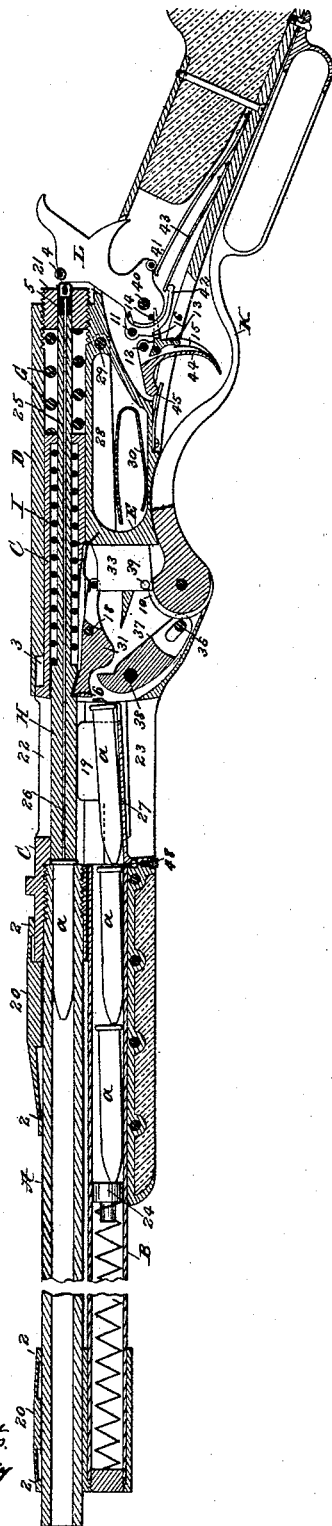


R. M. CATLIN.
RECOIL OPERATED MAGAZINE GUN.

No. 454,993.

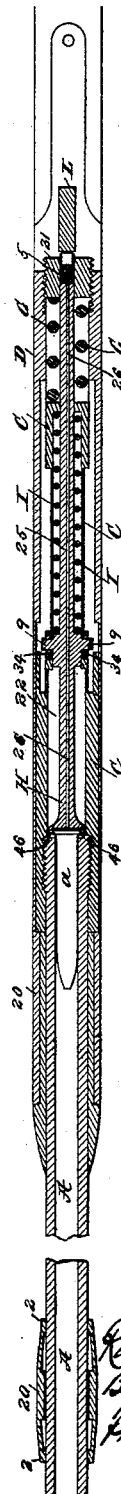
Patented June 30, 1891.

Fig. 1.



Attest:
Geo. H. Little,
J. H. Kennedy

Fig. 2.

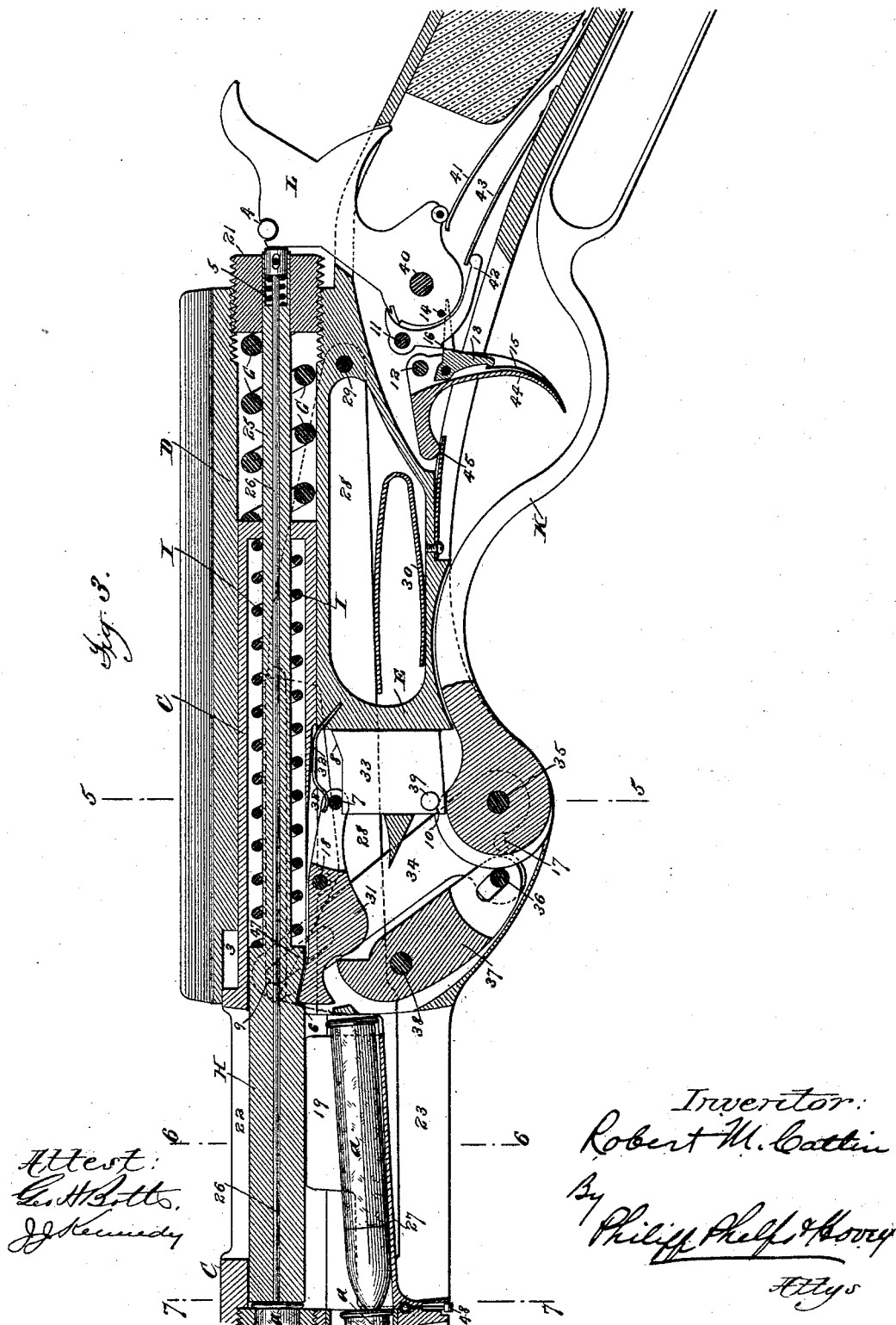


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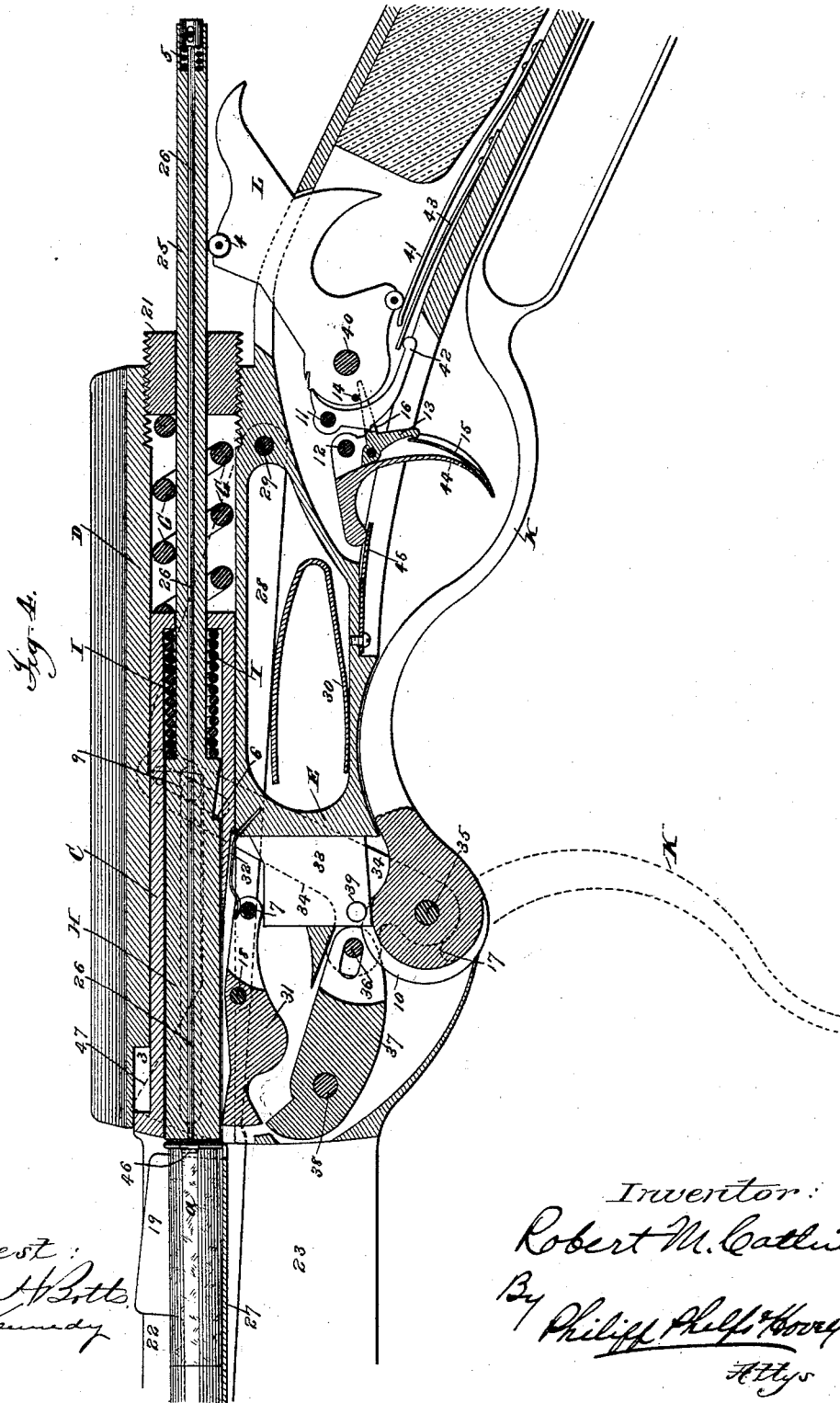
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Fig. 5.

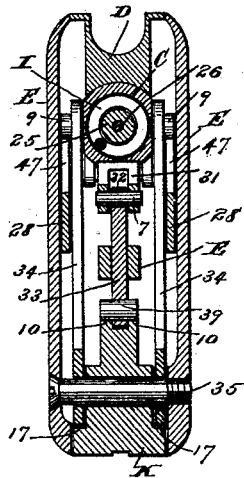


Fig. 6.

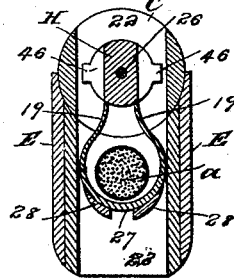


Fig. 7.

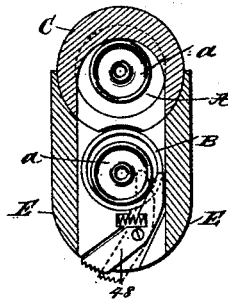
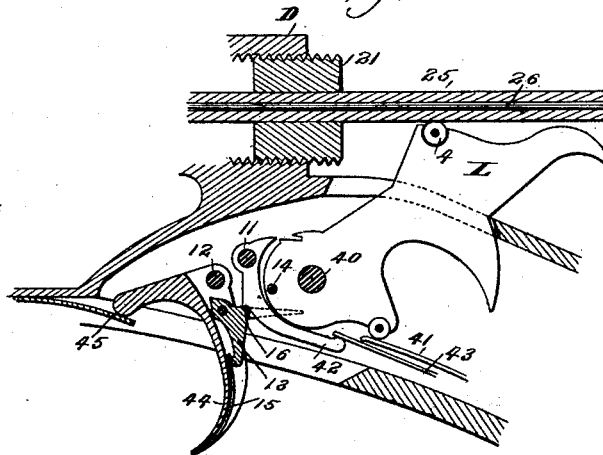


Fig. 8.



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UNITED STATES PATENT OFFICE.

ROBERT MAYO CATLIN, OF TUSCARORA, NEVADA.

RECOIL-OPERATED MAGAZINE-GUN.

SPECIFICATION forming part of Letters Patent No. 454,993, dated June 30, 1891.

Application filed August 28, 1889. Serial No. 322,171. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MAYO CATLIN, a citizen of the United States, residing at Tuscarora, county of Elko, and State of Nevada, have invented certain new and useful Improvements in Magazine-Guns, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that general class of fire-arms known as "magazine or repeating guns;" but the invention relates particularly to a gun of this class in which the energy developed by the recoil of the gun when it is fired is stored up and utilized in extracting the empty cartridge-shell, introducing a new cartridge into the barrel, and cocking the hammer for the next discharge.

In order to aid in a more ready understanding of the detailed description of the construction and operation of the gun, which will be hereinafter given, a brief preliminary description of its organization will be first given. The general organization of the gun is much the same as that of the well-known Winchester. The barrel is mortised vertically at its breech, so as to permit the cartridge to be introduced from beneath and the empty shell to be ejected at the top. The magazine is located beneath the barrel and is provided at its rear end with a carrier which serves to transfer the cartridges one by one from the magazine into proper position to be introduced into the barrel and at the same time eject the empty shell resulting from the last discharge. The barrel of the gun, however, instead of being rigidly attached to the stock is made capable of a limited longitudinal movement with relation to the stock, it being guided in its movement by guides or thimbles which surround the barrel and are secured to the magazine, which latter is secured rigidly to the stock. Located at the rear end of the barrel is a powerful spring, which, when the gun is fired, receives and is compressed by the force of the recoil. The expansion of this spring, which takes place immediately after the force of the recoil is expended, restores the barrel to its original position, and in so doing operates through suitable connections to withdraw the breech-bolt or block to open the breech, extract the empty shell from the barrel, cock

the hammer for the next discharge, and introduce a fresh cartridge into the barrel. The gun is also provided with a hand-lever located beneath the stock in the usual position, by which the gun can, when desired, be loaded and the hammer cocked in the ordinary manner. The trigger mechanism is also so constructed that the gunner can, when he desires, allow the hammer to operate automatically to fire the cartridge immediately after it has been introduced into the barrel by the recoil-operated mechanism, and thus the several cartridges contained in the magazine may be automatically introduced into the barrel and fired in succession without any manipulation of the gun upon the part of the gunner. The organization thus briefly outlined will now be described more in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a gun embodying the present invention, the parts being shown in the position they occupy when the gun is loaded, but with the hammer resting upon the firing-pin. Fig. 2 is a horizontal section of the same, taken through the barrel. Fig. 3 is an enlarged view of a portion of Fig. 1. Fig. 4 is a similar view showing the parts in the position they occupy after the firing has taken place and after the spring, which has absorbed the force of the recoil, has expanded and operated to retract the breech-bolt and extract the empty shell, and after the carrier has raised a fresh cartridge into position to be introduced into the barrel by the forward movement of the breech-bolt. Fig. 5 is a cross-section taken upon the line 5 of Fig. 3. Fig. 6 is a cross-section taken upon the line 6 of the same figure. Fig. 7 is a cross-section taken upon the line 7 of the same figure. Fig. 8 is an enlarged view of a portion of Fig. 4, showing the trigger mechanism in a different position.

Referring to said drawings it is to be understood that the barrel A of the gun is free to move longitudinally for a limited distance independent of the stock and the other parts. The barrel is held in position and guided in its movements by rings or thimbles 20, which surround the barrel and are rigidly connected to the magazine B, which is located beneath the barrel. The guides 20 are provided with

spring-extensions 2, which press against the barrel to prevent it from having any lateral movement in the guides. The barrel is provided at its rear end with a breech-piece C, which forms in effect a part of the barrel, and which enters a cylindrical guide D, located at the rear end of the barrel and rigidly secured to the metal frame-work E, which contains the lock mechanism and forms a part of the stock. The forward movement of the barrel and its breech-piece C is limited by the rear guide 20, and the rearward movement of the barrel and breech-piece is limited by a shoulder 3, formed upon the guide D, which engages with the corresponding shoulder formed upon the breech-piece. The barrel is normally held in its forward position by means of a powerful spring G, which is arranged within the tubular guide D and abuts against the rear end of the breech-piece of the barrel. The rear end of the guide is closed by a screw-plug 21, by which the tension of the spring G can be adjusted with great nicety. The breech-piece C, which forms the continuation of the barrel, is mortised vertically, as indicated at 22, so as to receive the cartridge *a* from beneath and allow the empty shell to be ejected upward through the mortise, in the manner common in this general class of fire-arms. The mortise 22 in the breech-piece registers with a similar vertical mortise 23, formed in the stock and with which communicates the rear end of the magazine B, which is located beneath the barrel in the usual position. The magazine is provided with the usual means for receiving its supply of cartridges *a*, and with the usual spring-pressed follower 24 for moving the cartridges rearward into the mortise 23 and into position to be moved upward into register with the bore of the barrel.

Located within the tubular breech-piece C, which forms the rearward extension of the barrel, is a reciprocating breech bolt or block H, which is arranged to move forward through the mortise 22, with its forward end in position to close the rear end of the barrel and hold the cartridge therein. The breech-bolt H is normally maintained in its forward position by means of a spring I, arranged between a shoulder on the breech-bolt and the rear end of the breech-piece C. The breech-bolt is provided with a rearward extension 25, which passes through an opening in the rear end of the breech-piece and through an opening in the plug 21, and is in position when the breech-bolt is retracted to engage with the hammer and rock it to the rearward into position of full-cock, the hammer being preferably provided upon its upper side with a small bowl 4 to reduce the friction between the hammer and the extension 25 as the latter passes above the former, as shown in Figs. 4 and 8. The breech-bolt and its extension 25 are perforated longitudinally to receive the firing-pin 26, which terminates in a small head located in a recess in the end of the ex-

tension 25 and arranged to receive the blow of the hammer. The firing-pin is provided with the usual light spring 5 for normally holding it slightly retracted from the cap in the end of the cartridge.

Located within the mortise 23 is a carrier 27, which is of a suitable form to receive a cartridge and is normally maintained in position to permit the rear cartridge contained in the magazine to be pressed rearward into the carrier by the spring-follower. This carrier is adapted to move vertically in the mortises 23 22, so as to carry the cartridge contained in it from the position in which it is received from the magazine (see Fig. 3) to a position in register with the bore of the barrel. (See Fig. 4.) For this purpose the carrier is carried upon two arms 28, which are pivoted to the frame E, as indicated at 29. Located beneath the arms 28 is a spring 30, the tendency of which is to raise the arms and the carrier 27 into position to carry the cartridge contained in the carrier upward into register with the bore of the barrel. The carrier is normally maintained in its depressed position by means of side flanges 19, (see Fig. 6,) which bear against the under side of the breech-bolt H.

The breech-bolt H is locked in its forward position, so as to form a solid abutment for the rear end of the cartridge when the same is exploded, by means of a latch 31, which is pivoted to the breech-piece C of the barrel, as indicated at 18, and the forward end of which enters a recess 6, formed in the under side of the breech-bolt, so as to hold the latter rigidly in its forward position. The latch 31 is provided with a bifurcated rearward extension having a pin 7, which is acted upon by a spring 32 to normally hold the latch in position to enter the recess 6. The pin 7 is also acted upon by the incline 8 of a block 33, which forms a tripping device, which is so arranged that as the barrel and its breech-piece C near the limit of their rearward movement, as will be hereinafter explained, the pin 7 will ride up the incline 8, and thereby rock the latch 31, so as to trip it and disengage it from the recess 6 and release the breech-bolt. The purpose of this will be made clear when the operation of the gun is explained. The latch 31 is, as will be observed, weighted in front of its pivot 18, so that the tendency of the latch is to disengage itself from the recess 6, and the spring 32 is so formed, as will also be observed, that it does not act to rock the latch into position to enter the recess 6, except when the barrel which carries the latch is at or near the forward limit of its movement. The purpose of this will also appear when the operation of the gun is described.

The breech-bolt H is provided near its rear end with two laterally-projecting studs 9, (see Fig. 2,) which pass through slots in the sides of the breech-piece C and enter slotted openings in a pair of levers 34, which are fulcrumed upon a bolt 35, passing through the

frame E. The levers 34 are provided between the studs 9 and their fulcrum 35 with forward projections, which are connected by a bolt 36, which passes through slotted openings in the bifurcated lower end of a lever 37, which is fulcrumed upon the frame E, as indicated at 38, with its upper end normally in position to be engaged by the forward end of the latch 31 when the latter is rocked downward by the incline 8, as will be hereinafter explained.

The principal functions of the parts which have thus far been described are to utilize the force of the recoil due to the discharge of the gun to reload and cock the same for the next discharge. It is, however, as will be readily seen, necessary that the gun should be loaded before this automatic reloading can take place. It is therefore necessary to provide means by which the gun can, when necessary, be loaded by hand. I will therefore before describing the operation of the gun in automatically reloading and cocking by means of the recoil describe the construction and operation of the devices by which the gun is loaded in the first instance and also the trigger mechanism.

The block 33 is made capable of vertical movement and is provided at its lower end with a stud 39, which is engaged by a cam 10, which is pivoted upon the bolt 35, and is provided with a rearwardly-extending lever K, which forms the trigger-guard in substantially the same manner as in the well-known Winchester. The cam 10 is also provided with two laterally-projecting shoulders 17, which are arranged to engage with the levers 34, so as to rock the latter rearward, as will be presently explained, there being, however, sufficient lost motion between the shoulders 17 and the levers 34 to permit the block 33 to be raised to rock the latch 31 and disengage it from the recess 6 before the shoulders 17 will engage with the levers and commence to move the breech-bolt rearward. The hammer L is of substantially the usual form, it being fulcrumed, as indicated at 40, and provided with a spring 41, causing it to strike against the firing-pin with sufficient force. The hammer is maintained in its cocked position by means of a sear 42, which is pivoted at 11 and is provided with a spring 43, the tendency of which is to throw it into engagement with the usual notches upon the hammer. The trigger 44 is pivoted as indicated at 12, and is provided with a spring 45, by which it is normally rocked to its forward position. Pivoted upon the trigger is a bell-crank lever 13, one arm of which is bifurcated and straddles the sear and hammer with its ends projecting beneath a stud 14, which passes through the hammer. The lever 13 is provided with a spring 15, the tendency of which is to rock the lever into position to maintain the arms of its bifurcated end in engagement with the stud 14. The sear 42 is provided with a shoulder 16, which is so positioned with relation to the lever 13 that when the hammer is in its cocked posi-

tion the crotch of said lever will be in position to engage with the sear above the shoulder, while, when the hammer is in its uncocked position the crotch of the lever 13 will be in position to pass beneath the shoulder 16.

The remaining features in the construction and organization of the gun will be described in connection with the explanation of its operation, which is as follows: The magazine having been supplied with cartridges, the rear cartridge in the line will be forced out of the rear end of the magazine into the carrier 27, where it will rest between the flanges 19, as indicated in Figs. 1 and 3. Assuming now that no cartridge is in the barrel of the gun, the manner of loading is as follows: The lever K will be swung from the position shown by full lines in Fig. 4 to the position shown by dotted lines in said figure. During the first of the movement of the lever the cam 10 will act upon the stud 39 and raise the block 33 against the pin 7, so as to rock the latch 31 against the tension of the spring 32 and out of engagement with the recess 6, thereby releasing the breech-bolt H, so that it may be moved rearward against the tension of the spring I. After this takes place the continued movement of the lever K will bring the shoulders 17 into engagement with the levers 34, thereby rocking said levers from the position shown in Fig. 3 to the position shown in Fig. 4. As the levers 34 are thus rocked to the rearward they act upon the studs 9 and move the breech-bolt to the rearward into the position shown in Fig. 4, thereby compressing the spring I. The spring G being much more powerful than the spring I, the barrel will not be moved rearwardly. As the breech-bolt is thus moved to the rearward, its extension 25 acts upon the hammer L and cocks it, in which position it is retained by the sear 42, as also indicated in Fig. 4. It will be understood that the hammer is partially cocked by the rearward movement of the breech-bolt with the barrel in the recoil movement, the further retraction of the breech-bolt by the spring G completing the movement of the hammer by bringing it to the position of full-cock. From an examination of Figs. 3 and 4 it will be apparent that the hammer, if desired, may be cocked wholly by the recoil movement, the arc through which the hammer moves varying but slightly from half-cock to full-cock. If the sine of the arc of full-cock be made equal to the distance the barrel moves in the recoil, it is evident that the recoil will full-cock the hammer. As soon as the breech-bolt H has been retracted, as just described, so as to be withdrawn from its position above the flanges 19 of the carrier, the spring 30 acts to raise the carrier and the cartridge contained therein from the position shown in Fig. 3 to the position shown in Fig. 4, thereby bringing the cartridge directly in front of the breech-bolt and in register with the bore of the barrel. As the cartridge is thus raised the flange upon its rear end passes within the hooks 46, formed

upon the sides of the front end of the breech-bolt, as indicated in Figs. 2 and 4. These hooks form the extractor for the empty shell; but it is to be understood that the extractor may be of different form, if preferred. As soon as the breech-bolt has been retracted with the results just stated, the lever K will be restored to its normal position, and as this takes place the spring I will expand and move the breech-bolt forward, so as to drive the cartridge forward out of the carrier and introduce it into the barrel, as indicated in Fig. 1. As the breech-bolt is thus moved forward, and after it has moved sufficiently far to carry the rear end of the cartridge and the head of the bolt beyond the flanges 19 of the cradle, the studs 9 engage with inclines 47, formed upon the upper edges of the arms 28 and depress said arms against the tension of the spring 30, so as to restore the cradle to its normal position and permit the next cartridge in the magazine to be forced rearward onto the cradle. It will be observed that as the breech-bolt is moved forward to drive the cartridge into the barrel it passes through the carrier and below the flanges 19; but said flanges, being made of spring metal, will spread sufficiently to readily pass over the breech-bolt as the carrier is restored to its depressed position by the studs 9. As the breech-bolt reaches the limit of its forward movement and when it has fully entered the cartridge into the bore of the barrel, the spring 32, acting upon the stud 7, will rock the latch 31 and cause it to enter the recess 6, so as to lock the breech-bolt in position. The gun is now loaded and in condition for firing.

To fire the gun, pressure is applied to the trigger, so as to move the lever 13 rearward and cause its crotch to engage with the sear 42 above the shoulder 16, thereby rocking the sear upon its pivot 11, so as to release the hammer and allow it to strike against the firing-pin and explode the cartridge. As soon as the explosion takes place, the force of the expanding gases will cause the barrel and the breech-piece C connected thereto to recoil against the tension of the spring G, thereby compressing said spring. The extent of the rearward movement of the barrel during the recoil will depend upon the strength of the spring G and the size of the charge; but the two will in practice preferably be so adjusted that the rearward movement of the barrel will be about half an inch. As the barrel and its breech-piece are moved rearward by the force of the recoil the stud 7 of the latch 31 travels on the straight upper edge of the block 33, thereby allowing the latch to remain in the recess 6 and lock the breech-bolt rigidly in its position to prevent the rearward movement of the cartridge-shell in the barrel, and this continues until the limit of the rearward movement of the barrel has been nearly reached, when the stud 7 engages with the incline 8 of the block 33, thereby tripping the latch so as to release the breech-

bolt and at the same time carry the forward end of the latch into a position to engage with the upper end of the lever 37 when the latch moves forward, as will presently be explained. At the time this takes place the barrel has reached the limit of its rearward movement, and the full effect of the powder has been exerted upon the ball. As soon as the full force of the recoil has been expended in compressing the spring G the spring will expand to its normal condition, and in thus expanding will move the barrel and its breech-piece C forward and restore them to their normal position. As the barrel is thus moved forward the latch 31 will engage with the upper end of the lever 37 and rock it upon its fulcrum, so as to move the levers 34 rearward to the position shown in Fig. 4, and this will operate, as already explained, to retract the breech-bolt against the spring I and cock the hammer. As the breech-bolt is retracted its hooks 46 being in engagement with the flange of the empty cartridge-shell, will extract it from the barrel, and as the breech-bolt reaches the limit of its rearward movement the spring 30 will raise the carrier and bring a fresh cartridge into position in front of the breech-bolt, as before explained. As the carrier is raised the flanges 19 will engage with the empty shell and drive it out from between the hooks 46 and expel it from the top of the mortise 22. Just as the barrel arrives at the limit of its forward movement the pin 7 will engage with the forward end of the spring 32 and rock the latch 31 upward, so as to disengage it from the upper end of the lever 37, thereby releasing said lever. As soon as this takes place the spring I will expand, thereby moving the breech-bolt forward, so as to enter the fresh cartridge into the barrel and lower the carrier to its normal position, as before explained. The gun is now in condition for a second discharge by simply pressing the trigger, and so the operation may continue to be repeated until the entire magazine is exhausted, the only operation necessary on the part of the gunner being to press the trigger at the proper times.

From what has been said it will readily be seen that the reloading of the gun and recocking of the hammer follow very quickly upon the discharge. For this reason it might happen, if means were not provided for preventing it, that the gunner should continue the pressure upon the trigger so long after the discharge as to prevent the sear from engaging with the notch on the hammer to retain it in its cocked position, and thus a premature second discharge might take place. To prevent this the sear is provided with the shoulder 16 and the hammer with the pin 14 to engage with the end of the lever 13. As soon as the crotch of the lever 13 is pressed against the sear above the shoulder 16 to release the hammer, and as the hammer descends the pin 14 engages with the forked end of the lever 13 and rocks said lever down-

ward to such a position, as indicated in Fig. 3, as to allow the shoulder 16 to pass above the fork and thus leave the sear free to engage with the notches of the hammer when the latter is cocked by the retraction of the breech-bolt, as before explained, and this will be the case even though the gunner continue to press the trigger slightly.

There may be cases when it will be desirable to remove the sear permanently out of engagement with the hammer, so as to allow the hammer to descend automatically immediately upon the forward movement of the breech-bolt and thus explode the cartridge without waiting for the gunner to press the trigger. When this is desired, the gunner will draw the trigger back as far as possible and hold it in that position, which will allow the crotch of the lever 13 to pass beneath the shoulder 16 of the sear and act against the sear at that point to rock the sear away from the hammer, as indicated in Fig. 8. By drawing the trigger to and holding it in this position the hammer will not be arrested in its cocked position, but will descend immediately upon the forward movement of the breech-bolt, and its inertia will be sufficient when it is arrested by the arrival of the bolt at the limit of its forward movement to drive the firing-pin forward with sufficient force to explode the cartridge, and by this means the gun will be successively loaded and fired until the entire magazine is exhausted, without any action on the part of the gunner further than the continued holding of the trigger in the position shown in Fig. 8.

The form of the breech bolt or block may be varied without departing substantially from the invention, and the form and arrangement of the connections for transmitting the power of the spring G to the breech bolt or block may also be varied without departing from the invention.

It will frequently be desirable to remove the cartridge from the gun-barrel, so as to leave the gun in an unloaded condition when it is not required for use. To enable this to be most readily accomplished without emptying the entire magazine, the magazine is provided just at its rear end, and at the point of its junction with the cradle 27, with a spring-pressed latch 48, the upper end of which is arranged to be moved into position behind the rearmost cartridge in the magazine, so as to prevent said cartridge from passing into the cradle, as indicated by dotted lines in Fig. 7. When, therefore, it is desired to remove the cartridge from the barrel, the latch 48 is moved to and held in this position, and the lever K is operated, so as to withdraw the cartridge from the barrel and allow the cartridge contained in the carrier to be raised into position in front of the breech-bolt. As the carrier is raised, the cartridge withdrawn from the barrel will be ejected through the top of the mortise 22. Upon the reverse

movement of the lever K the cartridge contained in the carrier will pass into the barrel, and by then repeating the operation this second cartridge can be removed, leaving the gun uncharged.

What I claim is—

1. The combination, with the longitudinal-ly-movable barrel, of a spring put under tension by the recoil of the barrel, and a breech-bolt operated to open the breech by the return movement of the spring, substantially as described.

2. The combination, with the longitudinal-ly-movable barrel, of a spring put under tension by the recoil of the barrel, and a breech-bolt and extractor operated by the return movement of the spring to open the breech and extract the empty shell, substantially as described.

3. The combination, with the longitudinal-ly-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt operated by the return movement of the spring to open the breech, a firing-pin, and a hammer cocked by the return movement of the spring, substantially as described.

4. The combination, with a longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt and extractor operated by the return movement of the spring to open the breech and extract the empty shell, a firing-pin, and a hammer cocked by the return movement of the spring, substantially as described.

5. The combination, with the longitudinal-ly-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt operated by the return movement of the spring to open the breech, a magazine, and a spring-actuated carrier for transferring the cartridges from the magazine to the barrel when the breech is open, substantially as described.

6. The combination, with the longitudinal-ly-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt and extractor operated by the return movement of the spring to open the breech and extract the empty shell, a magazine, and a spring-actuated carrier for transferring the cartridges from the magazine to the barrel when the breech is opened, substantially as described.

7. The combination, with the barrel, of a spring put under tension by the recoil, a breech-bolt operated by the return movement of the spring to open the breech, and a hand-lever connected to said breech-bolt for operating the latter independently of its automatic action, substantially as described.

8. The combination, with the barrel, of a spring put under tension by the recoil, a breech-bolt operated by the return movement of the spring to open the breech, and another spring put under tension by the opening of the breech and reacting upon the breech-bolt

to close the breech when the force of the breech-opening spring is expended, substantially as described.

9. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt operated by the return movement of the spring to open the breech, and another spring put under tension by the opening of the breech and reacting upon the breech-bolt to close the breech when the force of the breech-opening spring is expended, substantially as described.

10. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt operated by the return movement of the spring to open the breech, a latch for locking the breech-bolt in position to close the breech, and a tripping device for operating the latch to release the bolt at or near the limit of the recoil movement, substantially as described.

11. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt operated by the return movement of the spring to open the breech, a latch for locking the breech-bolt in position to close the breech, a tripping device for operating the latch to release the bolt at or near the limit of the recoil movement, and a hand-lever and connections for operating the bolt and latch independently of their automatic action, substantially as described.

12. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel and reacting to return the barrel to its normal position, and a breech-bolt operated by the return movement of the spring to open the breech, substantially as described.

13. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, and a breech-bolt moving with the barrel during the recoil movement, said breech-bolt and barrel being moved in opposite directions by the return movement of the spring to open the breech, substantially as described.

14. The combination, with the longitudinally-movable barrel, of a breech-bolt moving with the barrel during the recoil, and a spring put under tension by the recoil of the barrel and moving the barrel and breech-bolt simultaneously in opposite directions in resuming its normal condition, substantially as described.

15. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel and reacting to return the barrel to its normal position, and a breech-bolt connected to the barrel and operated by its return movement to open the breech, substantially as described.

16. The combination, with a longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel and reacting

to return the barrel to its normal position, a breech-bolt connected to and operated by the return movement of the barrel to open the breech, a latch for locking the breech-bolt in position to close the breech, and a tripping device for operating the latch to release the bolt at or near the limit of the recoil movement, substantially as described.

17. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, and reacting to return the barrel to its normal position, and a hammer cocked by said return movement of the spring, substantially as described.

18. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, and a hammer partially cocked by the recoil movement of the barrel and brought to full-cock by the return movement of the spring, substantially as described.

19. The combination, with the longitudinally-movable barrel, of a spring put under tension by the recoil of the barrel, a breech-bolt, a lever having a long arm connected to said breech-bolt, and a short arm acted upon by the spring in its return movement, whereby the breech-bolt is operated to open the breech, substantially as described.

20. The combination, with the longitudinally-movable barrel and its breech-bolt, of a compound lever connected to and operating the breech-bolt to open the breech, means for returning the barrel to its normal position after recoil, and a latch carried by the barrel and engaging and actuating the lever for the retraction of the breech-bolt as the barrel returns to its normal position, substantially as described.

21. The combination, with the longitudinally-movable barrel and its breech-bolt, of a compound lever connected to and operating the breech-bolt to open the breech, means for returning the barrel to its normal position after recoil, a latch carried by the barrel and locking the breech-bolt to the barrel during the recoil movement, and a tripping device moving said latch into position to release the breech-bolt and to engage and operate the lever as the barrel returns to its normal position, substantially as described.

22. The combination, with the longitudinally-movable barrel, of a breech-bolt retracted to open the breech when the recoil movement is completed, a latch carried by the barrel, a spring for holding the latch in position to lock the bolt to the barrel during the recoil, and a cam-surface for tripping the bolt at or near the limit of the recoil movement, substantially as described.

23. The combination, with the longitudinally-movable barrel, of a breech-bolt retracted to open the breech when the recoil movement is completed, a rocking latch carried by the barrel, means for rocking the latch into position to lock the bolt to the barrel when the latter is at or near the limit of its

forward movement, and a tripping device rocking the latch to release the bolt when the barrel is at or near the limit of the recoil movement, substantially as described.

24. The combination, with the longitudinally-movable barrel and its breech-bolt, of latch 31, carried by said barrel, a lever mechanism operated by said latch in the forward movement of the barrel for the retraction of the breech-bolt, and a tripping device throwing the latch out of engagement with the lever mechanism when the breech-bolt has been fully retracted, substantially as described.

25. The combination, with the longitudinally-movable barrel, its breech-piece and breech-bolt, of the spring G, placed at the rear of the breech-piece and surrounding the breech-bolt, connections between the spring G and the breech-bolt, whereby the return movement of the spring retracts the breech-bolt, and a spring I inside the breech-piece put under tension by the retraction of the breech-bolt and operating to return the breech-bolt to its normal position when the force of spring G is expended, substantially as described.

26. The combination, with the hammer and its recoil-operated cocking mechanism, of a sear for holding the hammer in its cocked position, a trigger carrying a pivoted lever arranged to engage with said sear to release the hammer, and a stud upon the hammer arranged to engage with said lever and rock the same to release the sear when the hammer falls, substantially as described.

27. The combination, with the breech-bolt H, of a spring-pressed carrier 27, through which the breech-bolt passes in closing the breech, and means for depressing the carrier after the breech-bolt has passed through it, said carrier being provided with one or more spring-flanges yielding to allow the carrier to be depressed and holding the carrier in its depressed position as the breech-bolt is retracted, substantially as described.

28. The combination, with the breech-bolt H, of a spring-pressed carrier 27, through which the breech-bolt passes in closing the breech, pivoted arms 28, supporting said carrier and provided with cam-surfaces engaged by the breech-bolt in its forward movement, whereby the carrier is depressed against the tension of its spring, said carrier being provided with one or more spring-flanges yielding to allow the carrier to be depressed and holding the carrier in its depressed position as the breech-bolt is retracted, substantially as described.

29. The carrier 27, composed of a rigid tube of sufficient size to admit the cartridge and having the spring-flanges 19 on each side forming a slot normally of less width than the bore of the tube, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ROBERT MAYO CATLIN.

Witnesses:

E. H. MEAD,

J. B. FITZGERALD.