C. W. LANG.

RAPID FIRE GUN.

APPLICATION FILED MAY 16, 1916.

1,333,498.

Patented Mar. 9, 1920.

11 SHEETS—SHEET 1.

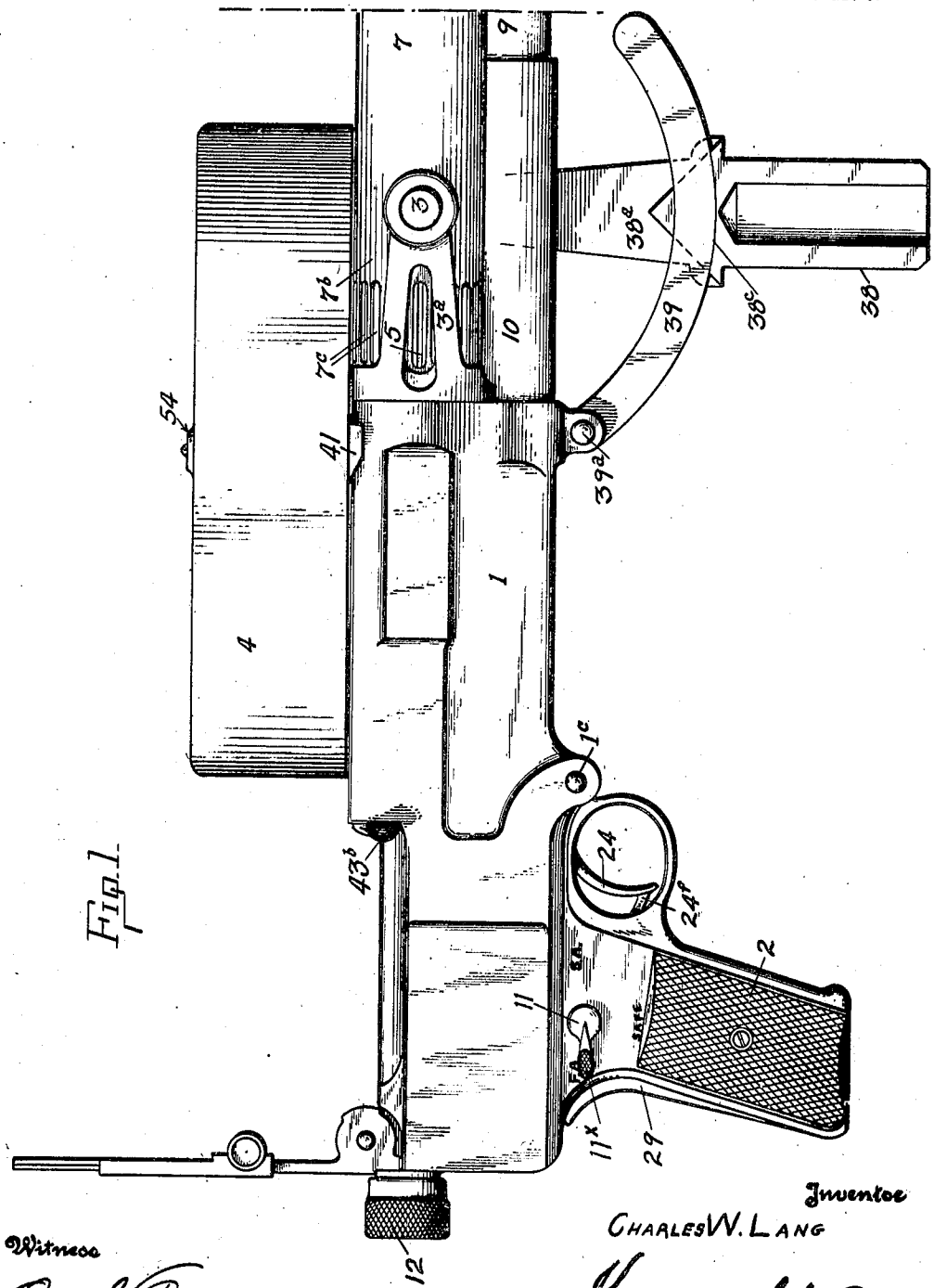


Fig. 1

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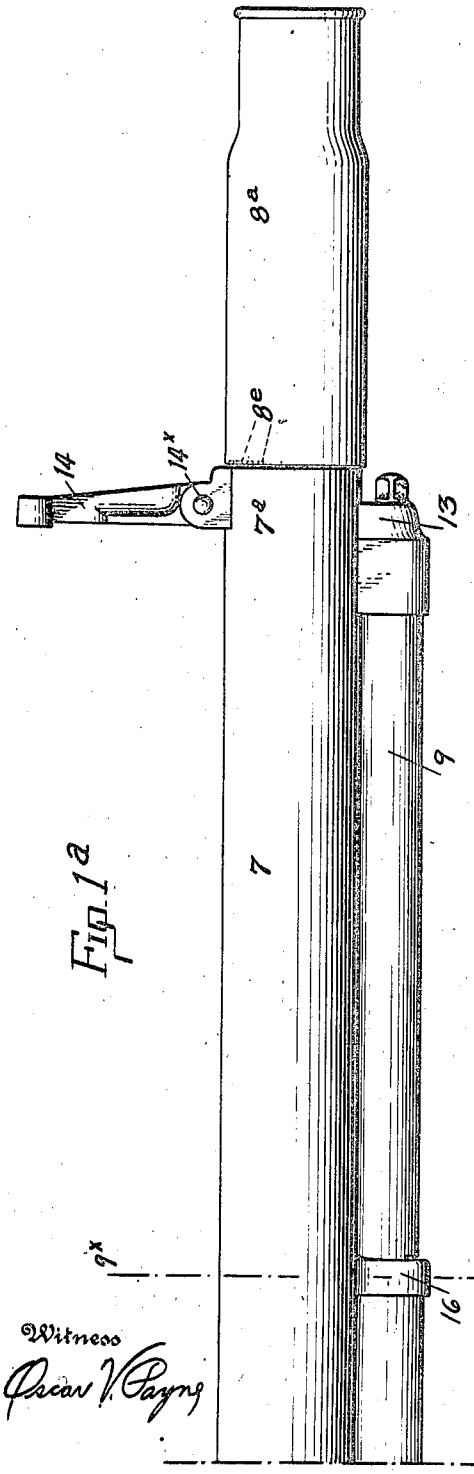


Fig. 1a

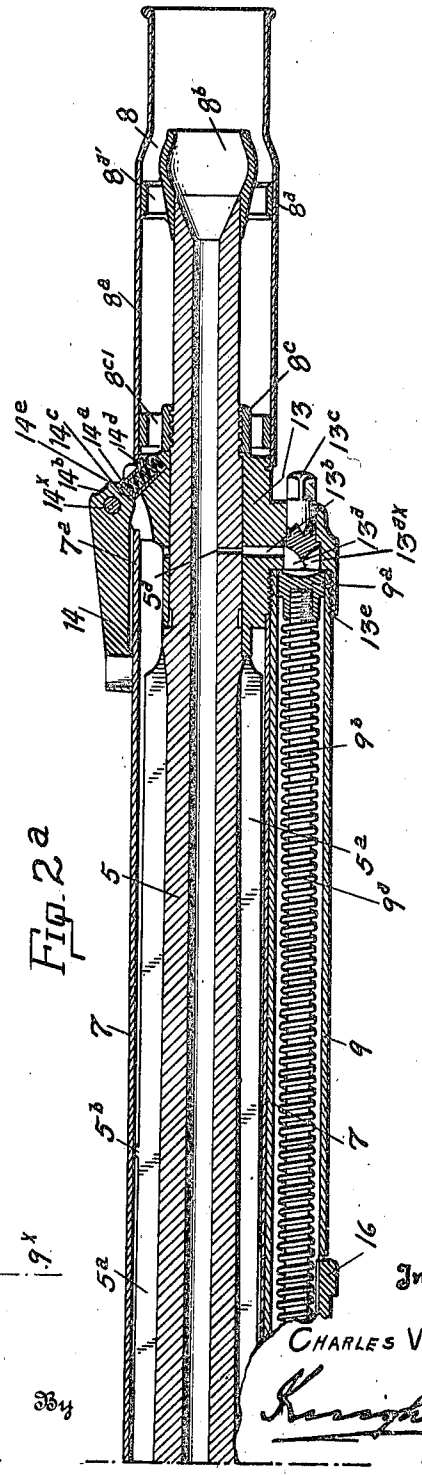


Fig. 2a

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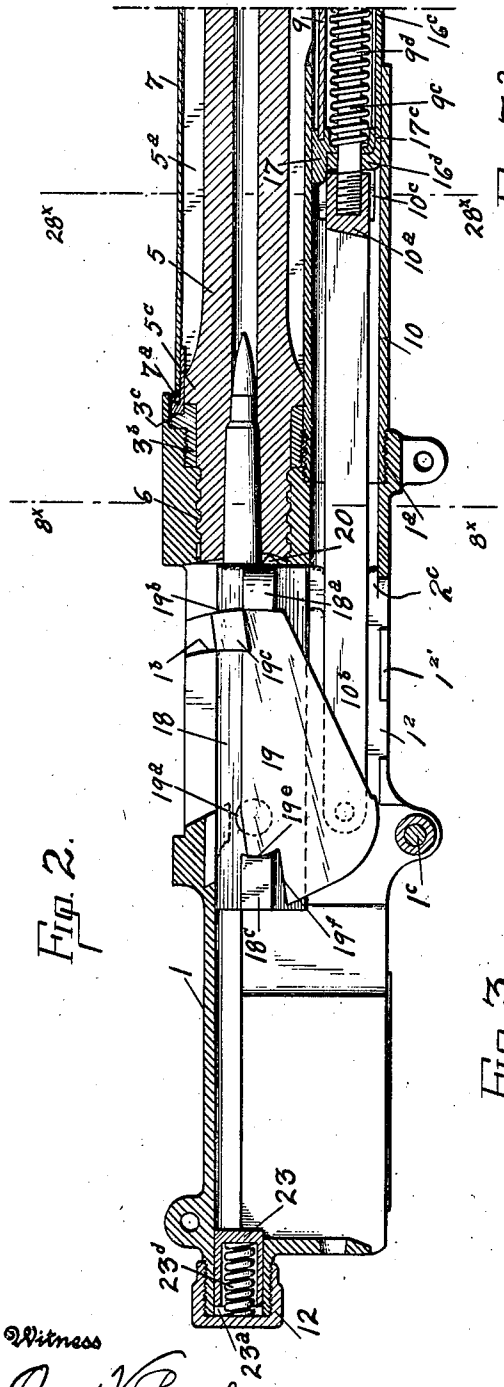


Fig. 2.

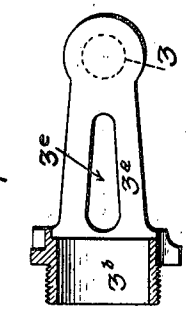


Fig. 3a

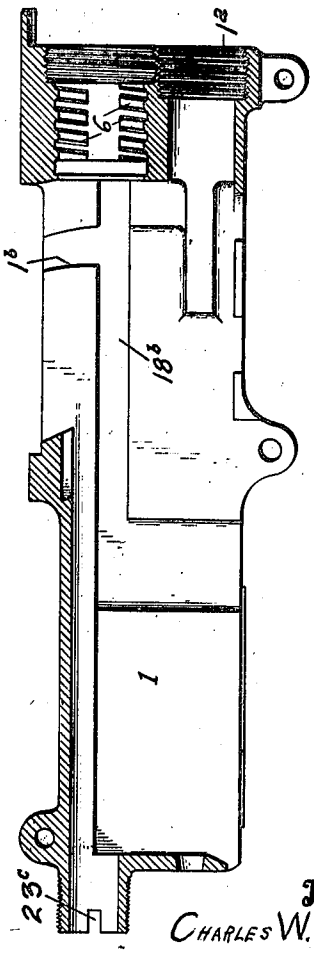


Fig. 3.

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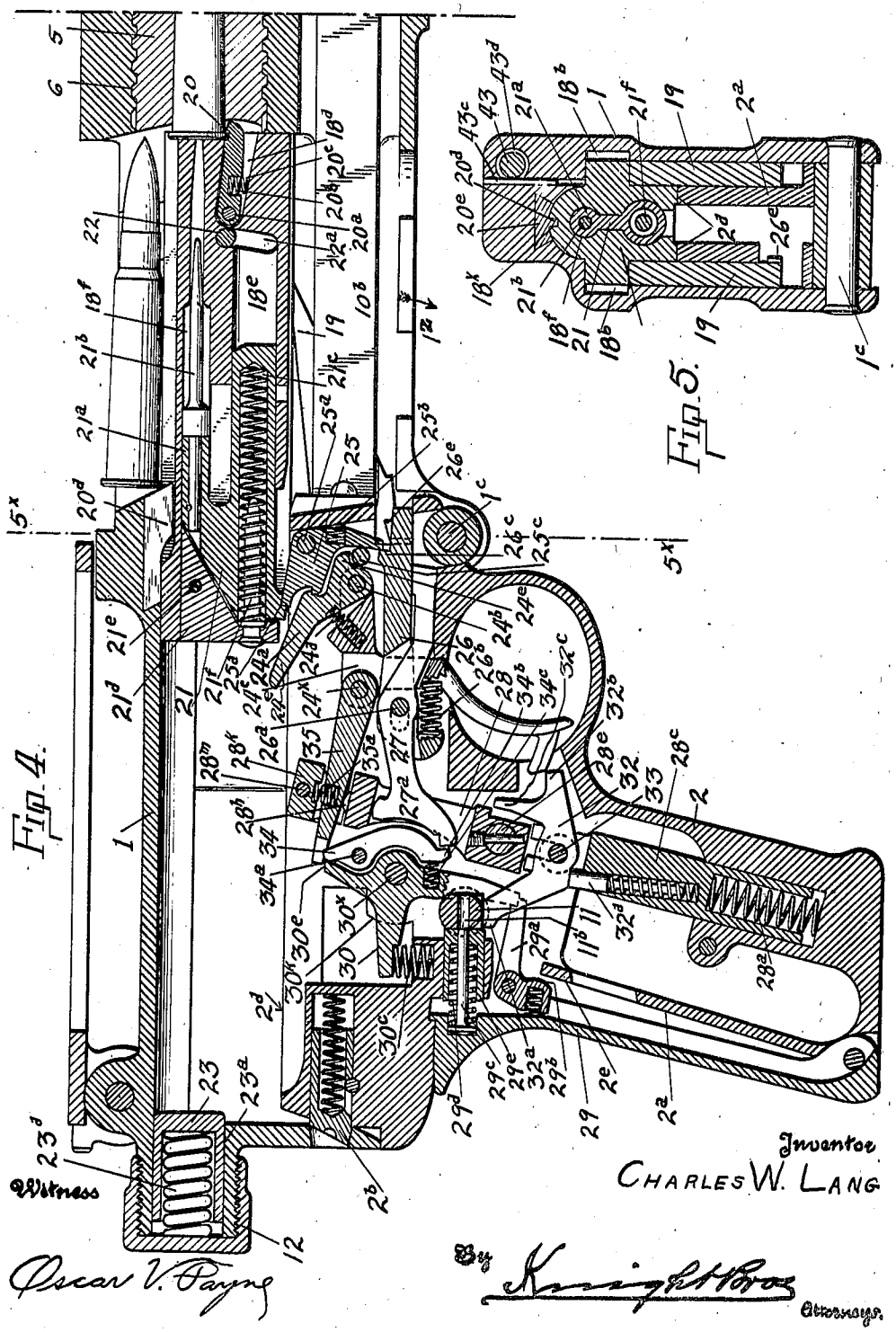


Fig. 4.

Fig. 5.

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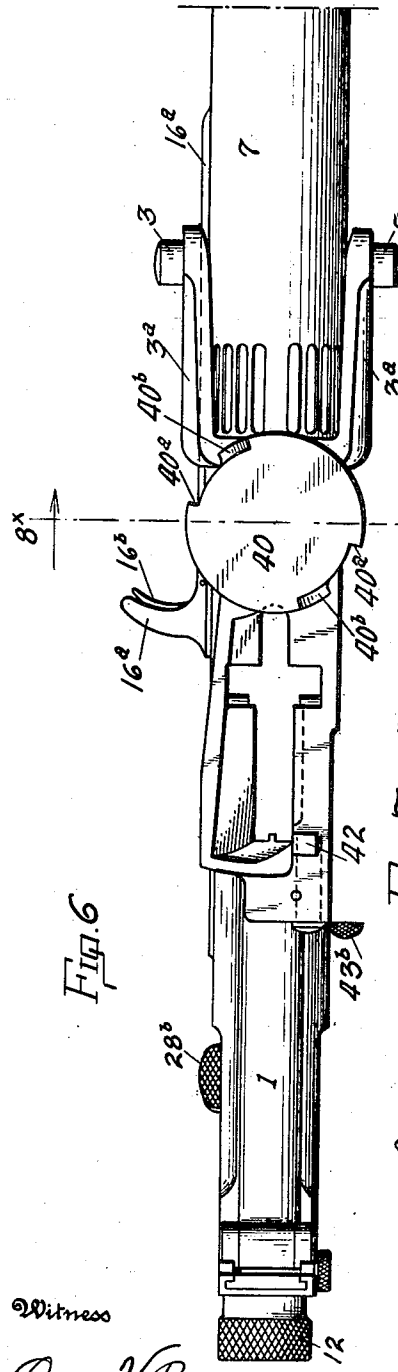


FIG. 6.

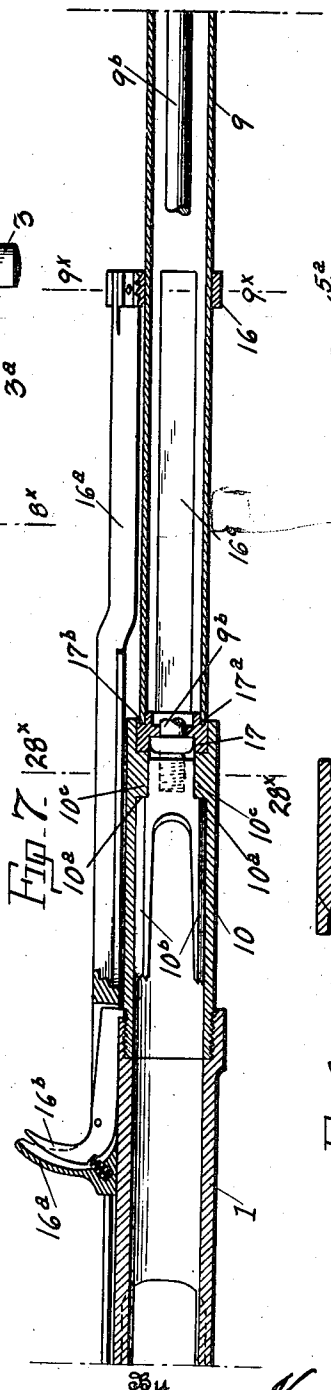


FIG. 7.

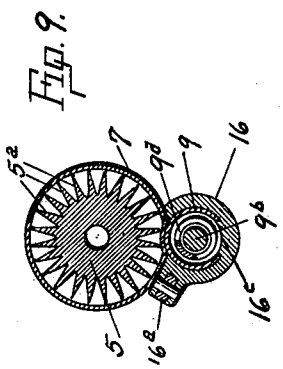


FIG. 9.

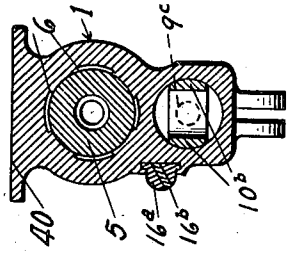


FIG. 8.

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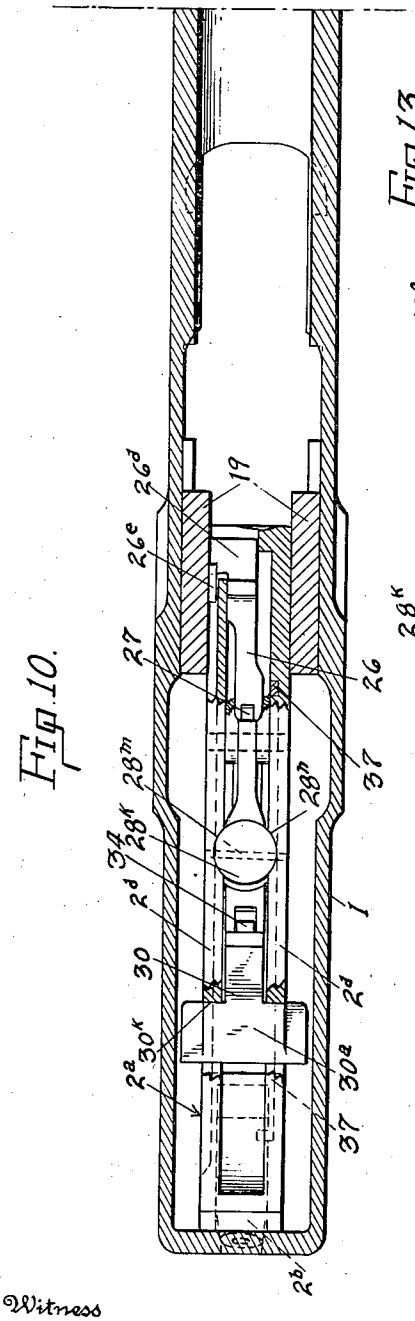


Fig. 10.

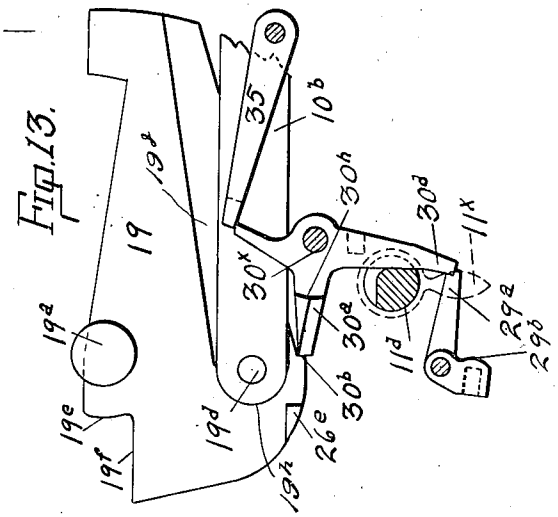


Fig. 13.

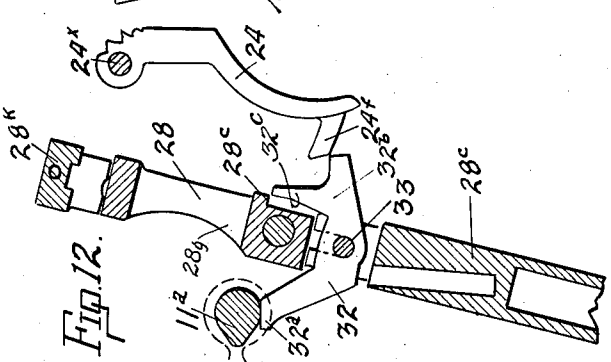


Fig. 12.

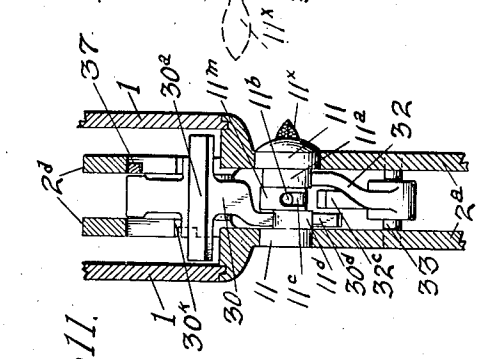


Fig. 11.

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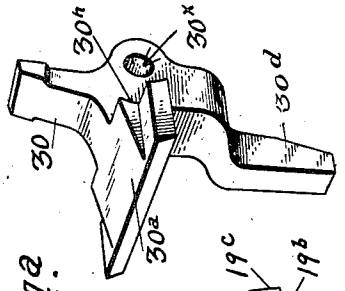


FIG. 16.



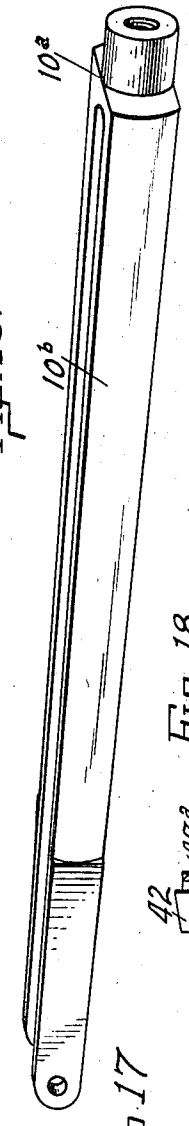


FIG. 15.

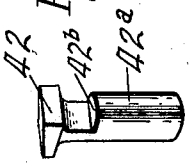


FIG. 19.

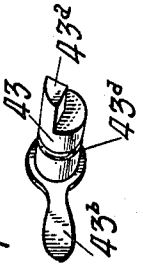


FIG. 18.

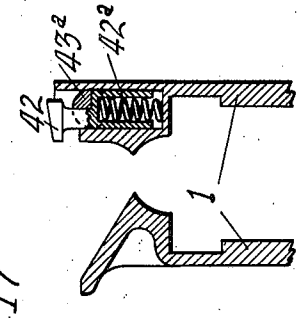


FIG. 17

FIG. 14.

FIG. 14a.

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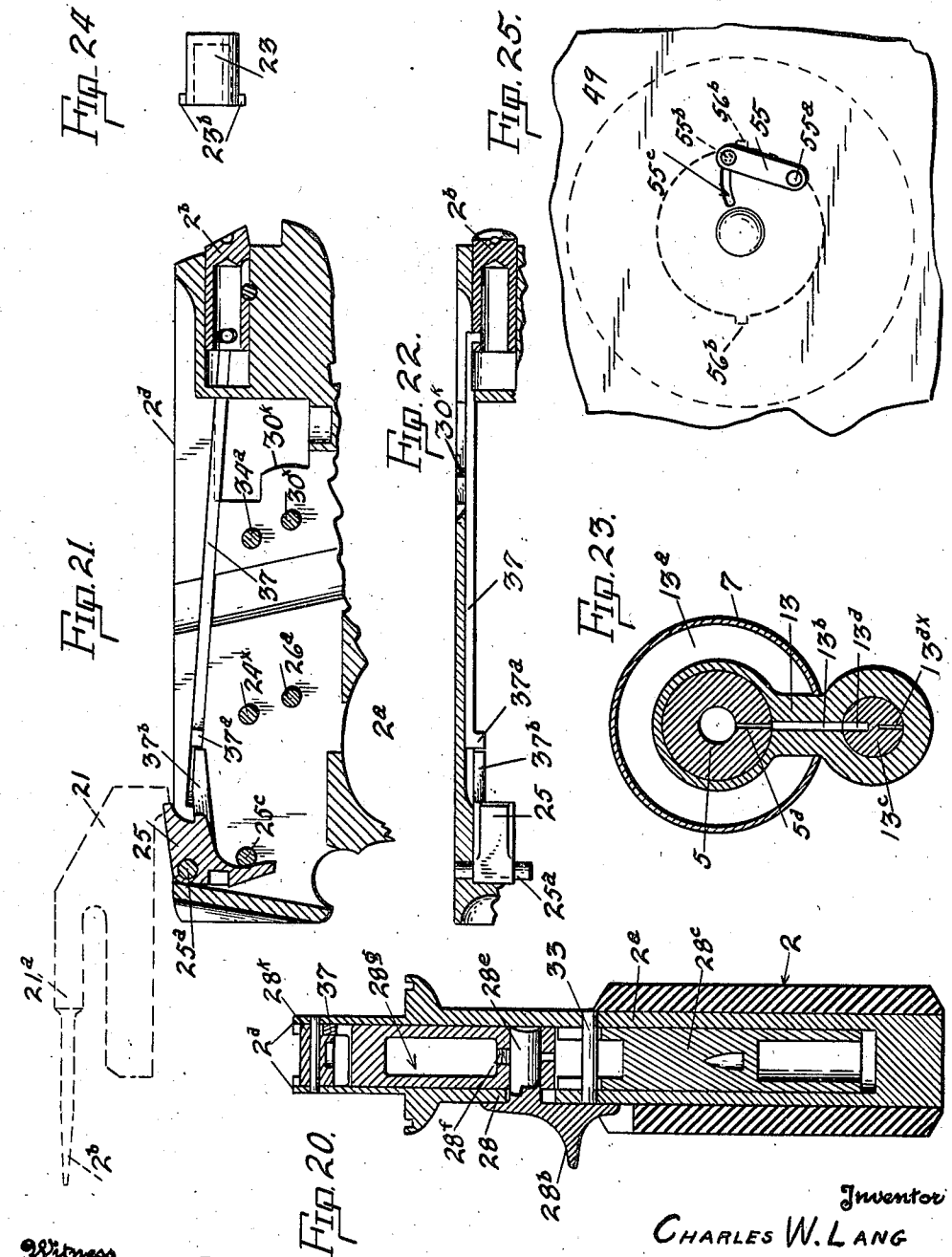
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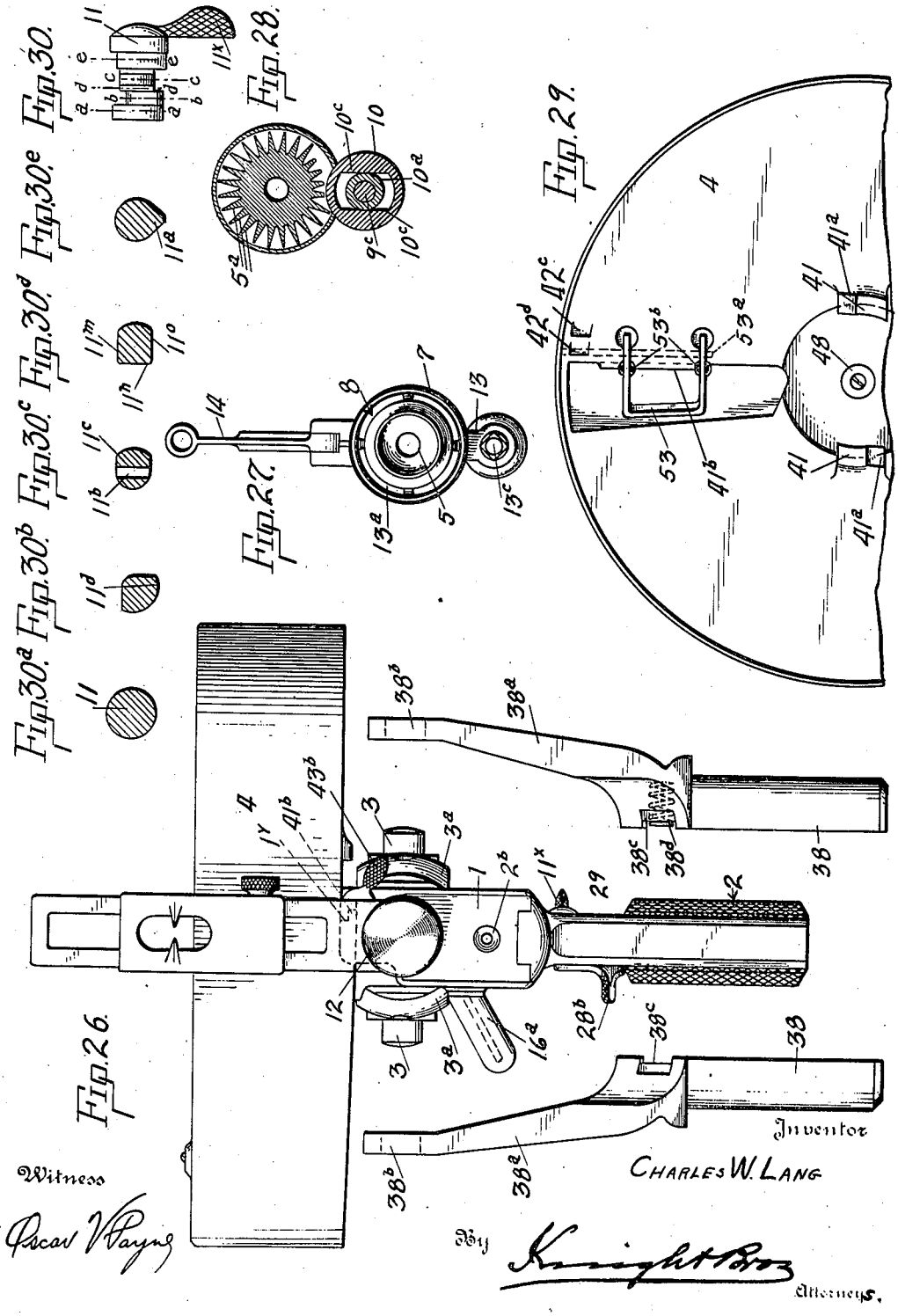
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Fig. 33.

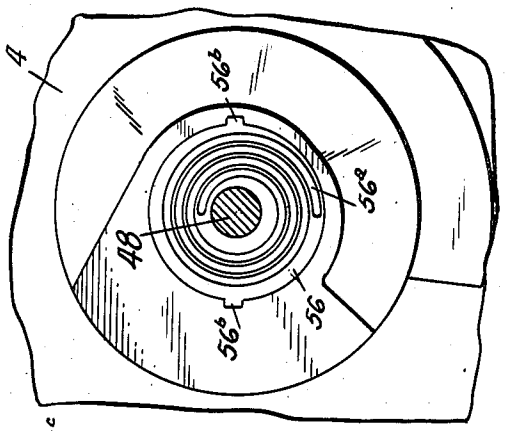


Fig. 34.

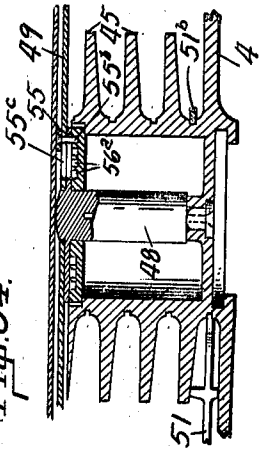


Fig. 32.

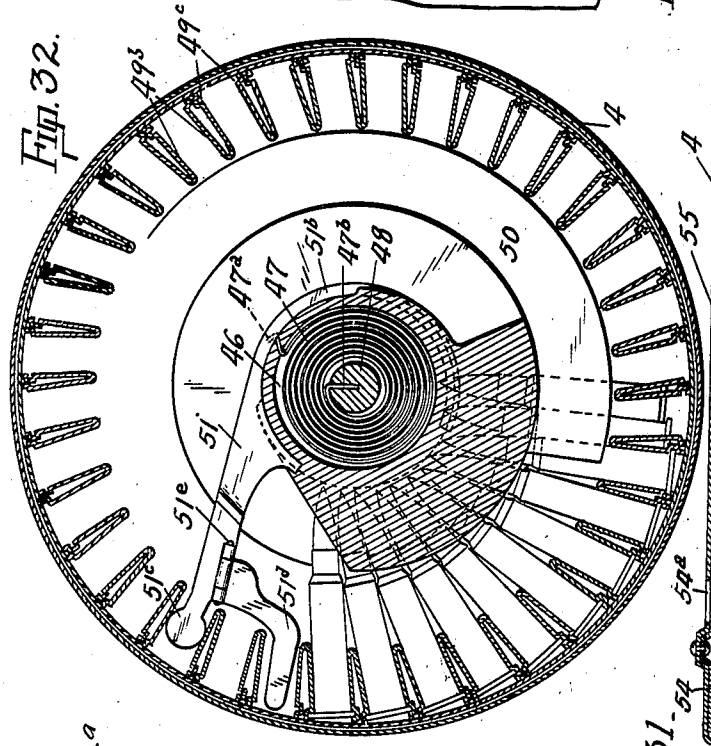


Fig. 31.

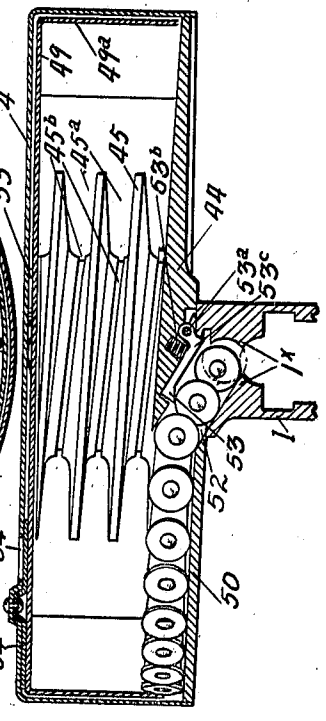
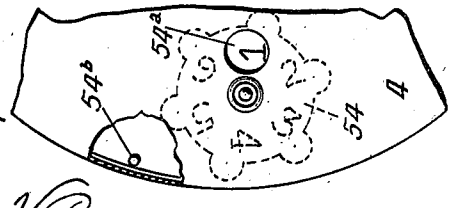


Fig. 34a.



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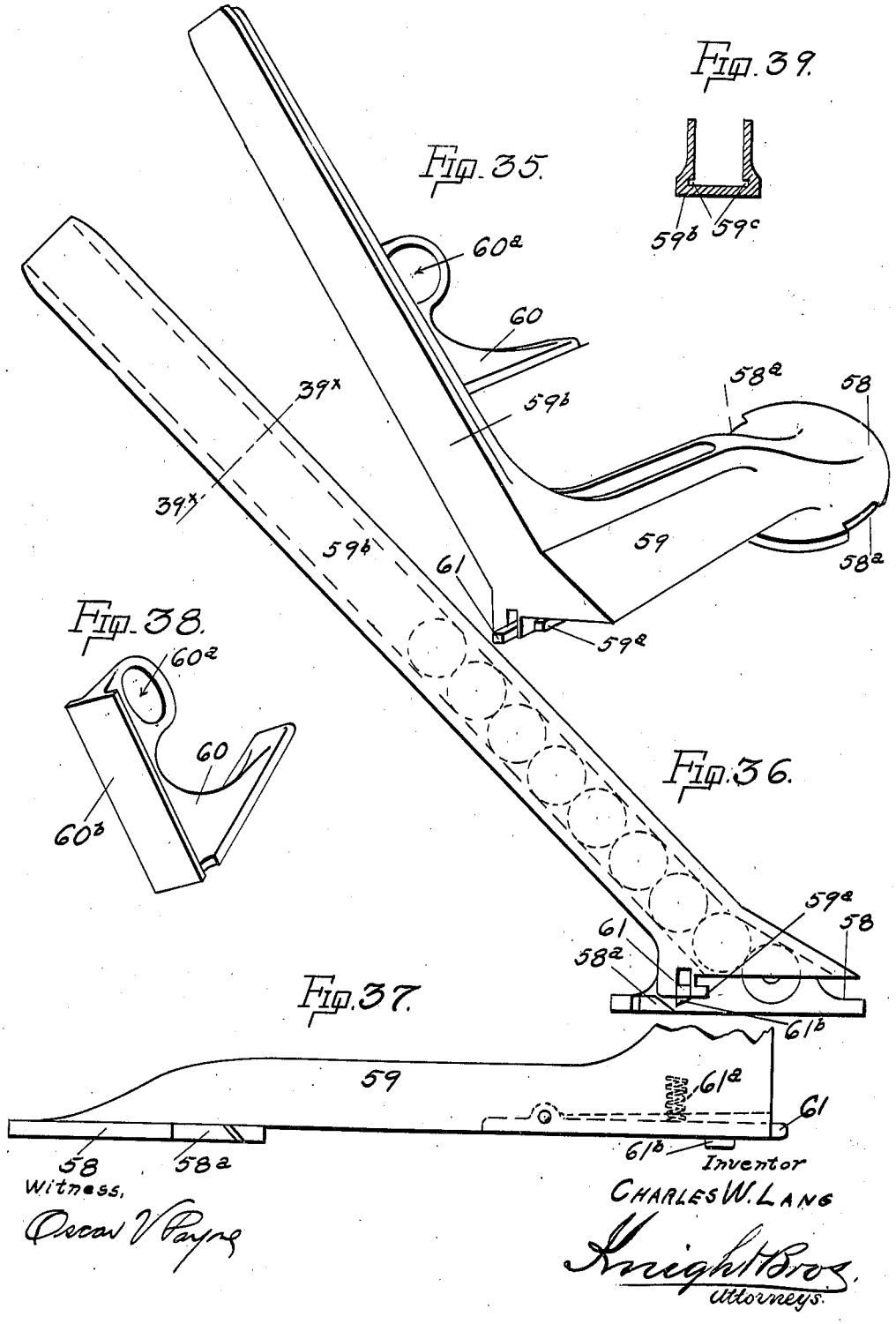
RAPID FIRE GUN.

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11 SHEETS—SHEET 11.



UNITED STATES PATENT OFFICE.

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RAPID-FIRE GUN.

1,333,498. Specification of Letters Patent. Patented Mar. 9, 1920.

Application filed May 16, 1916. Serial No. 97,886.

To all whom it may concern:

Be it known that I, CHARLES W. LANG, a citizen of the United States, and resident of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Rapid-Fire Guns, of which the following is a specification.

This invention, while embodying features of novelty which are adapted, severally and collectively, for embodiment in various types of automatic firearms, is designed primarily for and will be herein illustrated as embodied in a rifle caliber rapid fire gun adapted to be operated semi-automatically, or with full automatic rapid fire at will.

Some features of the invention relate to the general construction and assembly of the main parts of the gun, whereby the construction of the gun as a whole is simplified, the assembly and disassembly of its parts is rendered more convenient, and the parts, therefore, made more readily replaceable, and the endurance of the gun and its capacity to resist adverse conditions in service are enhanced. Other features of the invention relate to mechanisms whereby the gun is adapted to function in certain novel ways with advantageous results.

For the purpose of making known the underlying principles as well as the characteristics of structure and coöperative relationship which identify the various features of the invention, reference will be made to the embodiment disclosed in the drawings forming part of this specification. But while this embodiment of the invention involves numerous structural details that are claimed as new *per se*, such details are to be taken as illustrative merely, and not as definitive of the scope of the invention, which is rather to be gathered from the language of the claims.

In said drawings—

Figures 1 and 1^a together show the complete gun in side elevation;

Figs. 2 and 2^a together show the receiver with the barrel, its cooling flue and the gas-actuated mechanism for functioning the gun, in vertical axial section, the grip frame and fire-controlling mechanism being omitted, and the breech closure shown in side elevation;

Fig. 3 is a detail view of the receiver, in vertical longitudinal section, minus all removable parts;

Fig. 3^a is a sectional view of the trunnion-mounting;

Fig. 4 is a vertical longitudinal section of the rear portion of the gun, on an enlarged scale;

Fig. 5 is a transverse section on the line 5^x—5^x of Fig. 4, the plane of section being through the pintle upon which the grip frame hinges.

Fig. 6 is a top plan view of the portion of the gun shown in Fig. 2.

Fig. 7 is a horizontal section through portions of the breech operating mechanism shown in Fig. 2.

Fig. 8 is a transverse section on the line 8^x—8^x of Figs. 2 and 6.

Fig. 9 is a transverse section on the line 9^x—9^x of Figs. 1^a, 6 and 7.

Fig. 10 is a horizontal section through the receiver just above the plane of the top edge 2^d of the frame, Fig. 4.

Fig. 11 shows a portion of the receiver and frame in vertical section on the line 11^x—11^x, Fig. 10.

Fig. 12 is a detail view of the coacting parts of the trigger lock;

Fig. 13 is a detail view of the breech-block arresting mechanism and parts controlling the same;

Fig. 14 is a perspective view of the parts of the breech block and locking wings segregated; and Fig. 14^a their arresting lever;

Fig. 15 is a detail view of the bifurcated drive rod structure through which movement is transmitted from the rod of the gas driven piston to the locking wings;

Fig. 16 is a detail view of the combined spring housing, tumbler-bolt and safety-pin guide, shown in section in Fig. 4;

Fig. 17 is a detail view of the throat of the receiver and the magazine latch mounted thereon;

Fig. 18 is a perspective view of the magazine-latch releasing lever;

Fig. 19 is a detail view of the bolt of the latch that secures the magazine against turning;

Fig. 20 is a vertical transverse section through the grip-frame in a plane that intersects the thumb trigger and the plunger which it controls;

Fig. 21 is a detail view of the safety lock that prevents releasing the frame-latch so long as the striker is in firing position; the parts being viewed in a direction opposite to that in which they are seen in Fig. 4;

Fig. 22 is a horizontal section of parts shown in Fig. 21;

Fig. 23 is a transverse section through the forward portion of the barrel in the plane of the gas duct;

Fig. 24 is a detail view of the breech-block buffer;

Fig. 25 is a detail view of the magazine stop;

Fig. 26 is a rear end view of the gun with its magazine mounted thereon, and with the parts of its axially divided vertical trunnion-yoke separated therefrom;

Fig. 27 is a front end view of the gun;

Fig. 28 is a section of the line 28^x—28^x Figs. 2 and 7;

Fig. 29 is a bottom plan view of the magazine;

Fig. 30 is a detail view of the fire-control tumbler;

Figs. 30^a, 30^b, 30^c, 30^d and 30^e are sections through Fig. 30, taken respectively on the lines *a—a; b—b; c—c; d—d* and *e—e;*

Fig. 31 is a vertical section of the magazine in position upon the throat of the receiver;

Fig. 32 is a horizontal section of the magazine;

Fig. 33 is a detail view of the magazine rotor with the spiral groove that receives the arresting stop shown in Fig. 25;

Fig. 34 is an axial section through the fixed and rotating parts of the magazine and the stop for limiting rotation thereof;

Fig. 34^a is a detail view of an indicator;

Fig. 35 is a perspective view of a magazine charger, adapted to be applied to the magazine when the latter is removed from the gun and inverted;

Fig. 36 is a rear elevation of the same;

Fig. 37 is a side elevation of the base thereof;

Fig. 38 is a perspective view of the finger fed follower for expelling the cartridges from the runway of the charges, through the gate of the magazine;

Fig. 39 is a detail view showing the sectional structure of the runway.

1 represents the receiver, 2 the grip, 3 the trunnions, 4 the magazine, 5 the barrel which is threaded into the receiver at 6, 7 the cooling flue surrounding the barrel, 8 the suction blast for inducing circulation through the cooling flue, 9 the housing for the gas-actuated mechanism, 10 the housing for the drive rods which function the breech mechanism. 11 the fire-selecting tumbler, and 12 the breech block buffer cap. The present invention resides in various features of novelty having to do with the several parts of the gun just enumerated, or with the manner of relating them one to another, or the manner of incorporating them in the organization as a whole, as will now be pointed out both generally and in detail, in the following description and particularly defined in the sub-joined claims.

One object of the present invention is to mount a gun of the type described, with increased stability against vertical deflection resulting from firing, to which end, one feature of the invention consists in locating the trunnions 3 of the gun, close to the center of stability of the entire mass and in the horizontal plane of the bore; and since this center of stability in a gun of the type herein selected for purposes of illustration will generally lie forward of the front end of the receiver, another feature consists in securing these trunnions to the receiver through means of forwardly extending arms 3^a lying on either side of the barrel; while a subordinate feature, in this connection, consists in connecting these forwardly extending trunnion arms with the receiver through means of an integral trunnion ring 3^b screwed tightly into the forward end of the receiver 1, concentrically with the barrel 5; and another subordinate feature consists in utilizing this connecting means for the trunnion arms to hold the rear end of a cooling air flue or tubular jacket 7 surrounding the barrel with a space for the circulation of air.

Another object of the present invention is to provide for ready assembly of the barrel with the receiver in a gun, in which a longitudinally reciprocating mechanism, mounted beneath the barrel and having connections extending into the receiver, is employed for functioning the breech mechanism; to which end, another feature of the present invention consists in connecting the barrel with the receiver through means of a readily releasable screw thread 6 (preferably a mutilated thread), and utilizing the air flue tube 7 to lock the barrel against unscrewing relatively to the receiver, by providing thereon a spline 7^a entering a seat 3^c in the trunnion ring and barrel.

Another object of the present invention is to provide an efficient cooling air flue around the barrel and subject it to the blasting effect of the powder gases escaping from the muzzle end; to which end, another feature of the invention consists in combining with a barrel 5 having a circumferential series of longitudinal, radiating ribs 5^a, a surrounding jacket or tube 7 spaced from its radiating ribs except at isolated points 5^b, so that heating of the jacket by direct conductivity is restricted sufficiently to keep the jacket cool enough to handle at all times; the forward end $7^{a'}$ of the jacket being subject to the suction of the blast of discharge, and its rear end 7^b being provided with a circumfer-

ential series of radial opening slots 7^c, some of which, to avoid choking the air intake, are fed through corresponding openings 3^e in the overlapping trunnion arms; while subordinate features in this connection consist in introducing the rear end of the jacket between an enlargement 5^c on the barrel and the trunnion ring 3^b; also in providing at an intermediate transverse plane in the length of the jacket, spacing lugs 5^b upon the outer edges of the ribs with which the jacket may contact; also in utilizing the gas connection fitting 13 on the forward portion of the barrel as the means for spacing the forward end 7^a of the jacket 7 and resisting its longitudinal movement. Still a further feature in this connection consists in providing this gas fitting with longitudinal passages 13^a, forming outlets for the forward flow of the cooling air, and fitting thereto a blasting shell 8^a terminating forward of the muzzle of the gun, and which coacts with a flaring nozzle 8^b applied to the muzzle; the effect of these parts being to induce a flow of air longitudinally through the cooling jacket in sufficient quantity to convey away the heat radiated from the cooling ribs, and keep the heat of the barrel within permissible limits.

The shell 8^a is preferably mounted on the threaded nut 8^c that forces the gas-fitting member rearward upon its tapered seat, through which it makes a ground fit upon the barrel, while the front portion of the shell is sustained in spaced relation to the nozzle 8^b by means of the spider 8^d which is carried by the nozzle. Nozzle 8^b has a sliding fit upon the end of the barrel, so that shell 8^a, nozzle 8^b, nut 8^c and spider 8^d constitute a single structure which may be applied or removed by merely rotating the shell and screwing the nut on or off the barrel. The gas fitting 13 which supports the forward end of the cooling jacket 7, carries the front sight 14 and receives the rear end of the shell 8^a, and has openings 13^a for passage of cooling air, while nut 8^c has openings $8^{c'}$, and the spider 8^d has openings $8^{d'}$ for the same purpose.

The front sight 14 is mounted upon the gas fitting through the medium of the pintle 14^x, and is controlled by a spring plunger 14^a to hold it in either of its normal positions, which plunger is constructed in the form of a cylindrical box for its spring and is mounted in the gas fitting in position to thrust its controlling end into either of the notches 14^b, 14^c of the sight, according to the position the latter occupies. The plunger 14^a serves the further purpose of locking the shell 8^a against unscrewing movement, for which purpose it is provided with a lug 14^d that will engage in one of the notches 8^e of the shell whenever the sight is being held by the plunger; but a swell 14^e on the heel of the sight between the notches 14^b and 14^c momentarily presses the lug 14^d out of locking relation to the shell 8^a, as the sight passes from one position to the other, so that if the sight be voluntarily arrested in such intermediate position, the shell can be unscrewed.

The gas fitting has a duct 13^b which communicates with the port 5^d in the barrel, which port and duct are of such capacity as to deliver to the piston 9^a, the powder gases in sufficient quantity at the high pressure of the propelling charge, to drive the piston rearward and function the loading and firing mechanism. A gas control is mounted in the member 13, and valve 13^e has a plurality of (preferably radially disposed and sector-shaped) recesses 13^d, 13^{dx} of large and small capacity respectively, each adapted to be positioned to intersect the duct by proper rotary adjustment of the valve, and thereby regulate the capacity of the duct and control the force applied to the piston. Thus the rapidity of action, according to heating or other conditions, may be determined at will.

The forward end of the spring chamber 9 has a threaded seat 13^e in the gas fitting 13. The piston 9^a delivers its work through the rod 9^b, the rear end 9^c of which is threaded into the yoke 10^a of the drive rods 10^b to drive the latter rearward, and the return movement of the piston with these connected parts is effected through the medium of the spring 9^d.

16 represents the forearm-actuated drive connection for the yoke 10^a of the drive rods 10^b, which comprises a ring embracing the spring housing 9, connected through drawrod 16^a with a finger hook and latch 16^b, which latter normally locks the actuator against rearward movement; also a thrust rod 16^c extending rearwardly in a longitudinal slot formed in the under side of the tube 9 and terminating in an upturned end 16^d which lies in front of the yoke 10^a, and is secured against displacement by providing it with a bore by which it loosely embraces the piston rod 9^b. Rearward pressure applied to latch 16^b and finger hook, releases the ring 16 and drives the yoke 10^a and drive rods 10^b rearwardly, taking with them, piston rod 9^b and piston 9^a, and compressing the return spring 9^d. Initial opening of the breech and cocking of the gun are thus accomplished and followed by the closing of the breech under the reaction of the spring as soon as the finger hook is released.

Another object of the invention is to obtain a simple and effective connection serving in common as a support for the rear end of the spring chamber 9 of the gas-actuating mechanism, in a manner to sustain its split rear end against either collapse or expansion, and as an abutment for

the rear end of the spring in said chamber, and a guide for the hand-operated connection 16^c and for piston rod 9^b; to which end, a further feature consists in mounting in the forward end of the housing 10 of the drive rods, a header 17 in the form of a guiding abutment formed with a central bore 17^a for the piston rod 9^b, with a concentric annular seat 17^b for the tube 9 that constitutes the spring chamber, and with a lower guide 17^c for the longitudinally reciprocating hand rod 16^c; a subordinate feature in this relation consisting in forming the forward end of the drive rod chamber of a tube 10 screwed at 1^a into the front end of the receiver, and carrying suitable abutments 10^c that provide the stop for the yoke 10^a of the drive rods, in their forward, or breech-closing movement, and also receive the header 17 and hold it against rotation; and another subordinate feature consisting in having the upturned end 16^d of the hand rod 16^c which surrounds the piston rod 9^b, just forward of the yoke 10^a, enter between the abutments 10^c at the limit of its forward movement, and thus find its arresting abutment against the header 17, which permits ring 16, rod 16^c and end 16^d to be readily assembled when made integral.

Another object is to provide a simple and efficient breech closure of the non-rotating reciprocating block type, with locking means near its forward end; to which end, a further feature of the invention consists in combining with a breech block 18, provided with forward side lugs 18^a which adapt it to reciprocate in longitudinal ways 18^b in the side walls of the receiver 1, a pair of locking wings 19 fulcrumed through pintles 19^a upon the rear portion of the block, and having their forward ends 19^b abutting the rear faces of the lugs 18^a on the block, and having upon their own outer faces, lugs 19^c movable from positions in alinement with the block lugs 18^a, which they occupy while the breech block is reciprocating, to positions which bring them forward of arcuate shoulders 1^b on the side walls of the receiver, which these wing lugs occupy when the breech is locked, so that resistance to opening is transmitted through the block lugs 18^a to the forward ends 19^b of the wings, and through shearing resistance of these wings and their own lugs 19^c to the shoulders in the side walls of the receiver; and a further feature in this connection consists in utilizing these locking wings for imparting the reciprocating movements to the breech block, for which purpose, the drive rods 10^b are connected to the locking wings by pintle studs 19^d offset from their pivotal connections 19^a with the breech block, and by recesses 19^g providing thrust shoulders 19^h, and the wings are provided with bearings acting rearwardly against the breech block independently of pintles 19^d, as by having arcuate faces 19^e of the wings bear against guiding lugs 18^c on the breech block, the wings being also provided with faces 19^f that bear beneath the lugs 18^c at the limit of the unlocking movement, which together with the arrest of the forward locking lugs 19^c on the wings by the bottoms of the guide grooves 18^b of the receiver, relieves the wing pintles 19^a of vertical stress in the rearward arrest of the breech block. Further features in the construction of the breech block relate to the extractor, according to which a vertically swinging hooked pawl 20 secured by a transverse pin 20^a in a forwardly opening recess 18^d of the breech block, is provided with a spring seat 20^b formed directly in the pawl, so that it may be slid conveniently to its position with the outer end of the spring 20^c riding upon the face of the recess, and thus avoiding the inconvenience of fitting the spring to a special bearing in the breech block; also to the construction of the ejector which coacts with said extractor to trip the spent cartridge shell downwardly and flip it out through the bottom opening 1^z in the receiver having ledges $1^{z'}$ for attachment of a shell receptacle if desired. Said ejector comprises a projection 20^d that works in the groove 18^x in the top of the breech-block 18, and the dovetailed anchoring base 20^e that slides rearwardly into a correspondingly formed socket in the top of the receiver. A carrier 21 inserted from the rear into a longitudinal bore 18^e in the lower portion of the breech block, has a forwardly presented but vertically offset horn 21^a working in an upper bore 18^f, coaxial with the chamber of the gun and adapted to receive a firing pin 21^b, through which it strikes the primer of the cartridge, a projecting spring 21^c being mounted in the portion which enters the lower bore, and the whole being confined by an end closure 21^d fitted in the rear end of the breech block, secured by a transverse pin 21^e, or other readily releasable means, and carrying a guiding core 21^f for the projecting spring. Preferably a part, for instance through-pin 22, having its ends counter-sunk in the inner faces of the locking wings and working in a vertical slot 22^a, is adapted to intercept the forward movement of the carrier so long as the breech is unlocked, and thus prevent the striker from reaching the cartridge, in the event that it should become unintentionally released before the breech block is securely locked. A further feature having relation to the breech closure consists in the construction of the rear limiting cushion or buffer that receives the breech block at the end of its opening movement, according to which a hollow buffer 23 mounted in a bearing 23^a formed in the rear end of the

receiver, in which it slides longitudinally a distance limited by lugs 23^b on the buffer entering slots 23^c in the bearing or by other suitable overlap of parts, receives a cushioning spring 23^d which, together with the buffer, is confined by a cap 12 screwed upon the rear end of the bearing.

A further object of the invention is to provide for ready assembly and disassembly of the breech closure and firing mechanism with the gun, to which end, a further feature consists in mounting the grip 2 with such portions of the firing mechanism as are readily separable from the striker, upon a frame 2^a pivotally supported at one end upon the pin 1^c, and releasably locked by a latch 2^b at its other end in the receiver in such manner that when the latch is released and the frame, with the parts which it supports, is swung downward and out of the way (preferably by lifting it from its hinging bearing), and the breech block is moved to its rearward position, the drive rods, normally spread apart by an intervening portion 2^c of the frame and held upon their pin connections 19^d with the locking wings, may now be pressed together to disengage them from said locking wings, and the breech block lowered through the opening left by the removal of the frame, the breech block being removable at such time, because in complete assembly, the vertical support for the rear end of the breech block is afforded solely by the upper edge 2^d of the removable frame, and when the rear end of the breech block is dropped down, its forward end may then continue rearward until the front lugs 18^a pass beyond the rear ends of the side grooves 18^b in which they travel.

Another object is to provide a novel construction of trigger connection with the sear, whereby such connection will not only be automatically released by the opening of the breech block, but will be held out of re-engaging position so long as the trigger is held in retracted position, so that while available for any number of individually delivered shots, and for the first shot in starting automatic firing, the connection between the trigger and the sear will be held out of functioning relation to the sear and free from the action of the breech block. To this end, another feature consists in providing the trigger 24, fulcrumed at 24^x, with a pawl 24^a connected with the trigger through means of the pintle 24^b, preferably upon the horizontal arm 24^c of the trigger, and providing it with a spring 24^d that presses its hook normally into engagement with the sear 25, so that when the trigger is pulled, the rear end of the sear 25 will be rocked downward to release the striker 21. Sear 25 is mounted through means of pintle 25^a on the frame 2, and is pressed by spring 25^b normally against the stop pin 25^c, in which position its end 25^d will be in the path of the striker on the closing movement of the breech block. 24^e is a tail piece on the end of the pawl 24^a, in the path of the receding breech block that insures disengagement of the pawl from the sear 25 in time to permit the latter to snap into position to arrest the striker. The pin 25^c also has the effect of forcing the pawl out of position to engage the sear, said pin being in the path of said pawl when moved downwardly by the trigger. Hence, while the instant release of the sear is insured by the tail piece 24^e, the continued separation of the tripping pawl and the sear will be insured, so long as the trigger is held.

A further object is to provide, for rapid fire, a sear release that is entirely independent of that through which the trigger acts, and which is itself actuated by the closing of the breech, and, in order to insure greater safety, by the end of the locking movement of the breech; and to these ends, an independent sear tripper 26, slidably mounted upon the pin 26^a and normally retracted by spring 26^b, is provided with a shoulder 26^c through which it is adapted to engage the depending end of the sear 25. This rapid fire tripper is further provided with a lug 26^d, which lies in the path of a lug 26^e on one of the locking wings 19, and encountered by such wing lug just as the wings approach their limit of locking movement, so that the striker will not be released until the breech is safely closed. The rapid fire sear tripper 26 may swing vertically upon its pin 26^a, as well as slide upon said pin, and the spring 26^b acts upon said tripper at a point offset from the pin 26^a, so that the sear-engaging end of said tripper is normally pressed downward out of position, where it cannot be encountered by the actuating lug 26^e on the locking wing. To elevate this tripper to effective position, a lever 27 is fulcrumed on the pin 26^a and has its rear end 27^a projected into the path of a plunger 28, which is normally elevated by a spring 28^a, but which may be depressed at will by a thumb trigger 28^b projecting from the left-hand side of the grip 2. So long as the plunger 28 is depressed, the rapid fire sear release will be in effective position; and so long as said plunger is elevated, said rapid fire sear release will be inoperative, and the striker can be released only by pressing the finger trigger for each shot. For convenience of assembling, plunger 28 is divided, and its spring 28^a is housed in its lower plunger post 28^c that abuts upwardly against the upper portion 28, while upward movement is limited by the abutment 28^k fixed by through-pin 28^m. Abutment 28^k, plunger 28, and plunger post 28^c all have substantially cylindrical form as shown at 28^k in Fig. 10, and these parts are held in place by introducing

them endwise into a substantially vertical seat formed by cylindrical scarfs 28^n formed in the opposite inner walls of the frame.

A further object is to provide novel and effective means for preventing discharge of the gun until the grip is firmly within the gunner's grasp and firing is intentionally initiated, to which end, the grip is provided with a common form of safety lever 29 conforming to the rear surface of the grip in a known manner, but this safety lever has novel connections through which it controls the firing, to wit: 30 represents an arresting lever, fulcrumed at 30^x, for arresting the breech block as the latter starts forward under the action of the return spring 9^d; to which end, said lever has a cross head 30^a, the rear edge of which is adapted to engage notches 30^b on the locking wings 19, as the breech block returns from its fully open position; said arresting lever being rocked by spring 30^c to normally present its cross head in engaging position, and forward arcuate faces 30^h (see Fig. 14^a) of the cross head having a direct bearing against the arcuate walls 30^k, to relieve the pintle fulcrum 30^x from strain. A leg 30^d on the lever 30 enters the path of the dog 29^a on the safety lever 29, so that by pressing the lever 29 inward in the act of firmly embracing the grip by the hand of the gunner, lever 30 is rocked downward to release the breech block and permit it to snap to closed position. Obviously, until the breech is permitted to close, the striker is not arrested by the sear and the gun is not in condition to be fired, even by the finger trigger. With the parts occupying the positions shown in Fig. 4, each shot could be delivered only by pulling the finger trigger 24, and each shot would be followed by an opening of the breech and arresting it in open position, since the dog 29^a has a heel 29^b that strikes the wall 2^e that trips the dog from the leg 30^d of lever 30 each time the grip is pushed inward, and thus permits the lever 30 to turn to the position in which it will arrest the breech block. It will be understood, however, that the grip lever may be forced inward to permit closing of the breech, and the gun will not be fixed until the finger trigger is pulled; thus all preparations may be made for firing, but the shot not actually delivered until the aim is complete.

A further object is to provide an improved safety device that will prevent either pulling the finger trigger, or pressing in the grip lever, and to these ends, a further feature consists in providing a grip lever with a pin 29^c that must pass through a bore 11^b in the tumbler 11 each time the grip lever is pressed inward. Tumbler 11 is rotatable by its index lever 11^x on the exterior of the grip, and if it be turned to a position with bore 11^b out of alinement with pin 29^c, grip lever 29 cannot be moved. A spring 29^d serves in common to return the grip lever 29 and withdraw the pin 29^c from tumbler bore 11^b; and a spring box 29^e for this spring is made in the form of a bolt that slides under the action of said spring into abutment with one or another of the three sector faces 11^m, 11^n, 11^o of said tumbler, and so holds it against axial displacement and also against unintentional rotary movement from any of its three positions to which it may be adjusted for fire control. Likewise, under the control of the tumbler 11, is a trigger stop 32, fulcrumed at 33 with one horn 32^a coacting with the tumbler 11^a and another horn 32^b movable into and out of the path of the finger trigger 24, or a projection 24^f carried thereby. A third horn 32^c on the trigger stop 32 is adapted to engage beneath the shoulder 28^c of the plunger 28, and prevent depression of the latter when the tumbler 11^a is turned to safety position. Thus all voluntarily actuated parts of the firing mechanism may be rendered immovable and the gun made thoroughly safe, though fully loaded, when not in use.

Trigger stop 32 is pressed normally out of effective position by a spring plunger 32^d, which, though mounted in the vertically movable plunger 28, has a sufficient range of movement to retain its control over the trigger stop even when plunger 28 is depressed. Plunger 28 is normally elevated by spring 28^a, and it has its connection with thumb trigger 28^b through the medium of the dowel 28^e secured thereto by threaded pin 28^f. Connection of plunger 28 with the setting lever of rapid fire sear tripper 26 is through the medium of the slot 28^s in said plunger.

A further object is to permit the breech block arresting lever 30 to be locked out of arresting position for single shot firing, so that the breech will close after each shot, and to this end, the tumbler 11 is provided with a cam 11^d, which, when the firing index on the outer end of said tumbler 11 points forwardly, will engage with the tail piece 30^d, pressing the latter forward and the engaging wings 30^e downward out of the path of the shoulders 30^b of the locking wings.

A further object is to provide for positively holding the lifting lever 27 of the automatic fire sear release 26, in its lifting position so long as the plunger of the thumb trigger is depressed, thereby steadying the positions of these parts which insure automatic firing; also to provide for the release of the positive holding means and the withdrawal of the automatic fire sear release instantly, so as to insure the striking of the sear only when the parts are in full engagement; also to permit return of the breech block arresting lever to arresting position whenever automatic fire ceases, in order that the gun may be left open for cooling. To

these ends, lever 30 controls a rocking dog 34, fulcrumed at 34^a in frame 2, in position to have its dogging end 34^b thrust by spring 34^c above the end 27^a of lifting lever 27, whenever the plunger 28 is depressed and the lever 30 simultaneously pressed inward by the grip lever 29; and a dogging lever 35 resting at 28^h upon the plunger 28 and pressed downward by spring 35^a, lying beneath abutment 28^k, follows the plunger downward and enters behind the upper end 30^e of lever 30, whenever the depression of plunger 28 and the rocking of lever 30 occur simultaneously, which conditions obtain so long as the thumb trigger is depressed. The thumb trigger thus becomes the means for continuing automatic firing and is adapted to arrest automatic firing by merely permitting it to rise with its plunger 28 under the action of spring 28^a, for at the end of this rising movement, it trips off the dog 35 and allows the lever 30 to rock back into normal position under the action of its spring 30^c, thereby withdrawing the dog 34 from the end 27^a of the lifting lever and permitting automatic fire sear release 26 to withdraw from the path of the wing lug which actuates it. When the parts are in these positions, the breech may be closed by merely pressing the grip lever 29, when the gun will be loaded and cocked ready for firing. If now the finger trigger be pulled, a single shot will be delivered and the breech will open and remain so until the grip lever is released to permit reëngagement of the tripper 29^a with the tail piece 30^d of lever 30; or if it be desired to proceed with single shot firing without having to release the grip lever each time to close the breech, the index on the outer end of the tumbler 11 will be turned to forward position, to permanently retire the breech-arresting lever 30 when single shot firing may proceed at will; or if it be desired to resume rapid or full automatic fire, thumb trigger with plunger 28 will be depressed, and grip lever 29 pressed inward to permit closing of the breech, whereupon rapid fire will commence, since the rapid fire sear release will be elevated into the path of the wing lug 26^e. If it be desired to shift from single shot fire to rapid fire, which will take place while the breech is closed, downward pressure is applied to the thumb trigger in the usual way, followed by the pressing of the grip lever and the finger trigger. Plunger 28 will not yield at first, because the lug 26^e on wing 19 is overlying the projection on the rapid fire sear release but as soon as the breech moves rearward under the reaction of the first shot, plunger 28 will yield to the pressure of the thumb instantly and bring the fire-control parts into conditions which insure rapid fire as already explained.

A further object is to provide means for preventing the opening of the receiver by the downward swinging of the frame 2, so long as the gun is cocked, to which end a further feature consists in providing the latch 2^b with a rod connection 37 extending forwardly and carrying a lug 37^a that encounters a projection 37^b on the side of the sear 25 whenever the sear is in position to arrest the striker, so that latch 2^b cannot be pressed inward to release the frame 2 until the trigger is pulled, or, in other words, until there is no longer an unspent cartridge in the gun.

A further object is to provide an efficient support for the horizontal trunnions of the gun and to adapt this support to be conveniently assembled with the trunnions; to which end, another feature consists in providing an axially divided vertical trunnion 38 adapted to fit into the socket of a tripod or other mounting (not shown), said vertical trunnion being formed with arms 38^a with horizontal trunnion bearings 38^b, so as to make up a yoke in which the gun can rest. And a further object is to afford, through means of this support, a yielding resistance to elevation movements of the gun upon its horizontal trunnions, to which end a further feature consists in forming the divided yoke with recesses 38^c which, together, form a guide or slideway for a radius arm 39, pivoted at 39^a to the receiver 1. To maintain friction on the radius arm in its slideway, a spring-pressed disk 38^d is provided. The dividing of the yoke facilitates introduction of the radius arm into its slideway, as well as the fitting of the yoke members to the horizontal trunnions.

A further object is to provide an efficient magazine of the rotary hopper type, of comparatively simple construction, and to these ends, a further feature consists in providing upon the forward end of the receiver 1, a magazine table 40 having bayonet joint locking lugs 40^a for engaging a magazine by a rotary movement of the latter, and inclined face 40^b which will serve to lift the magazine and detach it from the table by a reverse rotation; also in providing the magazine 4 with lugs 41 adapted to engage beneath the table lugs 40^a and having inclined faces 41^a adapted to coact with the faces 40^b on the table. Interengaging lips 41^b on the magazine and 1^y on the receiver adjacent to the communicating throats of these two members, prevent lifting of the magazine and the separation of these throats when they are turned into interlocked position. And a further feature in this connection consists in means for locking the magazine against rotation in the direction to unlock it from the table, which means consists in a vertical latching bolt 42 pressed upward by spring 42^a and having an inclined upper end that engages in first one and then the

other of the inclined notches 42^c, 42^d of the magazine, and permits the latter to ride over the bolt and engage behind it; also a releasing cam 43 having an end 43^a that overlies a shoulder 42^b of the bolt 42, so that when said cam is rotated by its lever 43^b, presented within convenient reach of the gunner as shown in Fig. 26, the bolt is withdrawn and the magazine may be rotated in the direction to release it. Cam 43 is conveniently secured in position by a pin 43^c, sunk into the wall of the receiver and engaging in the groove 43^d of the cam.

A further object is to provide a construction of magazine that will receive and feed cartridges in a spiral series and positively force them toward the throat of the receiver, to which end another feature consists in providing the magazine with a base 44 that carries the attaching lugs 41 and affords the bottom upon which the cartridges are delivered in reaching the receiver; said base being surmounted by a central fixed core 45 formed with a spiral groove 45^a, in which the points of the cartridges may travel, and a spiral guideway 45^b for a follower 51 to be described. The fixed core 45 is constructed in the form of a spring box 46 to receive a helical plate spring 47 anchored at its outer end to the fixed core at 47^a, and having a driving connection 47^b at its inner end with the shaft 48 of the inner shell 49 of the magazine, which is securely riveted to and driven by the shaft 48, and which, therefore, constitutes the rotor of the magazine. The rotor is provided with a depending annular flange 49^a, carrying inwardly extending partitions 49^b which provide cartridge stalls to receive the larger ends of the cartridges, and these partitions 49^b are formed adjacent to the rotor flange which carries them, with recesses 49^c or other means conforming to the necks or flanges of the cartridges, in order to definitely engage the ends of the cartridges and hold them against movement in a horizontal plane so long as they are under control of the partitions. An essential characteristic of the stalls formed by the partitions 49^b and their structural feature which adapts them to interlock with the butt end of the cartridge, is that these parts are positioned to carry the cartridges at an angle inclined backward from the radius of the magazine with several advantageous results, principal among which is the improved positioning of the cartridges due to the offsetting of their approaching ends; and most important of all the assurance of proper feeding through the throat 52 of the magazine and into the throat of the receiver, as well as their proper presentation, one by one, to the closing breech block without the complication of special feeding means ordinarily required for insuring the individual entry of the cartridges in proper position. That is to say, by having the point of each cartridge retarded with relation to its butt in reaching the arresting ledges of the receiver throat 1^x, which support the cartridge through the medium of its shell, this shell or portion of the cartridge by which it is to be arrested, will reach the ledges before the point has had time to drop down into the receiver, and thus the vertical tipping of the cartridge is prevented. A further advantage of this backward inclination of the points of the cartridges is that their flanges are stepped and they will lie closer together and in better relation to restrain each one its follower.

A further feature of the improved magazine consists in providing the follower 51 with an embracing ring segment 51^b, by which it is adapted to travel in the spiral guide 45^b, and with an end 51^c entering one of the cartridge stalls so as to insure rotation of the follower; this follower being provided with a pusher 51^d hinged thereon at 51^e in position to ride upon the bottom 50 of the magazine and insure feed of the last cartridges down into the throat of the receiver 1.

53 represents a gate pivoted at 53^a and adapted to be closed by a spring 53^b to interrupt the escape of cartridges from the magazine. A heel 53^c encounters the wall of the receiver 1, as shown in Fig. 31, when the magazine is in place and holds the gate open. But whenever the magazine is removed from the gun, the gate automatically closes to prevent the escape of any cartridges remaining therein.

54 represents a rotary counter having figures adapted to be exposed through a window 54^a in the casing of the magazine and adapted to be rotated by pins 54^b on the rotor, of which there may be any desired number, the figures on the counter indicating multiples of cartridges that have passed into or out of the magazine, and consequently the number remaining therein.

The follower 51 may serve as the stop to arrest movement of the rotor 49, under the action of its spring 47, but I prefer to employ a special stop for this purpose which will act upon the rotor with an increasing leverage as the magazine is being charged, and which by following in a spiral path in the rotor, can be given the requisite travel to permit several revolutions of the rotor requisite for a large capacity for shells. To this end, an arm 55, pivoted at 55^a to the rotor and having a pin 55^b adapted to swing in the radius slot 55^c, enters the spiral groove 56^a in the disk 56 which is non-rotatably secured by lugs 56^b to the fixed core or spring box. By this arrangement, the pin 55^b reaches the outer end of the spiral groove 56^a under the winding action of the spring

developed by forcing cartridges into the magazine, and thus acts upon a greater leverage of radial distance in resisting this forcible introduction of cartridges, and it encounters the inner end of the spiral groove under the unwinding action of the spring which is of comparatively low power when thus unwound.

A further object is to provide a suitable means for charging the magazine, and to these ends, a further feature consists in providing a plate 58 having bayonet lock openings 58^a adapted to coact with the lugs 41 of the magazine precisely as does the magazine table on the receiver; also a delivery hood 59 adapted to overlie the magazine throat when the magazine is removed from the gun and in inverted position, and interlock therewith by a rotary movement simulating the rotary interlock between the magazine and the gun, and having the lip 59^b to engage with the lip 41^b on the magazine precisely as does the lip 1^y of the receiver throat and for the same purpose, a vertical runway 59^b extending upwardly from said hood 59, and suitably constructed as suggested at 59^c to engage the heads of the cartridges to confine them against lateral displacement in the runway; also displacing follower 60 having a finger hold 60^a by which it may be forcibly depressed to expel cartridges from the runway through the hood and into the magazine, and constructed with a T-head 60^b for guiding it in said runway. A latch lever 61, normally depressed by a spring 61^a and having a lug 61^b, resists rotation of the magazine charger relatively to the magazine, just as the latch bolt prevents unlocking rotation of the magazine upon the magazine table.

I claim:—

1. In a gun having a longitudinally reciprocating breech-actuating member, a forearm-actuated drive connection for said member, comprising a ring mounted to slide upon the gun, a draw rod extending rearwardly from said ring, a manually engaged projection connected with said draw rod, and a latch normally resisting movement of the draw rod associated with said projection in position to be released by actuating pressure upon said projection.

2. In a firearm having a longitudinally reciprocating breech-actuating drive rod, an abutment limiting forward movement of said drive rod, a thrust rod having an upturned end acting upon the drive rod adjacent to its abutting end, a piston rod working through the abutment and having controlling connection with said drive rod, a cylindrical housing for said piston rod, and a thrust rod actuating member having a suitable hand-hold, mounted to slide upon said tubular housing and having connection with said thrust rod.

3. In a firearm having a longitudinally reciprocating breech-actuating drive rod, an abutment limiting forward movement of said drive rod, a thrust rod having an upturned end acting upon the drive rod adjacent to its abutting end, a piston rod working through the abutment and having controlling connection with said drive rod, a cylindrical housing for said piston rod, and a thrust rod actuating member having a suitable hand-hold, mounted to slide upon said tubular housing and having connection with said thrust rod; said thrust rod having an upturned end through which it engages the drive rod, and said piston rod extending through said upturned end.

4. In a firearm having a longitudinally reciprocating breech-actuating drive rod, an abutment limiting forward movement of said drive rod, a thrust rod having an upturned end acting upon the drive rod adjacent to its abutting end, a piston rod working through the abutment and having controlling connection with said drive rod, a cylindrical housing for said piston rod, and a thrust rod actuating member having a suitable hand-hold, mounted to slide upon said tubular housing and having connection with said thrust rod; said tubular housing being formed with a longitudinal slot, and said thrust rod being fitted to slide in said slot.

5. In a firearm having a longitudinally reciprocating breech-actuating drive rod, an abutment limiting forward movement of said drive rod, a thrust rod having an upturned end acting upon the drive rod adjacent to its abutting end, a piston rod working through the abutment and having controlling connection with said drive rod, a cylindrical housing for said piston rod, and a thrust rod actuating member having a suitable hand-hold, mounted to slide upon said tubular housing and having connection with said thrust rod; said tubular housing being formed with a longitudinal slot, and said thrust rod being lifted to slide in said slot; and said tubular housing having an annularly grooved header in which it fits, seated against said abutment and providing a forward limit for the thrust rod.

6. In a firearm, the combination of a receiver having breech mechanism and a longitudinally reciprocated drive rod for said breech mechanism; a housing for the drive rod secured to and projecting forwardly from the receiver and constructed with an abutment providing a forward limit stop for the drive rod, an automatically returning gas-driven piston rod working through said abutment, and having a connection with the drive rod, through which the drive rod, when arrested by the abutment, also arrests the forward movement of the piston rod, and a tubular housing for the piston rod sustained against rearward movement by

said abutment; said piston rod housing having an annular header fitted to its rear end, through which it rests against said abutment; and said header being fitted within the forward end of the drive rod housing and being constructed to embrace the piston rod housing circumferentially.

7. In a firearm having a receiver and a breech block reciprocating in said receiver; locking wings fitted to the sides of the breech block and projecting below the breech block, drive rods connected with said below-projecting portions of the locking wings and lying against the opposed inner faces of the latter, and a frame introduced between said drive rods and holding them against said wings.

8. In a firearm having a receiver with a breech block reciprocating therein, and with wings for locking the breech block, located between the walls of the receiver and said breech block and projecting below the latter, pins on the inner opposed faces of the below-projecting portions of the wings, drive rods fitted over said pins, and a frame projecting between the ends of the drive rods and holding them in engagement with the pins.

9. In a firearm having a receiver, with a breech closure movable in said receiver carrying suitable firing mechanism; a frame mounted in said receiver and carrying fire-controlling mechanism including a sear; said frame being removable, with its fire-controlling mechanism and sear, from the receiver, and having a releasable latch normally holding it against removal, and a safety connection between said latch and the sear that prevents releasing the latch, so long as the sear is in restraining relation to the firing mechanism.

10. A breech closure for firearms constructed with two longitudinal bores, and a rear end opening establishing communication between the bores, a striker comprising a carriage having a portion adapted to work in one of the bores, and a horn projecting in position to coöperate with the other bore and carrying a firing pin in said horn, an end closure in the rear end of the breech closure, extending across both bores, and a projecting spring for the carriage having rearward abutment against said end closure.

11. A sear mechanism for firearms which reload automatically, comprising a sear, a sear-release having a movement imparted by the trigger for withdrawing the sear, and an independent movement by which it leaves the sear and permits the latter to return to its function of cocking the firing pin in the automatic reloading; said sear-release having a projection entering the path of the loading mechanism and enforcing its separation from the sear, and a stop against which the sear-release impinges near the end of the movement imparted to it by the trigger, and by which stop the sear-release is retired from the sear and has its projection withdrawn from the path of the loading mechanism.

12. A fire-controlling mechanism for rapid fire guns comprising a sear, breech mechanism having a firing device adapted to be controlled by said sear, a rapid fire sear-release having a sear-releasing movement and a movement by which it is adapted to be interposed in the path of the breech mechanism, and means for controlling, at will, the last-named movement of said sear-release, comprising a lifting lever over which said sear-release moves, and an external projection through which to control said lifting lever.

13. A fire-controlling mechanism for rapid fire guns having automatic breech mechanism and a suitable firing device; said fire-controlling mechanism comprising a rapid fire sear-release having a sear-withdrawing movement, and a shifting movement, and having a construction which enters the path of the breech mechanism, under its shifting movement and causes it to receive its withdrawing movement from said breech mechanism, and means for developing said shifting movement at will, comprising a lever over which said sear-release is adapted to slide, a plunger controlling said lever, and an texternal projection controlling said plunger.

14. A rapid fire control mechanism for guns having a breech mechanism and a firing device; said control mechanism comprising a rapid fire sear-release having a sear-withdrawing movement and a shifting movement by which it is presented in the path of the breech mechanism and caused to receive its sear-withdrawing movement, a shifter for said sear-release, an actuator for said shifter, adapted to be moved by the gunner, a dogging device engaging the shifter at the end of its shift-imparting movement to relieve the actuator, and means through which said dogging device is withdrawn by the return movement of said actuator.

15. A rapid fire control mechanism for guns having a breech mechanism and a firing device; said control mechanism comprising a rapid fire sear-release having a sear-withdrawing movement and a shifting movement by which it is presented in the path of the breech mechanism and caused to receive its sear-withdrawing movement, a shifter adapted to impart said shifter movement, an actuator for said shifter adapted to be moved by the gunner, a dogging device resisting the return movement of said shifter, an arrester adapted to engage the breech mechanism and hold it in open position,

and means through which said arrester is withdrawn from arresting position by the shift-imparting movement of the actuator.

16. In a rapid fire gun having suitable breech mechanism and a sear; a fire control mechanism comprising a rapid fire sear-release having a sear-withdrawing movement and a shifting movement by which it enters the path of the breech mechanism and receives therefrom, its sear-withdrawing movement, a shifter for said sear-release, a dog resisting the return movement of said shifter, an arrester for the breech mechanism adapted to hold it in open position, and means through which the arrester withdraws the dog from the shifter as the arrester assumes arresting position.

17. In a rapid fire gun having suitable breech mechanism and a sear, a rapid fire sear-release constructed to be engaged by the breech mechanism to develop its sear-withdrawing movement and shiftable into and out of the path of said breech mechanism, a shifter for said sear-release, an actuator for said shifter, an arrester adapted to hold the breech mechanism in open position and movable to and from arresting position, and a detent for the arrester, adapted to hold the arrester out of arresting position and adapted to be withdrawn by the return movement of the actuator.

18. In a rapid fire gun having breech mechanism and a sear, a rapid fire sear-release constructed to be engaged by the breech mechanism to develop its sear-withdrawing movement and shiftable into and out of the path of said breech mechanism, a shifter for said sear-release, an actuator for said shifter, a dog for said shifter resisting its return movement, an arrester movable into and out of position for arresting the breech mechanism in open position, a detent resisting the return of the arrester to arresting position, means through which the arrester withdraws the shifter dog, and means through which the actuator withdraws the arrester detent.

19. In a rapid fire gun having breech mechanism and a sear, a rapid fire sear-release constructed to be engaged by the breech mechanism to develop its sear-withdrawing movement and shiftable into and out of the path of said breech mechanism, a shifter for said sear-release, a dog resisting return movement of said shifter, an actuator for said shifter, an arrester normally assuming a position to engage and arrest the breech mechanism in open position, a detent resisting movement of the arrester to its said position, means through which the arrester withdraws the shifter dog on moving to arresting position, and means whereby the actuator displaces the arrester detent on its return movement; said last-named means being constructed to complete such displacement of the detent at the end of its return throw.

20. In a rapid fire gun having a breech mechanism and a sear; a fire-control mechanism comprising a rapid fire sear-release having a sear-withdrawing movement and a shifting movement by which it enters the path of the breech mechanism and receives therefrom, its sear-withdrawing movement, a shifter for said sear-release, a dog resisting return movement of said shifter, an arrester for holding the breech mechanism in open position, withdrawing the dog by its movement to the position in which it arrests the breech mechanism, and a manually controlled member for withdrawing the arrester and permitting the breech to close.

21. In a fire control mechanism for firearms having a breech closure, the combination of a sear-release, a shifter for said sear-release, a dog for said shifter preventing its return movement, an actuator imparting shifting movement of said shifter, an arrester for the breech closure normally assuming arresting position and adapted to withdraw the shifter dog by assuming such position, a lever for withdrawing the arrester and permitting the breech to close having a trip-pawl through which it first imparts withdrawing movement to the arrester and then releases it, and a detent for the arrester that prevents its return to arresting position, and which is withdrawn from the arrester by return movement of the actuator.

22. In a firearm, fire-controlling mechanism including an actuator adapted to continue fire so long as it is held in one direction, a breech mechanism, an arrester adapted to hold said breech mechanism in open position, and a detent for said arrester, adapted to hold it out of arresting position, which is controlled by the return movement of the actuator, whereby when the actuator permits an interruption of firing, the breech closure is arrested in open position.

23. In a firearm, having a breech closure with means automatically actuating the same for rapid fire, an arrester adapted to engage said breech closure and hold it in open position, a grip lever having a trip-pawl through which it is adapted to withdraw said arrester and permit the breech closure to close, and a safety device for said grip lever comprising a tumbler and a pin passing said tumbler by the functioning movement of the grip lever and adapted to be arrested by said tumbler to prevent movement of the grip lever, when the tumbler is adjusted to safety position.

24. In a firearm having a breech closure with means automatically actuating the same for rapid fire, an arrester adapted to engage said breech closure and hold it in

open position, a grip lever having a trip-pawl through which it is adapted to withdraw said arrester and permit the breech closure to close, and a safety device for said grip lever comprising a tumbler and a pin passing said tumbler by the functioning movement of the grip lever and adapted to be arrested by said tumbler to prevent movement of the grip lever, when the tumbler is adjusted to safety position; said tumbler having another adjustment by which it is adapted to hold the arrester out of arresting position.

25. In a firearm, the combination of firing mechanism, a single fire trigger adapted to control said firing mechanism, a rapid fire sear-release for said firing mechanism, an actuator for said rapid fire sear-release, a safety tumbler, and a dogging lever controlled by said safety tumbler and adapted to enter the paths of both said trigger and said actuator.

26. In a firearm, the combination of firing mechanism, a single fire trigger adapted to control said firing mechanism, a rapid fire sear-release for said firing mechanism, an actuator for said rapid fire sear-release, a safety tumbler, and a dogging lever controlled by said safety tumbler and adapted to enter the paths of both said trigger and said actuator; said actuator comprising a plunger, said dogging lever being extended through an opening in said plunger, and said plunger carrying a spring which normally sets the dogging lever out of dogging position.

27. In a firearm, the combination of fire-controlling mechanism, a grip lever, a spring resisting movement of said grip lever, a hollow bolt forming the housing for said spring, a safety tumbler adapted to control the movement of said grip lever; said bolt being pressed by the spring against said safety tumbler and yieldingly holding the latter to the positions to which it is adjusted.

28. In a firearm, the combination of a finger trigger, firing mechanism controlled by said finger trigger, a rapid fire controlling device also adapted to control said firing mechanism, a thumb trigger having connections through which it controls said rapid fire device, a breech closure arrester, and a grip lever adapted to control said breech closure arrester.

29. In a gun, a breech block, reciprocating to open and close the gun, a wing reciprocating with said breech block, and having an independent locking and unlocking movement in the closed position thereof, and a sear-release actuated by the locking movement of said wing; said wing carrying a lug through which it acts upon said sear-release, and said sear-release being movable into and out of the path of said lug, to cause or prevent firing, at will.

30. In a gun, a breech block, reciprocating to open and close the gun, a wing reciprocating with said breech block, and having an independent locking and unlocking movement in the closed position thereof, and a sear-release actuated by the locking movement of said wing; said wing carrying a lug through which it acts upon said sear-release, and said sear-release being movable into and out of the path of said lug, to cause or prevent firing, at will, and said lug overlying said sear-release when the wing is in locking position to prevent introduction of the sear-release at such time.

31. In a gun, a breech block, reciprocating to open and close the gun, a locking wing connected with said breech block and reciprocating therewith, and an arrester adapted to engage the locking wing in the open position of the breech block and prevent closing of the same.

32. In a gun, a breech block, reciprocating to open and close the gun, a locking wing connected to said breech block and reciprocating therewith, a breech-actuating mechanism imparting movement to the breech block through the medium of the locking wing, and an arrester adapted to engage the locking wing in the open position of the breech block and resist closing movement of the actuating mechanism.

33. In a gun, a breech block movable to open and close the breech end of the gun, a locking wing having a swinging movement on the breech block when in closing position, to lock and unlock the breech block, and partaking of the opening and closing movement of the breech block when the locking wing is in unlocked position, a breech-actuating mechanism connected with the locking wing and imparting its locking and unlocking movement, and acting through the wing to impart the opening and closing movement to the breech block, an arresting lug on the wing moved to arresting position by the combined unlocking and opening movements of the wing, and an arrester in position to engage said lug at the end of the opening movement of the breech block.

34. In a gun, a breech closure, an arrester in position to engage the breech closure when in open position, and breech-actuating mechanism; said arrester comprising a pivoted lever having means for moving it into and out of the path of the breech mechanism, and a cross arm on said lever which engages the breech mechanism on opposite sides of the lever.

35. In a gun, a breech closure, an arrester in position to engage the breech closure when in open position, and breech-actuat-

ing mechanism; said arrester having a bearing independently of its fulcrum which receives the thrust imposed by the arrested breech mechanism.

36. In a gun, a breech closure, an arrester in position to engage the breech closure when in open position, and breech-actuating mechanism; said arrester comprising a pivoted lever having a cross-arm through which it arrests the breech closure, and having a thrust-bearing on either side thereof, sustaining it against the load imposed in arresting the breech closure.

37. In a gun, a breech closure, an arrester in position to engage the breech closure when in open position, and breech-actuating mechanism; said arrester comprising a pivoted lever having a cross-arm through which it arrests the breech closure, and having a thrust-bearing on either side thereof, sustaining it against the load imposed in arresting the breech closure; said bearings comprising shoulders on a fixed part, and shoulders on the arrester, arcuately extended concentrically with the lever pivot both above and below the cross bar.

38. In a gun, a breech block having a longitudinally extending extractor pocket, and an extractor having a transverse spring-pocket with a compression spring in said pocket, protruding therefrom; said extractor being pivotally connected at the inner end of said pocket with its spring bearing against a side wall thereof, and said side wall being constructed to permit the spring to slide longitudinally thereover in the insertion and removal of the extractor.

The foregoing specification signed at New York city this fifteenth day of May, 1916.

CHARLES W. LANG.