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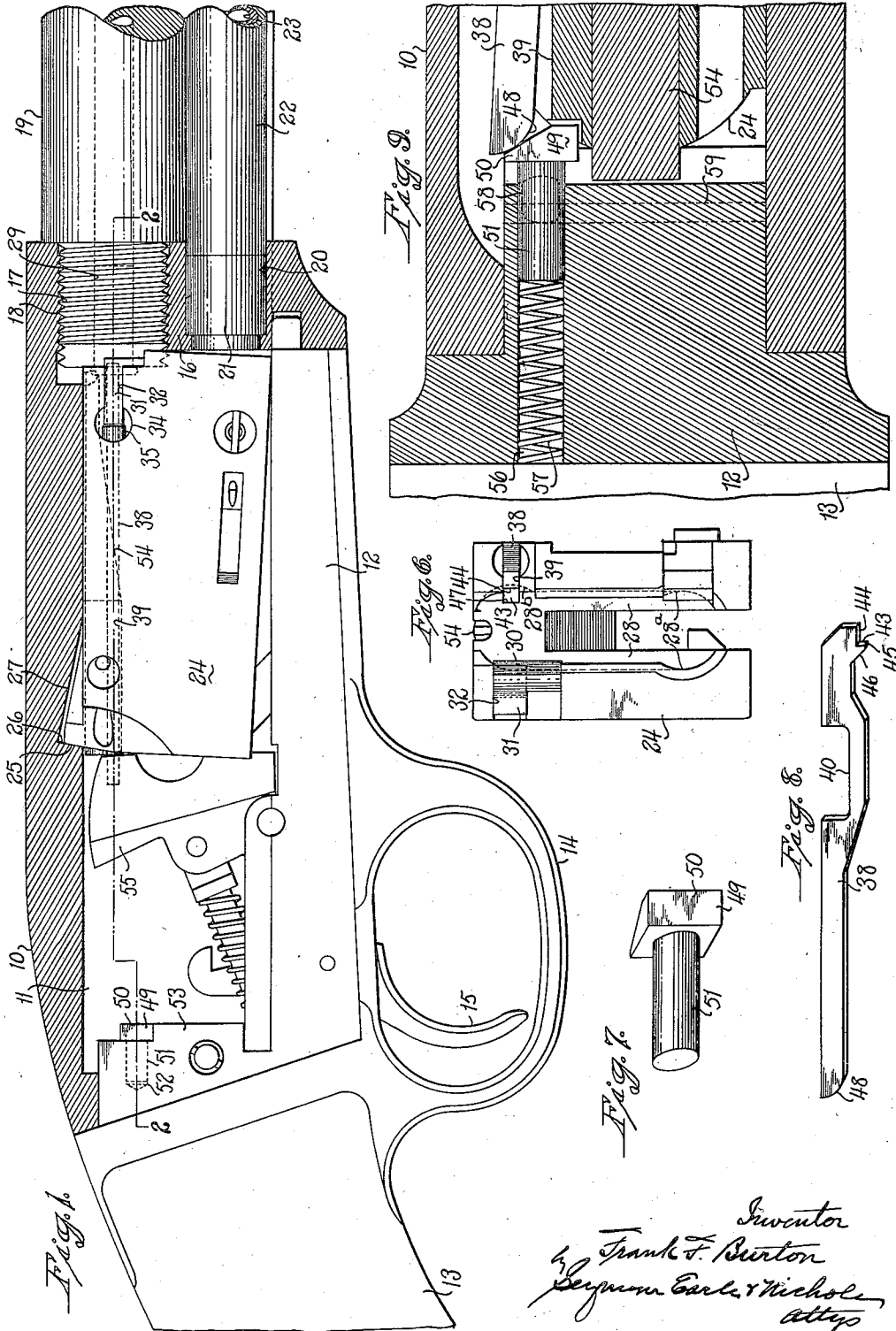
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2,101,236

CARTRIDGE EJECTING MECHANISM FOR FIREARMS

Filed Nov. 28, 1934

3 Sheets-Sheet 1



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Fig. 2.

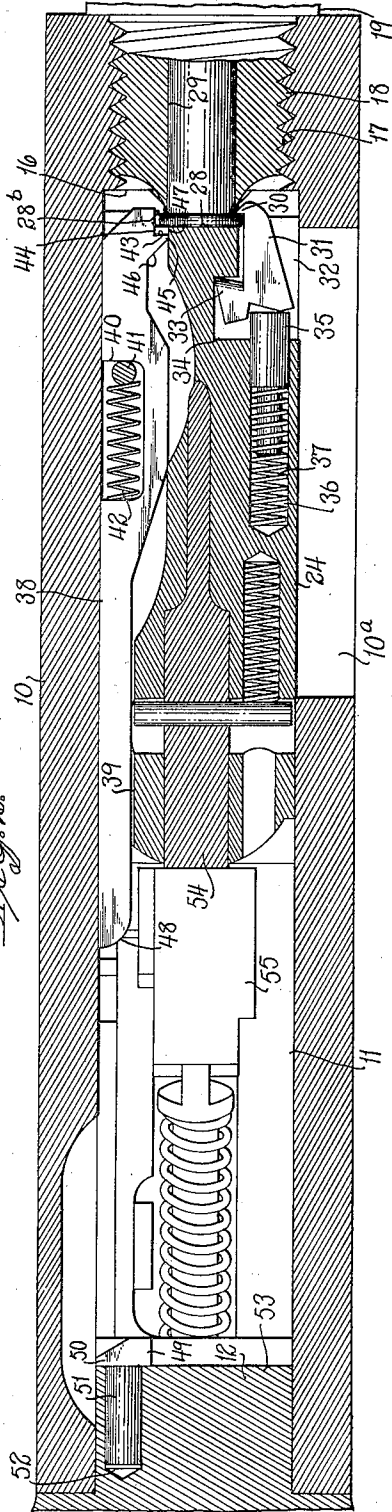
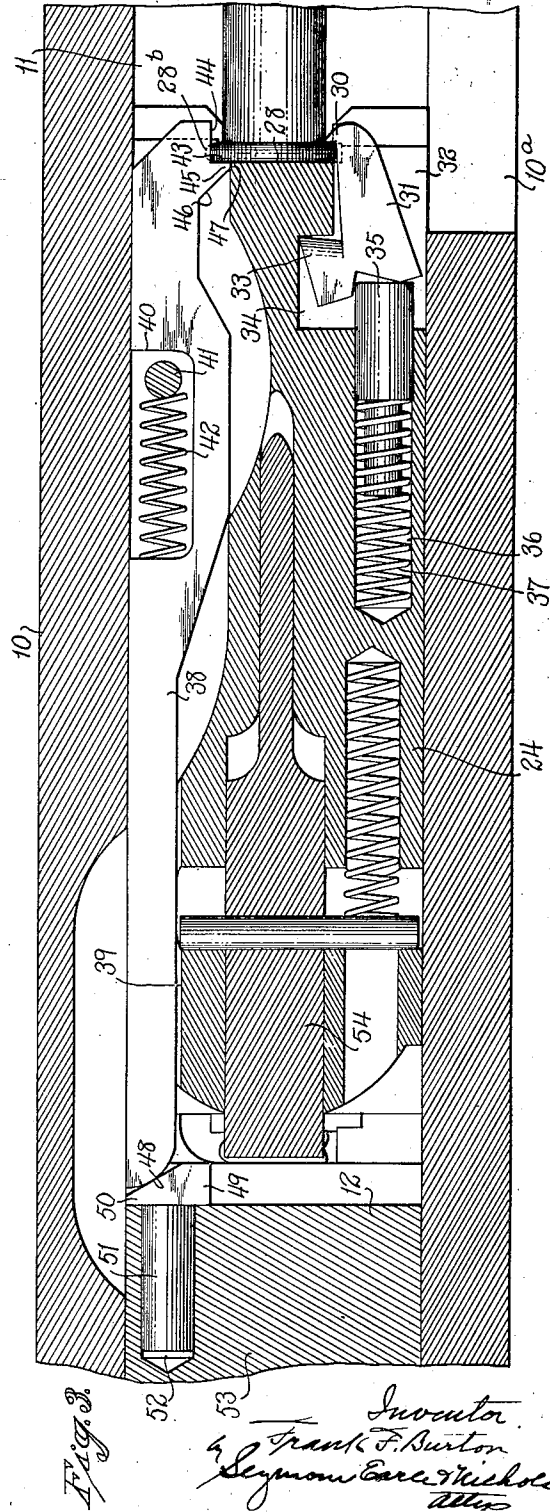


Fig. 3.



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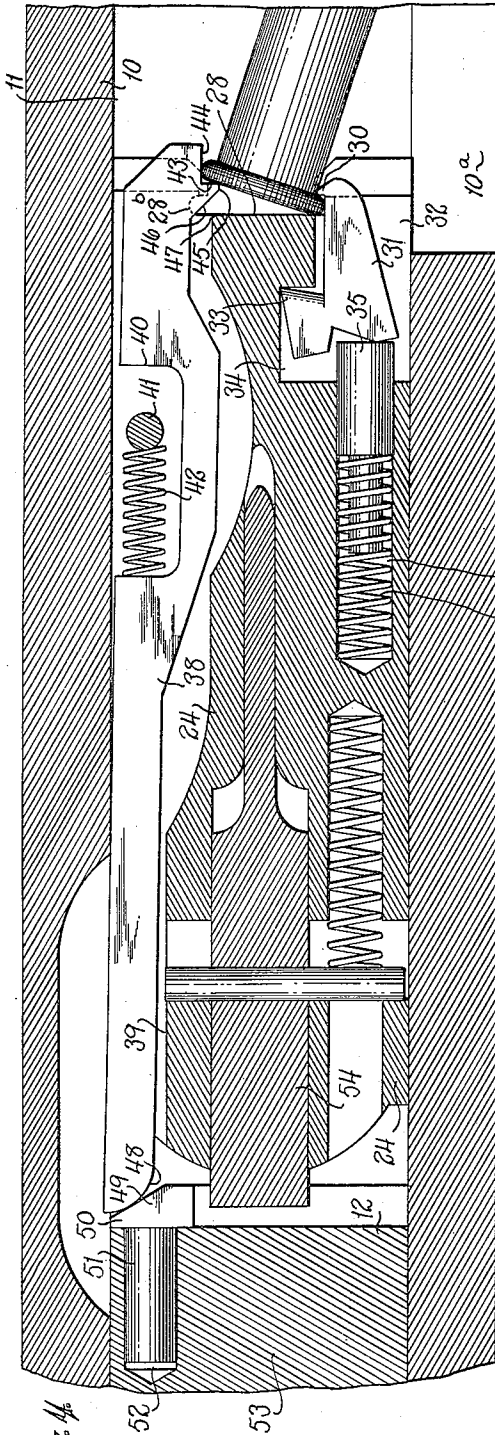


Fig. 1

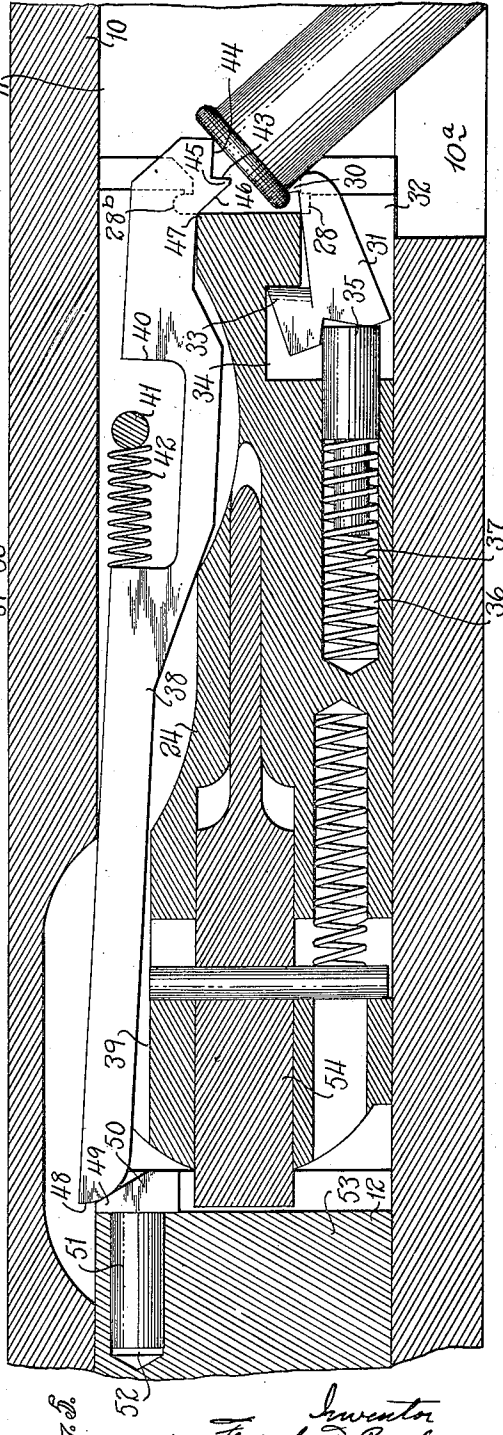


Fig. 2

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UNITED STATES PATENT OFFICE

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CARTRIDGE-EJECTING MECHANISM FOR FIREARMS

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6 Claims. (Cl. 42—25)

This invention relates to improvement in fire-arms and particularly to cartridge-ejecting mechanism for that class of firearms having breech-bolts or equivalent members which reciprocate longitudinally of the arm.

One of the objects of the present invention is to provide a firearm having superior means for ejecting empty shells therefrom, which means will be effective when the breech-mechanism is operated rapidly as well as when the same is operated slowly.

A further object of the present invention is to provide superior ejecting-means to effectively eject empty shells varying in length and/or in the diameter, shape, etc., of their heads or rims.

With the above and other objects in view, as will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings and appended claims, the present invention includes all features disclosed therein which are novel over the prior art.

In the accompanying drawings:

Fig. 1 is a broken view of the central portion of a firearm shown mainly in side elevation but with the frame-cover shown in vertical longitudinal section, the breech-bolt being shown in its closed and locked position;

Fig. 2 is a broken detail view in transverse section taken on the line 2—2 of Fig. 1;

Fig. 3 is a similar but less comprehensive view on a larger scale showing the parts in the positions which they assume when the breech-bolt is moved rearwardly into a position approaching the limit of its rearward movement;

Fig. 4 is a corresponding view showing the parts in the positions which they assume when the breech-bolt is slightly nearer the limit of its rearward travel than as shown in the preceding figure;

Fig. 5 is a corresponding view showing the parts in the positions which they assume when the breech-bolt is at the limit of its rearward movement;

Fig. 6 is a view in front elevation of the breech-bolt;

Fig. 7 is a perspective view of the ejector-operating abutment;

Fig. 8 is a perspective view of the ejector; and

Fig. 9 is a broken detail sectional view showing a modified construction in which the ejector-operating abutment is in the form of a spring-pressed plunger.

The particular tubular-magazine repeating rifle herein chosen for illustration of the present invention includes a frame-cover 10 having a chamber 11 formed therein, the bottom of which latter is closed by a portion of a frame 12 forming a feature of and forwardly extending from a butt-stock 13. The said frame 12 is formed with

the usual trigger-guard loop 14 housing in the usual manner a trigger 15.

The integral forward wall 16 of the frame-cover 10 is formed near its upper end with an internally-threaded bore 17 receiving the externally-threaded shank 18 of a barrel 19. Immediately below the threaded bore 17 just referred to, the front wall 16 of the frame-cover 10 is formed with a parallel bore 20 into which is snugly fitted a bushing or sleeve 21. The said bushing 21 is slightly shorter than the bore 20 in which it is fitted so as to permit the introduction into the forward end of the said bore of an outer magazine-tube 22 of usual construction and having telescopically fitted within it an inner magazine-tube 23.

Housed within the chamber of the frame-cover 10 is a longitudinally-slidable and vertically-rocking breech-bolt 24, the upper portion 25 of the rear face of which is adapted to engage a locking-abutment 26 constituting the rear wall of a notch 27 formed in the under face of the upper wall of the frame-cover 10 (Fig. 1.) When the portion 25 of the breech-bolt is engaged with the abutment 26, the breech-bolt is prevented from rearward movement under the shock of an exploding cartridge, but the said bolt may be rocked downwardly in the ordinary manner of firearms to disengage the aforesaid surfaces and permit the breech-bolt to be retired rearwardly from the position in which it is shown in Fig. 1.

The forward face of the breech-bolt 24 is formed with a vertically-extending undercut cartridge-guideway 28 adapted to successively receive the heads of cartridges as the same are rearwardly fed from the tubular magazine and to guide each cartridge successively upward into alignment with the cartridge-chamber 29 in the barrel 19. To permit the initial axial entry of the head or rim of a cartridge into the guideway 28, the lower end thereof is cut away as at 28^a, as clearly shown in Fig. 6.

The lifting of each cartridge successively upward into line with the cartridge-chamber 29 as just described may be accomplished by any suitable mechanism not requiring detailed description herein. As each successive cartridge moves upwardly through the guideway 28 into alignment with the cartridge-chamber 29, its head is positioned "beneath", so to speak, the extracting-nose 30 of a plate-like pivotal extractor 31. The said extractor is mounted with capacity for rocking movement in a longitudinal groove 32 formed in the forward right-hand corner of the breech-bolt 24 in a plane laterally in line with the axis of the cartridge-chamber 29. The extractor 31 is provided with an inwardly-projecting lug 33 entering a socket 34 opening inwardly from the rear end of the groove 32 before referred to.

For the purpose of swinging the extractor 31

in a counterclockwise direction and hence move its extractor-nose 30 inwardly for engagement with a cartridge, a plunger 35 is employed which reciprocates in a longitudinal bore 36 leading rearwardly out of the rear end of the groove 32 and housing a helical spring 37 which exerts a constant effort to move the said plunger forwardly.

For the purpose of laterally ejecting an empty cartridge after the same has been extracted from the cartridge-chamber 29 by the extractor 31, a floating bar-like ejector 38 is located in a longitudinal groove 39 formed in the left side wall of the breech-bolt 24 and having capacity for both longitudinal bodily movement and lateral rocking movement in the said groove. In its outer edge, the ejector 38 is formed with a notch 40 receiving a retaining-pin 41 and a helical spring 42. The said helical spring 42 is seated at its forward end against the retaining-pin 41, and at its rear end seats against the rear wall of the notch 40 and exerts a constant effort to move the ejector 38 bodily rearward.

The forward inner corner of the ejector 38 is notched to provide an L-shaped surface, the forwardly-facing rear wall of which constitutes an ejecting-shoulder 43, for exerting a forward urge upon a cartridge, while the inwardly-facing wall thereof constitutes a complementary ejecting-shoulder 44 adapted to exert a lateral pressure upon a cartridge, in a manner as will more fully hereinafter appear. Just to the rear of the shoulders 43 and 44, the inner edge of the ejector 38 is notched to form a narrow nose 45, the rearwardly-sloping rear wall of which provides a retracting cam-surface 46 adapted to ride up the forward corner 47 of the bottom wall of the notch 39 of the breech-bolt 24, in which the ejector 38 is located.

The rear end of the ejector 38 is rounded to form an inwardly and forwardly sloping cam-surface 48 for engagement with the similarly-inclined forward face of the head 49 of an ejector-operating abutment 50 having a cylindrical shank 51 located axially in line with the said ejector, and rigidly mounted in a bore 52 in the upstanding portion 53 of the frame 12.

The breech-bolt 24 carries the usual longitudinally-arranged firing-pin 54, adapted to be struck for firing a cartridge by a pivotal hammer 55 controlled by the trigger 15, before referred to, in any approved manner.

Starting with the breech-bolt in its closed position, as illustrated in Fig. 1, when the said breech-bolt is moved rearwardly in any approved manner, the empty cartridge in the cartridge-chamber 29 of the barrel 19, will be withdrawn from the said chamber by the nose 30 of the extractor 31. As soon as the empty cartridge has been sufficiently withdrawn from the cartridge-chamber 29, as just described, it will be shifted slightly laterally by the urge of the extractor 31, with the effect of seating the periphery of its head or rim in an arcuate undercut 28^b leading laterally out of the vertical guideway 28 in the front face of the breech-bolt, adjacent the forward end of the ejector 38.

Now as the breech-bolt 24 approaches the limit of its rearward travel, the cam-surface 48 at the rear end of the ejector 38 will engage with the sloping forward face of the head 49 of the ejector-operating abutment 50, with the effect of urging the forward end of the ejector 38 simultaneously forwardly and inwardly. Owing, how-

ever, to the bearing of the nose 45 upon the bottom of the groove 39, the resulting initial movement of the ejector will, in the main, be limited to a bodily forward movement thereof until very shortly after the ejecting-shoulder 43 thereof is engaged with the rear face of the head of the empty cartridge, as shown in Fig. 3. This movement of the ejector serves to slightly compress the retracting-spring 42.

The continued rearward movement of the breech-bolt 24, and hence the continued relative forward movement of the ejector 38 with respect thereto, will overcome the resistance to displacement which is offered by the engagement of the head or rim of the empty cartridge with the undercut 28^b and force the said head or rim out of the said undercut, at which time the nose 45 of the said ejector will have cleared the forward end 47 of the bottom wall of the groove 39 in the breech-bolt, whereupon the forward end of the ejector will be swung inwardly by virtue of the lateral force-component provided by the engagement of the rounded cam-surface 48 of the ejector 38 with the sloping surface of the head 49 of the ejector-operating abutment 50.

As soon as the nose 45 of the ejector 38 clears the forward end of the bottom wall of the groove 39, as above described, the inwardly-facing ejecting-shoulder 44 of the ejector will engage with the periphery of the head of the empty cartridge and exert thereon a lateral force simultaneously with the exertion thereupon of a forward urge by the ejecting-shoulder 43. The parts may now be said to have reached the approximate position in which they are shown in Fig. 4, in which it will be noted that the forward end of the ejector is free to press both forwardly and laterally against the head of the cartridge, and continues to exert such pressure until the empty cartridge is flipped laterally outwardly through an ejection-opening 10^a in the side wall of the frame-cover 10. During the above-described movement of the cartridge, the same turns around the fulcrum provided by the nose 30 of the extractor 31.

From the foregoing, it will be seen that the forward end of the ejector 38 is guided in its swinging movement solely by the head or rim of the cartridge itself, and that, therefore, despite variations in cartridges, the ejector will perform on each and every one thereof in substantially identically the same manner, so that a proper and uniform ejection is assured. In this connection, it may be explained that the heads or rims of cartridges vary considerably in diameter, contour, etc. These variations occur, for instance, as a result of different standards set by different manufacturers, as a result of variations in the hardness or softness of the metal from which the cartridges are made, and occasionally by eccentricities of the heads or rims with respect to the bodies of the cartridges.

It may be stated in this connection that it has been one of the practices in prior art to provide an ejector with guide-means which definitely determine the path through which the forward end of a rocking ejector would move. Such ejectors, however, owing to the predetermined path in which they must travel, were substantially incapable of compensating for variations in the rims of cartridges, with the result that an occasional cartridge would fail to eject properly and cause a jamming of the gun.

As soon as the empty cartridge has been ejected, as above described, and the breech-bolt 24 moved forwardly so as to disengage the rear

end of the ejector 38 from the operating-abutment 50, the spring 42 will assert itself and move the ejector rearwardly with respect to the breech-bolt, whereupon the said ejector will reassume the relative position in which it is shown in Fig. 2.

As shown in Fig. 9, instead of fixedly mounting the ejector-abutment 50 in the arm, the shank 51 thereof may be mounted for reciprocation in a relatively-deep bore 56, in the outer end of which latter is located a spring 57 exerting a constant effort to move the said ejector-abutment 50 forwardly. The reciprocating movement of the said ejector-abutment is limited by providing the shank 51 thereof in its under face with a notch 58 receiving a transverse stop-pin 59.

The spring 57 is preferably of such strength as to overcome the relatively-slight opposite pressure exerted by the spring 42, and will impart to the ejector 38 a rapid snapping movement once the said ejector has forced the head or rim of a cartridge from the undercut 28^b in the forward face of the breech-bolt.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are therefore to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. In a firearm, the combination with a reciprocating breech-bolt; of an ejector-member carried by the said breech-bolt with freedom for both lateral and longitudinal movement with respect to the said breech-bolt; and cam-like spring-actuated ejector-operating means carried by a normally-stationary part of the firearm and engageable with the said ejector-member upon the retiring movement of the said breech-bolt and constructed and arranged to impart to the said ejector-member a combined forward-and-lateral cartridge-ejecting movement.

2. In a firearm, the combination with a reciprocating breech-bolt; of an ejector-member carried by the said breech-bolt with freedom for both lateral and longitudinal movement with respect to the said breech-bolt and having a rearwardly-and-inwardly-facing cam-surface; and a spring-actuated ejector-operating plunger engageable with the cam-surface of the said ejector-member upon the retiring movement of the said breech-bolt and imparting to the said ejector-member a combined forward-and-lateral cartridge-ejecting movement relative to the said breech-bolt.

3. In a firearm, the combination with a reciprocating breech-bolt; of an ejector-member carried by the said breech-bolt with freedom for both lateral and longitudinal movement with respect to the said breech-bolt and having a rearwardly-and-inwardly-facing cam-surface; and a spring-actuated ejector-operating plunger having a cam-surface engageable with the cam-surface of the said ejector-member upon the retiring movement of the said breech-bolt and imparting to the said ejector-member a combined forward-and-lateral cartridge-ejecting movement relative to the said breech-bolt.

4. In a bolt-action firearm the combination with the reciprocating breech-bolt thereof; of an ejector-member carried by the said breech-

bolt and constructed and arranged in such manner as to be free of restraint thereby within the range of its cartridge-ejecting movement, the said ejector-member having on its forward portion both a laterally-facing ejecting-shoulder and a forwardly-facing ejecting-shoulder both of which latter being free for lateral guidance within the range of the swinging movement of a cartridge being ejected solely by such cartridge; and an ejector-abutment carried by a normally-stationary part of the firearm distinct from the said breech-bolt and positioned to be engaged by the said ejector-member upon the retiring movement of the said breech-bolt, the said ejector-abutment and the part of the said ejector-member contacting therewith being also constructed and arranged with respect to each other to impart to the said ejector-member a combined forward and lateral movement relative to the said breech-bolt for guidance by a cartridge being ejected.

5. In a bolt-action firearm the combination with the reciprocating breech-bolt thereof; of an ejector-member carried by the said breech-bolt and constructed and arranged in such manner as to be free of restraint thereby within the range of its cartridge-ejecting movement, the said ejector-member having on its forward portion both a laterally-facing ejecting-shoulder and a forwardly-facing ejecting-shoulder, both of which latter being free for lateral guidance within the range of the swinging movement of a cartridge being ejected solely by such cartridge; and an ejector-abutment having an outwardly and rearwardly sloping cam-surface and carried by a normally-stationary part of the firearm distinct from the said breech-bolt and positioned to be engaged by the said ejector-member upon the retiring movement of the said breech-bolt, the cam-surface of the said ejector-abutment and the part of the said ejector-member contacting therewith being constructed and arranged with respect to each other to impart to the said ejector-member a combined forward and lateral movement relative to the said breech-bolt for guidance by a cartridge being ejected.

6. In a bolt-action firearm the combination with the reciprocating breech-bolt thereof; of an ejector-member having a rearwardly and outwardly directed cam-surface and carried by the said breech-bolt and constructed and arranged in such manner as to be free of restraint thereby within the range of its cartridge-ejecting movement, the said ejector-member having on its forward portion both a laterally-facing ejecting-shoulder and a forwardly-facing ejecting-shoulder both of which latter being free for lateral guidance within the range of the swinging movement of a cartridge being ejected solely by such cartridge; and an ejector-abutment carried by a normally-stationary part of the firearm distinct from the said breech-bolt and having an outwardly and rearwardly directed cam-surface positioned to be engaged by the cam-surface of the said ejector-member upon the retiring movement of the said breech-bolt, the cam-surface of the said ejector-abutment and the cam-surface of the said ejector-member being both constructed and arranged with respect to each other to impart to the said ejector-member a combined forward and lateral movement relative to the said breech-bolt for guidance by a cartridge being ejected.

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