T. H. EICKHOFF.

GUN MECHANISM.

APPLICATION FILED MAR. 10, 1921.

1,433,945. Patented Oct. 31, 1922.

6 SHEETS—SHEET 1.

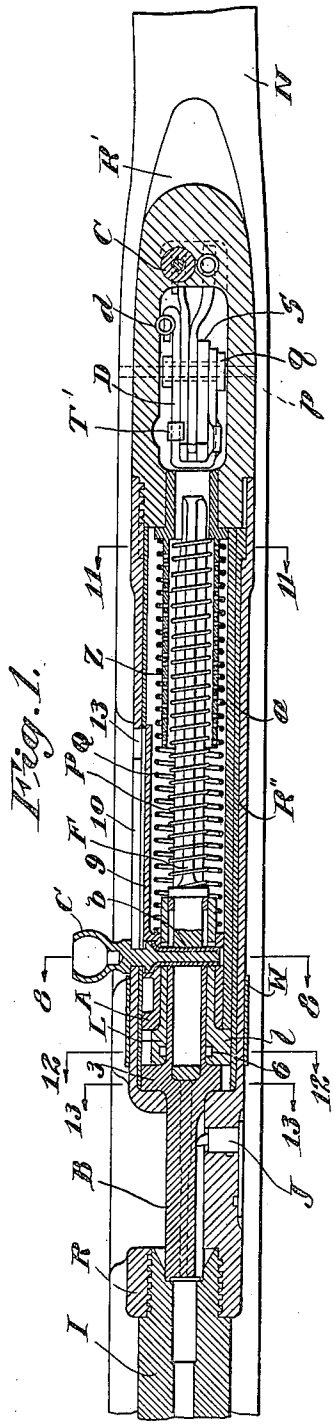

Fig. 1.

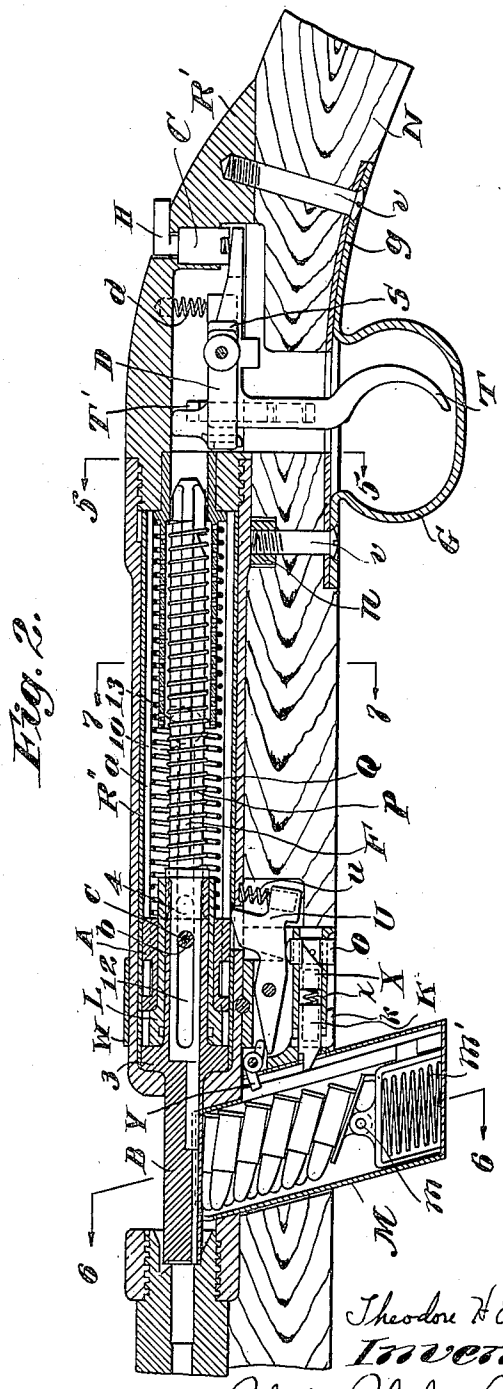

Fig. 2.

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By Robert Roberts & Cushman
his Attorneys

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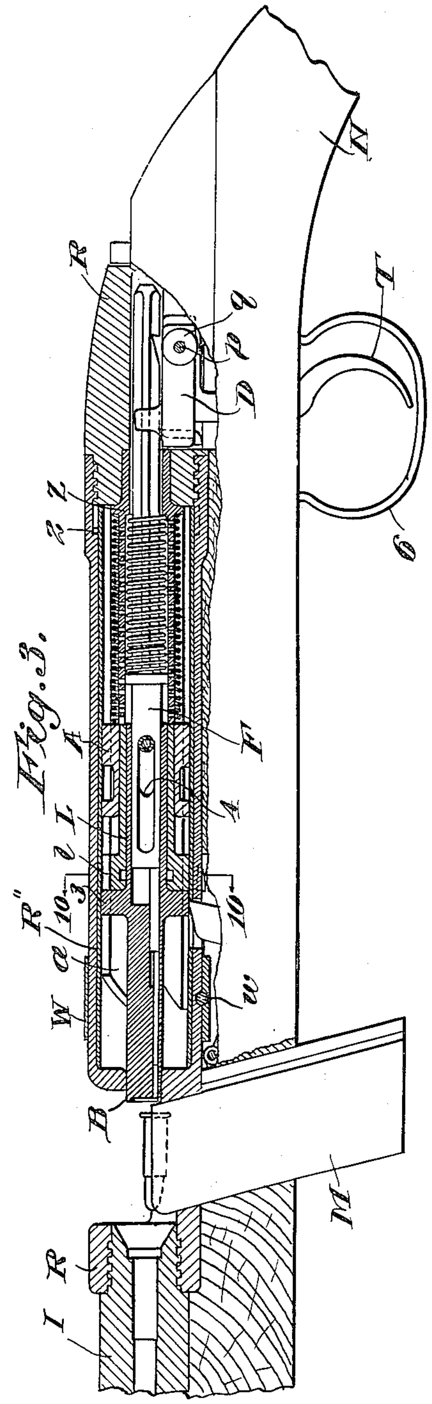

Fig. 3.

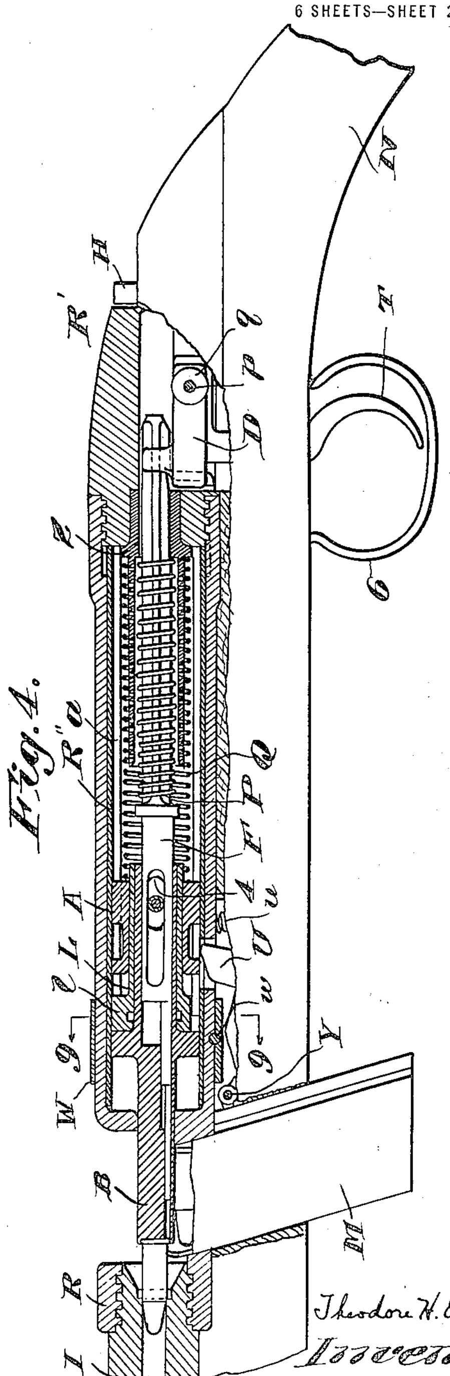

Fig. 4.

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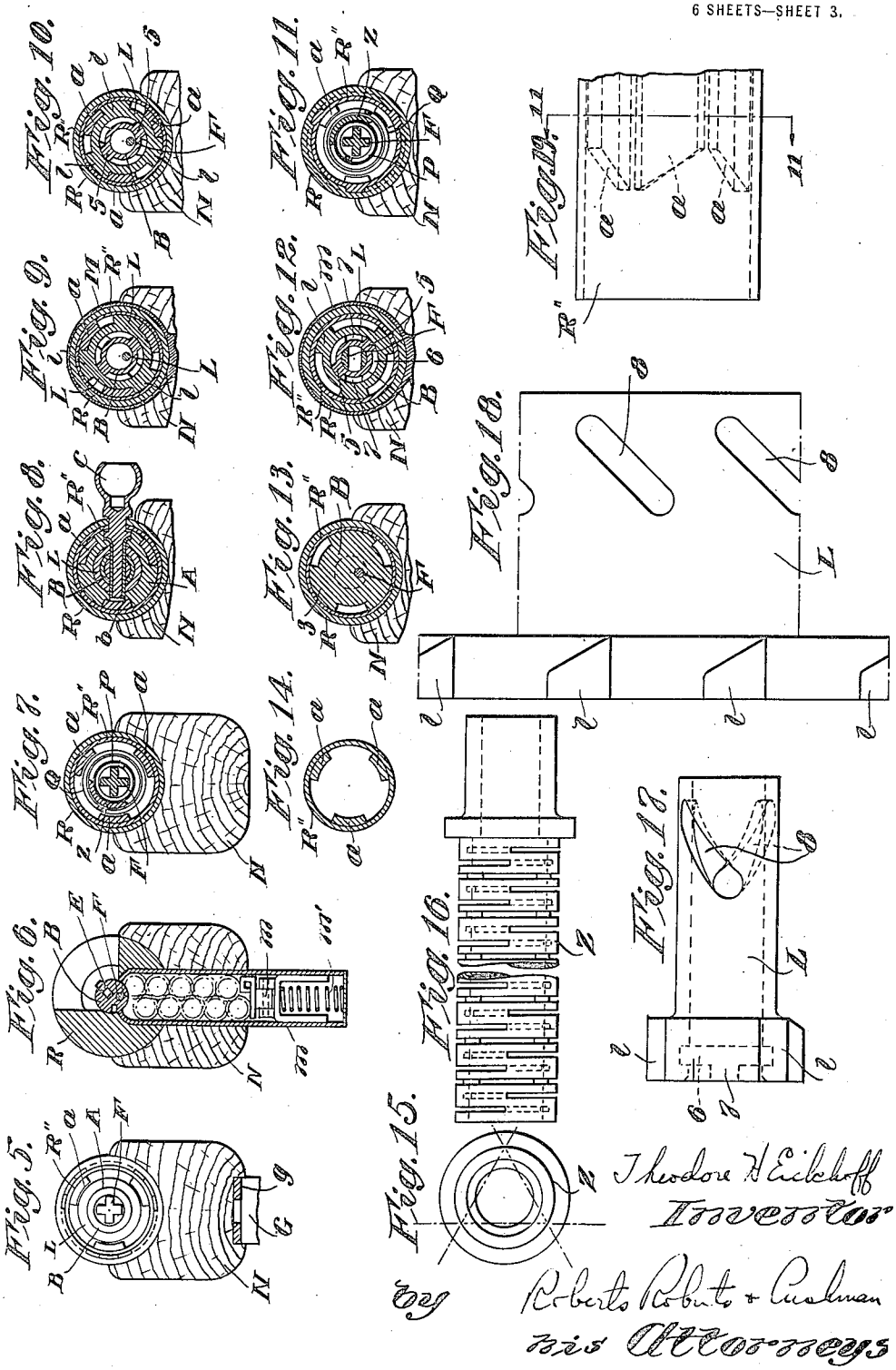

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Fig. 22.

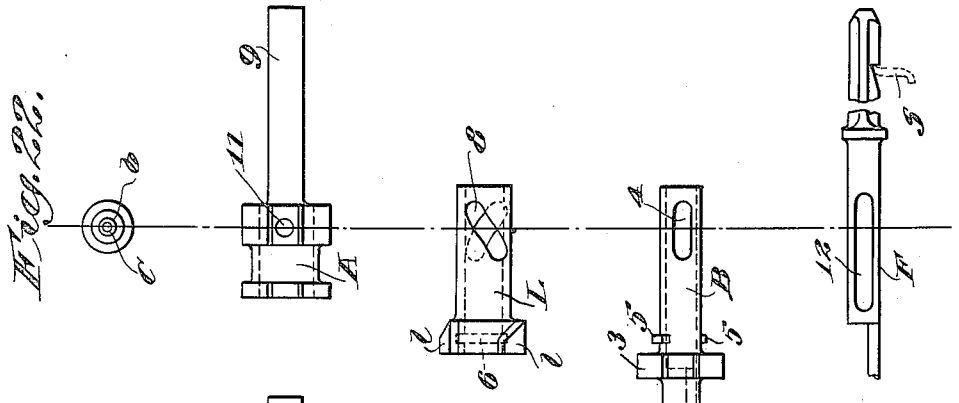


Fig. 21.

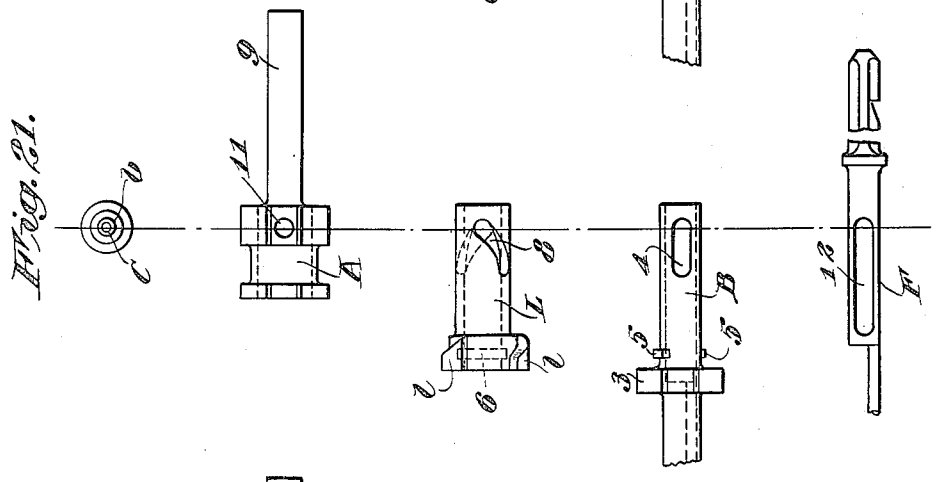
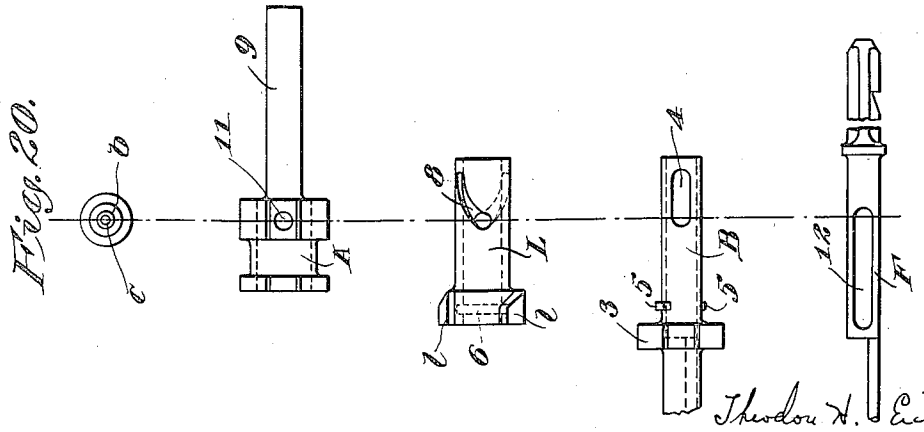


Fig. 20.



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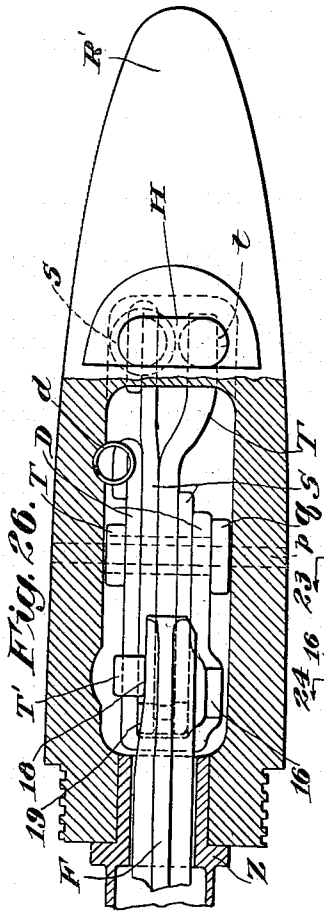

Fig. 26.

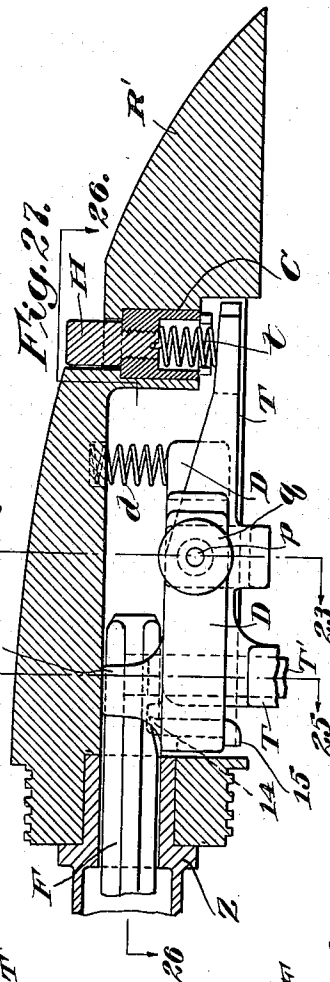

Fig. 27.

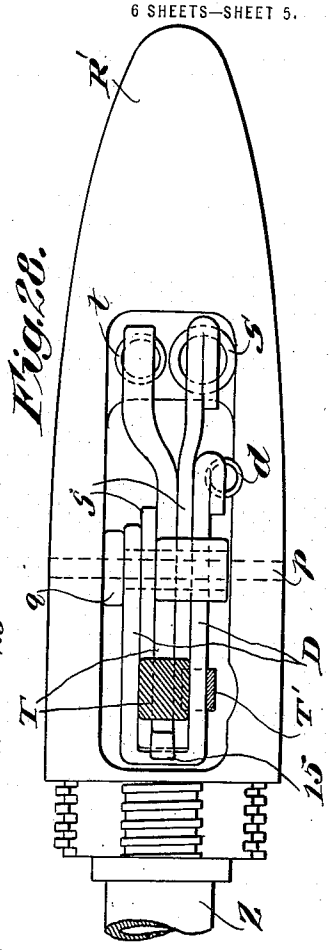

Fig. 28.

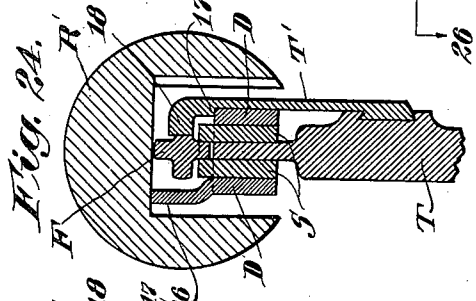

Fig. 24.

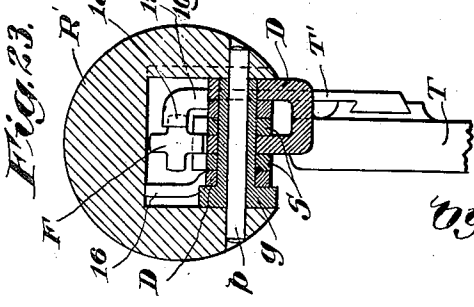

Fig. 23.

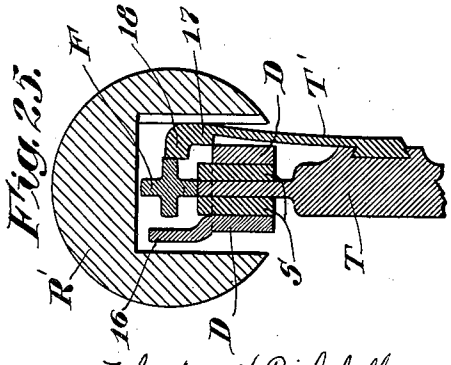

Fig. 25.

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6 SHEETS—SHEET 6.

Fig. 30.

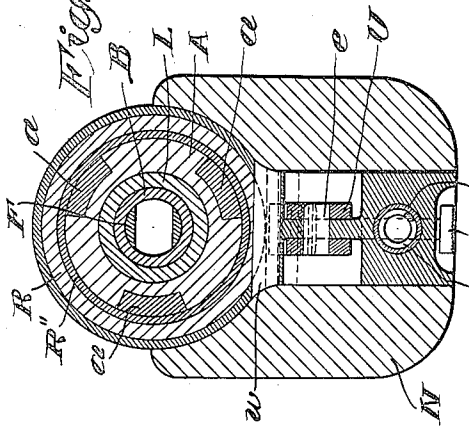


Fig. 33.

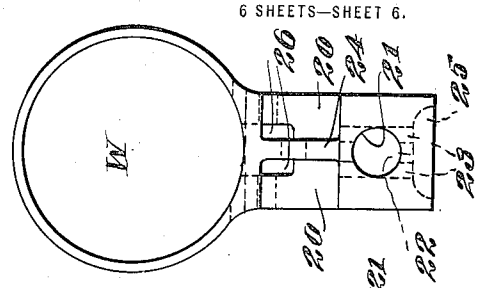


Fig. 32.

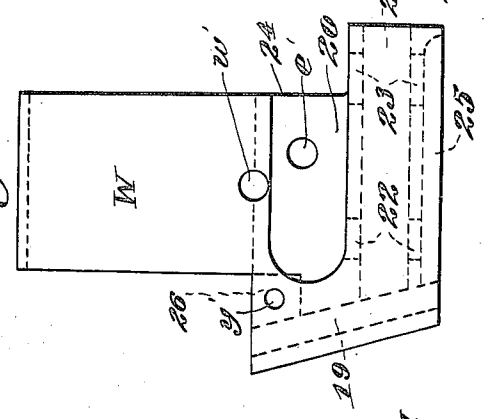


Fig. 29.

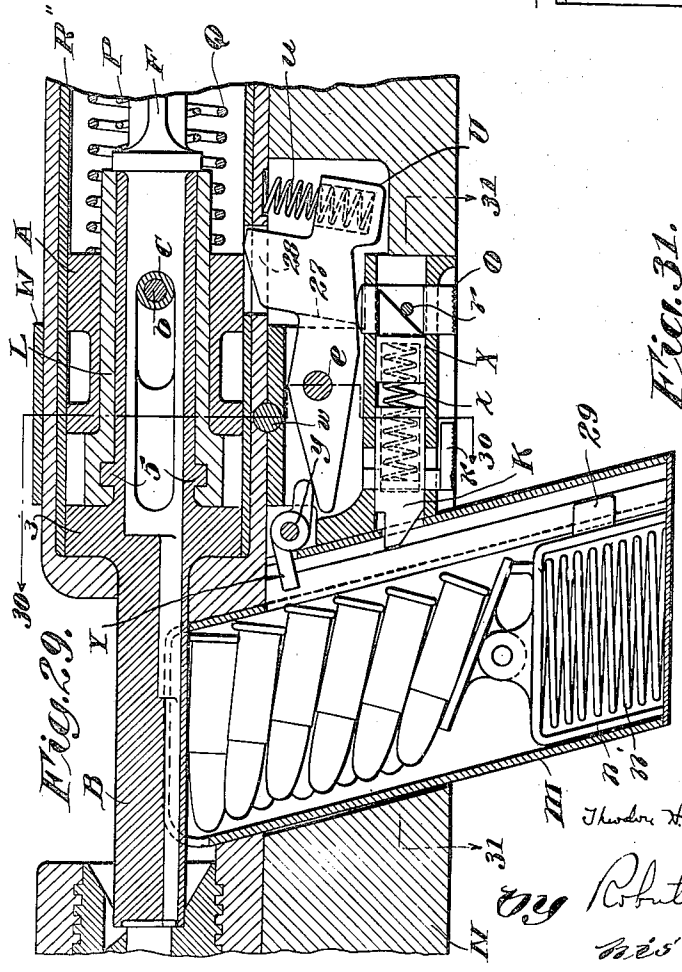
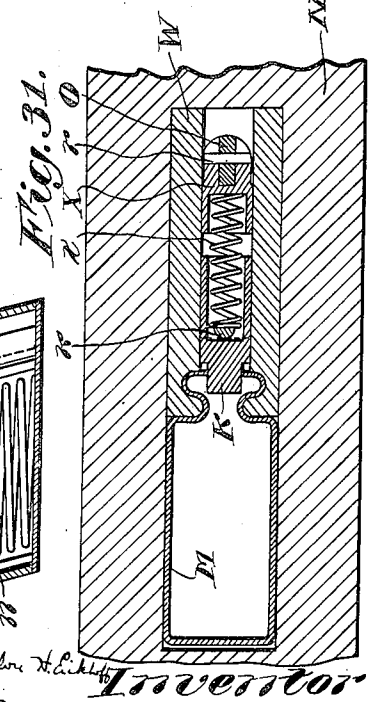


Fig. 31.



Inventor.

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His Attorneys

Patented Oct. 31, 1922. 1,433,945

UNITED STATES PATENT OFFICE.

THEODORE H. EICKHOFF, OF CLEVELAND, OHIO, ASSIGNOR TO AUTO-ORDNANCE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

GUN MECHANISM.

Application filed March 10, 1921. Serial No. 451,139.

To all whom it may concern:

Be it known that I, THEODORE H. EICKHOFF, a citizen of the United States of America, and resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Gun Mechanism, of which the following is a specification.

This invention relates particularly to fire-arms but in certain of its aspects it is applicable to ordnance as well as small arms. In its principal aspect the invention relates to breech closures for guns.

The principal objects of the invention are to provide a gun which is simple and economical to construct, which has its receiver and breech mechanism formed largely of cylindrical or other circular parts adapted to be rapidly and cheaply formed, which is strong and durable in construction, which can be readily assembled and disassembled, which is automatic in action, which cannot be fired until the bolt is closed and locked, and which functions automatically in response to the breech pressure acting through the bolt, thereby obviating all auxiliary mechanism such as gas-operated, recoil-operated, and other mechanism.

Other objects are to provide an improved buffer, fire control mechanism, bolt-stop, magazine attachment, etc.

To illustrate the invention defined by the appended claims a concrete embodiment is shown by way of example in the accompanying drawings, in which—

Fig. 1 is a horizontal axial section with the bolt closed and the firing pin advanced;

Fig. 2 is a vertical axial section with the bolt and firing pin in the same positions and the barrel at an angle to show the extractor receiving recess;

Fig. 3 is a vertical axial section, parts being shown in elevation, with the bolt retracted;

Fig. 4 is a view similar to Fig. 3, showing the bolt advancing a cartridge into the firing chamber and showing the firing pin cocked;

Fig. 5 is a transverse section on line 5—5 of Fig. 2;

Fig. 6 is a transverse section on line 6—6 of Fig. 2;

Fig. 7, is a transverse section on line 7—7 of Fig. 2;

Fig. 8, is a transverse section on line 8—8 of Fig. 1;

Fig. 9, is a transverse section on line 9—9 of Fig. 4;

Fig. 10 is a transverse section on line 10—10 of Fig. 3;

Fig. 11, is a transverse section on line 11—11 of Fig. 1;

Fig. 12, is a transverse section on line 12—12 of Fig. 1;

Fig. 13, is a transverse section on line 13—13 of Fig. 1;

Fig. 14, is a transverse section of the receiver tube and guide ribs;

Fig. 15, is a front end elevation of the buffer;

Fig. 16, is a side elevation of the buffer;

Fig. 17, is a side elevation of the lock;

Fig. 18, is a development of the lock;

Fig. 19, is a side elevation of the forward end of the receiver tube and guide ribs;

Fig. 20 is a side elevation of parts of the breech action aligned in the relative positions occupied, at the instant of firing;

Fig. 21 is a similar view showing the parts aligned in the relative positions occupied at full recoil;

Fig. 22 is a similar view showing the parts aligned in the relative positions occupied when the bolt is closing and is about one-half locked;

Fig. 23 is a transverse section on line 23—23 of Fig. 27 showing the firing pin cocked;

Fig. 24 is a similar section on line 24—24 of Fig. 27;

Fig. 25 is a view identical with Fig. 24 except that the firing pin is retracted beyond cocked position as at full recoil of the bolt;

Fig. 26, is a horizontal longitudinal section on line 26—26 of Fig. 27;

Fig. 27, is an elevation of the firing mechanism showing the receiver and safety and a part of the buffer in section;

Fig. 28, is a bottom plan of the firing mechanism and associated parts;

Fig. 29, is an enlarged section corresponding to a portion of Fig. 2;

Fig. 30, is a transverse section on line 30—30 of Fig. 29;

Fig. 31, is a longitudinal section on line 31—31 of Fig. 29;

Fig. 32 is a side elevation of the magazine mount; and

Fig. 33 is a rear end elevation of the magazine mount.

The particular embodiment of the invention chosen for the purpose of illustration comprises a barrel I, a stock N, a receiver comprising a forward portion R, a rearward portion R′, and an inner tubular portion R″ fitted into the forward portion R, bolt B, lock L, actuator A, actuator sleeve *b*, actuator pin C, firing pin F, firing pin spring P, recoil spring Q, extractor E, ejector J, buffer Z, trigger T, trigger hook T′, trigger spring *t*, sear S, sear spring *s*, disconnector D, disconnector spring *d*, pivot sleeve *q*, pivot pin *p*, safety catch C, safety catch handle H, trigger guard G, trigger guard plate *g*, screws *v*, nut *n*, magazine M, follower *m*, follower spring *m′*, magazine catch K, mount W for bolt stop and magazine, mount pin lock *w*, bolt stop U, bolt stop spring *u*, bolt stop pivot pin *e*, bolt stop finger actuator O, bolt stop actuator pin *r*, bolt stop actuator follower X, bolt stop actuator spring *x*, and bolt stop trip Y.

The barrel is threaded into the forward end of the forward part R of the receiver and the rearward receiver part R′ is connected to the forward part by mutilated threads. The inner tubular part R″ is preferably made from standard steel tubing to fit snugly in the forward part R, being held in position by the internal shoulder of part R at its forward end, and by the forward end of part R′ at its rearward end and against turning by lugs 2 (Fig. 3) extending into slots in the rear end of part R. Ribs or abutments *a* are welded or otherwise fast to the inside of tube R″, these ribs forming guides for the bolt, lock and actuator, and the forward ends of the ribs forming locking abutments cooperating with the lock to restrain the bolt from opening. By forming these ribs separately and then securing them inside the receiver tube, the difficult operation of machining the ribs inside the receiver is eliminated.

The substantially cylindrical bolt is provided with an integral collar 3 near the middle and with a transverse slot 4 near the rear (Figs. 20–22). The bolt is longitudinally chambered to receive the firing pin, (Fig. 2). The collar 3 extends radially to the tube R″ and its periphery is recessed to receive the ribs *a* (Fig. 13).

The tubular lock L (Figs. 17, 18 and 20) is rotatably fitted over the bolt and may (though not necessarily) be held against longitudinal movement relatively to the bolt by lugs 5 extending from the bolt into an annular groove 6 in the lock, the groove 6 having outlets 7 to permit assembly (Fig. 17). At its forward end the lock has an integral collar or flange cut away to form locking abutments *l* adapted to cooperate with the forward ends of ribs *a* to restrain the bolt from opening. These lugs *l* are substantially equal in width to the ribs *a* and are considerably narrower than the spaces between the ribs. The rear faces of the lugs *l* and the forward ends of ribs *a* are inclined circumferentially (Figs. 18 and 19) at such angles that the lock is automatically rotated out of locking position by the breech pressure acting through the bolt. By predetermining this angle according to the discovery of John Blish (United States Patent No. 1,131,319, March 9, 1915) the bolt may be restrained from opening until the breech pressure has decreased to a safe value, this being of the utmost importance in military rifles and other high power guns. Spiral slots 8 are formed in the opposite sides of the lock L so that the corresponding portions of the slots are diametrically opposite.

The tubular actuator A telescopes over the lock L in the rear of the lugs *l*. The actuator is essentially cylindrical except for an annular lightening cut in its outer periphery, longitudinal recesses in its outer periphery (Fig. 8) to receive the ribs *a* with a free sliding fit, and a tail 9 to cover the actuator slot 10 (Fig. 1) in the receiver when the bolt is closed. A diametrical opening 11 is provided in the actuator to receive the sleeve *b* and pin *c*.

The firing pin F is circularly shaped at its forward end slidingly to fit in the bolt. At its rearward end it is cross-shaped in section (Figs. 23–25), and near the center it has an integral collar adapted to abut against the rearward end of the bolt when the pin is fully advanced and to slide into the buffer upon recoil. The pin has a slot 12 adapted to receive the actuator sleeve *b* and pin *c*.

The buffer Z telescopes into receiver R′ at its rearward end and at its forward end it is adapted to abut the rear end of lock L upon recoil, the forward portion of the buffer being transversely slotted at staggered intervals (Figs. 15 and 16) to function as a stiff spring. The recoil spring Q abuts the actuator at its forward end and an external flange on the buffer at its rearward end. The firing pin spring abuts the collar on the firing pin at its forward end, and an internal shoulder on the buffer at its rearward end.

To assemble the breech action the firing pin F, bolt B, lock L, and actuator A are telescoped together with the slots 12, 4 and 8 and the opening 11 in registry (Figs. 20–22), the sleeve *b*, is then inserted through

the slots and opening to tie the parts together as a unit, the unit is then inserted into the receiver until the sleeve *b* comes into registry with the rear enlarged end 13 of slot 10 (Figs. 1 and 2,) and the pin *c* is then inserted into the sleeve *b*. After the parts are then further advanced into the receiver the pin *c* is held in place by the sides of the slot 10 fitting into the annular groove in the pin (Figs. 1 and 8). In normal operation the parts are never retracted far enough for the pin *c* to come into registry with the enlarged end 13 of slot 10.

The operation of the breech action is as follows: At the instant of firing (Figs. 1 and 2) the breech pressure is transmitted through the bolt, thence from collar 3 to the lock, and thence from lugs *l* to ribs or abutments *a* on the receiver, thus restraining the bolt from being abruptly opened by the breech pressure. However, with the engaging faces between the lugs *l* and abutments *a* inclined as described the lock is automatically cammed over in a counter-clockwise direction until the lugs *l* slide off the abutments *a*, whereupon the bolt unit (bolt, firing pin, lock and actuator) recoils under the influence of the residual breech pressure. The ribs *a* and pin *c* prevent the bolt and actuator from rotating at any time. The lock, therefore, is the only rotating part of the bolt unit, rotating in a counterclockwise direction under the influence of the residual breech pressure in unlocking and rotating in a clockwise direction under the influence of the recoil spring acting through the actuator in locking. As the lock rotates out of locked position its cam slots 8 force the actuator sleeve *b* and pin *c* rearwardly relatively to the bolt unit thereby shifting the parts to the positions shown in Figs. 3 and 21 wherein the actuator and the firing pin are retracted relatively to the lock and bolt a distance equal to the axial length of the lock and bolt slots. As the bolt unit starts forward under the urge of recoil spring Q the firing pin is caught by the sear (Fig. 22) and the other parts continue forward. When the bolt stops upon reaching closed position the actuator continues to advance, sliding over the lock, until it reaches its original position shown in Figs. 1, 2 and 20. As the actuator slides over the lock sleeve *b* engaging the lock slots 8 cam the lock into locked position. The gun cannot be fired until the lock reaches locked position inasmuch as the sleeve *b* stops the firing pin unless it is at the forward ends of the lock and bolt slots.

As before stated the spaces between the ribs *a* are considerably wider than the lugs *l*. Consequently when the lock is rotated out of locked position by the residual breech pressure (with more or less force) the rotation of the lock is not stopped the moment the lugs *l* slide off the abutments *a* but the lock continues to rotate by its inertia after the bolt unit begins to recoil. The rotative movement of the lock is yieldingly resisted by the recoil spring acting through the cam slots of the lock and is gradually stopped thereby. Thus the sharp impact which would result from abruptly changing the movement of the lock from rotation to reciprocation is avoided by gradually blending the two movements. If the rotary movement of the lock is not entirely stopped by the recoil spring acting through the cam slots 8, the lock lugs finally engage the next adjacent ribs in a counterclockwise direction.

The bolt may be manually retracted by pulling rearwardly on the actuator handle *c*, thereby first sliding the actuator rearwardly on the lock, then rotating the lock out of locking position, and finally retracting the bolt unit as a whole as in automatic operation.

Referring to the fire control mechanism shown in detail in Figs. 23 to 28, the trigger T, sear S and disconnector D are pivotally interconnected as a unit by sleeve *q* and the unit is pivotally mounted in a chamber in the rear part R′ of the receiver by a pin *p* extending through the sleeve. The trigger comprises a horizontal arm pivoted at the center of the pin *p* and sleeve *q* with the compression spring *t* engaging its rearward end and the finger portion depending from its forward end. A tab extends downwardly from the horizontal arm of the trigger immediately beneath the pivot, thence bends at right-angles to the right, and thence bends upwardly and is pivoted at the right-hand end of the pivot, this tab serving to brace the trigger against lateral tipping on the pivot. The sear is U-shaped and surrounds the forward end of the horizontal arm of the trigger, the left-hand leg extending rearwardly into engagement with the compression spring *s* and the cross-bar having a hook 14 (Fig. 27) adapted to engage the firing pin. The disconnector is also U-shaped and surrounds the forward end of the sear, the right-hand leg extending into engagement with compression spring *d* and the cross-bar overlying a flange 15 on the cross-bar of the sear. A lug 16 extends upwardly from the left-hand leg of the disconnector to limit its movement in response to spring *d* by engagement with the top of the receiver chamber. The trigger hook T′, which is dovetailed into trigger T and is elastic, has a shoulder 17 normally overhanging the right-hand leg of the disconnector and a side lug 18 bearing against the cam surface 19 (Fig. 26) of the firing pin.

The operation of the fire control mechanism is as follows: With the parts in posi-

tion ready to fire, as shown in Figs. 23, 24, 26 and 27, a pull on the trigger, swings the trigger in a counterclockwise direction (Fig. 27), the shoulder 17 of trigger hook T' swings the disconnector likewise, the disconnector cross-bar engaging the sear hook 15 swings the sear likewise, and the firing pin is released. If the trigger is promptly released the parts are restored by springs *t*, *s*, and *d*, so that the sear catches the firing pin on recoil of the bolt unit. However, if the trigger is not released, upon recoil the cam surface 19 of the firing pin flexes the trigger hook T' outwardly until the disconnector is disengaged from the shoulder 17 (Fig. 25), whereupon the disconnector and sear are restored to normal position by their springs *d* and *s* and the sear catches the firing pin as before. After the disconnector is freed from shoulder 17 the trigger hook T' is held out by the disconnector engaging the side face of shoulder 17 until the trigger is released. If the trigger hook engaged the sear directly and were not thus held out by the disconnector it would flex inward as the firing pin starts forward and might again catch the sear before the sear catches the firing pin. As shown in Fig. 3 the firing pin recoils considerably beyond cocked position, thus affording time for the sear and disconnector to snap up after being freed from the trigger and before the firing pin has advanced into position to be caught by the sear.

The safety C (Fig. 27) is introduced into its recess from the bottom and the handle H from the top the parts being threaded together and held in fixed relation to each other by the end of spring *t* lying in a groove in the two parts. The lower end of the tubular catch C has a recess adapted to receive the rear end of the trigger arm when the handle H is turned to the right (Fig. 27) and thus permit firing, but when the handle is turned 90° to the rear as shown in Fig. 2 the catch blocks the trigger and renders the gun safe.

The mount W for the magazine and bolt stop, which is formed in a single piece (Figs. 32 and 33), comprises a ring adapted to encircle the receiver R and a depending body, the mount being held in position by a pin *w* extending through pin-hole *w'*. The forward face of the body has a dovetail groove 19 formed therein to receive the dovetail portion of the magazine M. Each side of the body is recessed at 20, leaving a central web 24, a cylindrical opening 21 extends from front to back through the bottom of the body, a vertical slot 22 and a vertical cylindrical opening 23 intersect the opening 21, the bottom is recessed at 25, and a recess 26 communicates with the dovetail groove 19 and the recesses 20.

The bolt stop U, which is bifurcated forward of the line 27 (Fig. 29), straddles the web 24 and is pivoted thereto by pin *e* extending through opening *e'* in the web. The bolt stop has a nose 28 extending upwardly through openings in the receiver R and tube R'' to engage the collar 3 of the bolt and hold the bolt open when the nose is elevated. The bolt **stop** is normally held in the inoperative position shown in Fig. 29 by spring *u*. The trip Y is pivoted in recess 26 by pin *y* extending through pin-hole *y'* in mount W. The forward end of trip Y extends into the magazine in the path of lug 29 on follower *m* and the rear end of the trip, which is bifurcated, straddles the web 24 just above the bifurcated end of the bolt stop. Thus when the magazine becomes empty the bolt stop is automatically actuated to retain the bolt open after the last shot is fired.

The magazine catch K slides in the forward end of opening 21. The actuator O, by which the bolt stop may be manually actuated, slides vertically in opening 23. The central portion of actuator O is reduced in thickness to a thin web and carries a transverse pin *r*. The actuator follower X slides in the rear end of opening 21 and its rear bifurcated end straddles the web in cam engagement with the ends of pin *r*. The magazine catch retractor *k* comprises a finger piece lying in recess 25 and a pin extending upwardly through slot 22 and through a pin-hole in the catch K. The rear side of this pin is recessed to receive spring *x*, which actuates catch K and actuator O, thereby to prevent the retractor *k* from falling out after the parts are assembled. Obviously the magazine catch may be retracted to disengage the magazine by moving retractor *k* rearwardly; and the bolt stop may be manually actuated by pressing upwardly on actuator O.

Herein, the word bolt is used as a convenient term for breech closure and is not intended to be limited to the small arms type of bolt shown in the illustrated example. Likewise the word lock and the like do not necessarily imply a positive locking, as the lock may merely restrain the bolt from opening, although when employing the Blish principle the bolt is positively locked during high breech pressures.

I claim:

1. A gun comprising a receiver, a bolt reciprocatable in the receiver, abutments on the bolt and receiver for counteracting the breech-pressure thrust on the bolt, a locking sleeve rotatably mounted on the bolt, said sleeve having a portion adapted to engage said abutments on its forward and rearward surfaces respectively when the sleeve is rotated into locking position, and certain of said surfaces being inclined relatively to the line of breech pressure at such an angle that

the sleeve is automatically rotated into unlocking position by the breech pressure acting through the bolt after the pressure has decreased to a predetermined value.

2. A gun comprising a receiver, a bolt reciprocatable in the receiver, abutments on the bolt and receiver for counteracting the breech-pressure thrust on the bolt, a locking sleeve rotatably mounted on the bolt, said sleeve having a portion adapted to engage said abutments on its forward and rearward surfaces respectively when the sleeve is rotated into locking position, certain of said surfaces being inclined relatively to the line of breech pressure at such angle that the sleeve is automatically rotated into unlocking position by the breech pressure acting through the bolt after the pressure has decreased to a predetermined value, and the abutment surface contact between the sleeve and bolt extending substantially around the bolt.

3. A gun comprising a receiver, a bolt reciprocatable but non-rotatable in the receiver, rearwardly and forwardly facing abutments on the bolt and receiver respectively, a locking sleeve mounted on the bolt to rotate thereabout and to reciprocate therewith, said sleeve having a portion arranged to interengage between said abutments to transmit the breech thrust from the bolt to the receiver when the sleeve is rotated into locking position, certain of the surfaces between said sleeve portion and said abutments being inclined to the line of breech pressure at such angle that the sleeve is automatically rotated to unlocking position by the breech pressure acting through the bolt when the breech pressure has decreased to a predetermined value.

4. A gun comprising a tubular receiver, longitudinal ribs fast to the inner periphery of said receiver, the forward ends of said ribs being beveled and spaced from the forward end of the receiver, a circular bolt reciprocatable in the receiver, said bolt having a collar extending therearound, and a sleeve rotatable between said collar and said rib ends, and having projections beveled to fit said rib ends, whereby said sleeve is adapted to restrain the bolt from opening when in one angular position and automatically to move under reduced pressure to another angular position to permit the bolt to open.

5. A gun element comprising a tubular receiver, longitudinal ribs fastened to the inner periphery of said receiver, the forward ends of said ribs being spaced from the forward end of the receiver to form longitudinal thrust abutments.

6. A gun element comprising a tubular receiver and longitudinal guide ribs fastened to the inner periphery of the receiver.

7. A gun element comprising a tubular receiver, and separate guide ribs fastened integrally lengthwise along the inner periphery of the receiver.

8. A gun element comprising a tubular receiver and longitudinal ribs welded to the inner periphery of the receiver.

9. A gun element comprising a tubular receiver, longitudinal ribs fastened to the inner periphery of the receiver, the forward ends of the ribs being inclined circumferentially.

10. A gun comprising a receiver having a cylindrical bolt chamber, longitudinal ribs on the inner periphery of said chamber, a circular bolt having a collar extending outwardly substantially to the periphery of said chamber, said collar being recessed on its outer periphery to receive said ribs, and a circular lock rotatably mounted on said bolt said lock having lugs projecting outwardly into position to engage the forward ends of said ribs to lock said bolt closed until the breech pressure has decreased to a relatively low value, and thereafter to slide thereon to release said bolt.

11. A gun comprising a receiver having a cylindrical bolt chamber, locking and guiding ribs on the inner periphery of said chamber, a cylindrical bolt extending along the axis of said chamber, said bolt having a collar extending outwardly substantially to the wall of said chamber, said collar having recesses in its periphery to receive said ribs thereby to restrain the bolt from turning, and a lock rotatable on said bolt, said lock having lugs extending into engagement with the forward ends of said ribs, said lugs having a smaller circumferential dimension than the spaces between said ribs, whereby when the lock is rotated out of locking position it may continue to rotate after the bolt is unlocked.

12. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable relatively to the bolt for locking the bolt closed, and an actuator reciprocatable relatively to said lock for manually unlocking the bolt, said bolt, lock and actuator being mounted in telescoping relation within said receiver.

13. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable on the bolt for locking the bolt closed, and an actuator movable on the lock for unlocking the bolt, said actuator having a member passing through slots in said bolt and said lock.

14. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable on the bolt for locking the bolt closed, and an actuator telescoped over said lock and reciprocatable thereover for unlocking the bolt.

15. A gun comprising a receiver having a circular chamber therein, a circular bolt reciprocatable in said chamber, a circular lock rotatable into and out of position to

lock the bolt closed, and a circular actuator telescoped over said lock and reciprocatable in said chamber to actuate the lock.

16. A gun comprising a receiver having a cylindrical chamber therein and a slot in the side thereof, a circular bolt reciprocatable in said chamber, a tubular lock rotatable on said bolt to lock the bolt closed, an actuator for actuating said lock, said actuator having a member slidable in said slot and passing through said bolt and said lock for uniting said parts.

17. A gun comprising a receiver having a cylindrical chamber therein, a circular bolt reciprocatable in said chamber, and a lock for locking said bolt closed, a tubular actuator coaxial with said chamber for actuating said lock, said actuator having a lost motion connection with said bolt.

18. A gun comprising a receiver having a cylindrical chamber therein, a circular bolt reciprocatable in said chamber, a tubular lock rotatable on said bolt to lock the bolt closed, and a tubular actuator reciprocable on said lock and having a lost motion connection with said bolt.

19. A gun comprising a receiver having longitudinal ribs on its inner periphery, and bolt and lock and actuator members collinearly disposed in the receiver, said members having circumferential portions extending substantially to said periphery, each of said portions being recessed to receive said ribs.

20. A gun comprising a receiver having longitudinal ribs on its inner periphery, and bolt and lock and actuator members collinearly disposed in the receiver, said members having circumferential portions extending substantially to said periphery, each of said portions being recessed to receive said ribs, said bolt portion being in front of said lock portion and said actuator portion being in rear of said lock portion.

21. A gun comprising a receiver having longitudinal ribs on its inner periphery, and bolt and lock and actuator members collinearly disposed in the receiver, said members having circumferential portions extending substantially to said periphery, each of said portions being recessed to receive said ribs, the recesses in the bolt and actuator portions being substantially as wide as said ribs and the recesses in the lock being wider than the ribs.

22. A gun comprising a receiver having a circular chamber therein, a bolt of smaller diameter reciprocatable in the receiver, and a tubular lock and a tubular actuator telescoping with each other and over the bolt, said belt, lock and actuator having circumferential portions extending substantially to the periphery of said chamber.

23. A gun comprising a circular receiver, a circular bolt of smaller diameter, a tubular lock fitting over the bolt, and a tubular actuator fitting over the lock, said bolt and lock having flanges extending substantially to the inner periphery of the receiver.

24. A gun comprising a circular receiver, longitudinal ribs on the inner periphery of the receiver, a circular bolt of smaller diameter in the receiver, a tubular lock and a tubular actuator telescoping with each other and over the bolt, said bolt and lock and actuator having circumferential portions extending substantially to said periphery, said portions being recessed to receive said ribs.

25. A gun comprising a receiver, a bolt, a lock and an actuator telescoping with each other, means for restraining the bolt and actuator from rotating, and a pin extending through openings in said parts, certain of said openings being in the form of cam slots whereby reciprocation of the actuator produces rotation of the lock.

26. A gun comprising a receiver, a bolt having a longitudinal slot therein, a lock and actuator telescoping with the bolt, the lock having an oblique slot and the actuator having a pin opening, a pin extending through said opening and slots and thence outwardly through a slot in the receiver.

27. A gun comprising a receiver, a bolt and a firing pin, each having longitudinal slots therein, a lock having an oblique slot therein, and an actuator pin extending through said slots.

28. A gun comprising a receiver, a bolt and a firing pin, each having longitudinal slots therein, a lock having an oblique slot therein, and an actuator pin extending through said slots, said slots being interrelated so that rearward movement of said pin unlocks the bolt and cocks the firing pin and so that the gun cannot be fired until the bolt is locked.

29. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable relatively to the bolt for locking the bolt closed, means responsive to diminished breech pressure acting through the bolt for automatically moving the lock out of locking position, and an actuator reciprocatable relatively to the lock for manually unlocking the bolt.

30. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable on the bolt for locking the bolt closed, means responsive to diminished breech pressure acting through the bolt for automatically moving the lock out of locking position, and an actuator movable on the lock for manually unlocking the bolt.

31. A gun comprising a receiver, a bolt reciprocatable therein, a lock rotatable on the bolt for locking the bolt closed, means responsive to greatly reduced breech pressure acting through the bolt for automatically moving the lock out of locking position, and an actuator reciprocatable on the lock for unlocking the bolt.

32. A gun comprising a receiver having a circular chamber therein, a circular bolt reciprocatable in said chamber, a circular lock rotatable into and out of position to lock the bolt closed, means responsive to reduced breech pressure acting through the bolt for automatically rotating the lock out of locking position, and a circular actuator reciprocatable in said chamber manually to actuate the lock.

33. A gun comprising a receiver having a cylindrical chamber therein, a circular bolt reciprocatable in said chamber, a tubular lock rotatable on said bolt to lock the bolt closed, means responsive to diminished breech pressure acting through the bolt for automatically rotating the lock out of locking position, and an actuator for actuating said lock.

34. A gun comprising a receiver having a cylindrical chamber therein, a circular bolt reciprocatable in said chamber, a lock for locking said bolt closed, means responsive to the breech pressure transmitted through the bolt automatically to unlock the bolt after the breech pressure has decreased to a safe value, and a tubular actuator coaxial with said chamber for actuating said lock.

35. A gun comprising a receiver having a cylindrical chamber therein, a circular bolt reciprocatable in said chamber, a tubular lock rotatable on said bolt to lock the bolt closed, means responsive to greatly reduce breech pressure acting through the bolt for automatically rotating said lock to unlocked position, and a tubular actuator rotatable on said lock for actuating the lock.

36. A gun comprising a circular receiver, longitudinal ribs on the inner periphery of the receiver, a circular bolt of smaller diameter in the receiver, a tubular lock and a tubular actuator telescoping with each other and over the bolt, said bolt and lock and actuator having circumferential portions extending substantially to said periphery, said portions being recessed to receive said ribs, the forward ends of said ribs and said lock having abutting surfaces inclined at such angles that the lock is rotated into unlocked position automatically by the breech pressure acting through the bolt.

37. A gun comprising a receiver having a circular chamber, a circular bolt reciprocatable therein, a circular lock rotatable therein, the lock and receiver having inclined abutting surfaces automatically to rotate the lock to unlocked position, and a circular actuator manually to unlock the bolt.

38. A gun comprising a receiver, a bolt and an actuator reciprocatable relatively to the receiver, and a lock rotatable relatively to the receiver, the parts being interconnected to rotate the lock and reciprocate the bolt either in response to a straight pull on the actuator or in response to the breech pressure acting through the bolt.

39. A gun comprising a receiver, a bolt and an actuator reciprocatable in the receiver, a lock rotatable in the receiver to lock the bolt closed, the lock interengaging with the receiver along oblique surfaces whereby the breech pressure acting through the bolt rotates the lock to unlock the bolt; and the actuator interconnecting with the lock through a cam whereby a manual pull on the actuator rotates the lock to unlock the bolt.

40. A gun comprising a receiver, a bolt, a lock and an actuator telescoping with each other, means for restraining the bolt and actuator from rotating, a cam engagement between the lock and receiver for rotating the lock in response to the breech pressure acting through the bolt, and a cam connection between the actuator and lock for rotating the lock in response to a straight pull on the actuator.

41. A gun comprising a receiver, a bolt, a lock and an actuator telescoping with each other, means for restraining the bolt and actuator from rotating, means for automatically unlocking the bolt in response to the breech pressure acting through the bolt, and a pin extending through openings in said parts, certain of said openings being in the form of cam slots whereby reciprocation of the actuator produces rotation of the lock.

42. A gun comprising a receiver, a bolt having a longitudinal slot therein, a lock and actuator telescoping with the bolt, the lock having an oblique slot and the actuator having a pin opening, a pin extending through said opening and slots and thence outwardly through a slot in the receiver, and means for automatically unlocking the bolt in response to the breech pressure acting through the bolt.

43. A gun comprising a receiver, a bolt and a firing pin, each having longitudinal slots therein, a lock having an oblique slot therein, an actuator pin extending through said slots, and means for automatically unlocking the bolt and cocking the firing pin in response to the breech pressure acting through the bolt.

44. A gun comprising a firing pin, a bolt, a lock, and an actuator disposed in juxtaposition with registering openings, and a hollow sleeve adapted to extend through said openings to hold the parts in position during assembly.

Signed by me at Cleveland, Ohio this 5th day of March 1921.

THEODORE H. EICKHOFF.