April 14, 1925. 1,533,966

J. M. BROWNING

AUTOMATIC RIFLE

Filed Dec. 6, 1922 2 Sheets-Sheet 1

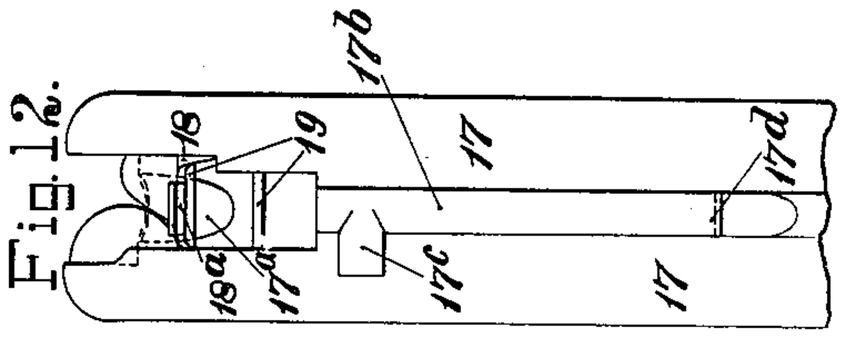


Fig. 1a.

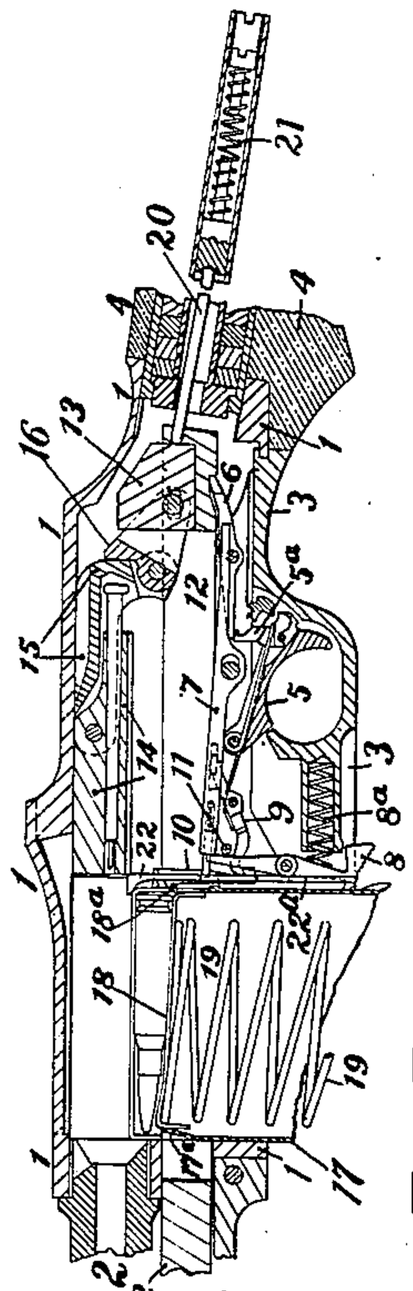


Fig. 2.

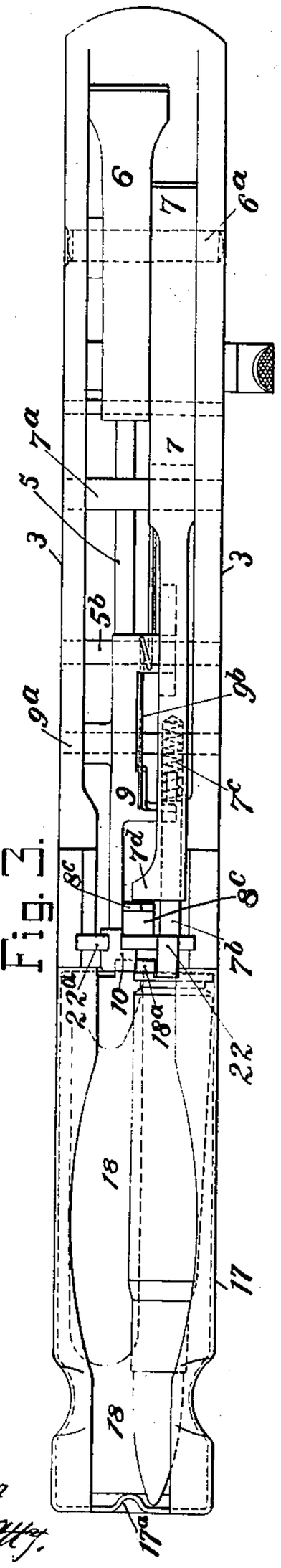


Fig. 3.

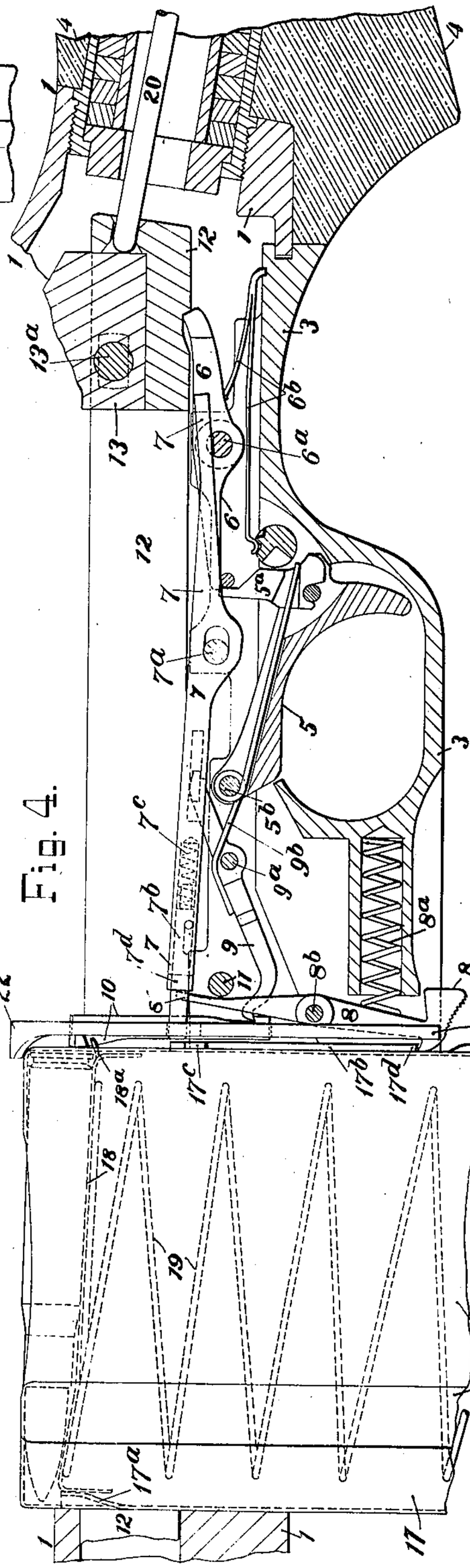


Fig. 4.

Fig. 1.

Inventor

John M. Browning

by E. J. Ekbets, Atty.

April 14, 1925.

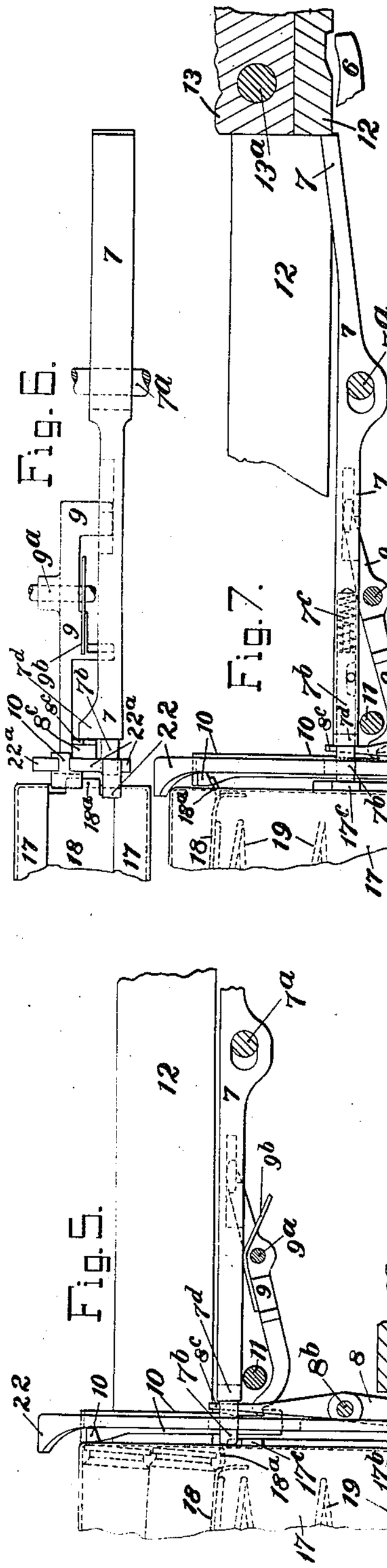
1,533,966

J. M. BROWNING

AUTOMATIC RIFLE

Filed Dec. 6, 1922

2 Sheets-Sheet 2




Inventor.

John M. Browning
by E. J. Ebbitt Atty.

Patented Apr. 14, 1925. 1,533,966

# UNITED STATES PATENT OFFICE.

JOHN M. BROWNING, OF OGDEN, UTAH.

## AUTOMATIC RIFLE.

Application filed December 6, 1922. Serial No. 605,229.

*To all whom it may concern:*

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

The invention relates to improvements in automatic rifles, such as are shown and described in the Letters Patent of the United States No. 1,293,022, granted to me on February 4, 1919.

The invention generally relates to automatic rifles in which all operations of the breech mechanism, except that of the trigger, are automatically effected, and in which the form and weight of the rifle adapt it for firing modern highly-charged military ammunition, the shooter either lying prone upon the ground, or standing erect with only his hands and shoulder supporting the rifle.

The invention relates specially to novel improvements in that class of gas-operated magazine rifles in which a vent in the barrel leads into a gas cylinder mounted below and alongside the barrel, in which cylinder the powder gases may expand.

The forward end of said gas cylinder is closed; the rear end of the same has the form of a strong integral block from the under side of which a flat guide-bar extends into the lower forward portion of the breech casing where it is detachably secured by a transverse locking pin; to said bar a wooden handle for supporting the rifle is firmly attached, its sides extending upward to cover the sides of the gas cylinder and of the barrel in order to positively protect the shooter's hand, when grasping said handle, from being burned by contact with either the gas cylinder or the barrel, both of which become highly heated during the rapid automatic operation of the rifle.

The powder gases expanding in the gas cylinder exert pressure upon a movable piston therein; the piston rod extends to the rear from the piston and out of the cylinder, and bears at its end a cross-head to which the action-slide is firmly attached; some distance in rear the action-slide enters the frame of the rifle and is bifurcated for the passage through it of the cartridge magazine located in the usual magazine seat in the rifle. The movements of the action-slide are transmitted to the breech mechanism of the rifle, thereby actuating said mechanism.

In the butt-stock of the rifle a strong helical reaction-spring is contained in a suitably mounted tube, the rear end of said spring resting against a plug screwed into said tube, the forward end of the spring being attached to a shouldered piston fitted to slide lengthwise in said tube but prevented from escaping therefrom; in its forward surface said piston has a central cup-shaped depression and a rod loosely resting in said depression extends forward therefrom into a similar depression in the rear end of the action-slide, both ends of said rod being kept in their respective positions by the pressure of said reaction-spring. A second tube considerably larger in diameter surrounds the reaction-spring tube and contains a suitable annular elastic packing, which, by co-operating with the reaction-spring, will cushion and absorb any excess of energy of recoil of the action-slide when thrown rearward by the pressure of the powder gases in the gas cylinder.

The main object of the present invention is, to provide an automatic rifle with a novel and improved magazine-latch mechanism, which, while simple and reliable in construction and operation, is sufficiently strong and durable to withstand the exposure and abuse which it is liable to meet in the trenches and the field of modern warfare. This object is attained by providing the following novel constructions.

In the accompanying drawings:

Fig. 1 is a front view of the frame or breech casing of an automatic rifle, with the barrel and forward end of the action-slide and rear end of the guide-bar in cross section.

Fig. 2. is a central vertical section through the frame of an automatic rifle which contains an embodiment of the present inven-

tion; the frame of the rifle, the barrel, the trigger-plate and the forward and rear cross-bars of the action-slide being shown in section, as is also the hammer forming part of said action-slide.

Fig. 3. shows a top view of the trigger-plate, detached, on a greatly enlarged scale compared with Figs. 1 and 2, and of substantially actual size, which, being of a width to fit between the side walls of the frame of the rifle, closes the same at the bottom, and contains the greater part of the members of the magazine-latch mechanism. This figure also shows a top view of the magazine in its position in front of the trigger-plate.

Fig. 4 is a longitudinal vertical section of certain portions of the rifle frame, on the same scale as Fig. 3, and of the trigger-plate, the members of the magazine-latch mechanism being shown in their proper positions in said trigger-plate; in front of the trigger-plate the cartridge magazine is represented in its proper operative position; its lowest portion is broken away.

Fig. 5 is a side view of certain members of the magazine-latch mechanism, detached, on the same scale as Fig. 4, but showing only the rear portion of the magazine and the forward portion of said latch mechanism.

Fig. 6 is a top view of certain members of the magazine-latch mechanism, detached, on the same scale as Fig. 4.

Fig. 7 shows a side view of the magazine-latch mechanism, detached, in its relation to the action-slide, on the same scale as Fig. 4.

Fig. 8 is a side view of the cartridge magazine, the upper portion of which is shown in section to expose to view the magazine-follower with one cartridge thereon, and the follower-actuating inward indentation of the front wall of the magazine causing the narrow rearmost portion of said follower to project beyond said magazine.

Fig. 9 shows a top view of the sear, trigger and trigger-pawl, detached.

Fig. 10 shows the trigger-plate with the trigger, trigger-pawl, sear, latch-spring, shell-ejector and shell-ejector plate, and shell-ejector plate locking plunger located therein; a portion of the trigger-plate is broken away.

Fig. 11 is a front view of the trigger-plate, with the shell-ejector and shell-ejector plate removably attached thereto and locked in place by the shell-ejector plate locking plunger; a portion of said plate between its upper and lower parts is broken away.

Fig. 12 is a rear view of the cartridge-magazine with one cartridge upon the follower; the lowest portion is broken away.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 1 and 2, the frame or receiver 1 of the rifle carries, as usual, the barrel 2, and, in rear thereof, the breech closing part in the form of the reciprocating breech block 14 and pivotally attached thereto a locking brace 15, the frame having a corresponding locking abutment to co-operate with said brace. The breech block contains a firing pin, and the locking brace is connected to the action-slide 12 of the rifle by an intermediate link 16 pivoted to both the brace and the action-slide. The action-slide 12 carries the hammer 13, as usual.

As usual in this class of automatic fire-arms, the action-slide depends, for its rearward movement on firing a shot, upon the pressure of the powder gases in the barrel before the projectile leaves the muzzle of the same, said gases, being admitted through a vent communicating with the closed forward end of the gas cylinder, act therein rearwardly upon a gas piston, to the piston rod of which the forward end of the action-slide is secured. The return movement of the action-slide in forward direction results from the expansion of a reaction-spring 21 located in rear of said action-slide, said spring having been compressed during the rearward movement of the same and reacting through the rod 20 upon the action-slide.

Below the action-slide are mounted most of the members of the magazine-latch mechanism in the trigger-plate 3, which closes the bottom of the frame of the rifle. In front of said trigger-plate the magazine 17 is, as usual, removably secured in its vertical seat in the frame, and contains a number of cartridges in two columns and in staggered relation in the way well known and embodied in my prior patent, hereinbefore cited. These cartridges are fed upward, as usual, by the magazine-follower 18 and the follower-spring 19.

During the automatic operation of the rifle while the trigger 5 is kept pulled back and the sear 6 is in its inoperative position, it is necessary for continuous firing that, as soon as the last cartridge has been removed from the magazine and fired, the magazine be automatically released and ejected from its seat, to make room for the insertion of another magazine containing cartridges, with the least possible delay.

The releasing of the magazine is performed by moving forward the upper arm of the two-armed magazine-latch lever, which is fitted on a transverse pivot pin $8^b$ located a slight distance in rear of the forward face of the trigger-plate 3, and thereby moving rearward the lower arm 8 which is yieldingly pressed forward by the latch spring $8^a$ seated in the trigger-plate 3, as shown in Figs. 2, 4, 5, 7 and 10, and the end of the lower arm 8 of said latch lever is pro-

vided with a finger piece and with an integral hook-shaped forward projection adapted to engage under the locking shoulder 17[d] in the rib 17[b] projecting from the rear face of the magazine 17; in Fig. 4 the latch lever is shown in the operative position in which the projection on its lower arm 8 locks the magazine, as hereinbefore stated; but in Fig. 7 the latch lever is shown as having released the magazine, the lower arm 8 being swung to the rear so as to withdraw the hook-shaped forward projection from the locking shoulder 17[d] of the magazine, because the upper arm 8[c] of the latch lever is shown as pressed forward by the front end of the auxiliary sear 7, which has, for this purpose, on the right-hand side of its forward end a laterally extending projection 7[d].

The auxiliary sear 7 is adapted for lengthwise movement by having an elongated pivot-hole for the fixed pivot pin 7[a]. While cartridges remain in the magazine during the automatic firing, the auxiliary sear 7 is kept in its rearward position, in which its rear end extends some distance under the action-slide 12, by the latch spring 8[a], and by the action of the upper arm 8[c] of the latch lever against the forward end of the auxiliary sear 7. See Figs. 2, 3 and 4.

While the last cartridge in the magazine is being raised to the top of the same by the magazine-follower 18 and spring 19, the forward end of said follower is engaged by the central cam-shaped inward indentation 17[a], (see Figs. 3, 4, 8 and 12), in the forward wall of the magazine and cammed rearward so as to cause the rearward projection 18[a] of the follower 18 to protrude through a central slot in the upper part of the rear wall of the magazine.

As soon as the last cartridge has been transferred from the magazine 17 to the barrel and fired, the follower 18, under the action of the spring 19, continues to rise and in nearing its uppermost position causes its rearward projection 18[a] to engage a lateral shoulder on the upper end of a sliding connector 10, thereby forcing said connector upward; by this upward movement of the connector 10 a rearward shoulder at the lower end of the same engages the forward end of an actuating lever 9. Said lever 9 is pivotally mounted upon the pivot pin 9[a] fixed in the trigger-plate and has a rear arm which carries a lateral projection on its left-hand side, this projection entering into a corresponding lengthwise recess in the right-hand side of the forward arm of the auxiliary sear, and therefore, when the forward arm of said actuating lever rises its rear arm descends and positively depresses the forward arm of the auxiliary sear 7, and thereby raises the rear arm of said auxiliary sear 7 before the forward movement or counter-recoil of the action slide 12 can carry the same over said rear end of the auxiliary sear; the said rear end of the auxiliary sear 7 being thus carried into the path of the action-slide 12, the said auxiliary sear is forced forward by said slide 12 to operate the magazine-latch, and thereafter positively prevents further forward movement of said action-slide 12, until said rear end of the auxiliary sear is depressed out of the path of said action-slide 12; thus the two-armed lever 7 is properly termed an auxiliary sear.

The forward end of the auxiliary sear 7 carries a plunger 7[b] with a spring 7[c] yieldingly holding it in its forward position, see Figs. 2, 3 and 4. Fig. 11 shows a front view of the trigger-plate 3, and mounted in a T-shaped recess therein, the shell-ejector plate 22[a] which is removably locked therein by a spring-actuated plunger 3[a], and is provided at its upper end with the shell-ejector 22, as is also clearly shown in Fig. 10; this figure also shows mounted on said plate 22[a] the vertically sliding connector 10 with the lateral and rearward shoulders thereon; it also shows the forward end of the plunger 7[b], carried in the auxiliary sear, projecting into a vertical slot in the said ejector-plate. When the auxiliary sear 7 is in its operative position and the magazine has been automatically released and ejected, the plunger 7[b] projects some distance forward of the front face of the plate 22[a] in such a manner that, when another filled magazine is being inserted and has nearly reached its uppermost position, a square lug 17[c] on the rear face of the magazine at the left-hand side of the central rib 17[b], which lug is shown in a rear view in Fig. 12 and in a vertical section in Fig. 8, engages the projecting end of said plunger 7[b], raises the forward arm of the auxiliary sear 7, depresses the rear arm of the same and releases the action-slide 12, and thus continues the automatic firing with the renewed supply of cartridges. If, however, the trigger 5 has been released and has returned forward, it has allowed the rear arm of the sear 6 to be raised by the sear spring 6[b], and, by this action the sear point has entered the sear recess and engaged the cocking shoulder in the action-slide 12, and holding the same, will prevent continuation of the firing though the auxiliary sear 7 has released said action-slide.

As soon as the rear end of the auxiliary sear 7 is depressed, said auxiliary sear is again returned to its rearmost position in which its rear end lies under the action-slide 12, and in which the plunger 7[b] is removed out of the path of the lug 17[c] on the magazine, under the action of the latch spring 8[a] and the cooperation of the upper arm 8[c] of the latch-lever, the latch 8 being simultaneously returned to its operative position in which its locks the magazine in place.

The upward movement of the forward arm of the auxiliary sear 7 also raises the rear arm of the actuating lever 9, depresses the forward end of said lever 9 and through it the sliding connector 10, lever 9 and connector10 being kept in this position by the combined trigger and actuating lever spring $9^b$.

Another important improvement embodied in the mechanism hereinbefore described is that, though constructed to automatically release and eject the magazine when emptied for being replaced, it does not prevent the manual releasing and withdrawal of the magaine when desired, either empty or containing a number of cartridges. Nor does it prevent, after such manual release and withdrawal, the manual re-introduction of another magazine and the usual spring-actuated locking of the same in place.

In Fig. 5 a magazine containing several cartridges is shown partly in the magazine seat but not locked in place.

It will be obvious that this Fig. 5 illustrates the magazine either in the act of being introduced to or in the act of being withdrawn from the magazine seat.

I claim:

1. In an automatic firearm, the combination of a frame having a magazine-receiving seat therein, a cartridge magazine insertable in said seat and having a spring-actuated follower, a latch for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocatory movement in said frame, and means movable into the path of said action-slide by said follower after said magazine has become empty, said means having an operative connection with said latch and being movable, when engaged by said action-slide on the counter-recoil of the same after the firing of the last cartridge taken from said magazine, for operating said latch to release the magazine.

2. In an automatic firearm, the combination of a frame, a cartridge magazine, a latch for releasably locking said magazine in said frame, means for automatically moving said latch to release the magazine when it has become empty, said means comprising a magazine follower, an action-slide, and a member having an operative connection with both said follower and said action-slide, the connection with said follower comprising a slidable connector and an actuating lever co-operating with said member and with said connector.

3. In an automatic firearm, the combination of a frame, a cartridge magazine having a vertical slot in its rear wall, a latch for releasably locking said magazine in said frame, and means for automatically moving said latch to release said magazine when it has become empty, said means comprising a vertically slidable connector having a shoulder thereon, a magazine follower having a rearward projection, and a cam-surface on the forward wall of said magazine, whereby the follower, in nearing its uppermost position, is moved rearward causing said rearward projection to engage under said shoulder, thereby moving said connector upward.

4. In an automatic firearm, the combination of a frame, a cartridge magazine, a latch for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocatory movement in said frame, and a member constructed and arranged to be automatically moved into the path of said action-slide on its counter-recoil after the last cartridge has been removed from said magazine and fired, said member, after such movement, being actuated by said action-slide to operate said latch to release said magazine, and thereafter preventing further counter-recoil of said action-slide until said member is again moved out of the path of said action-slide.

5. In an automatic firearm, the combination of a frame, a cartridge magazine, a latch for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocatory movement in said frame, and a two-armed lever having a lengthwise as well as a swinging movement, and being normally held in an inoperative position, but arranged to have its rear arm automatically swung into the path of said action-slide, before the counter-recoil of said slide, after the last cartridge taken from the magazine has been fired, carries it over said rear arm, said lever, after such swinging movement, being actuated lengthwise by said action-slide to operate said latch to release said magazine, and thereafter preventing further counter-recoil of said action-slide until said lever-arm is again swung out of the path of said action-slide.

6. In an automatic firearm, the combination of a frame, a cartridge magazine having a spring-actuated follower movable therein, a latch for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocatory movement in said frame, a reaction-spring for moving said action-slide forward, a two-armed lever pivoted on a transverse pin and having a short lengthwise movement on said pin, means for yieldingly holding said lever rearward with the rear arm lowered to permit free movement of said action-slide while there are cartridges in said magazine, and a connection between the forward arm of said lever and said follower whereby, after the last cartridge has been removed from said magazine, the further rise of the follower causes the rear arm of said lever to move into the path of said action-slide, before the

forward movement of said slide, after the firing of said last cartridge, can carry said action-slide over the rear arm of said lever, said lever, after such movement, being actuated lengthwise under the action of said action-slide and its reaction spring to operate said latch to release said magazine, and thereafter preventing further forward movement of said action-slide until said lever arm is again moved out of the path of said action-slide.

7. In an automatic firearm, the combination of a frame having a magazine-receiving seat therein, a cartridge magazine insertable in said seat, a spring-actuated latch for releasably locking said magazine in said frame, means for automatically moving said latch to, and retaining it in, its magazine-releasing position to permit the ejection of said magazine after the same has become empty, means for automatically ejecting said magazine after the release of the same, said moving means comprising a member constructed and arranged to co-operate with a device on a succeeding magazine, whereby said latch is automatically freed, to allow the same to return to its operative position, by the act of fully inserting said succeeding magazine into said magazine-receiving seat in the frame.

8. In an automatic firearm, the combination of a frame having a magazine-receiving seat therein, a cartridge magazine insertable into said seat, a latch for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocatory movement in said frame, a two-armed lever having a lengthwise as well as a swinging movement, and being normally held in an inoperative position, but arranged to have its rear arm automatically swung into the path of said action-slide before the counter-recoil of said slide, after the last cartridge taken from the magazine has been fired, carries said slide over said rear arm, said lever, after such swinging movement, being actuated lengthwise by said action-slide to operate said latch to, and retain the same in, its magazine-releasing position to permit the ejection of the empty magazine, and thereafter preventing further counter-recoil of said action-slide, and means for moving said lever to swing it out of the path of said action-slide and thereby allow said latch to return to its operative position, said means comprising a spring-actuated plunger on the forward arm of said lever arranged to project into the path of a shoulder on a succeeding magazine when said magazine is manually inserted in the magazine-receiving seat in the frame.

9. In an automatic firearm, the combination of a frame having a magazine-receiving seat, a cartridge magazine normally positioned in said seat, means for releasably locking said magazine in said seat, and means comprising an action-slide and a stop therefor for automatically moving said locking means to release said magazine after the same has become empty, and means operative after such release for automatically ejecting said magazine.

10. In an automatic firearm, the combination of a frame, a cartridge magazine, means releasably locking said magazine in said frame, means for automatically moving said locking means to release the magazine after the same has become empty, said moving means comprising a magazine follower, an action-slide and a stop for said slide actuated by said follower, and means operative after such release for automatically ejecting said magazine.

11. In an automatic firearm, the combination of a frame, a cartridge magazine having a spring-actuated follower, means for releasably locking said magazine in said frame, an action-slide mounted for longitudinal movement in said frame, and means for automatically moving said locking means to release the magazine comprising a stop movable by said follower into the path of the action-slide and by said slide to actuate the locking means.

12. In an automatic firearm, the combination of a frame, a cartridge magazine, means for releasably locking said magazine in said frame, an action-slide mounted for longitudinal reciprocating movement in said frame, a stop lever for said action-slide having lengthwise as well as swinging movement and being normally held in inoperative position, but arranged to have a shoulder thereon swung into the path of said action-slide after the last cartridge has been taken from the magazine and fired, said lever after such swinging movement, being actuated lengthwise by said action-slide to operate said locking means to release said magazine.

13. In an automatic firearm, the combination of a frame, a cartridge magazine having a slot in its rear wall, means for releasably locking said magazine in said frame, and means for automatically moving said locking means to release said magazine when the same has become empty, said moving means comprising a magazine follower having a rearward projection and a cam surface on a wall of the magazine, whereby the follower, in nearing its uppermost position, is moved rearward causing said rearward projection to extend through said slot in position to actuate another element of said moving means.

14. In an automatic firearm, the combination of a frame, a cartridge magazine having a slot in a wall thereof, means for releasably locking said magazine in said frame, and means for automatically moving

said locking means to release said magazine when the same has become empty, said moving means comprising a magazine follower having a projection thereon adapted to extend through said slot and means for camming said follower, in nearing its upermost position, toward the wall of the magazine having said slot therein and thereby causing said projection to extend through said slot in position to actuate another element of said moving means.

This specification signed and witnessed this 29th day of November, A. D. 1922.

JOHN M. BROWNING.

In the presence of:
D. SELLICK,
T. S. BROWNING.