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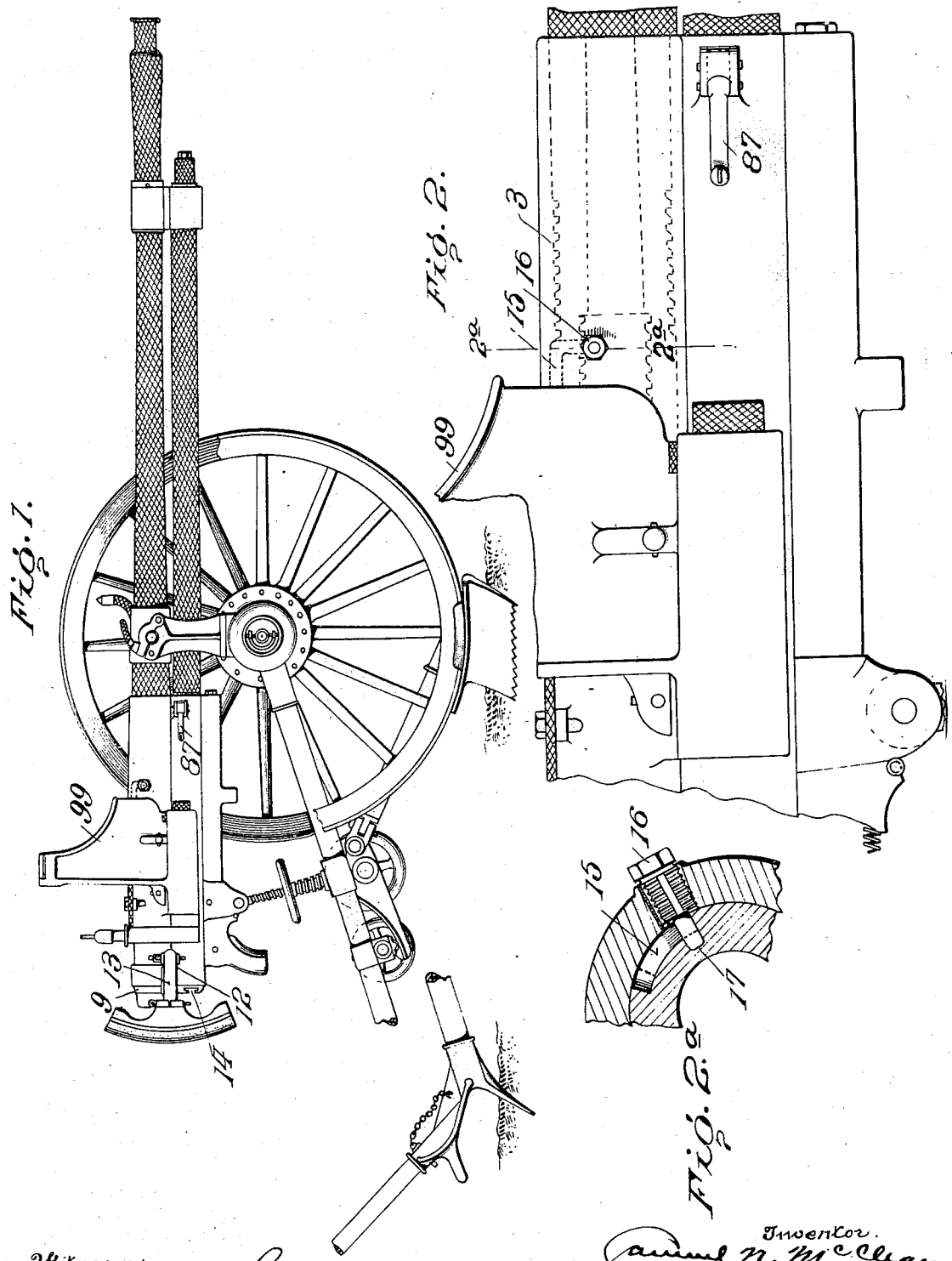
BREECH LOADING GAS ACTUATED GUN.

APPLICATION FILED SEPT. 11, 1905.

933,098.

Patented Sept. 7, 1909.

5 SHEETS—SHEET 1.



Witnesses.
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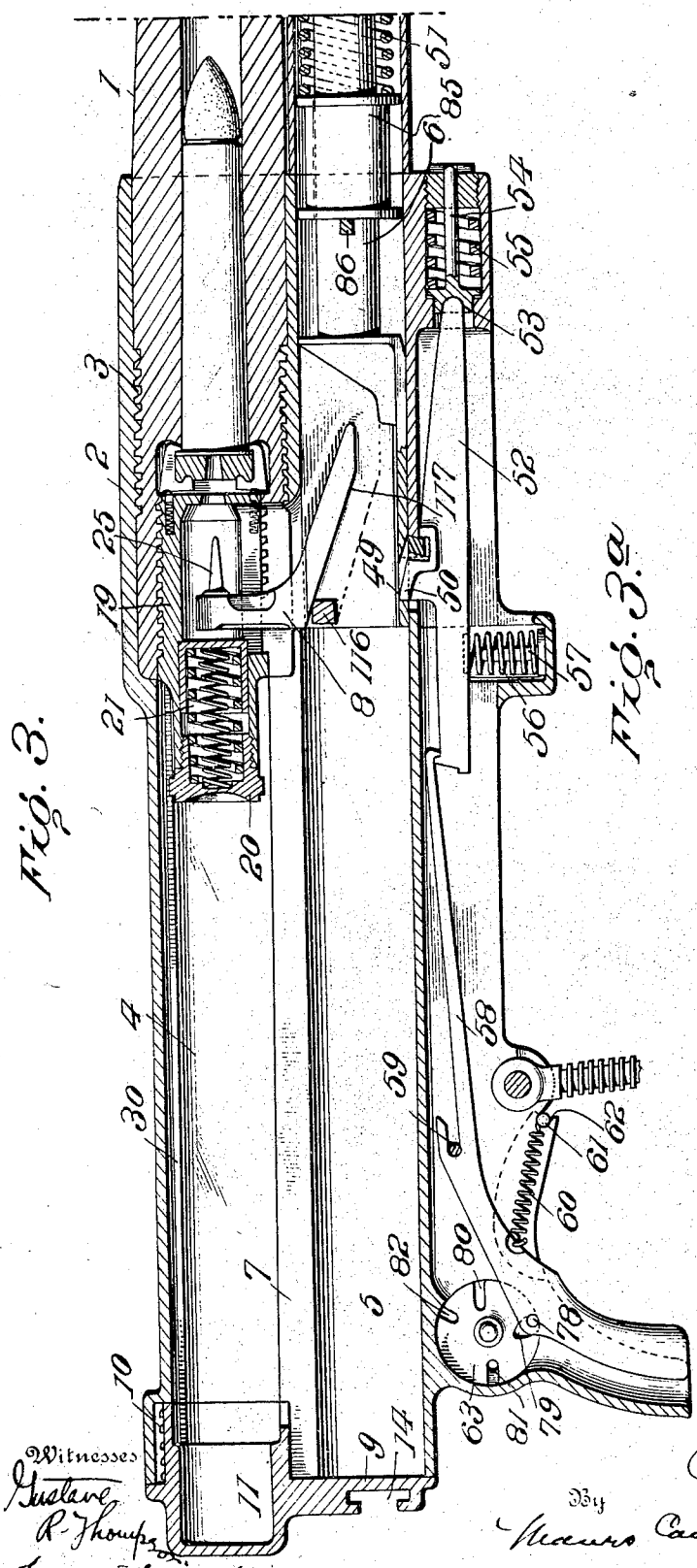

Fig. 3.

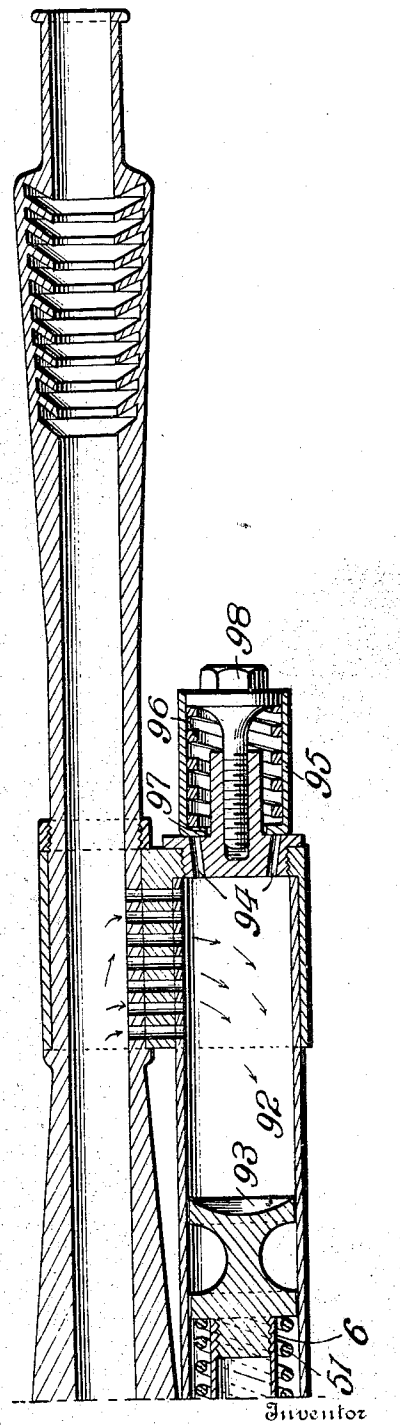

Fig. 3a.

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Fig. 4.

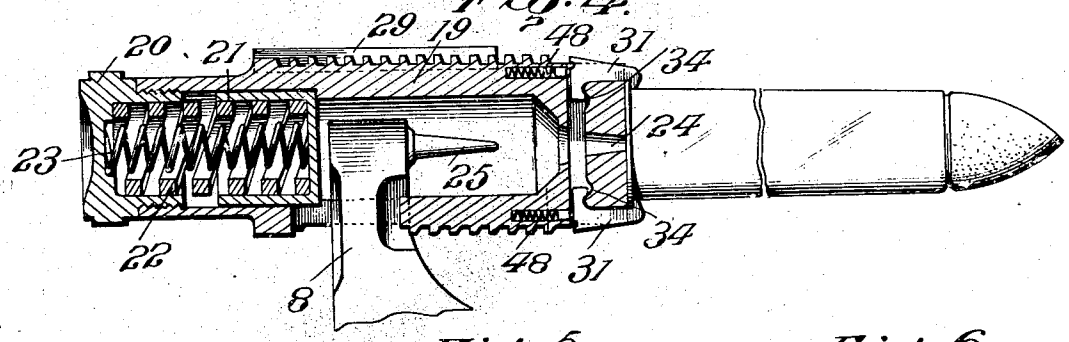


Fig. 5.

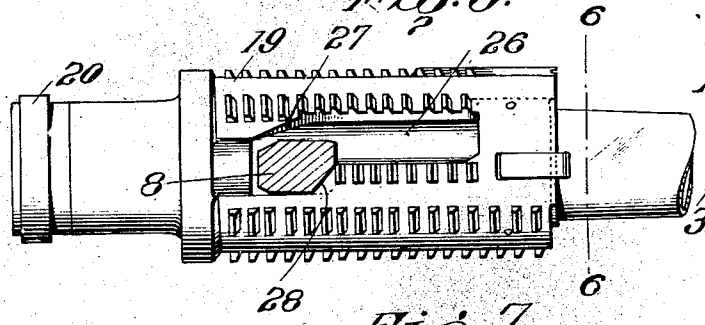


Fig. 6.

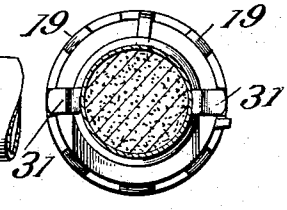


Fig. 7.

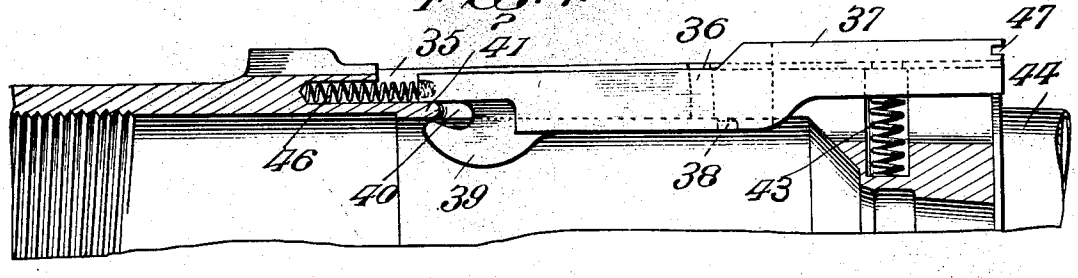
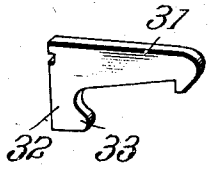


Fig. 9.



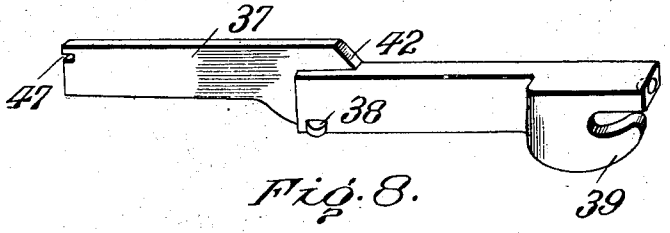


Fig. 8.

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Fig. 10.

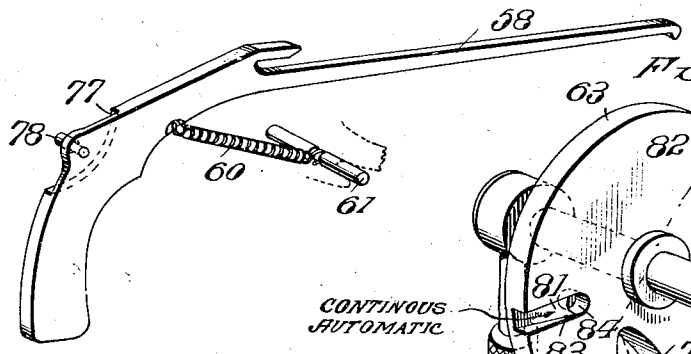

Fig. 12.

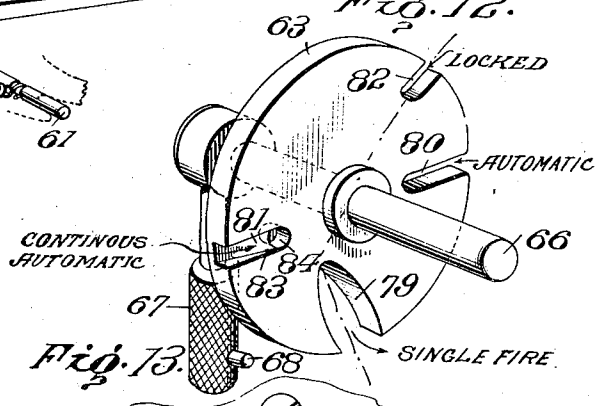

Fig. 11.

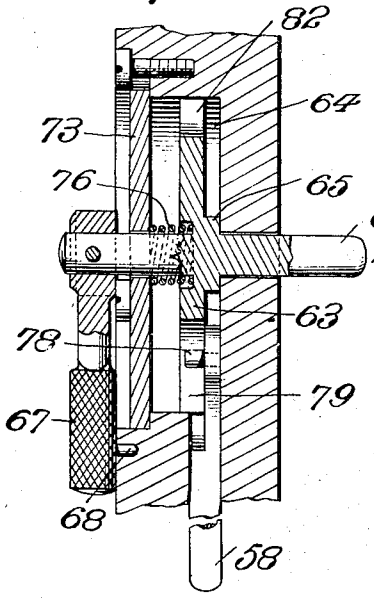

Fig. 13.

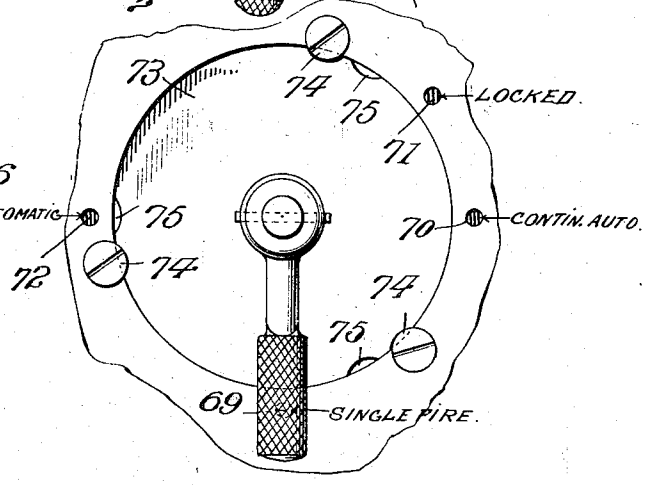

Fig. 14.

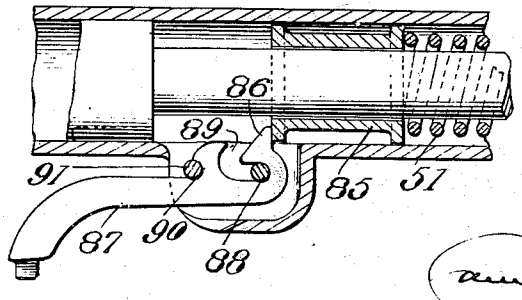

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Fig. 15.

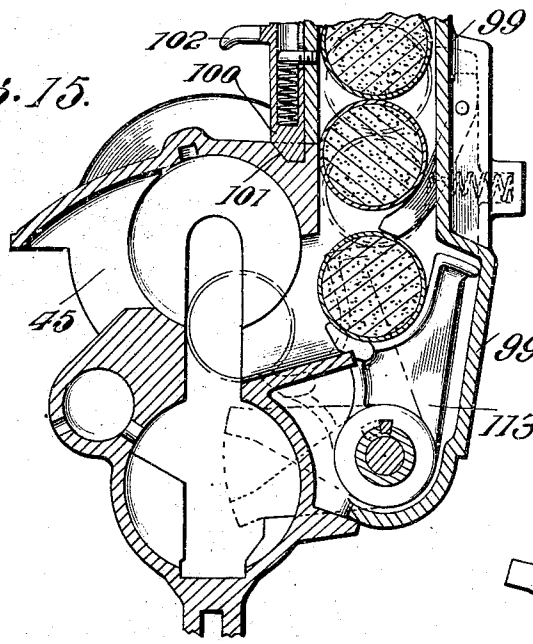
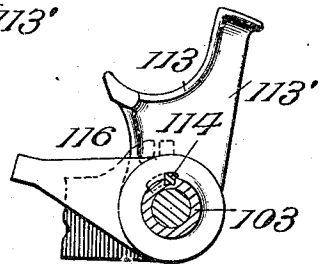


Fig. 18.



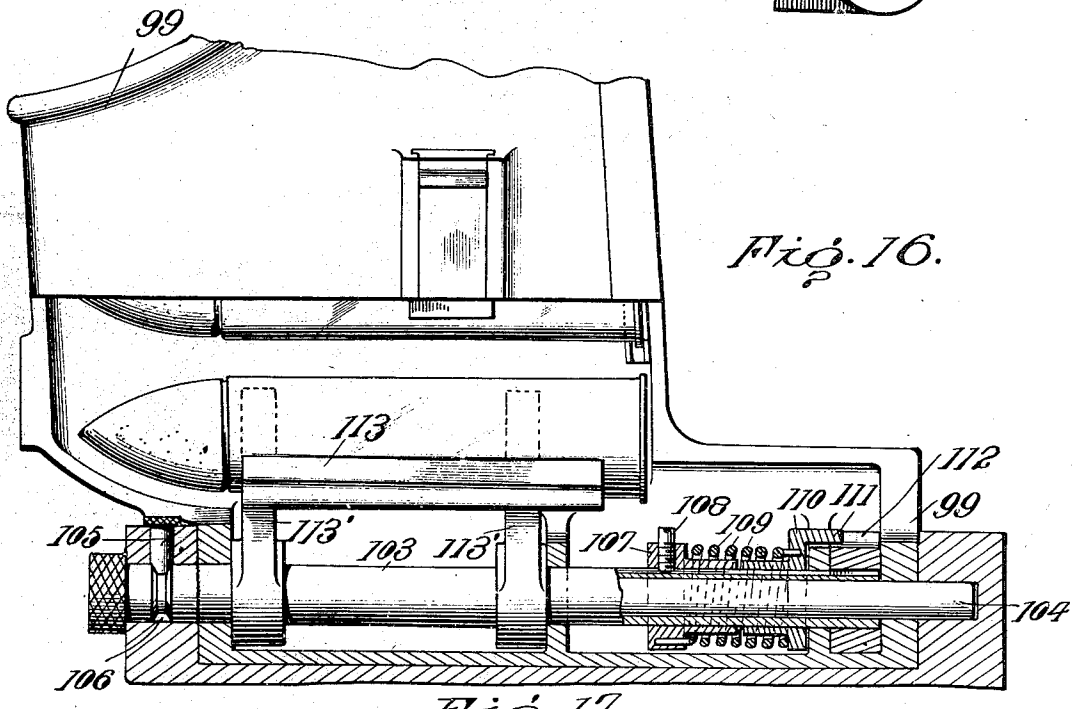
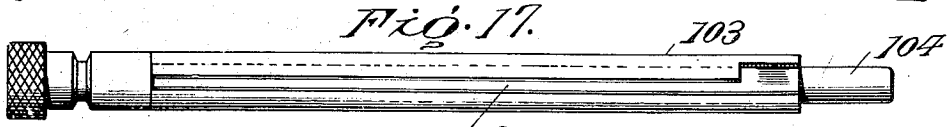


Fig. 16.

Fig. 17.



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UNITED STATES PATENT OFFICE.

SAMUEL N. McCLEAN, OF CLEVELAND, OHIO, ASSIGNOR TO THE McCLEAN ARMS AND ORDNANCE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF NEW JERSEY.

BREECH-LOADING GAS-ACTUATED GUN.

933,098. Specification of Letters Patent. Patented Sept. 7, 1909.

Application filed September 11, 1905. Serial No. 277,990.

To all whom it may concern:

Be it known that I, SAMUEL N. McCLEAN, a resident of Cleveland, Ohio, have invented a new and useful Improvement in Breech-Loading Gas-Actuated Guns, which invention is fully set forth in the following specification.

This invention relates to breech-loading gas-actuated guns, and more particularly to gas-actuated automatic guns.

The object of the invention is to improve and simplify the construction and operation of these guns, and to provide certain details of improvement in connection with the feeding, firing, ejecting and actuating mechanisms thereof.

More specifically stated, the object of the invention is to construct a gun in which the several parts shall so interlock that they can be readily assembled and dis-assembled by hand, without the use of other tools than those entering into the construction of the gun itself.

Furthermore, the object is to reduce the gun to the simplest number of operating parts, which parts shall be interlocking, to the end that they shall positively and securely retain their interlocked position during the operating action of the gun, and may, nevertheless, be freely and quickly dis-assembled by hand.

Furthermore, an additional object is to provide cartridge-feeding devices for retaining and releasing the cartridges and maintaining a continuous automatic firing of the gun. And finally, the object is to provide certain details of construction in connection with the gas-actuated and power-controlling parts of the gun.

With these objects in view, the invention consists in the construction described and claimed in the following specification taken in connection with the drawings, which form a part thereof, which drawings are designed merely as one mechanical expression of the inventive idea involved, and not as defining the limits of the invention.

In said drawings: Figure 1 is a side elevation of a one-pounder field-gun embodying the invention; Fig. 2 is a broken side-elevational detail thereof; Fig. 2ª is a sectional detail on the line 2ª—2ª, Fig. 2; Fig. 3 is a longitudinal central section, with parts shown in elevation, of the gun-frame and the rear portion of the gun-barrel and the mechanism connected therewith; Fig. 3ª is a like central longitudinal section of the forward or muzzle portion of the barrel, together with the gas-cylinder and actuating piston; Fig. 4 is a central vertical section of the breech-block with a portion of the operating-rod in elevation and in position in the block; Fig. 5 is a bottom plan view of the breech-block, and Fig. 6 is a front elevation of the breech-block with a cartridge in position, the latter being shown in section on the line 6—6, Fig. 5; Fig. 7 is a central vertical section of a portion of the breech-block on a large scale, with the ejector shown in position in side elevation. Fig. 8 is a perspective view of the ejector, showing the reverse side from that shown in Fig. 7; Fig. 9 is a perspective view of one of the extractor hooks; Fig. 10 is a perspective view of the trigger; Fig. 11 is a central vertical section of the disk for controlling the firing action, together with its seat in the frame of the gun; Fig. 12 is a perspective view of said disk, and Fig. 13 is a side elevation thereof with a portion of the gun-frame shown in broken detail. Fig. 14 is a sectional detail showing the means for placing the drive-rod spring under tension; Fig. 15 is a transverse sectional view through the gun-frame and magazine; Fig. 16 is a side-elevation of the magazine with parts removed and parts in section to show the construction; Fig. 17 is a view of a hinge-pin and sleeve for the magazine, and Fig. 18 is a side elevation of the cartridge-receiving cradle the hinge-pin and sleeve, being shown in transverse section.

Referring to the drawings, and particularly to Fig. 1, 1 is the gun-barrel and 2 is the gun-frame, to which the gun-barrel is connected by screw-threads, preferably of the interrupted screw-thread type, the screw-threads being shown at 3, in Figs. 2 and 3. The gun-frame proper has a longitudinal cylindrical bore 4 in line with the bore of the barrel, within which the breech-block reciprocates, and beneath the bore 4 is a similar bore 5, within which the operating-head 8 of the drive-rod 6 reciprocates for operating the breech-block, the bores 4 and 5 being in communication through slot 7, as is well-known in guns of this type heretofore invented by me, and as is clearly shown in Fig. 3. The rear end of the gun-frame is closed by a cap 9 secured to the gun-

frame by interrupted screw-threads 10, that portion of the cap in line with the bore 4 forming a cylindrical cup 11, acting, in connection with a piston on the breech-block, to form a dash-pot. Referring to Fig. 1, said cap 9 is provided with oppositely disposed under-cut flanges 12 for receiving the arm of the shoulder-piece for the purpose of steadying and training the gun. Said cap is also provided with similar under-cut flanges 14, see Fig. 3, within which the arm 13 of the shoulder-piece may be inserted without unscrewing the cap from the gun-frame.

Referring to Figs. 2 and 2a, 15 is a slot having two portions formed at right angles to each other in the rear end of the barrel, and 16 is a screw-threaded pin passing through the frame of the barrel with its lower end in a position to engage said slot when the barrel is thrust into position in the frame and turned to secure the engagement of the interrupted screw-threads on the barrel and gun-frame heretofore referred to. In assembling the parts screw-pin 16 is screwed downwardly, so that its lower end travels within the slot 15, and, at the point when the barrel has been turned so as to secure the desired locking engagement, the lower end of the pin is opposite a depression 17 in the slot 15, and by screwing pin 16 home it engages said depression and thus securely locks the barrel and frame together and prevents any turning of the barrel with relation to the frame.

Referring to Figs. 3, 4 and 5, 19 is the breech-block provided with interrupted screw-threads, as shown, and having a rear extension forming a piston 20 coacting with the dash-pot 11 in the cap 9, as hereinbefore described. This rearward extension is also provided with a spring-cushion 21 which is acted upon by springs 22, 23, which serve to take up the rearward thrust of operating-head 8 on the piston-rod 6 and prevent undue jarring of the parts. The forward portion of the breech-block is of hollow cylindrical construction, as shown in Fig. 4, and has a central conical opening 24, Fig. 4, for the passage of the firing-pin 25 in the act of exploding the cartridge. On the underside of the breech-block is a longitudinally extending slot 26 having a straight forward portion and a straight rearward portion, that is, said portions are parallel with the axis of the breech-block; the slot also has on one side, near its rear portion, a cam 27, and on the other side a cam 28 for engagement with the piston-head 8 for the purpose of giving the block the requisite turn in unlocking the block, or locking the same, all as well understood in guns of this construction. The block is also provided with a flange or exterior rib 29 which plays in a longitudinal groove or way 30 in the gun-frame, for the purpose of controlling and timing the locking or turning movement of the block. This slot or way is engaged by the rib 29 so that the block can not turn during the time that the rib is in said slot or groove 30. The groove, however, has its walls cut away at its extreme forward portion, that is, when the breech block is in position to be turned to lock the same in the breech of the barrel.

Referring to Figs. 3, 4, and 9, 31 is the extractor hook or hooks, mounted on the forward end of the breech-block. These hooks have the usual claw-like construction for engaging the rim of the cartridge and are substantially right-angular or bell-crank in form, the inwardly projecting arms 32 being provided with bearing lugs 33 which enter corresponding seats 34 in the breech-block, as will be understood by inspection of Fig. 4. These bearing seats are nearer the center of the block than the cartridge engaging claws of the extractor, so that the rearward pull of the block in the act of opening the breech causes the claw-portions of the extractor to tend to move toward the center of the block, thereby effecting a firm grip upon the flange of the cartridge.

Referring to Figs. 7 and 8, 35 is a slot longitudinally extending through the side-wall of the breech-block, said slot having formed in its side-wall a groove 36 shown in dotted lines in Fig. 7. 37 is an ejector-bar designed to be seated in the slot 35 and provided with a lateral lug 38, Fig. 8, which, in the act of assembling the parts, registers with the groove 36 in the side-wall of slot 35. On the underside of the ejector, and at the rear end thereof, is a lug 39 which forms with the upper portion of the bar a recess 40, within which is seated, when the ejector is in position, a forwardly projecting lug 41 on the block. The ejector-bar is provided with a cam-shoulder 42 which engages a fixed part of the gun-frame as the breech-block is moved rearward, for the purpose of moving the ejector inward against the tension of the ejector-spring 43, whereby the ejector gives a sudden push or flip to the cartridge 44 and ejects it through the lateral opening 45, Fig. 15, in the gun-frame. Situated in a recess in the breech-block, immediately to the rear of the ejector-bar is a spring 46 bearing upon the rear of the ejector-bar and tending to hold it in its forward position. The ejector-bar is also provided on its front end with suitable means for engaging it by a proper tool, which, for example, may be the head of a cartridge-shell, for forcing it rearward against the tension of spring 46, until the lug 38 registers with the groove 36, when it may be turned around the ledge 41 of the gun-frame and lifted out of its place in the breech-block. As here shown, this suitable means of engagement consists of a notch 47,

shown in Figs. 7 and 8. It will be understood that the extractors are retained in their position by springs 48, 48, Fig. 4, which are situated in suitable recesses in the forward end of the breechblock, as shown in Fig. 4. The rear end of head 8 of piston rod 6 is provided with a sear-notch 49, Fig. 3, which is engaged by the shoulder 50 on the sear, and when so engaged the head 8 is retained in the position shown in Fig. 3, with the piston-rod spring 51 under tension, and, when the sear is withdrawn, the piston-head 8, with its firing-pin 25, is advanced so as to bring said pin in contact with the primer of the cartridge for firing the gun. The sear consists of the bar 52 engaging by a ball-and-socket joint 53, with pin 54 whose head rests upon a spring 55, so that as the piston-head moves forward and is resisted by the engagement of the shoulder 50 on the sear with the notch 49 on the piston-rod, the jar is taken up by the spring 55 in a manner that will be readily understood. The sear is normally held in its elevated position, shown in Fig. 3, by a spring 56 surrounding a headed pin 57 resting in a suitable socket in the gun-frame, which socket, together with the under side of the sear chamber, is cut away, as shown in Fig. 3. The pin is of such length as to permit the sear to be vibrated to release the shoulder 50 from the notch 49 and at the same time serves as a stop to prevent a too great depression of the sear when the trigger is pulled.

In assembling the parts, the sear is first pushed into position with its forward end bearing upon the spring-pressed pin 54, and the spring 56 being placed over the pin 57, the two are inserted in the socket for said pin, and the spring 56 sufficiently compressed to allow the parts to slip into position and the spring to rise into its seat on the underside of the sear, all as will be clearly understood from an inspection of Fig. 3. The parts are dis-assembled by compressing spring 56 and tilting the same, with its pin 57, forward, after which the sear is free to be shoved slightly rearward and removed from the under-side of the sear-chamber. The trigger 58 is hung on a pin 59 by means of an under-cut groove, as shown in Fig. 3, the trigger being held in its forward position by the tension of spring 60 having one end secured to the trigger and the other end secured to bar 61 resting in grooves 62 in the frame, as will be understood from an inspection of Fig. 3. In order to dis-assemble the trigger, the bar 61 is pulled forward until it becomes dis-engaged from groove 62 and the trigger turned down and rearward till it becomes disengaged from the pin 59, when it can be readily removed from the underside of the gun-frame. Coöperating with the trigger for the purpose of controlling the movements thereof, in effecting the firing action of the gun is a disk 63, shown in position in Fig. 3, and shown in detail construction in Figs. 11, 12 and 13. This disk is normally situated in a cylindrical recess 64, Fig. 11, formed in the side of the gun-frame and is provided on its underside with a boss or shoulder 65 which serves to hold the inner face of the disk somewhat removed from the inner end of the cylindrical recess 64. The disk preferably has formed integral therewith, or otherwise secured thereto, a pin 66 extending entirely through the wall of the gun-frame and projecting on either side thereof, as shown in Fig. 11, and has secured thereto an operating handle 67, which handle has on its inner side, or the side adjoining the gun-frame, a pin 68 for engagement in suitable depressions 69, 70, 71 and 72 formed in the gun-frame.

The cylindrical seat 64 for the firing-disk is closed by a plate 73 which is normally held in position by screws 74 situated in the gun-frame and having their heads overlapping the edges of the plate 73, as clearly shown in Fig. 13. Said plate also has notches 75 formed in its periphery, so spaced as to register with the heads of screws 74, and by turning the plate 73 so that the notches 75 come into register or alinement with the heads of screws 74, the plate can be readily removed. The pin 66 passes through the plate 73, and interposed between said plate and the firing-disk is a spring 76 which normally tends to keep the firing disk in position with the boss 65 engaging the inner wall of the cylindrical chamber 64, all as shown clearly in Fig. 11. The trigger 58 is cut away on its upper rearward shoulder, as shown at 77, Fig. 10, and has a pin 78 projecting from said thinned or cut away shoulder. When the parts are assembled, this cut away portion 77 lies between the firing-disk 63 and the inner wall of chamber 64, with its pin 78 engaging one of a series of notches formed in the periphery of the firing-disk 63. Referring to Fig. 11, by pressing on the right-hand end of pin 66 with the hand, spring 77 may be compressed so as to force the disk 63 to the left far enough to clear the pin 78 and to withdraw the pin 68 from its retaining notch in the gun-frame, and by grasping the handle 67 with the other hand the disk may be turned so as to cause the pin 68 to enter one of the depressions 69, 70, 71 or 72, above referred to.

The control of the firing action by the disk is effected through the action of pin 78 with the notches cut in the periphery of the firing-disk above referred to. Referring to Figs. 3, 11 and 12. 79 is a notch in the firing-disk for controlling the trigger so as to effect single firing of the gun, 80 is a notch for effecting the continuous firing of the gun

so long as the trigger is held by the gunner, 81 is the notch for effecting the continuous automatic firing of the gun even though the gunner's finger be removed from the trigger, and 82 is the notch for locking the trigger against action, so that when the pin 78 is in said notch the gun cannot be fired at all. These several actions are due to the specific form of notches 79, 80, 81 and 82. For instance, 79 is of such form and extent that when the trigger is pulled the pin 78 travels far enough therein to permit the nose of the trigger to be entirely withdrawn from the sear 52, so that upon each pull of the trigger it serves to first depress the sear out of the notch 49 in the operating-head of the piston-rod and then free the sear, to the end that it may again rise under the influence of spring 56 so as to be in position to reëngage the notch 49 as the piston moves forward. If, however, the disk 63 is adjusted in position for the notch 80 to be in register with the pin 78 upon the trigger, the trigger is permitted to move in a direction to depress the sear, but without becoming disengaged therefrom, so that as long as the trigger is held by the finger of the gunner the sear is held depressed and the gun continues firing automatically. On the other hand, if the notch 81 of the firing-disk is turned into position to register with the pin 78 and the trigger is pulled, the pin first enters the notch and rides up the inclined cam-way 83 forming the bottom of notch 81 until it reaches the inner end of the notch, when the pin 78 then drops into the hole 84, see Fig. 12, thereby retaining the trigger in its rearward or withdrawn position against the tension of its spring, and the trigger at the same time acting to hold the sear depressed, so that the shoulder 50 thereon cannot engage notch 49 on the piston-head. In this position the gun will continue firing automatically even though the gunner's finger be removed from the trigger, and the gunner is therefore free to use both hands in manipulating the gun, as for example, in training it in different directions, etc. For the purpose of permitting the pin 78 to ride up over the cam 83 and into the hole 84, as above described, there is sufficient spring or play of the parts to permit the slight lateral movement required.

When it is desired to lock the gun so that it cannot be fired, the disk 63 is adjusted in position to bring notch 82 in register with the pin 78, and when in normal position the pin 78 rests on the bottom of said notch 82 and prevents any movement of the trigger, thereby effectively locking the gun.

In addition to the safety secured by the locking notch 82 upon the firing-disk, the gun may be placed in an entirely safe and non-firing position by removing the tension from the piston-spring 51. In order to accomplish this result, there is placed around the piston-rod a sleeve 85, Figs. 3 and 14, through which sleeve the rod slides freely without substantial friction, the sleeve, however, having bearing within the cylindrical tube within which the piston-rod plays and having a forward flange upon which the piston-spring 51 seats, and a rearward flange in position to be engaged by the nose 86, Fig. 14, of a lever 87 mounted to turn around a pin 88 in the frame of the gun, engagement of said pin with the lever 87 being secured by means of angular slot 89 formed in the head of the lever. When this lever is drawn into the position shown in Fig. 14, the sleeve 85 is pressed forward and the spring 51 is thus placed under tension. When, however, the lever 87 is thrown out into a position at right-angles to that shown in Fig. 14, the nose 86 of said lever no longer bears upon the sleeve 85, and the spring 51 is relieved from tension. For the purpose of holding the lever in the position shown in Fig. 14, that is, to hold the sleeve in position to compress the spring 51, the lever is provided with an engaging notch 90, engaging a pin 91 in the gun-frame, whereby it is yieldingly held in the position shown. Upon firmly grasping the lever 87, however, and forcing it downward, the spring 51 yields sufficiently to allow the notch 90 to clear pin 91 and the lever to be thrown downward to relieve the tension of spring 51, as above described. It will be understood that by withdrawing the pin 88 the lever 87 may be readily removed for the purpose of disassembling the parts.

The piston-rod is driven rearward, as is usual in guns of this class, by the action of the gases of discharge taken from near the muzzle of the gun and drawn into a piston-cylinder 92, Fig. 3ª, where they re-act upon a piston 93 secured to the piston-rod 6. For the purpose of regulating and controlling the tension of the gases in the cylinder 92, the forward end of said cylinder is provided with a series of openings 94, which openings are normally closed by a valve 95 held to its seat by a spring 96, which spring re-acts between a flange 97 on the valve and the head of pin 98 screw-threaded into the outward end of the cylinder, as will be understood from an inspection of Fig. 3. When the tension of the gases exceeds the degree to which the spring 96 is adjusted by means of screw 98, the valve moves outward against the tension of the spring, thereby opening the ports 94 and permitting the gases to escape until the tension within the chamber 92 equals that of spring 96, when the latter acts to re-seat the valve.

The magazine 99, Figs. 1, 15 and 16, is hinged to the side of the gun-frame and is normally held in its elevated or substantially vertical position by a catch 100 thereon

which engages a notch 101 in the frame. This catch may be lifted against the tension of its spring by grasping a handle or lug 102 and withdrawing the catch from the notch in the gun-frame, when the magazine may be turned downwardly into a horizontal position to remove the cartridges from the magazine or get to the interior of the gun-frame for cleaning or inspection. The magazine is hinged to turn around a sleeve 103 on a pin 104, Fig. 16, which pin has bearing at its opposite ends in the frame of the gun, as shown in said Fig. 16, and is retained in its position by a headed pin 105 whose inner end engages a groove 106 in the pin and prevents its withdrawal, the pin 105 being retained in position when the magazine is elevated by reason of the engagement of the magazine with the head of the pin. When, however, the magazine is lowered, the pin 105 is readily removed, after which the pin 104 may be withdrawn and the entire magazine, together with its operating parts, removed from the gun. The sleeve 103 is loose upon pin 104 so as to be free to turn thereon, and has keyed thereto a boss or sleeve 107, secured by any suitable means, as by a set-screw 108. To this sleeve 107 is secured one end of a spring 109, the other end of which is secured to an oppositely disposed sleeve 110 having a laterally projecting lug 111, which lug normally rests against a shoulder 112 in the gun-frame. By turning the sleeve 107 any desired tension may be placed upon the spring 109, after which the set-screw 108 is seated and the spring held under the desired tension.

Referring to Figs. 16 and 18, 113, 113, constitute the cradle for receiving the cartridges from the magazine, cradle arms 113′ 113′ being keyed to sleeve 103 by means of a longitudinally extending key-bar 114, Fig. 18, engaging suitable notches in the cradle arms 113′ and the longitudinally extending slot or groove 115, Fig. 17, formed in the sleeve. It will be seen that when the magazine is removed from the gun-frame by the removal of pin 104, as hereinbefore described, the cradle 113 may be removed from the sleeve 103 by the withdrawal of the key 114. For the purpose of tipping the cradle 113 from the position shown in Fig. 15 in full lines to the dotted line position shown therein to feed the cartridge into the receiver, there is secured to sleeve 103 an inwardly projecting arm 116, whose inner end is in position to be engaged by a cam-groove 117 formed in the side of the piston-head 8, so that as the piston-head moves rearward the end of arm 116 is depressed, turning the cradle and the sleeve 103, against the tension of the spring 109, and thereby transferring the cartridge from the bottom of the magazine into the receiver of the gun in front of the open breech-block, by which it is engaged and thrust into the barrel upon the return movement of the piston-head and block. For the purpose of permitting the piston-head to clear the end of arm 116 in the act of advancing the block, a suitable clearance groove is provided above the cam 117, through which the end of arm 116 passes as the piston-head moves forward, the lug 111 upon the sleeve 110 yielding sufficiently to permit the elevation of the arm 116 enough to effect this clearance, whereupon as soon as the arm 116 is to the rear of the arm 117 the weight of the parts immediately causes the same to drop into the position shown in Fig. 3, in which position they are arrested by the engagement of the lug 111 and the sleeve 110 with the shoulder 112 on the gun-frame, as shown in Fig. 16. It will thus be seen that the cartridge cradle is actuated by the lower face of the cam 117 on the drive rod to throw or roll the cartridge into the path of the breech bolt, while the upper side of this cam on the drive rod swings the cartridge cradle back into the path of the cartridges as they drop out of the magazine, the cam on the drive rod actuating the cartridge cradle positively in both directions, and the coiled spring 109 on the shaft of the cartridge feed engages with the collar 108 at one end to hold the cartridge cradle in the path of the cartridges as they drop out of the magazine, and the other end of this coiled spring engages with collar 110 which operates as a spring-stop to hold the lever 116 in the path of its actuating cam on the driving rod. This coiled spring 109 on the shaft of the cartridge feed thus constitutes a spring-stop, one end of the coiled spring being attached to the cartridge cradle to hold it in the path of the magazine and the other end holding the feeding lever in the path of the cam track on the driving rod, the cam on the driving rod positively actuating the feed to swing the cartridge in and to swing the feed back for the next cartridge.

What is claimed is:

1. The combination of a gun-frame having two parallel longitudinally-extending channels connected by an intermediate slot, a gun-barrel removably secured by interlocking lugs to one end of one of said channels, a breech block reciprocating in said gun-barrel chamber, a reciprocating piston rod in the other chamber having a part projecting through said slot and engaging the breech block, and a removable cap or closure secured by interlocking lugs to the rear end of the frame and closing both of said chambers.

2. In a gas-actuated automatic gun, the combination of a reciprocating piston rod and a breech block operatively connected thereto, with a spring for impelling the piston rod forward, a sleeve surrounding the piston rod and forming an abutment for the

rear of said spring, and means removable by hand without the employment of tools for adjusting said sleeve upon the rod to place the spring under tension or relieve it from tension at will.

3. In a gun, the combination of a sear resting at one end upon a yielding bearing and having a shoulder for engaging the firing device, a spring normally pressing said sear into operative position, a trigger mounted in the gun-frame and removably hung upon a pivot pin, and a trigger spring acting to hold the trigger in position upon its pin, whereby the sear and trigger may be removed from their positions by hand without the employment of tools.

4. In a gun, the combination of a sear having a longitudinal and swinging movement, a spring resisting the longitudinal movement, a pin or shoulder engaging with the sear to receive its end thrust, a spring engaging with the sear to control its vibrating movement, and a stop engaging with the sear to limit the vibrating movement.

5. In a gun, a sear engaging with the firing mechanism and having an end which forms one part of a ball and socket joint, a spring-pressed element forming one part of a ball and socket joint and engaging with the sear, a spring engaging with the sear to actuate it into engagement with the firing mechanism, and a stop engaging with the sear to limit its vibrating movement.

6. In a gun, a sear engaging with the firing mechanism, a spring engaging with the sear, a stop engaging with the sear to limit its movement, a gun frame having a socket engaging with the said stop, the socket permitting the stop and spring to be raised up and removed from the frame, thus permitting the sear to be dis-assembled without tools.

7. In a gun, the combination of a sear engaging with the firing mechanism and having a vibrating movement, and having an upper and lower notch for engagement with the trigger, a spring actuating the sear, and a stop engaging with the sear to limit its vibrating movement, the gun frame having a socket for receiving and releasing the said stop and said spring, a trigger engaging with the sear and removably retained in the gun frame, the said trigger having a longitudinal and vibrating movement, and a firing dial engaging with the trigger to control its engagement with the sear.

8. In a gun, the combination of firing mechanism, a sear engaging the same, a trigger engaging the sear, a firing dial engaging the trigger, a plate, lugs engaging said plate and retaining it in position on the gun frame, a spring re-acting between said plate and dial, said plate having cut-out portions capable of being turned into registry with said lugs whereby the plate and dial may be removed.

9. In a gun, the combination of the gun-frame, the firing mechanism, and the trigger engaging the latter, and a firing-dial engaging with the trigger and having a series of cams and slots to control the action of the trigger and to lock it against action, a plate acting to hold the dial in position on the frame and having cut-out portions and lugs on the frame engaging said plate and retaining it in position, said plate being capable of being removed by turning said cut-out portions into registry with said lugs.

10. In a gun, the combination of a gun-frame, the firing mechanism and the trigger engaging the latter, with a firing-dial having a series of notches for controlling the trigger, and an actuating lever connected to said dial, a plate for retaining the dial in position on the gun-frame and provided with cut-out parts, a spring re-acting between said plate and dial, lugs on the frame engaging said plate when in normal position, but releasing the same when the cut-out parts on the plate are brought in registry with the lugs, whereby the firing dial and its actuating lever may be removed as a unit.

11. In a fire-arm, the combination of a gun-frame and a firing mechanism, with a sear having a part engaging a socket in the gun-frame, a trigger having an open ended slot engaging a bearing on the frame, a firing-dial engaging with said trigger and with the gun-frame, and means having interlocking engagement with the gun-frame and retaining the dial in position on the frame.

12. In a gun, the combination of a gun frame, having interior engaging lugs, a barrel having exterior lugs for engaging those in the gun frame, and provided with a groove one part of which extends parallel with the axis and the other of which extends around the circumference of the rear end of the barrel, and a pin extending through the gun-frame into said groove and engaging a depression in the end of the circumferential portion of the slot in the barrel, whereby when the gun is inserted in the frame and the lugs on the barrel engage those within the frame the pin may be adjusted into said depression to retain the parts in locked position.

13. In a gas-actuated automatic gun, a gun-frame, a breech block and breech-block-operating mechanism, a magazine pivoted to the side of the gun frame on a removable pivot, and means retaining said pivot in its operative position while the magazine is elevated but capable of being removed by hand when the magazine is lowered, whereby the magazine pivot may be withdrawn and the magazine removed from the gun.

14. In a magazine gas-operated gun, the

combination of the gun-frame, a breech-block and its operating piston, of a magazine pivoted to the side of the frame, a cartridge cradle in said magazine, a pivot to which said cradle is secured, an arm also secured to the pivot and extending in the path of the breech-block-operating piston whereby the cradle is tilted to deliver a cartridge into the receiver chamber, and a spring reacting between the pivot and the gun frame.

15. In a gun, the combination with the frame, the breech mechanism, a cartridge magazine, and breech-mechanism-operating devices, of an oscillating cartridge feed, an arm or lever operatively connected to said cartridge-feed and also in operative relation with said breech-mechanism-operating devices, and a spring-stop engaging said oscillating feed and holding the feed in the path of the cartridges in the magazine and also holding said arm or lever in position to be engaged by the breech-mechanism-operating devices.

16. The combination with a gun, gun-frame, breech-mechanism, and the cartridge magazine, of a breech-block-actuating slide having a cam, an oscillating cartridge feed engaging with the frame and with the magazine, an actuating arm or lever for the cartridge feed and a coil-spring engaging with the cartridge feed to normally retain it in the path of the cartridges in the magazine and retain said arm or lever in the path of the cam on the breech to actuate the slide, whereby the cam will oscillate the feed and consecutively feed the cartridges.

17. In a gun, the combination with a gun-frame, breech mechanism, a breech-block-actuating slide, and the cartridge magazine, of an oscillating cartridge feed having an arm or lever projecting into the path of an operative part on said actuating slide, a spring stop controlling the movement of said arm or lever in either direction and normally holding said arm or lever in the path of the part on the breech-mechanism.

18. In a gun, the combination of the frame, breech-mechanism, and the cartridge magazine, the breech-block-operating slide having a diamond-shaped cam, an oscillating cartridge feed having an actuating arm or lever for engagement with said cam, and a spring stop controlling the movement of said arm or lever in either direction and holding said arm or lever in the path of the cam, whereby the switching of the arm around the cam is automatically controlled by said stop.

19. In a gun, the combination of the frame, the breech mechanism, and cartridge magazine and actuating cam on the breech-mechanism, an oscillating cartridge feed mounted on a shaft and receiving the cartridge from the magazine, an actuating arm or lever carried on said shaft and having a key and slot connection therewith whereby said arm or lever has limited movement in one direction independent of the shaft, a coil-spring carried on said shaft, one end of the spring engaging with the gun-frame and the other end with the actuating arm or lever to hold said feed in the path of the cartridges in the magazine and the said arm or lever in the path of the actuating cam on the breech-mechanism, whereby said arm or lever, by reason of its limited movement, is enabled to pass over and around the actuating cam.

20. In a magazine gun, a magazine substantially vertical in operative position, a magazine pivot about which the magazine may be turned for lowering it, a cartridge cradle in the magazine secured to the magazine pivot, and means for turning the cradle in one direction to feed a cartridge into the receiver against the tension of a spring, and a spring for restoring the cradle to its normal position in the magazine.

21. In a magazine gun, the combination of a gun-frame, a magazine pivot, a magazine hung on said pivot, a sleeve on the pivot and rotatable with relation thereto, a cartridge cradle keyed to the sleeve, means connected to the cradle and in the path of the operative parts of the breech mechanism for tilting the cradle, and a spring having one end secured to said sleeve and the other end secured to a part engaging an abutment on the frame.

22. In a gun, the combination of a breech-block having a longitudinally-extending slot therein, with a groove or channel formed in one wall of said slot, a lug on the block extending forward into said slot, and an ejector bar having a recess for engaging said lug and also a lateral lug for engaging the inner walls of the breech-block, and a spring normally holding the ejector with said last-mentioned lug in engagement with the walls of the breech-block.

23. In a breech-loading gun, the combination of a breech-block having a longitudinally-extending ejector bar slot formed in the walls thereof, a forwardly extending lug at the rear end of said slot, a spring seat above said slot, a spring seated therein, and an ejector bar bearing against said spring and having a recess engaging said lug on the breech-block, a recess in one of the side walls of said slot and a lug on the ejector bar and registering with said recess when the bar is forced rearward to compress said spring, whereby the ejector bar may be placed in or removed from its operative position.

24. In an automatic gas-actuated gun, the combination of a trigger and means for controlling the action of said trigger consisting of a rotatable disk contained in a de-

pression in the gun-frame, a pin on the trigger moving in the plane of the disk, and a spring bearing on the face of the disk and yielding to permit said disk to be shifted so as to clear said pin on the trigger whereby the disk may be adjusted with relation to the trigger pin for the desired firing action.

25. In an automatic gun, the combination of the trigger, and means for controlling the firing action thereof, comprising a disk seated in a depression in the gun-frame, a pivot pin for said disk, a series of notches formed in said disk for securing the desired firing action of the gun, a pin on the trigger extending into the plane of the disk, means for adjusting the disk to bring the desired notches into register with the pin on the trigger, and means for retaining the disk in its adjusted position.

26. In an automatic gun, the combination of a trigger and means for controlling the firing action thereof, comprising a revoluble disk mounted in a recess in the gun-frame and having a pivot pin extending through the frame and projecting on both sides thereof, a cap for the recess in which the disk is concealed, means for retaining said cap in position, and a spring interposed between the cap and the disk, a pin on the trigger extending into the plane of the disk and capable of entering suitable firing notches formed in the latter, whereby by pressing the pin the disk may be shifted laterally against the tension of its spring and adjusted to bring the desired notch on the disk in register with the pin on the trigger.

27. In a gun, the combination of a sear, and a trigger for engaging the same, said trigger being provided with an open-ended groove or slot, a pin in the gun-frame upon which the trigger is mounted by means of said open-ended groove or slot, and a spring having one end secured to the trigger and the other to the gun-frame for normally holding the trigger with said open-ended groove or slot in operative relation with the pivot pin.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SAMUEL N. McCLEAN.

Witnesses:
JOSEPH H. KITCHEN,
E. G. CARR.