April 14, 1953 H. H. SEFRIED II 2,634,536

CARTRIDGE DETENT-MECHANISM FOR SELF-LOADING FIREARMS

Filed Nov. 8, 1950 3 Sheets-Sheet 1

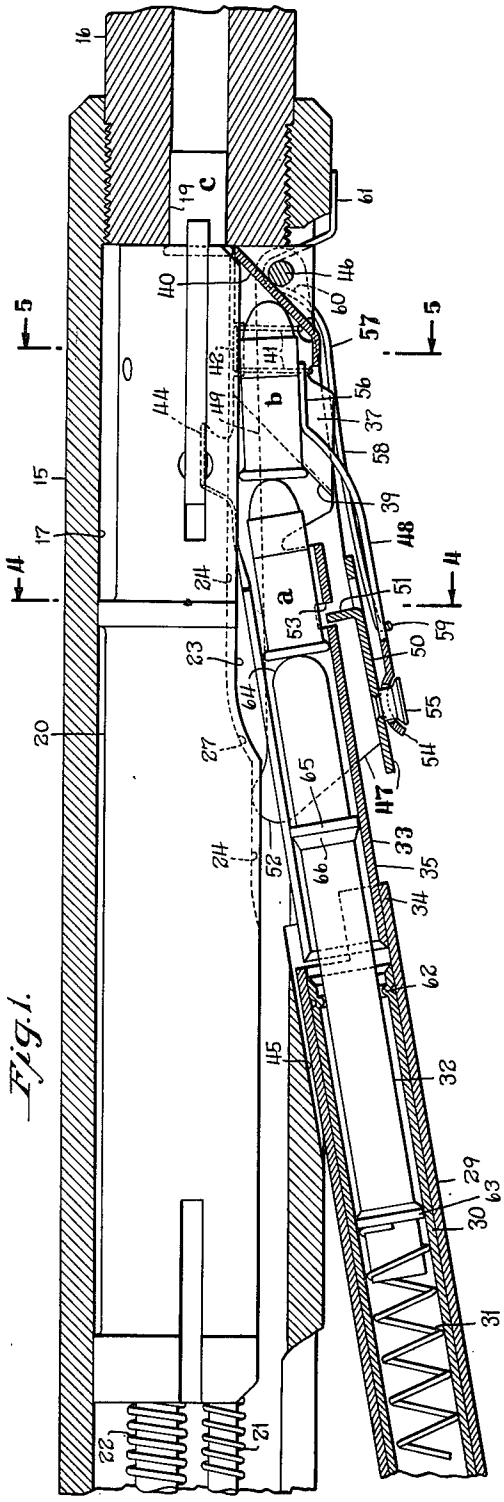


Fig. 1.

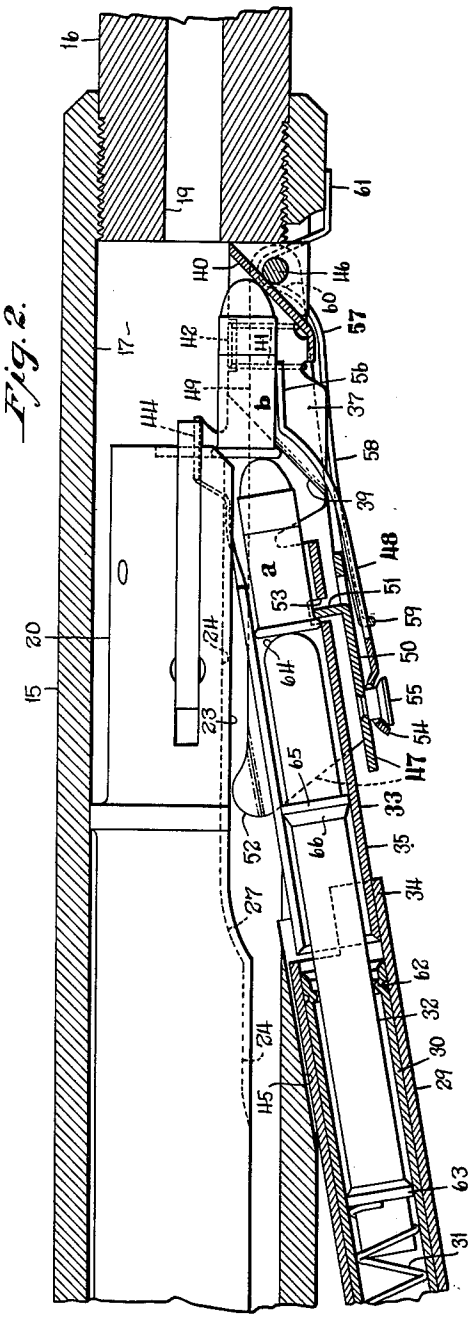


Fig. 2.

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CARTRIDGE DETENT-MECHANISM FOR SELF-LOADING FIREARMS

Filed Nov. 8, 1950 3 Sheets-Sheet 2

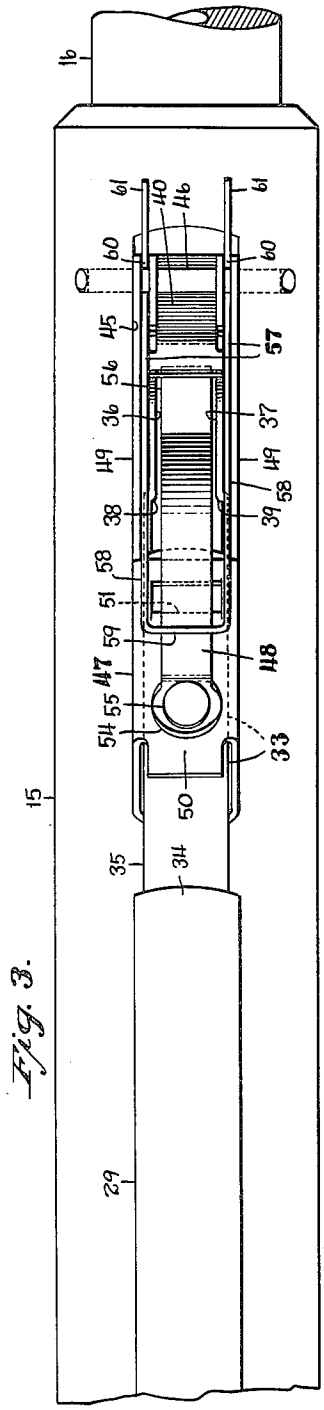


Fig. 3.

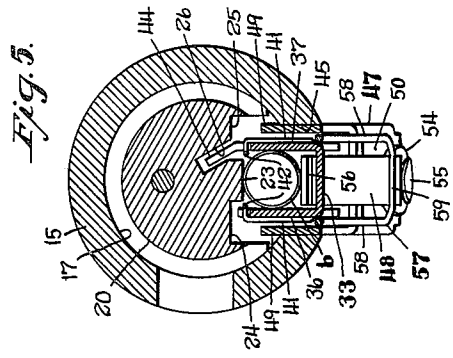


Fig. 5.

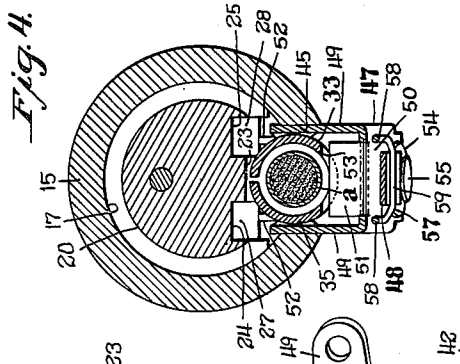


Fig. 4.

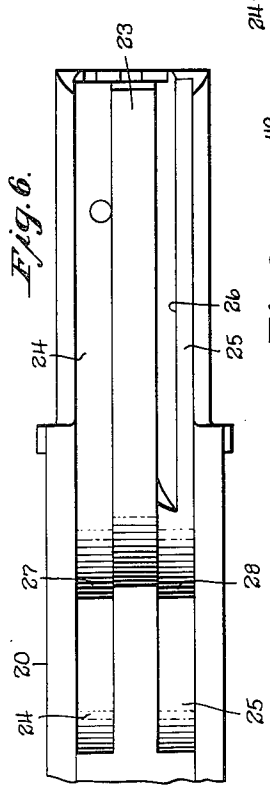


Fig. 6.

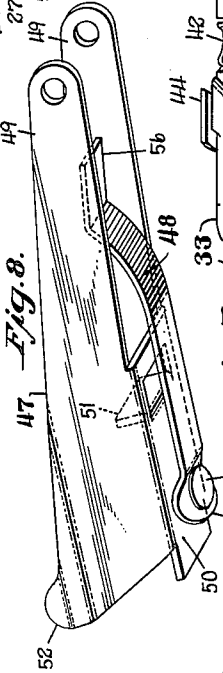


Fig. 8.

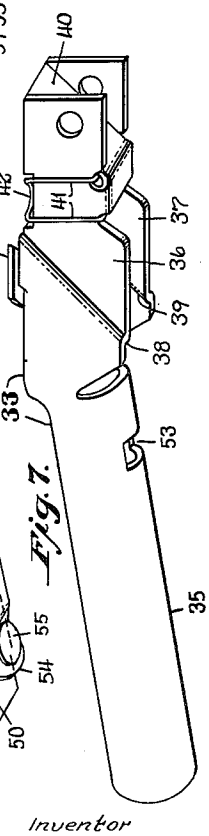


Fig. 7.

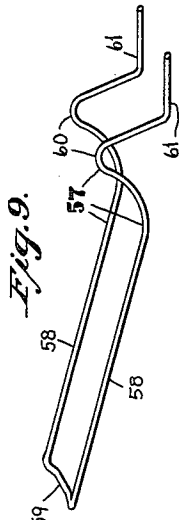


Fig. 9.

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April 14, 1953 H. H. SEFRIED II 2,634,536

CARTRIDGE DETENT-MECHANISM FOR SELF-LOADING FIREARMS

Filed Nov. 8, 1950 3 Sheets-Sheet 3

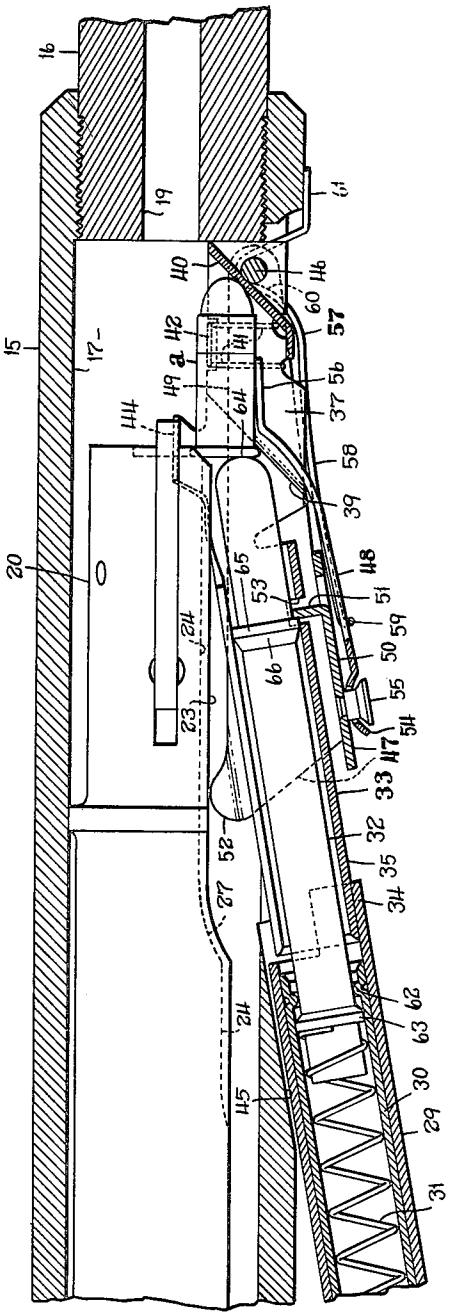


Fig. 10.

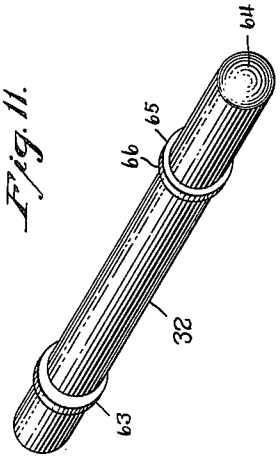


Fig. 11.

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Patented Apr. 14, 1953

2,634,536

UNITED STATES PATENT OFFICE

2,634,536

CARTRIDGE DETENT MECHANISM FOR SELF-LOADING FIREARMS

Harry H. Sefried II, New Haven, Conn., assignor to Olin Industries, Inc., New Haven, Conn., a corporation of Delaware

Application November 8, 1950, Serial No. 194,603

14 Claims. (Cl. 42—17)

1

This invention relates in general to improvements in self-loading or magazine firearms and more especially to the cartridge detent-means for such firearms.

An object of the invention is to provide a self-loading firearm with superior cartridge detent-means of relatively-simple, reliable and durable construction.

A further object of the invention is to provide a superior cartridge cut-off for self-loading firearms for alternately detaining and releasing successive cartridges being fed from the magazine to the chamber of the barrel.

A further object of the invention is to provide a self-loading firearm with superior cartridge cut-off means which is operable in the manner described above, as the result of the movements of the breech-bolt of the firearm.

A still further object of the invention is to provide a self-loading firearm with superior cartridge cut-off means, wherein the functions of alternately detaining and releasing successive cartridges and elevating the cartridges successively into chambering position, are controlled by a common resilient means.

Other objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken view in central, vertical, longitudinal section of the mid-portion of a magazine or self-loading firearm embodying the present invention, the breech-bolt being shown in breech-closing position;

Fig. 2 is similar to Fig. 1 but shows the breech-bolt in its partially-retired position;

Fig. 3 is a bottom plan view of the portion of the firearm shown in Figs. 1 and 2;

Fig. 4 is a transverse section of the firearm on line 4—4 of Fig. 1;

Fig. 5 is a transverse section of the firearm on line 5—5 of Fig. 1;

Fig. 6 is a broken plan view of the underside of the breech-bolt of the firearm;

Fig. 7 is a perspective view of the magazine-throat unit of the firearm;

Fig. 8 is a perspective view of the cartridge cut-off means and cartridge-elevating means secured together in a sub-assembly;

Fig. 9 is a perspective view of the spring associated with the sub-assembly of Fig. 8;

Fig. 10 is similar to Fig. 2, but shows the last-remaining cartridge in the magazine advanced onto the elevator by the cartridge-follower; and

Fig. 11 is a perspective view of the cartridge-follower of the tubular magazine.

2

The particular type of firearm herein chosen for the purpose of illustrating the present invention is of the self-loading type, that is to say, it is a firearm in which the discharge of one cartridge effects the extraction and ejection of the just-fired cartridge and the insertion of a fresh cartridge into the chamber of the barrel. The present invention, however, is not limited to firearms of the self-loading type, but is applicable to various types of repeating firearms and in particular, repeating firearms of the tubular magazine type, as will be apparent from the following description.

Since the invention is related substantially in its entirety to the portion of the firearm located between the cartridge-chamber of the barrel and the rear end of the receiver only this limited portion of the firearm is shown in the drawings. For a more comprehensive view of the firearm, reference may be had to the Burton Patent No. 2,267,078, December 23, 1941.

Referring to the drawings, the receiver of the firearm is indicated at 15 and the barrel 16 is rigidly coupled to the forward end of the receiver 15 in any approved manner such, for instance, as by threading the rear end of the barrel 16 into the internally-threaded forward end of a breech-bolt passage 17, which extends longitudinally throughout the length of the receiver 15. The barrel 16 is formed with the usual longitudinal bore, having at its rear portion a cartridge-chamber 19.

Mounted for reciprocating movement in the axial breech-bolt passage 17 of the receiver 15, is a breech-bolt 20 which is yieldingly urged forwardly into its breech-closing position by a helical breech-bolt return-spring 21. The latter presses at its forward end against the rear end portion of the breech-bolt, the rear end of the breech-bolt return-spring being seated against a removable receiver plug (not shown) in the manner shown in the above-identified Burton patent. As previously stated, the firearm is of the self-loading type and, hence, its breech-bolt 20 is adapted normally to be moved rearwardly automatically by the explosive force of a just-fired cartridge from its breech-closing position; and to be returned from its rearward excursion forwardly into breech-closing position by the force of the compressed return-spring 21. As is characteristic of firearms of this type, the breech-bolt

may be provided with a finger-piece (not shown) for manually opening the breech. The spring 22 is the firing-spring, which is adapted in the usual manner to actuate a firing-plunger (not shown) carried by the breech-bolt.

As shown especially well in Fig. 6, the breech-bolt 20 is formed on its underface adjacent and intersecting its forward end with a relatively-shallow but wide clearance-groove, the bottom of which is indicated at 23, the rear end of the clearance-groove 23 being blended into the underside of the rear end-portion of the bolt by a substantially-cylindrical surface of revolution. The clearance-groove 23 provides clearance beneath the underside of the forward end-portion of the breech-bolt for accommodating the forward end of the magazine-throat hereinafter described.

Formed in the bottom 23 of the clearance-groove of the breech-bolt adjacent opposite sides thereof and extending longitudinally of the breech-bolt rearwardly from its front face is a pair of relatively-narrow grooves 24 and 25 respectively, each of which provides clearance for the upstanding side walls respectively of the aforesaid magazine-throat, as and for the purpose hereinafter described. Moreover, the bottom of the clearance-groove 25 is, in turn, provided with a relatively-deep narrow ejector-groove 26 which extends longitudinally of the clearance-groove 25 and upwardly at an oblique angle to the bottom surface thereof so as to provide clearance for the cartridge-ejector element of the magazine-throat. The forward end of the ejector-groove 26 intersects the front face of the breech-bolt, while the rear end of the ejector-groove 26 terminates short of the rear end of the clearance-groove 25. Each clearance-groove 24 and 25 exceeds, in length, the length of the clearance-groove 23 in the bottom of the breech-bolt, the rear end-extensions of the respective clearance-grooves 24 and 25 constituting substantially-flat cut-off hold-down surfaces, each of which is joined to the forward end of its respective clearance-groove by a cylindrical surface of revolution, which cylindrical surfaces of revolution constitute relatively-shallow cartridge cut-off actuating-cams 27 and 28 respectively, as and for the purpose hereinafter described.

The tubular magazine of the firearm is supported in its stock in the manner shown especially well in the aforementioned Burton patent, and comprises a tubular housing-member 29 and a tubular cartridge-receiving member 30 fitting within the tubular housing-member 29 and provided adjacent its forward end with an internal circumferential cartridge-follower stop-shoulder 62, in a manner common in tubular-magazine firearms. Within the tubular cartridge-receiving member 30 is a helical magazine-spring 31 which exerts constant forward pressure upon a cartridge-follower 32 which, in turn, is adapted to thrust forwardly upon such cartridges as may be within the cartridge-receiving member 30; and within the magazine-throat indicated generally at 33, as well as certain of those cartridges en route to the cartridge-chamber 19 of the firearm, all in a manner as will more fully hereinafter appear.

The tubular housing-member 29 of the magazine is formed at its front end with a forwardly-projecting lip 34 which projects beyond the forward end of the tubular cartridge-receiving member 30 and serves to support the underside of the rear end of a tubular extension 35 of the aforesaid magazine-throat 33. The tubular cartridge-receiving member 30 is thus maintained in axial alignment with the tubular extension 35 of the magazine-throat to ensure the passage of cartridges from the tubular magazine into the magazine-throat.

The magazine-throat 33 embodies the aforesaid tubular extension 35 having at its forward end two integral substantially-parallel laterally-spaced upstanding side walls 36 and 37 respectively formed of substantially-flat metal stock, which provide therebetween a cartridge-pocket in which each successive cartridge is supported immediately prior to movement thereof into its chambered position in the barrel of the firearm. Projecting inwardly from the upstanding side walls 36 and 37 respectively of the magazine-throat are shoulders 38 and 39 respectively which extend forwardly and upwardly, the lateral spacing between the forwardly-and-upwardly-inclined shoulders being only slightly greater than the diameter of a cartridge-case, but less than the diameter of the cartridge-head, whereby the head of a cartridge is adapted to engage and ride up the respective cartridge-elevating shoulders to guide the cartridge into chambering position. Complementing and functioning in conjunction with the cartridge-elevating shoulders 38 and 39 of the respective side walls of the magazine-throat is a fixed cartridge-elevating surface 40 which slopes upwardly and forwardly between the laterally-spaced side walls of the magazine-throat, the upper end of the cartridge-elevating surface 40 coinciding with the forward ends of the side walls of the magazine, as shown especially well in Fig. 7.

The cartridge-retaining or hold-down member of the magazine-throat comprises a substantially U-shaped resilient wire element arranged to clip onto the magazine-throat intermediate its cartridge-elevating shoulders and the cartridge-elevating surface thereof. Each arm 41 of the cartridge-returning member comprises a pair of spaced-parallel spring-tempered wires which extend upwardly on the outsides of the respective side walls of the magazine-throat, each pair of wires being joined integrally at their upper ends by an inwardly-curved reach of wire providing a hold-down finger 42 which projects laterally into the upwardly-opening cartridge-pocket of the magazine-throat, in the manner shown especially well in Fig. 5, the lateral spacing between the inwardly-projecting hold-down fingers 42—42 being normally less than the diameter of a cartridge, for resiliently holding a cartridge temporarily against moving upwardly out of the magazine-throat, following the initial rearward excursion of the breech-bolt. Formed integrally with the side wall 37 of the magazine-throat and projecting upwardly therefrom and inwardly at an acute angle to the vertical plane of the side wall is a cartridge-ejector lip 44 which is adapted to project into the aforesaid ejector-groove 26 in the breech-bolt 20, as illustrated especially well in Fig. 5.

The magazine-throat 33, as well as the forward portions of the tubular housing-member 29 and the cartridge-receiving member 30, is received in a longitudinal opening 45 in the lower wall of the receiver 15, the magazine-throat and the parts carried thereby being rigidly coupled to the receiver partly in the longitudinal opening 45 therein and partly within the breech-bolt passage 17 by means of a coupling-pin 46 which extends transversely through axially-aligned apertures in

the forward ends of the respective side walls of the magazine-throat and the adjacent flanking-portions of the receiver.

The cartridge detent-means and elevating-means for alternately detaining and releasing successive cartridges from the tubular magazine into the magazine-throat and lifting cartridges successively into chambering position is illustrated especially well in Fig. 8 and comprises a cartridge cut-off indicated generally at 47; and a cartridge-elevator 48. The cartridge cut-off comprises, in the main, two sheet-metal arms 49—49 supported in substantially-vertical laterally-spaced parallel relationship by an integral bottom-wall portion 50 joined to the bottom edges of the respective arms adjacent the rear ends thereof. Upstanding from the bottom-wall portion of the cut-off between its arms 49—49 and extending transversely thereof is a substantially-vertical cartridge cut-off lip 51 for alternately detaining and releasing successive cartridges being advanced into the magazine-throat, as hereinafter described. Extending upwardly from the upper edge of the arms 49—49 of the cut-off adjacent its rear end are upstanding carrier-actuating tongues 52—52 respectively which are adapted to engage the aforesaid cut-off actuating cam-surfaces 27 and 28 respectively of the breech-bolt, to depress the lower end of the pivoted cut-off as the breech-bolt is moved into breech-closing position; the respective flat hold-down surface rearwardly of each cam-surface serving to engage the corresponding tongue of the carrier to positively hold the cut-off in its depressed inoperative position when the breech-bolt is in breech-closing position.

The cartridge cut-off 47 and the cartridge-elevator 48 mounted thereon, as hereinafter described, is adapted to be pivotally mounted on the receiver for movement in a substantially-vertical plane, and to this end, the forward ends of the respective arms 49—49 of the cut-off are provided with axially-aligned apertures extending transversely therethrough and arranged to receive the coupling-pin 46 of the magazine-throat. In this connection, the lateral spacing of the arms 49—49 of the cut-off is slightly greater than the distance between the outer faces of the side walls 36 and 37 of the magazine-throat, whereby upon assembling the cut-off and magazine-throat on the receiver the respective arms 49—49 of the cut-off will be disposed outside of the respective side walls of the magazine-throat. Moreover, the arms 49—49 of the cut-off are of such length that in assembling the cut-off and magazine-throat on the receiver, the bottom wall 50 of the cut-off is located below the tubular extension 35 of the magazine-throat whereby pivotal movement of the cut-off in a vertical plane will move its cartridge cut-off lip 51 toward and away from the tubular extension of the magazine-throat. To this end, the tubular extension 35 is provided in its underside with a transversely-extending slot 53 which is substantially opposite the cartridge cut-off lip 51 of the cut-off and is dimensioned to permit the cartridge cut-off lip to pass upwardly therethrough into the path of movement of cartridges being fed from the tubular magazine into the magazine-throat for alternately detaining and releasing successive cartridges.

The aforesaid cartridge-elevator 48 comprises a length of flat, narrow relatively-stiff metal provided at its rear end with an apertured enlargement 54 which is dished to provide a raised bearing-surface adapted to engage against the under-

side of the bottom wall 50 of the cut-off, as shown in Figs. 1 and 2. Fastening-means is provided to secure the apertured enlargement 54 of the cartridge-elevator to the bottom wall 50 of the cut-off rearwardly of its cartridge cut-off lip 51 and is preferably a rivet 55, which engages loosely in the apertured enlargement 54 at the rear end of the cartridge-elevator 48 so that while the cartridge-elevator and cut-off form a sub-assembly, the cartridge-elevator is not fastened rigidly to the cut-off. As shown in Fig. 8, the forward reach of the cartridge-elevator extends forwardly and upwardly between the oppositely-disposed arms 49—49 of the cut-off and is provided at its forward extremity with a flat cartridge-supporting surface 56 which is located intermediate the cartridge-elevating shoulders 38—39 and the cartridge-elevating surface 40 of the magazine-throat for substantially vertical movement, as seen in Figs. 1 and 2, and as hereinafter described, between the respective side walls 36 and 37 of the magazine-throat.

The cartridge cut-off 47 and cartridge-elevator 48 are adapted to be held in normal positions for respectively detaining a cartridge in the magazine-throat and supporting a preceding cartridge in an elevated position therein for chambering, by means of a single resilient element which, as shown especially well in Fig. 9, comprises a spring 57 consisting of two reaches 58—58 of spring-tempered wire arranged in substantially-spaced parallel relationship and joined together at their rear ends by an integral cross-piece 59. The forward ends of the spring-tempered reaches 58—58 are bent to form upstanding inverted substantially V-shaped loops 60—60 rearwardly of the forward terminal-ends 61—61 of the respective reaches, the forward terminal-ends of which are substantially in the plane of the reaches 58—58. As shown especially well in Figs. 1, 2 and 3, the spring 57 is assembled in the opening 45 in the receiver for cooperative engagement with the cartridge cut-off 47 and cartridge-elevator 48. To this end, the V-shaped loops 60 of the reaches of the spring are inserted between the corresponding side walls 36—37 and the arms 49—49 of the assembled magazine-throat and cut-off respectively, as shown especially well in Fig. 3, and held therein by means of the coupling-pin 46 which extends through the loops 60—60 of the reaches 58—58 of the spring. In this connection, the forward terminal-ends 61—61 of the reaches of the spring are engaged beneath the underside of the receiver adjacent the forward edge of the opening 45 therein; while the cross-piece 59 of the spring is adapted to engage against the underside of the cartridge-elevator forwardly of its connection with the pivoted cut-off, the spring temper of the respective reaches of the spring serving to constantly urge the cross-piece of the spring upwardly against the underside of the cartridge-elevator. Thereby an upwardly-directed force is exerted on the rear end-portion of the pivoted cut-off to constantly urge the latter upwardly within the receiver-opening 45, in which position its cartridge cut-off lip 51 projects upwardly through the transverse slot 53 in the underside of the tubular extension of the magazine-throat, as shown in Fig. 2, into the path of cartridges being fed therein from the tubular magazine. The force of the carrier-spring 57 likewise serves to resiliently but independently urge the flat substantially-horizontal cartridge-supporting surface 56 of the cartridge-elevator upwardly con-

stantly within the cartridge-receiving pocket of the magazine-throat. Moreover, it will be clear, from Fig. 2, that when the rear end of the cartridge cut-off is forced downwardly to its position as shown in Fig. 1 against the resistance of the spring 57, the cartridge cut-off lip 51 will be moved down out of the path of cartridges being fed therein. However, since the cartridge-elevator is mounted on the rear end of the cut-off by a loose connection, the spring continues to urge the said elevator upwardly irrespective of the downward displacement of the cartridge cut-off.

As has been pointed out above, the cartridge-cutoff 47 is pivotally secured at its forward end by the coupling-pin 46 to the frame of the firearm. Therefore, the distance from the back face of the cartridge cutoff-lip 51 to the coupling-pin is always constant and, as shown in Fig. 10, is substantially equal to the length of two cartridges minus the thickness of the rim of one cartridge. This construction is used, in conjunction with the cartridge follower, to insure that the last cartridge in the magazine will be fed into chambering position, the aforesaid cartridge-follower 32 being constructed as hereinafter described so as to be moved forwardly in the tubular magazine sufficiently to push the last cartridge in the magazine onto the cartridge-supporting surface of the elevator in position for chambering by the breech-bolt. It is also important that the forward end of the cartridge-follower be prevented from moving forwardly so far as to interfere with the underside of the breech-bolt.

To these ends, the cartridge-follower 32, in addition to having a conventional annular flange 63 adjacent its rear end to serve as a spring-abutment and to cooperatively engage with the stop-shoulder 62 of the receiving-member 39 to limit the forward movement of the cartridge-follower, is constructed at its forward end to simulate a cartridge, that is to say, the forward end of the cartridge-follower has a rounded nose 64, while rearwardly thereof at a distance substantially equal to the distance between the nose of a cartridge and its rim is an annular flange 65, the front face of which is provided with a substantially-square shoulder 66 adapted to be engaged by the cartridge cutoff-lip 51, when the latter is in its cutoff position, to positively hold the follower against forward movement. Since the distance from the connecting-pin 46 to the cartridge cutoff-lip 51 is constant, the foremost position of the rounded nose 64 of the cartridge-follower is thus accurately maintained, thereby insuring that the last cartridge in the magazine will be properly positioned on the elevator for chambering. This construction has the added advantage of eliminating inaccuracies which arise in conventional cartridge-follower stop-means due to an accumulation of tolerances.

Moreover, as shown especially well in Fig. 10, the spacing of the front and rear flanges 65 and 63, respectively, of the cartridge-follower is such that when the square shoulder 66 of the front flange 65 is in engagement with the cutoff-lip 51, the rear flange 63 of the cartridge-follower is spaced rearwardly of the cartridge-cutoff stop-shoulder 62 of the magazine-member 30. Thus, when the cutoff-lip 51 is moved downwardly out of engagement with the flange 65 of the cartridge-follower by movement of the breech-bolt into breech-closing position, as hereinafter described, the cartridge-follower is released and will be moved forwardly by the force of the follower-spring until the rearmost flange 63 of the cartridge-follower engages the stop-shoulder 62 of the magazine-member 30, which thereby positively prevents further forward movement of the follower. In this connection, the forward flange 65 of the follower will have gone beyond the cutoff-lip and, consequently, to facilitate loading the magazine, the back face of the follower-flange 65 is provided with a frusto-conical cam-surface 66 which is adapted to cam the elevated cutoff-lip 51 downwardly so as to permit the flange 65 of the cartridge-follower to be moved rearwardly thereof.

For the purpose of making clear the operation of the tubular-magazine repeating firearm above described and illustrated in the accompanying drawings, let it be assumed that the cartridge *c* in the chamber of the barrel has just been discharged and that the parts of the firearm are in the positions in which they are shown in Fig. 1, which illustrates the conditions existing immediately following the discharge of the firearm.

The breech-bolt is thus in its forward breech-closing position wherein the flat cartridge-cutoff holddown surfaces of the respective clearance-grooves 24 and 25 of the breech-bolt are in engagement with the upstanding tongues 52—52 of the respective arms of the cutoff and serve to hold the latter down in its inoperative position against the resistance of the spring 57, in which position the cartridge cutoff-lip 51 of the cutoff is displaced downwardly out of the path of movement of the cartridges in the tubular extension of the magazine-throat. The magazine-spring 31 is thus free to thrust the cartridge *b*, as well as the companion cartridge *a*, forwardly until the foremost cartridge *b* is checked by engagement of its forward end with the cartridge-elevating surface 40 and the underside of the breech-bolt. It will be noted, however, that when the cartridge *b* is thrust forwardly by the force of the magazine-spring, the cartridge *b* overrides the upwardly-biased cartridge-supporting surface 56 of the cartridge-elevator and positively displaces the latter downwardly against the resistance of the tensioned spring 57.

With the parts in the positions above referred to, the breech-bolt 20 and its associated parts will be thereupon "kicked" back by the energy developed by the discharge of the cartridge *c* in the chamber of the barrel, with the effect of extracting the now-fired cartridge *c* from the chamber of the barrel and withdrawing the cartridge *c* rearwardly until it is brought into engagement with the fixed upstanding ejector-lip 44 which serves to eject the cartridge from the ejection-port in the side of the receiver.

Very shortly after the initiation of the rearward travel of the breech-bolt, as above described, the flat hold-down surfaces of the respective clearance-grooves 24 and 25 will have moved rearwardly out of engagement with the upwardly-projecting cutoff actuating-tongues 52—52, thereby releasing the latter, whereupon the force of the tensioned spring 57 will swing the cutoff upwardly as shown in Fig. 2, wherein its cartridge cutoff-lip 51 will rise up through the transverse aperture 53 in the underside of the magazine-throat into the path of the cartridges therein, the disposition of the cartridge-cutoff with respect to the space provided forwardly thereof in the cartridge-pocket of the magazine-throat being such that the cutoff will engage in front of the head (or rim) of the cartridge *a*. Concurrently, the foremost cartridge *b* will have been released for upward movement by the rear-

wardly-moving breech-bolt, whereupon the force of the magazine-spring acting through the cartridge *a* against the rear end of the foremost cartridge *b*, serves to urge the latter forwardly slightly. At the same time, the spring-biased cartridge-elevator **48** is now able to raise the cartridge *b* upwardly, the forward and upward movement of the cartridge *b* being controlled by the cartridge-elevating shoulders **38** and **39** and the cartridge-elevating surface **40** of the magazine-throat. The upward movement of the cartridge *b* is, however, temporarily halted by engagement of the cartridge with the resilient cartridge hold-down fingers **42—42** projecting inwardly laterally over the open upper end of the magazine-throat. The cartridge *b* is thus held in an elevated position such as to have its rear face engaged by the forward face of the breech-bolt when the same moves forwardly, as will presently be described.

When the breech-bolt has reached the limit of its rearward travel and the energy developed by the just-fired cartridge *c* has expended its force, the breech-bolt return-spring will assert itself and move the breech-bolt forwardly.

The forward travel of the breech-bolt will first bring its forward face into engagement with the rear face of the now-partially elevated cartridge *b* and the continued forward movement of the breech-bolt will force the cartridge *b* forwardly and upwardly under the guidance of the cartridge-elevating shoulders and the cartridge-elevating surface of the magazine-throat. This forward and upward movement of the cartridge *b* overcomes the restraining action of the cartridge hold-down fingers **42—42**, whereupon the cartridge *b* will escape thereby under the upward urge of the spring **57** up into the cartridge-chamber of the barrel. Prior to the chambering of the cartridge *b*, the cartridge *a* will still be held from moving forwardly in the magazine-throat by engagement of the cartridge-cutoff with the head of the cartridge *a*, as hereinabove described. However, as the breech-bolt moves into its foremost closed position for chambering the cartridge *b*, the cartridge-cutoff actuating-cams **27** and **28** of the breech-bolt engage the upstanding tongues **52—52** of the pivoted cutoff and force the latter downwardly against the resistance of the spring **57**, thereby withdrawing the cartridge cut-off lip down out of the path of the cartridges in the magazine-throat, so as to release the cartridge *a* and the cartridge-follower to the rear thereof. Hence, the cartridge *a* will move forwardly under the urge of the magazine-spring until it is checked by engagement with the forward portion of the underside of the now-closed breech-bolt and the inclined surface **40**, the cartridge *a* overriding the substantially-horizontal cartridge-supporting portion of the cartridge-elevator, and forcing the latter downwardly against the resistance of the spring **57**.

The parts of the firearm are now in position for discharging the cartridge *b*, upon which occurrence, the cycle above referred to will be repeated with the cartridge *a* now moved forwardly onto the elevator by the cartridge-follower and retained against forward and upward movement by the underface of the forward portion of the breech-bolt. The flange **65** of the cartridge-follower is now substantially opposite the cartridge cutoff lip **51** which, in turn, is held down out of the slot of the tubular extension **35** of the magazine, in the manner shown in Fig. 1.

Following discharge of the cartridge *b* and rearward movement of the breech-bolt for extracting and ejecting the fired cartridge, the cartridge-cutoff is released, whereupon the force of the spring **57** urges the cartridge cutoff-lip upwardly into the path of movement of the follower for engagement with the square shoulder **66** of its flange **65**, whereby the follower is held from moving forwardly. Subsequently on the forward movement of the breech-bolt, it picks up the cartridge *a* and moves it forwardly into the chamber of the barrel. Concurrently, the cartridge-cutoff is again forced downwardly by the forwardly-moving breech-bolt, whereby the cartridge cut-off-lip of the carrier is moved downwardly out of engagement with the square shoulder **66** of the cartridge-follower. The latter is thus released and moved forwardly by the force of the magazine-spring until the flange **63** of the follower brings up against the stop-shoulder of the magazine, thereby positively preventing further forward movement of the follower, as a consequence of which the nose of the cartridge-follower is held from interfering with the action of the bolt.

Upon withdrawing the tubular magazine of the firearm for the purpose of reloading, the frusto-conical cam-surface **66** of the cartridge-follower flange **65** will cam the cartridge cutoff-lip downwardly as the follower is pulled rearwardly relative thereto, so as to permit the flange **65** to pass over the cutoff-lip.

From the foregoing description, it will be seen that the cartridge detent-mechanism of this invention is of simple and durable construction and especially convenient for assembly, and is characterized by the use of a single resilient element for biasing the cartridge-cutoff means and cartridge-elevator.

While the description of operation above given has been in connection with the automatic functioning of the firearm shown herein, it may here be noted that the breech-bolt and the parts carried and controlled thereby may be manually shifted by force applied to a finger-piece for operating 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 herein.

I claim:

1. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber rearwardly thereof; a breech-bolt movable in said receiver; a magazine positioned below said cartridge-chamber and extending rearwardly of the gun, said magazine having resilient means for urging cartridges therein successively upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine and movable to and from the path of movement of the cartridges in said magazine to alternately detain and release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said detent-means and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; and resilient means constructed and arranged to hold both said detent-

means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine and for elevating a cartridge into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine resilient means is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

2. In a repeating-firearm construction including in combination: a receiver; a barrel having a cartridge-chamber rearwardly thereof; a breech-bolt movable in said receiver; a magazine positioned below said cartridge-chamber and extending rearwardly of the gun, said magazine having resilient means for urging cartridges therein successively upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine and movable to and from the path of movement of the cartridges in said magazine to alternately detain and release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said detent-means and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; resilient means constructed and arranged to hold both said detent-means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine and for elevating a cartridge into chambering position; and resilient cartridge hold-down means carried by said magazine and arranged to temporarily resist the upward movement of a cartridge by said elevating-means into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine resilient means is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

3. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber; a breech-bolt movable in said receiver; a magazine positioned to extend below said receiver and constructed and arranged to successively cause cartridges to be moved upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine and movable to and from the path of movement of the cartridges in said magazine to alternately detain and release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said detent-means and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; resilient means constructed and arranged to hold both said detent-means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine and for elevating a cartridge into chambering position; and a single fastening-element constructed and arranged to engage and secure said magazine, said cartridge-detent means and said resilient means to said receiver.

4. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber; a breech-bolt movable in said receiver; a magazine positioned to extend below said receiver and constructed and arranged to successively cause cartridges to be moved upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine and movable to and from the path of movement of the cartridges in said magazine to alternately detain and release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said detent-means and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; resilient means constructed and arranged to hold both said detent-means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine and for elevating a cartridge into chambering position; resilient cartridge hold-down means carried by said magazine and arranged to temporarily resist the upward movement of a cartridge by said elevating-means into chambering position; and a single fastening-element constructed and arranged to engage and secure said magazine, said cartridge-detent means and said resilient means to said receiver.

5. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber; a breech-bolt movable in said receiver; a tubular magazine positioned below said cartridge-chamber to extend rearwardly of the gun, said tubular magazine having a magazine-throat at its upper end and a magazine-spring at its lower end, said magazine-spring being arranged to successively cause cartridges in said tubular magazine to be moved upwardly and forwardly into said magazine-throat into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine-throat and movable to and from the path of movement of the cartridges in said magazine-throat to alternately detain and release successive cartridges being moved forwardly therein; cartridge-elevating means arranged to project into said magazine-throat to elevate a cartridge therein into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; and resilient means constructed and arranged to hold both said detent-means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine-throat and for elevating a cartridge into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine-spring is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

6. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber; a breech-bolt movable in said receiver; a tubular magazine positioned below said cartridge-chamber to extend rearwardly of the gun, said tubular magazine having a magazine-throat at its upper end and a magazine-spring at its lower end, said magazine-spring being arranged to successively cause cartridges in said tubular magazine to be moved upwardly and forwardly into said magazine-throat into position adjacent the cartridge-chamber of the barrel; cartridge-detent means cooperatively associated with said magazine-throat and movable to and from the path of movement of the cartridges in said magazine-throat to alternately detain and release successive cartridges being

moved forwardly therein; cartridge-elevating means arranged to project into said magazine-throat to elevate a cartridge therein into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; resilient means constructed and arranged to hold both said detent-means and said elevating-means in their respective positions for detaining a cartridge from moving forwardly in said magazine-throat and for elevating a cartridge into chambering position; and resilient cartridge hold-down means carried by said magazine-throat and arranged to temporarily resist the upward movement of a cartridge by said elevating-means into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine-spring is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

7. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber rearwardly thereof; a breech-bolt movable in said receiver; an actuating cam on said breech-bolt; a magazine positioned below said cartridge-chamber and extending rearwardly of the gun, said magazine having resilient means for urging cartridges therein successively upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; cartridge-detent means comprising a cartridge cut-off cooperatively associated with said magazine and having a cartridge cut-off lip and a cam-engaging element, said cam-engaging element being arranged to be engaged by the actuating-cam of said breech-bolt as said breech-bolt moves into breech-closing position to move said cartridge cut-off lip down out of the path of movement of the cartridges in said magazine so as to release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said cartridge cut-off and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; and resilient means arranged to engage said cartridge-elevating means to resiliently hold the said cartridge cut-off lip up in the path of movement of the cartridges in said magazine to detain successive cartridges being moved forwardly therein, and to resiliently hold said elevating-means in its up position for elevating a cartridge into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine resilient means is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

8. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber rearwardly thereof; a breech-bolt movable in said receiver; an actuating-cam on said breech-bolt; a magazine positioned below said cartridge-chamber and extending rearwardly of the gun, said magazine having resilient means for urging cartridges therein successively upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; a coupling-pin arranged to secure the forward end of said magazine to said receiver; cartridge-detent means comprising a cartridge cut-off pivotally supported by said coupling-pin beneath said magazine, said cut-off having a cartridge cut-off lip and a cam-engaging element, said cam-engaging element being arranged to be engaged by the actuating-cam of said breech bolt as said breech-bolt moves into breech-closing position to swing said cut-off downwardly and move said cut-off lip down out of the path of movement of the cartridges in said magazine so as to release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said cartridge cut-off and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; and resilient means arranged to engage said cartridge-elevating means to resiliently hold said pivoted cut-off upwardly and the said cartridge cut-off lip up in the path of movement of the cartridges in said magazine to detain successive cartridges being moved forwardly therein, and to resiliently hold said elevating-means in its up position for elevating a cartridge into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine resilient means is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

9. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber rearwardly thereof; a breech-bolt movable in said receiver; an actuating-cam on said breech-bolt; a magazine positioned below said cartridge-chamber and extending rearwardly of the gun, said magazine having resilient means for urging cartridges therein successively upwardly and forwardly into position adjacent the cartridge-chamber of the barrel; a coupling-pin arranged to secure the forward end of said magazine to said receiver; cartridge-detent means comprising a cartridge cut-off pivotally supported by said coupling-pin beneath said magazine, said cut-off having a cartridge cut-off lip and a cam-engaging element, said cam-engaging element being arranged to be engaged by the actuating-cam of said breech-bolt as said breech-bolt moves into breech-closing position to swing said cut-off downwardly and move said cut-off lip down out of the path of movement of the cartridges in said magazine so as to release successive cartridges being moved forwardly therein; cartridge-elevating means carried by said cartridge cut-off and arranged to elevate a cartridge in said magazine into position to be engaged by said breech-bolt for insertion into the chamber of the barrel; and resilient means secured at its forward end to said receiver by said coupling-pin and arranged to engage at its rear end against the underside of said cartridge-elevating means to resiliently hold said pivoted cut-off upwardly and the said cartridge cut-off lip up in the path of movement of the cartridges in said magazine to detain successive cartridges being moved forwardly therein, and to resiliently hold said elevating-means in its up position for elevating a cartridge into chambering position; said detent-means being so positioned that, when moved into cartridge detaining position, the pressure of said magazine resilient means is removed from the cartridge about to be chambered prior to elevation of such cartridge into final position for chambering.

10. In a repeating-firearm construction, including in combination: a receiver; a barrel having a cartridge-chamber; a breech-bolt movable in said receiver; a tubular magazine positioned below said cartridge-chamber to extend rearwardly of the gun, said tubular magazine having a magazine-throat at its upper end provided with

and arranged to be urged forwardly therein by a magazine-spring, the said cartridge-follower having a flange adjacent its rear end adapted to engage the stop-shoulder of said magazine to limit the forward movement of said follower therein; cartridge-detent means cooperatively associated with said magazine and movable to and from the path of movement of cartridges in said magazine to alternately detain and release successive cartridges being moved forwardly therein; resilient means arranged to hold said detent-means in a position for detaining a cartridge from moving forwardly in said magazine; a flange on said cartridge-follower, said flange being displaced rearwardly of the forward end thereof a distance corresponding substantially to the length of a cartridge and arranged to engage said cartridge-detent means to positively limit

the forward movement of said cartridge-follower in said magazine independently of the said stop-shoulder thereof for correctly positioning the last cartridge in said magazine for chambering by said breech-bolt; and a cam-surface on the rear face of said flange for camming said detent downwardly out of the rearward path of movement of said follower.

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ADJUSTABLE CHOKE

Filed Dec. 13, 1948

FIG. 1

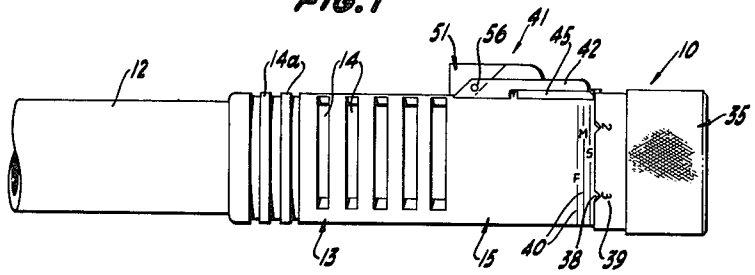


FIG. 2

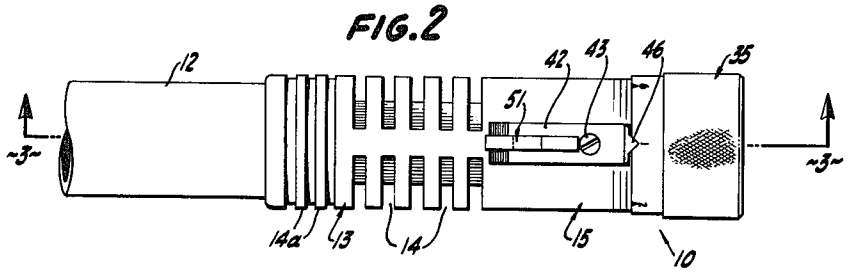


FIG. 3

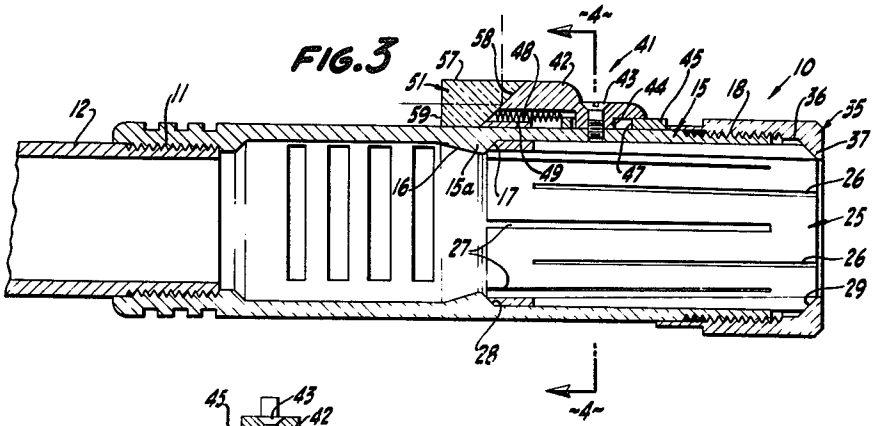
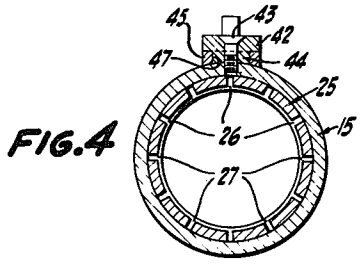


FIG. 4



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