latch may be at will pushed to the right when its end will enter a recess in the left side of the trigger W and securely lock the trigger against operation; to yieldingly hold the safety latch *w* in either its locking or its releasing position a small spring-actuated vertical piston is mounted in the rear plate J above the latch, to enter one of two recesses cut in the upper edge of the latch. The top of the locking recess in the trigger is open, so that on removal of the rear plate J the latch *w* may be withdrawn upwardly with the plate even if in its locking position, and in replacing the rear plate J the latch will readily reenter the recess in the trigger.

In Figs. XVII, XVIII and XIX the breech bolt E is shown to be provided at its front end with a vertical flangeway which consists of a central T-shaped slot adapted to receive from above and guide downward the rear ends of the cartridges. The two laterally overhanging front edges of the slot are fitted to enter the annular groove in the cartridges near their rear end, thereby firmly holding the cartridges against lengthwise movement. In Fig. XXXI a front view of the breech bolt E is represented on an increased scale clearly showing the flangeway on the face of the breech bolt, one side of said flangeway extending vertically from the top to the bottom of the breech bolt while the other side extends only partly upward from the bottom, leaving a space at the top of that side for the rear end of a cartridge in the feed belt to be moved through it laterally until it is stopped by the other side of the flangeway in a central position in front of the breech bolt. In the same figure, the breech bolt is shown provided with the combined cartridge feed extractor X and shell ejector *x*. The cartridge feed extractor X is mounted by a strong pivot 9 on that side of the breech bolt to which the flangeway is open for the reception from the side of a cartridge. On the other side of the flangeway the shell ejector *x* is pivotally mounted in the feed extractor X.

As hereinbefore described, cartridges are supplied in a feed belt fed through the feed channel from the left side to the right, as shown in Figs. I, II, III, IV, XII, and XIII, by the transverse movement of the feed slide *g*, in the usual manner. The feed

slide g in its movements is actuated by a two-armed lever Y which is mounted on the pivot pin y on the under side of the hinged cover G from which an arm projects downward to support the lower end of the hub of the lever, the pivot pin y being fitted through the top of the cover and through the hub of the lever into the supporting arm; a flat spring attached to the top of the pivot pin y and resting upon the top of the cover plate locks the pivot pin against accidental removal. The forward arm of the feed lever Y extends into a recess in the rear face of the feed slide g so as to communicate its movements to the same in the usual manner, see Fig. II; the rear arm of the feed lever Y carries a depending circular stud z which extends into a cam groove Z cut in the upper surface of the breech bolt E. By this construction the reciprocating movement of the breech bolt causes the stepwise movement of the feed belt and cartridges through the feed channel as usual, so that when the breech bolt arrives at its forward position a cartridge is moved to the front of the vertical center line of the breech bolt, having been carried over the top of the shorter side of the flangeway on the left side of the breech bolt. In this position, see Figs. III and V, the feed extractor X is in its raised position so that a downward projecting lip l on the under side of the feed extractor X, centrally above the flangeway, stands above the groove in the cartridge in front of the breech bolt and, on the first rearward movement of the breech bolt this lip l descending into the groove in the cartridge, grasps the same and draws the cartridge rearward out of the feed belt. As the breech bolt moves farther rearward, the feed extractor X is lowered and forces the cartridge held in its grasp to enter into the flangeway, where it is held in a horizontal position as the breech bolt is moved fully to the rear. During the return or forward movement of the breech bolt, the feed extractor X is farther forced down so that the cartridge is lowered until it is in line with the chamber in the barrel, which it will enter during the remainder of the forward movement of the breech bolt until the cartridge is fully inserted into the barrel, and barrel and breech bolt returned to the firing position. After firing the cartridge in the barrel, these movements are repeated, and during the next rearward movement of the breech bolt another cartridge is withdrawn from the feed belt, drawn fully to the rear, and by the return movement entered into the chamber of the barrel. In addition to this, the second rearward movement of the breech bolt not only withdraws the cartridge from the belt and moves it to the rear, but, as the rear end of the cartridge in the chamber of the barrel which was fired remains within the grasp of the flangeway, the second rearward movement of the breech bolt also draws the empty shell of the fired cartridge from the barrel, see Fig. IV, and during the ensuing return or forward movement the lower point of the descending shell ejector x strikes the shell and ejects it vertically downward through the flangeway. See Fig. XVI. The lower end of the shell ejector is forced inward, as it descends, when its lower end strikes the upper edge of the barrel extension below it, see Figs. XIV, XV, and XVI, the upper inner corner of the extension being inclined inward and downward and the shell ejector being correspondingly beveled so that it is forced inward and kept in its vertical position until it reaches its downmost position.

In Figs. XIV, XV, and XVI are represented transverse sections through the breech casing A and barrel extension C in rear of the barrel, looking rearward, and showing a front view of the breech bolt, and of the feed extractor respectively in its highest position, in a lower position, and in the lowest position. In Fig. XXX the feed extractor X is shown on an increased scale and in its highest position in which the lip l takes hold in the groove of the cartridge shown in dotted lines below the head of the feed extractor. In Fig. XXXI the front of the breech bolt is shown on an increased scale and the feed extractor X and shell ejector x are shown in their raised position. In Fig. XXXII a vertical transverse section through the head of the feed extractor is represented, showing the shell ejector x pivoted in a vertical slot in the right side of the feed extractor X and yieldingly held in its vertical position by a spiral spring pressing against the upper arm of the shell ejector x. The other end of this spring rests against a horizontal cam pin 7 which is inserted into the left side of feed extractor X and fixed therein for a limited movement by a small transverse stop pin, so that the spring yieldingly keeps the pin 7 projecting from the left side of the feed extractor. These views being seen from the front, the left and right sides appear reversed, as normally their location is determined from a position in rear of the gun looking forward.

The means for giving to the feed extractor X the vertical movements at the proper times will now be explained. On the under side of the cover G and near the left edge of the same, so as not to interfere with the feed lever Y there are mounted a flat spring 2 and a longitudinal rib 3, the under edge of the rib 3 having the form of a cam. The spring 2 and the rib 3 are represented in Figs. III and IV in dotted lines for the reason that these views are central vertical sections showing the interior of the right hand half of the breech casing and the cover, while the spring and the rib are located in

the left half of the breech casing. In Fig. II, the top view of the gun, the position of the rib 3 is indicated as just inside of the left side plate *a* of the breech casing. When the breech bolt is in its forward position, Fig. III, the flat spring 2 rests upon the head of the feed extractor X and holds the same yieldingly down upon the rear end of the cartridge with the lip *l* in the annular groove of the cartridge. During the first of the rearward movement of the breech bolt and feed extractor, the highest portion of the head of the feed extractor, which is near its left side, is carried under the front end of the depending rib 3, and as the breech bolt moves farther to the rear the cam-shaped lower edge of this rib positively forces the feed extractor down and holds it in that position until at the last of the rearward movement the feed extractor arrives in the position shown in Fig. IV where it and the cartridge have been lowered by the rib and where the head of the feed extractor has moved rearward beyond the rear end of said rib 3. In Fig. XI an outside view of a portion of the left side plate *a* and a section of the cover G are shown. The lower edge of the rib 3 depending from the cover is represented in dotted lines being located near the inner side of said side plate. Underneath the rib 3 and fastened by rivets to the inside of the left side plate are shown two cams, 4 and 5, their location in the vertical plane with the rib 3 being also indicated in the top view represented in Fig. X. The forward portion of the cam 4 is less high than the rear portion, a shoulder 6 being formed on the top edge of the cam 4, which shoulder 6 is laterally inclined rearward and inward, and as the breech bolt and feed extractor X pass rearward under the rib 3, this incline forces the cam pin 7 into its seat in the head of the feed extractor where it is held by the inner face of the cam 4 until the breech bolt and feed extractor reach their rearmost position; there the head of the feed extractor has passed beyond the rear end of the rib 3 and the cam pin 7 beyond the rear end of the cam 4 and, therefore, the pin 7 is by its spring forced outward again and projects from the left side of the feed extractor X. In the first of the forward return movement of the breech bolt and feed extractor, the cam pin 7 encounters the rear end of the cam 4 fastened to the left side plate, and this rear end being inclined downward and forward, the cam pin and the feed extractor are positively forced down to the lowest position shown in Fig. XVI and held there by the under edge of cam 4 until the pin arrives at the forward end of the cam 4 which is inclined upward and forward. Then the cam pin 7 encounters the rear edge of the cam 5, which inclines forward and upward, and this forces the feed extractor to again rise to its highest position when the breech bolt arrives at its forward closed position.

As shown in Figs. I and II, for at will moving the breech bolt rearward and forward by hand, a handle 8 is inserted into the right side of the breech bolt near its front end and moves in a slot in the right side plate of the breech casing; a collar on the handle 8 of a larger diameter than the width of the slot and located inside of the side plate, serves to lock the handle in its seat in the breech bolt.

As seen in Fig. I, the slot ends at the rear in a larger circular opening through which the handle 8 with its collar may be inserted or removed, when the rear plate J is removed for entering or withdrawing the breech bolt from the casing. This enlarged opening being in rear of the rearward limit of the normal movement of the breech bolt during the operation of the gun, the handle cannot accidentally escape from the breech bolt.

With the foregoing description of its construction, the operation of the breech mechanism may be readily understood. After a feed belt with cartridges in the pockets thereof, see Fig. XII, has been inserted into the feed channel from the left side to the right, Figs. I, II, and XIII, the breech bolt is once moved by hand to the rear. By this motion, the first cartridge is withdrawn out of the feed belt and as the handle is released the breech bolt is returned forward by the tension of the reaction spring R, and the cartridge, properly lowered by the feed extractor, is inserted into the barrel while the next step of the feed belt brings another cartridge above the barrel within the reach of the feed extractor. On pulling the trigger and releasing the same, the first cartridge is fired and the operation of the breech bolt is automatically repeated, and the next cartridge is seated in the barrel ready for firing. In this manner single shots may be at will fired, the pulling of the trigger lowering the sear each time and allowing it to return upward for holding the firing pin again in the cocked position.

If it is desired to fire a succession of shots, or a volley, the trigger is pulled and retained in its raised position, when the lateral projections on the front end of the forward arm of the trigger, which projections are inclined rearward and upward on their under sides, will automatically cause the sear to release the firing pin each time when the breech bolt reaches its forward locked position and thereby release the firing pin automatically for firing each succeeding shot, until the trigger is released.

If it becomes necessary at any time to obtain access to the breech mechanism, or to the feed belt or the mechanism moving the

same, it will only be required to press rearward the latch I and to raise the cover G from its closed position, Fig. III, to its open position, Fig. IV, in dotted lines. If on reclosing the cover, the feed belt moving slide *g* and the feed lever Y should happen to be in a position where the vertical stud *z* depending from the rear arm of the lever Y, can not enter the cam groove in the top of the breech bolt, but descends to rest upon the top surface of the bolt sidewise of the groove, the cover may nevertheless be readily pressed down and be locked by the latch I, as the rear arm of the feed lever Y, being thin and of a spring temper and having a space between its upper surface and the under side of the cover, will yield by bending upward; then on the first rearward movement of the breech bolt the cam groove will be brought beneath the stud *z* which will automatically find its place in the groove, the tension of the lever arm forcing the stud down into the groove.

It is evident that various changes in form and arrangement of the parts may be made without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. In a machine gun, the combination of a breech casing, a barrel and barrel extension supported and guided for longitudinal movement in the casing, a breech-bolt supported and guided for longitudinal movement in the barrel extension, a removable guide for said breech-bolt inserted in the casing, and a removable rear plate for closing the casing and locking said movable members and said guide therein, and for opening the casing to allow the movable members and the guide in their relative positions to be withdrawn from said casing.

2. In a machine gun, the combination of a breech casing, a barrel and barrel extension supported and guided for longitudinal movement in the casing, means located entirely within the breech casing, and not extending through or into the side walls thereof, for supporting, guiding and securing in position said barrel and barrel extension, a breech-bolt supported and guided for longitudinal movement in the barrel extension, and means located entirely within the breech casing, and not extending through or into the side walls thereof, for guiding and supporting the rear end of the breech-bolt, and a removable rear plate for closing the casing and locking said movable members in place therein, and for opening the casing to allow the movable members in their relative positions to be withdrawn from said casing, whereby said members of the breech mechanism may be readily inserted in the breech casing or removed therefrom.

3. In a machine gun, the combination of a breech casing, a barrel and barrel extension supported and guided for longitudinal movement in the casing, means located entirely within the breech casing, and not extending through or into the side walls thereof, for supporting, guiding and securing in position said barrel and barrel extension, a breech-bolt supported and guided for longitudinal movement in the barrel extension, and means located entirely within the breech casing, and not extending through or into the side walls thereof, for guiding and supporting the rear end of the breech-bolt, a removable top cover, cartridge feed mechanism attached to the under side of said cover, and a removable rear plate for closing the casing and locking the barrel, barrel extension and breech-bolt within the casing and for opening the casing to allow said parts in their relative positions to be withdrawn therefrom.

4. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having an integral cartridge-engaging projection near its free end and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism.

5. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, and means for depressing the free end of said feed extractor and keeping it in engagement with the cartridge until the cartridge is fully depressed and in line with the bore of the barrel.

6. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, a vertical flange-way formed on the face of the breech-bolt integrally therewith,

and means for vertically moving the free end of said feed extractor to lower the cartridge and force its head into said flange-way.

7. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, and a shell ejector carried by the free end of said feed extractor.

8. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, means for causing said feed extractor to engage the cartridge, a vertical flange-way formed on the face of the breech-bolt integrally therewith, a shell ejector carried by the free end of said feed extractor, and means for vertically moving the free end of said feed extractor to lower the cartridge and force its head into said flange-way and to cause said ejector to eject the empty shell from the flange-way.

9. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, and a shell ejector carried by the free end of said feed extractor, means for depressing the free end of said feed extractor to lower the cartridge during the rearward movement of the breech-bolt, and means for further depressing said free end during the return movement of said breech-bolt.

10. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, and means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, a shell ejector carried by the free end of said feed extractor, means for depressing the free end of said feed extractor to lower the cartridge during the rearward movement of the breech-bolt, means for further depressing said free end during the return movement of said breech-bolt, and means for raising the free end of said feed extractor near the end of the return movement of the breech-bolt.

11. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, a shell ejector carried by the free end of said feed extractor, a spring and a cam rib located above the free end of the feed extractor for engaging same and depressing said free end.

12. In a machine gun, a barrel, a breech-bolt supported and guided for longitudinal movement to open and close the breech of the barrel, feed mechanism for successively feeding cartridges to a position above and in line with the barrel, a feed extractor pivoted to the breech-bolt and having a cartridge-engaging projection near its free end, means for causing said feed extractor to engage the cartridge, whereby upon rearward movement of the breech-bolt a cartridge is withdrawn from the feed mechanism, a shell ejector carried by the free end of said feed extractor, a pin extending from the feed extractor and yieldingly mounted therein, and cams for engaging said pin and forcing it into the feed extractor and for thereafter releasing same during the rearward movement of the breech-bolt, and cams for engaging said pin and thereby depressing and later raising the free end of said feed extractor during the return movement of the breech-bolt.

13. In a machine gun, the combination of the breech casing, a barrel and barrel extension supported and guided for longitudinal movement in the casing, a breech-bolt supported and guided for longitudinal movement in the barrel extension, a pivoted rocking lever, a rib on the rear face thereof, a locking face on said rib, an arm on the barrel extension, a locking face on said arm for engaging the locking face on said rib, and a buffer spring and piston for engaging said arm, whereby at the end of the rearward movement of the barrel extension

said rocking lever and barrel extension are locked against return movement.

14. In a machine gun, the combination of a breech casing having a removable rear plate, a barrel and barrel extension adjustably secured together by screw threads and supported and guided for longitudinal movement in the casing, a breech-bolt supported and guided for longitudinal movement in the barrel extension, a series of recesses around the circumference of the barrel forward of the barrel extension, a spring pawl secured in said barrel extension for engaging one of said recesses and in position to be engaged by the breech casing, whereby the barrel is positively locked against rotation when in place in the breech casing, but whereby the barrel may readily be adjusted in the barrel extension relatively to the breech-bolt when the parts are rearwardly withdrawn from the breech casing.

15. In a machine gun, the combination of a casing, a barrel and barrel extension, a breech-bolt movable lengthwise in the barrel extension, a locking block mounted in the barrel extension and adapted to lock the breech-bolt in the barrel extension, an upward inclined projection on the bottom of the breech casing adapted to force said locking block into the locking position when the barrel extension and breech-bolt are in the forward position, and a breech-bolt guide having forwardly extending arms adapted to engage said locking block on the rearward movement of said barrel extension to lower said block to unlock the breech-bolt.

16. In a machine gun, a breech casing inclosing and guiding the breech mechanism and having an open transverse feedway for receiving and guiding a cartridge feed belt, a top cover attached to the casing by a pivot or hinge pin near the forward end of the casing, a transversely moving cartridge feed slide provided with a feed pawl mounted upon the under side of said cover, a feed lever pivotally mounted upon the under side of said top cover and adapted to move said feed slide through the feedway, and a breech-bolt having a cam groove in its top surface adapted to actuate said feed lever.

17. In a machine gun, a breech casing inclosing and guiding the breech mechanism and having an open transverse feedway for receiving and guiding a feed belt, a top cover attached to the breech casing, a feed slide and a feed pawl mounted upon the under side of said cover, a two-armed feed lever pivoted upon the under side of said cover and having a depending stud on the rear arm, and a breech-bolt having a cam groove in its top for receiving said stud, the rear arm of said feed lever being vertically resilient, whereby said cover may be closed without said stud entering said cam groove, and said stud will automatically spring into said cam groove when the breech-bolt has moved to the proper position therefor.

18. In a machine gun, a breech casing having a pivotally attached top cover and a removable rear plate, and provided with a spring-actuated latch for normally locking both the top cover and the rear plate in place, but releasing said top cover on being moved in one direction and releasing said rear plate on being moved in opposite direction.

19. In a machine gun, a breech casing having a pivotally attached top cover and a removable rear plate, and provided with a longitudinally sliding spring-actuated latch for normally locking both said top cover and said rear plate in place, but releasing said top cover on being pressed rearward, and releasing said rear plate on being pressed forward.

20. In a machine gun, a breech-bolt, a slotted firing pin carried thereby, a mainspring within the firing pin, a vertical pin confining the firing pin in the breech-bolt and also confining the rear end of the mainspring in the firing pin, and a horizontal transverse pin for confining the front end of said mainspring in the firing pin.

21. In a machine gun, a breech-bolt, a firing pin carried thereby, having a tubular portion open at the front end, a main spring within said tubular portion, a transverse pin for confining the front end of said main spring within the firing pin, and means carried by the breech-bolt for engaging and supporting the rear end of said spring.

22. In a machine gun, a breech-bolt, a firing pin carried thereby having a tubular portion open at the front end, a main spring within said tubular portion, a transverse pin for confining the front end of said main spring within the firing pin, means carried by the breech bolt for engaging and supporting the rear end of said spring, and a firing point on the lower edge of the front face of said tubular portion.

23. In a machine gun, a breech casing, a breech-bolt, a firing pin carried thereby having a tubular portion open at the front end, a main spring within said tubular portion, a transverse pin for confining the front end of said main spring within the firing pin, means carried by the breech bolt for engaging and supporting the rear end of said spring, said firing pin also having a slot in rear of said tubular portion, and a cocking lever pivoted in the breech bolt and entering said slot in the firing pin.

24. In a machine gun, a breech casing having a fixed top plate, a breech-bolt, a firing pin and a mainspring carried thereby, a cocking lever also carried by the breech-bolt, combined with a slot in the top plate of the breech casing, said slot having a rear wall for engaging said cocking lever

and moving it into position to hold the firing pin retracted, and also having a downwardly projecting front wall for engaging said cocking lever during the last of the forward movement of said breech bolt and positively moving said cocking lever into engagement with said rear wall again.

25. In a machine gun, a breech casing having a fixed top plate, a breech-bolt, a firing pin and a mainspring carried thereby, a cocking lever also carried thereby, a slot in the top plate of the breech casing having a rear wall for engaging said cocking lever and moving it into position to hold the firing pin retracted, and having a downwardly projecting front wall for engaging said cocking lever during the last of the forward movement of said breech bolt, and positively moving said cocking lever to initial position out of reach of said firing pin.

26. In a machine gun, a breech-bolt, a firing pin and a mainspring carried thereby, a vertically sliding sear also carried thereby, and a sear spring for holding said sear in the path of the firing pin, said sear provided with an arm having a shoulder for engaging and holding said firing pin in cocked position, said arm also having forward of said shoulder a surface extending parallel to the axis of the firing pin and of sufficient length to underlie the firing pin when in its forward or firing position.

27. In a machine gun, a breech casing, a breech-bolt, a breech-bolt guide, a sear mounted in the breech-bolt, a trigger pivoted in the breech-bolt guide having a finger piece extending at the rear beyond said guide and beyond the breech casing, said trigger also having a forward extension to engage the sear for at will causing it to release the firing pin.

28. In a machine gun, a breech casing, a breech-bolt, a breech-bolt guide, a sear mounted in the breech-bolt, a trigger pivoted in the breech-bolt guide having a finger piece extending at the rear beyond said guide and beyond the breech casing, said trigger also having a forward extension with inclines on its front end to engage and lower said sear in its forward movement.

29. In a machine gun, a breech casing, a breech-bolt carrying the forward portion of a reaction spring on a guide rod, a rear plate for the breech casing for supporting the rear end of said guide rod, coöperating means for entering and engaging by rotation said rod with the breech bolt, and means for positively preventing further rotation of said rod in the same direction while frictionally locking it against reverse rotation.

30. In a machine gun, a breech-bolt, a reaction spring and a guide rod with their forward portions extending into the breech-bolt, and coöperating means upon said guide rod and breech-bolt whereby upon the rotation of said guide rod it may be positively prevented from further rotation in the same direction and frictionally locked against reverse rotation.

31. In a machine gun, a breech-bolt, a reaction spring and a guide rod with their forward portions extending into the breech-bolt, said breech-bolt having an eccentric recess for engaging a projection on said guide rod whereby said guide rod is adapted to be locked in said breech-bolt by a part-rotation against further rotation in either direction.

32. In a machine gun, a breech casing, a breech-bolt, a breech-bolt guide, a trigger pivoted in the breech-bolt guide having a finger piece extending at the rear beyond the guide and beyond the breech casing, a removable rear plate closing the breech casing at the rear, said plate having in its lower edge a slot for the passage through it of the rearward extension of the trigger, whereby said rear plate is adapted to be removed or to be replaced without affecting the trigger.

33. In a machine gun, a breech casing, a breech-bolt, a breech-bolt guide, a trigger pivoted in the breech-bolt guide and having a finger piece extending at the rear beyond the guide and beyond the breech casing, a removable rear plate closing the breech casing at the rear, said plate having in its lower edge a slot for the passage through it of the rearward extension of the trigger, and a safety slide movably mounted in the lower portion of said rear plate, and a cooperating recess in the side of said trigger whereby said trigger may be at will secured against operation or released for operation.

34. In a machine gun, a breech casing, a breech-bolt, a breech-bolt guide, a trigger pivoted in the breech-bolt guide and having a finger piece extending at the rear beyond the guide and beyond the breech casing, a removable rear plate closing the breech casing at the rear, said plate having in its lower edge a slot for the passage through it of the rearward extension of the trigger, and a safety slide movably mounted in the lower portion of said rear plate, and a coöperating recess in the side of said trigger, said recess being open at the top, whereby said trigger may be at will secured against operation or released for operation, and whereby said rear plate is adapted to be removed or to be replaced without affecting the trigger or the safety slide.

35. In a machine gun, a breech casing having a fixed top plate, a breech-bolt, a firing pin and a mainspring carried thereby, a cocking lever also carried thereby, a slot in the top plate of the breech casing having a rear wall for engaging said cocking lever and moving it into position to hold the fir-

ing pin retracted, and a surface upon the under side of said top plate for thereafter engaging said cocking lever and holding it in said position during the rearward and greater portion of the forward movements of the breech-bolt, and a downwardly projecting front wall of said slot for engaging said cocking lever during the last of the forward movement of said breech bolt and positively moving said cocking lever to initial position out of reach of said firing pin.

36. In a machine gun, a breech casing inclosing and guiding the breech mechanism and having an open transverse feed way for receiving and guiding a feed belt, means for moving said feed belt stepwise through said feed way, a top cover attached to the breech casing, a movable feed lever mounted upon the under side of said cover and having a depending stud, said lever and stud comprising a yielding element whereby the stud may yield in vertical direction, and a breech bolt having a cam groove in its top for receiving said stud, whereby said cover may be closed without said stud entering said cam groove and whereby said stud will automatically spring into said cam groove when the motion of the breech bolt carries the groove to the proper position for receiving said stud.

This specification signed and witnessed this third day of October, A. D. 1916.

JOHN M. BROWNING.

In the presence of—

ARTHUR L. ULRICH,

KATHERINE A. POWERS.