May 2, 1961 H. H. SEFRIED II 2,982,044

SHELL EJECTING MECHANISM FOR FIREARMS OF BREAK-DOWN TYPE

Filed April 2, 1959 2 Sheets-Sheet 1

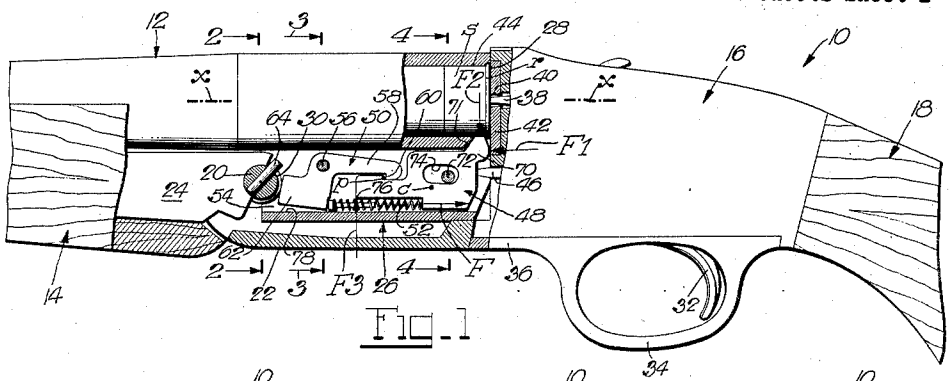

Fig. 1

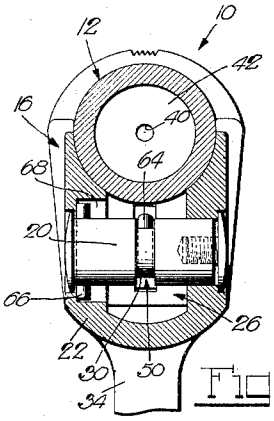

Fig. 2

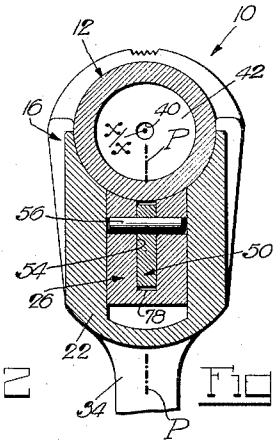

Fig. 3

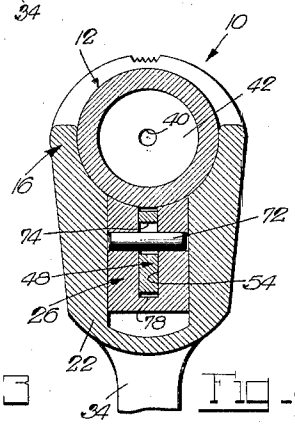

Fig. 4

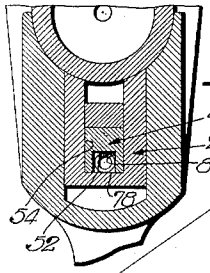

Fig. 7A

Fig. 7

INVENTOR.
Harry H. Sefried II
BY
Walter Sprungel
Attorney.

May 2, 1961 H. H. SEFRIED II 2,982,044

SHELL EJECTING MECHANISM FOR FIREARMS OF BREAK-DOWN TYPE

Filed April 2, 1959 2 Sheets-Sheet 2

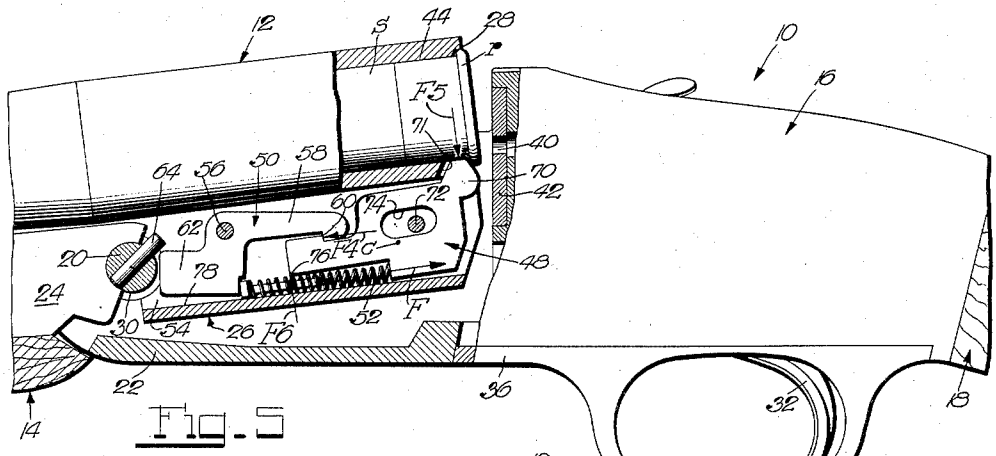

Fig. 5

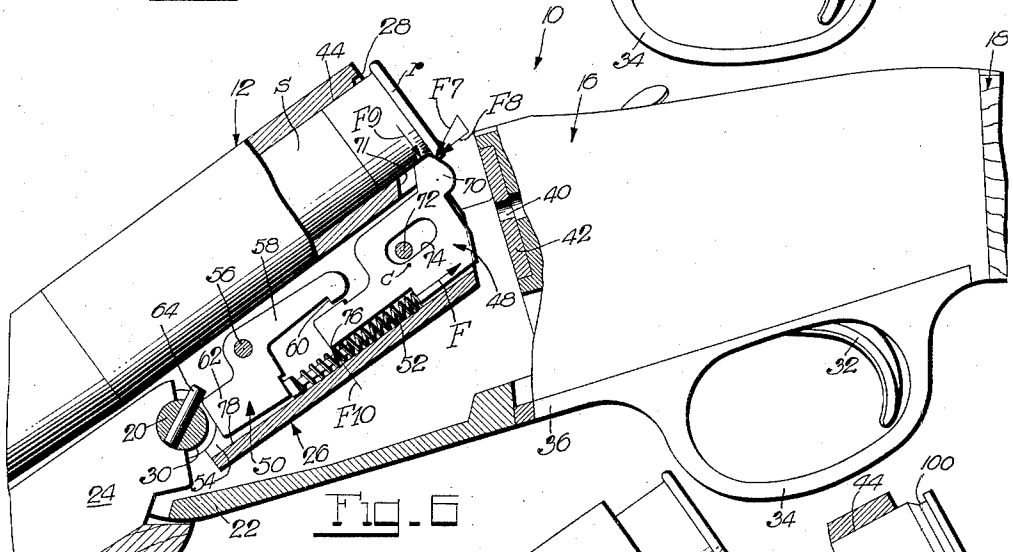

Fig. 6

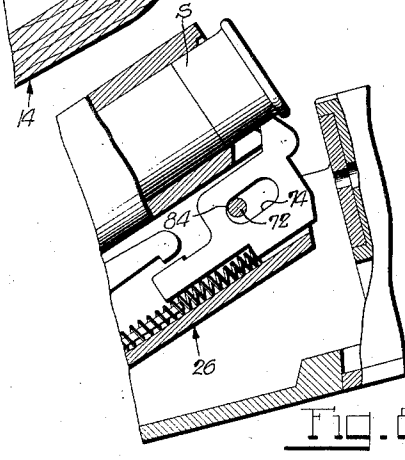

Fig. 8

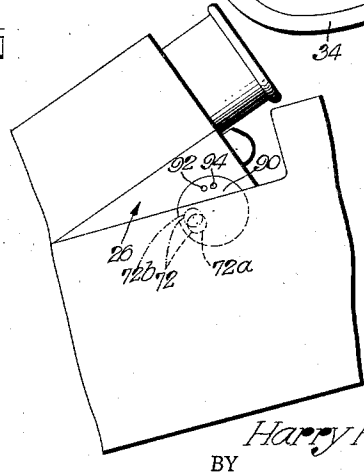

Fig. 9

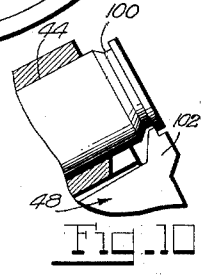

Fig. 10

INVENTOR.

Harry H. Sefried II

BY

Attorney.

United States Patent Office

2,982,044

Patented May 2, 1961

2,982,044

SHELL EJECTING MECHANISM FOR FIREARMS OF BREAK-DOWN TYPE

Harry H. Sefried II, 94 Prospect St., New Haven, Conn.

Filed Apr. 2, 1959, Ser. No. 803,690

13 Claims. (Cl. 42—47)

This invention relates to firearms in general, and to shell ejecting mechanisms in particular.

The shell ejecting mechanism with which the present invention is concerned is of the general type used in breakdown firearms. Ejecting mechanism of this type is customarily provided on the firearm barrel near its breech end and comprises a spring-powered shell ejector and a sear which releases the ejector when the path of a fired shell from the barrel chamber is cleared on breaking the action. While prior ejecting mechanisms of this type are generally satisfactory, they leave much to be desired in a few but important respects. Thus, the ejectors in these prior mechanisms are customarily guided for rectilinear motion throughout their ejection strokes and, hence, require for their reliable performance not only accurately oriented guides but also accurate fitting therein, all of which renders these mechanisms rather costly and not well suited for efficient mass production and assembly of their parts. Also, since accurate guidance of these ejectors is relied on for their reliable performance, they are not only liable to jam when dirt or other foreign matter gets to them, but they are also subjected to inevitable wear which in time will adversely affect the reliability of their performance.

It is the primary aim and object of the present invention to provide shell ejecting mechanism of this type which is not only of considerably lower cost than these prior mechanisms, but performs more reliably than the latter and even for the full life of the mechanism.

Thus, it is among the objects of the present invention to provide shell ejecting mechanism of this type in which the ejector, rather than being accurately guided for rectilinear movement as heretofore, is given deliberate freedom to move laterally into and from engagement with a shell in the barrel chamber, and the ejector and ejector spring are so arranged that the latter will not only propel the ejector on its ejection or work stroke but will also urge the same laterally into engagement with the shell. With this arrangement, pressure contact between the ejector and shell for unfailing ejection of the latter from the chamber under the full force of the ejector spring is assured at all times, and the ejector requires neither close tolerances in its dimensions nor fitting in the mechanism so that the latter lends itself to efficient mass production and assembly of its parts at low cost.

It is another object of the present invention to provide shell ejecting mechanism of this type in which the aforementioned freedom of the ejector to move laterally is further used to good advantage in retracting the same preferably somewhat prior to the end of its work stroke from engagement with the shell being ejected. With this further arrangement, the work stroke of the ejector may advantageously be rather short so that the ejector will impart to the shell in any event more than adequate inertia to fly completely from the chamber without prolonging its engagement with the shell to the point where the ejector would tend to bind the shell in the chamber

sufficiently to prevent its full ejection or even slow down its ejection.

A further object of the present invention is to provide shell ejecting mechanism of this type in which, as an alternative, the ejector is not retracted from engagement with the shell being ejected, so that the ejector will, at the end of its work stroke and by virtue of its lateral pressure engagement with the shell under the urgency of the ejector spring as aforementioned, suddenly act as a brake on the shell and stop the same after partial ejection from the barrel chamber for its intended further and complete removal from the chamber by hand.

Another object of the present invention is to provide shell ejecting mechanism of this type in which the ejector is not retracted from engagement with the shell being ejected for the aforementioned partial ejection of the latter from the barrel chamber, and the ejector is near the end of its work stroke forced into even firmer lateral engagement with the shell, thereby to increase the aforementioned brake action of the ejector on the shell after the partial ejection of the latter from the barrel chamber.

It is a further object of the present invention to provide a shell ejecting mechanism of this type in which a mere pin on the firearm barrel cooperates with the ejector just prior to the end of its work stroke in camming the same from engagement with the shell being ejected for its aforementioned retraction from the latter or, alternatively, in camming the ejector into more firm lateral engagement with the shell for its aforementioned brake action on the latter after its partial ejection from the barrel chamber.

Another object of the present invention is to provide shell ejecting mechanism of this type in which the ejector is received with a more or less loose fit in a groove in a depending barrel lug with freedom to move therein, within limits, in any direction in the plane of the groove, with a pin on the barrel lug limiting the work stroke of the ejector and also retaining the latter in its groove, and the ejector and its spring are so arranged that the spring will, for the aforementioned lateral engagement of the ejector with the shell prior to and during the ejection of the latter from the barrel chamber, merely tilt the ejector, about a part of the mechanism as a fulcrum, into such engagement with the shell. With this arrangement, there is no need for fitting the ejectors in the mechanisms other than seeing to their aforementioned more or less loose fit in their reception grooves, and the ejectors will reliably perform on even relatively wide tolerances in their dimensions and even when showing signs of wear after a long time.

A further object of the present invention is to provide shell ejecting mechanism of this type in which the aforementioned pins on the barrel lug for limiting the work stroke of the ejector and for camming the ejector from engagement, or alternatively into even firmer engagement, with a shell being ejected, are advantageously combined into a single pin performing these multiple functions.

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 fragmentary view, partly in section and partly in elevation, of a firearm embodying the present invention;

Figs. 2, 3 and 4 are enlarged sections taken on the lines 2—2, 3—3 and 4—4, respectively, of Fig. 1;

Figs. 5, 6 and 7 are enlarged fragmentary views, partly in section and partly in elevation, of the same firearm in different conditions;

Fig. 7A is a fragmentary section through a firearm embodying the present invention in a modified manner;

Fig. 8 is a fragmentary section through a firearm embodying the present invention in another modified manner;

Fig. 9 is a fragmentary view of a firearm embodying the present invention in a further modified manner; and

Fig. 10 is a fragmentary view of a firearm embodying the present invention in still another modified manner.

Referring to the drawings, and more particularly to Figs. 1 to 7 thereof, the reference numeral **10** designates a firearm having a barrel **12** suitably carried on a forearm **14**, a receiver **16** and a stock **18**. The present firearm **10** is of break-down type with its barrel **12** tiltable from firing position (Fig. 1) into shell loading or exchange position (Fig. 7). To this end, the barrel-carrying forearm **14** is pivoted on a joint pin **20** in the forepart **22** of the receiver **16**, presently through intermediation of a forearm pivot plate **24** and a barrel lug **26**. Thus, the barrel lug **26**, being suitably carried by the barrel **12** near its breech end **28**, is seated on the joint pin **20** over approximately one-half of its peripheral extent, while the pivot plate **24** is seated in a peripheral groove **30** in the joint pin **20** over part of its peripheral extent.

Provided in the receiver **16** is a conventional firing mechanism, including a trigger **32** with a guard **34** on a trigger plate **36**, and a firing pin **38** which is projectable through an aperture **40** in a breech plate **42** for firing a shell *s* in the barrel chamber **44**. The receiver **16** also contains a lock **46** suitably operable into and from interlock with the barrel lug **26** to arrest the barrel **12** in its firing position (Fig. 1) and to release it for pivotal motion into its loading position.

The barrel **12**, and presently the barrel lug **26**, carries a shell ejector **48** and an ejector sear **50**, as well as an ejector spring **52**. The ejector **48** is adapted to eject a fired shell *s* from the barrel chamber **44** when the action is sufficiently open (Fig. 7) to permit unobstructed passage of the fired shell rearwardly from the chamber **44**. To this end, the sear **50** is normally urged into interlock with the ejector **48** in its cocked position (Figs. 1 and 5), and the sear **50** is operable, and is presently automatically operated on opening the action (Figs. 6 and 7), to release the ejector for a shell ejection stroke.

The ejector **48**, sear **50** and ejector spring **52** are presently located in a groove **54** in the barrel lug **26** which, as shown in Figs. 3, 4 and 7, is received with a sliding fit in the forepart **22** of the receiver **16**. The groove **54** in the barrel lug **26** has, in the present instance, a median plane P in which lies the barrel axis *x*—*x* (Fig. 3). The sear **50**, which is pivoted on a pin **56** in the barrel lug **26**, has a rearward arm **58** with a lock shoulder **60**, and a forward arm **62**. Interposed between the ejector **48** and the forward arm **62** of the sear **50** is the aforementioned ejector spring **52** which functions to urge the ejector **48** on its ejection stroke and also to urge the sear **50** into interlock with the ejector, as will be readily understood. For the release of the cocked ejector **48**, the joint pin **20** carries a cross-pin **64** which is so angularly disposed that it will cam the sear **50** out of interlock with the ejector when the action has been sufficiently opened (Fig. 6) to permit the unobstructed passage of the fired shell *s* from the chamber **44**. In order to lock the joint pin **20** in the correct angular position of its sear-release pin **64**, the joint pin is provided with another crosspin **66** which is keyed in a groove **68** in the forepart **22** of the receiver **16** (Fig. 2). The ejector **48**, which is of longitudinal extent, has a rear finger **70** with which to eject the shell *s* from the chamber **44**. The shell *s* has the customary base rim *r* which, for the ejection of this shell, is engaged by the rear finger **70** of the ejector **48** (Figs. 1, 5 and 6). In order that the rear finger **70** of the ejector **48** may engage

the shell *s* behind its base rim *r* when the same is fully chambered (Fig. 1), the barrel **12** is there provided with a clearance notch **71**. The barrel lug **26** carries a stop pin **72** which extends into, and presently through, an elongated slot **74** in the ejector **48**, and serves to limit the ejection stroke of the latter to a fraction of the length of the shell *s*.

In accordance with an important aspect of the present invention, the ejector **48** is, for the ejection of the shell *s* from the barrel chamber **44**, not only spring-urged on its ejection stroke axially of the chamber but is also urged radially of the barrel axis *x*—*x* into engagement with the shell *s*. It is this spring-urged engagement of the ejector **48** with the chambered shell *s* radially of the barrel axis *x*—*x* which goes far in assuring unfailing ejection of the shell under the full force of the ejector spring **52**, for it makes for secure and optimum shell-ejection contact between the ejector and the customarily shallow base rim *r* of the shell. To this end, the ejector **48**, which may have a more or less loose fit in the groove **54** of the barrel lug **26**, has freedom to move therein in any direction, within limits, in the median plane P of this groove, and additional spring means may suitably be arranged in this groove to urge the ejector radially into engagement with the shell *s*. Preferably, however, the ejector spring **52** is so arranged that its force will urge the ejector **48** not only on its ejection stroke axially of the chamber **44**, but also radially of the barrel axis *x*—*x* into engagement with the chambered shell *s*.

For an analysis of the effects of the force of the ejector spring **52** on the ejector **48**, at least two, and presently three, different conditions of the ejector must be taken into consideration. Thus, the ejector **48** in the firing position of the barrel **12** (Fig. 1) may be spring-urged either against the breech plate **42** directly, or indirectly through intermediation of the base rim *r* of the fully chambered shell *s*. Assuming that the ejector **48** is spring-urged directly against the breech plate **42**, the ejector will be subjected to a force F1 (Fig. 1). Since it is presently an objective that the ejector **48**, even in its present restrained condition, be urged laterally into engagement with the shell *s*, the force F exerted by the ejector spring **52** on the ejector **48** must be so directed that the same cooperates with the force F1 in producing in the ejector a counterclockwise torque (Fig. 1) about the center of mass of the ejector, and presently about its center of gravity *c* because of its homogeneous construction. This is achieved with the present exemplary arrangement of the ejector spring **52**, for its force F clearly cooperates with the force F1 in producing in the ejector the counterclockwise torque just mentioned. Moreover, the force F of the ejector spring **52**, or at least its component axially of the chamber **44**, will urge the ejector on its ejection stroke. This counterclockwise torque will exert itself by tilting the ejector with its rear finger **70** into engagement with the chambered shell *s* and with its fore end **76** into engagement with the ejector spring **52** which presently extends along the bottom **78** of the groove **54**. Hence, on exertion of this counterclockwise torque, the ejector **48** will be subjected to two more forces F2 and F3 (Fig. 1) that produce in the ejector a clockwise torque which is, however, canceled by its counterclockwise torque, for the sums of these torques must equal zero in the now restrained condition of the ejector. However, while the ejector **48** is thus restrained, its rear finger **70** will exert on the shell *s* a reactive force of the same magnitude as and in a direction opposite to that of the force F2. Similarly, the fore end **76** of the ejector **48** will exert on the ejector spring **52** a reactive force of the same magnitude as and in a direction opposite to that of the force F3.

Reference is now had to Fig. 5 which shows the ejector **48** in its second condition. Thus, the action has been opened sufficiently for the ejector **48** to clear the breech plate **42**, with the result that the ejector spring **52** has urged the ejector, and with it the shell *s*, rearwardly to

take up the initial play *p* (Fig. 1) between the ejector and the lock shoulder **60** of the sear **50**, so that the ejector is now again restrained by reason of its interlock with the sear (Fig. 5). Among the forces now acting on the ejector **48** is the spring force F, and a force F4 by virtue of the interlock between the ejector and sear. This force F4 cooperates with the spring force F in producing in the ejector **48** a counterclockwise torque (Fig. 5) which will hold the ejector tilted with its rear finger **70** and fore end **76** in yielding engagement with the chambered shell *s* and the ejector spring **52**, respectively. The forces F5 and F6 thus acting additionally on the ejector **48** produce in the latter a clockwise torque which, in the present restrained condition of the ejector, cancels its aforementioned counterclockwise torque. Thus, the rear finger **70** and fore end **76** of the ejector **48** bear against the shell *s* and the ejector spring **52** with reactive forces of the same magnitude as but in directions opposite to those of the forces F5 and F6, respectively.

Reference is now had to Fig. 6 which shows the ejector **48** in its third condition. Thus, the action has been sufficiently opened to release the ejector **48** from interlock with the sear **50**, with the ejector free to pass through its ejection stroke under the urgency of its spring **52**. Among the forces acting on the ejector **48** on its release from the sear **50** are the spring force F, and a force F7 by virtue of the engagement of its rear finger **70** with the base rim *r* of the shell *s* which resists its ejection from the chamber **44** with more or less force F8. These forces cooperate in producing in the ejector a counterclockwise torque (Fig. 6) which will hold the ejector tilted with its rear finger **70** and fore end **76** in yielding engagement with the shell *s* and the ejector spring **52**, respectively. The forces F9 and F10 thus acting additionally on the ejector **48** produce in the latter a clockwise torque which cancels its aforementioned counterclockwise torque. Thus, the rear finger **70** and the fore end **76** of the ejector **48** bear against the shell *s* and the ejector spring **52** with reactive forces of the same magnitude as but in directions opposite to those of the forces F9 and F10, respectively.

It follows from the preceding that with the explained arrangement of the ejector spring, and especially on applying its force to the ejector directionwise generally as described, the rear finger **70** of the ejector will yieldingly bear laterally against the chambered shell *s* with some force prior to and during the ejection of the latter with the ejector as desired. Of course, the forces with which the ejector will be urged on its ejection stroke and with which the same will be urged into lateral engagement with a chambered shell may be varied widely to suit different desired ejector actions, by changing some of the factors involved in achieving spring urgency of the ejector on its ejection stroke and also into lateral engagement with a chambered shell. Some of these factors involve the size and shape of the ejector, the magnitude and direction of the spring force and its lever arm with respect to the center of gravity of the ejector, and the fit of the shell in the chamber **44**, for example. Insofar as the fit of the shell in the chamber is concerned, the same is desirably relatively loose to permit mechanical shell ejection in the first place, and assure shell ejection with reasonably forceful, but not overly forceful, ejector springs in the second place. This means, of course, that the force with which the ejector is during its ejection stroke urged into lateral engagement with a shell being ejected is not of large magnitude, and will ordinarily be of smaller magnitude than the force which urges it into such shell engagement prior to its ejection stroke. Nevertheless, and regardless of the magnitude of this force on the shell during the ejection stroke of the ejector, this force has been found to be highly advantageous and effective in unfailingly ejecting shells by keeping the ejector and the base rim of the shell in secure and optimum ejecting contact with each other.

It also follows from the preceding that the fore end **76** of the ejector **48** will, during the ejection stroke of the latter, slide in the present example on top of the ejector spring **52** while being forced into yielding engagement therewith. Thus, the ejector spring **52**, in its present exemplary arrangement on the bottom **78** of the groove **54** in the barrel lug **26**, serves as a track for the fore end of the ejector. This track extends generally longitudinally of the barrel chamber and may extend parallel to the barrel axis *x*—*x*. The this end, the bottom **78** of the groove **54** in the barrel lug **26** extends longitudinally of the chamber **44**, and presently parallel to the barrel axis *x*—*x*.

For practical reasons, the ejection stroke of the ejector **48** is desirably relatively short. Thus, in one contemplated mode of operation of the ejector **48** the same is to eject a shell completely from the barrel chamber **44**. This may be achieved in some applications despite a relatively short ejection stroke of the ejector **48**. Thus, the ejector, on its brief but quick rearward motion as well as forced lateral engagement with the shell under the action of its spring **52**, will quickly and forcefully impart to the shell considerable inertia which in some instances may be adequate for its continued and full ejection even after the ejector has reached the end of its ejection stroke. On the other hand, if the ejection stroke of the ejector **48** were considerably longer, the force with which the same laterally engages the shell being ejected might well bind the latter to the chamber sufficiently to stop its full ejection therefrom.

Reference is now had to Fig. 7A that shows a track arrangement for the ejector **48** which may be preferred to the track-serving ejector spring **52** in Figs. 1, 5 and 6. Thus, the ejector spring **52** (Fig. 7A), while still arranged along the bottom **78** of the groove **54** in the barrel lug **26**, is received in a bottom groove **80** in the fore part of the ejector **48** which extends down to the bottom **78** of the lug groove **54**, so that this groove bottom **78** in the barrel lug **26** becomes the track.

In accordance with another important aspect of the present invention, the ejector **48** may, prior to the end of its ejection stroke, be retracted from lateral engagement with a shell being ejected, thereby making certain that the shell will be fully ejected from the chamber without being subjected to any brake action from the ejector. This is achieved, in the present example, through cooperation between the stroke-limiting pin **72** in the barrel lug **26** and the slot **74** in the ejector **48**. Thus, and as will be observed in Figs. 1, 5 and 6, the pin **72** clears the slot **74** when the sear locks the ejector in its cocked position and while the latter is on its ejection stroke, so as then not to interfere with the described spring-urged lateral engagement of the ejector with the shell in the chamber. However, the pin **72** is so located in the barrel lug **26** that the same will, just prior to the end of the ejection stroke of the ejector **48**, be engaged by a cam face **82** of the slot **74** in the ejector (Fig. 7) so that the latter will be retracted from the shell before the ejector reaches the end of its ejection stroke. The cam face **82** is, in the present example, a lower part of the rounded endwall of the slot **74** in the ejector.

With this arrangement, the ejector **48** will over almost its entire, relatively short ejection stroke impart to the shell *s* inertia which in any event is adequate to throw the shell completely from the chamber with most any desired force, and the ejector will not in the least interfere with the shell's exit from the chamber despite its short ejection stroke which is but a relatively small fraction of the shell length. Thus, Fig. 7 shows the shell *s* shortly after the ejector has retracted from the shell and reached the end of its ejection stroke, and the shell does not stop there but continues its flight clear of the chamber. With this arrangement also, the ejector, under the urgency of a more powerful spring, will assuredly fully eject a shell from the chamber where it would fail to do so if it were not retracted from the shell just prior to the

end of its ejection stroke. Of course, this latter contingency may well be another contemplated mode of operation of the ejector, involving partial ejection of the shell by the ejector and its complete removal from the chamber by hand. This may be achieved by locating the pin 72 in, or shifting it to, the middle of the adjacent round endwall of the ejector slot 74 (Fig. 7), and otherwise arranging the parts of the ejecting mechanism so that the ejector will at the end of its ejection stroke laterally engage the shell with adequate force to cause the same to come to a stop while still partly in the barrel chamber.

Still another contemplated mode of operation of the ejector calls for partial ejection of shells from the barrel chamber by the ejector and positively controlled stoppage of the shells in substantially the same partially ejected position for their complete removal from the chamber by hand. This is achieved by camming the ejector throughout a final part of its ejection stroke into firmer lateral engagement with a shell being ejected, so that the ejector will at least at the end of its ejection stroke exert on the shell a brake force which soon will stop the shell. Fig. 8 shows such an arrangement in which the pin 72 is so located in the barrel lug 26 that it will be engaged by a cam face 84 on the ejector which, in the present example, is formed by an upper part of the endwall of the ejector slot 74 that engages the pin 72 throughout a very brief final part of the ejection stroke of the ejector and cams the latter into firmer engagement with the shell. In consequence, the shell presently in the chamber and all subsequent shells will on their ejection be stopped in substantially the same position which may be like or similar to that shown in Fig. 8.

Reference is now had to Fig. 9 which shows a conversion feature of the shell ejecting mechanism. Thus, the stroke-limiting pin 72, instead of being located directly in the barrel lug 26 as in the other forms of the firearm, is carried by a disc 90 in one side of the barrel lug. This disc 90 is turnable to shift the pin 72 into the dotted-line position 72*a* or into the dot-and-dash line position 72*b* which may correspond to the positions of the pin 72 in Figs. 7 and 8, respectively, and the disc 90 may be arrested in either of the pin positions 72*a* or 72*b* by being pinned at 92 or 94 to the barrel lug 26. Thus, with the pin in its position 72*a* (Fig. 9), which corresponds to the position of the pin 72 in Fig. 7, the ejector 48 will just prior to the end of its ejection stroke be retracted from the shell so that the latter will continue its motion completely out of the chamber. Conversely, with the pin in its position 72*b* (Fig. 9), which corresponds to the position of the pin 72 in Fig. 8, the ejector will through a very brief final part of its ejection stroke be cammed into firmer engagement with the shell being ejected, with the result that the latter will soon be stopped for its remaining removal from the chamber by hand.

The present ejecting mechanism also lends itself to the ejection of shells or cartridges having, in lieu of a base rim, a base groove 100 (Fig. 10). This requires only a modified rear finger 102 of the ejector 48 which under the urgency of the ejector spring snaps into interlock with the groove 100.

While in all forms of the firearm the lateral urge of the ejector into engagement with a shell in the chamber prior to and during the ejection stroke of the ejector is functionally highly advantageous as has been pointed out, it is also highly advantageous from a structural standpoint. Thus, the more or less loose fit of the ejector in the groove in the barrel lug and its freedom otherwise therein requires neither close dimensional tolerances of the ejector nor fitting of the latter in its reception groove. Also, since the ejector in action is tilted into engagement at its opposite ends with the shell and track, the ejector is subjected to inappreciable wear at the most. Moreover, the ejector will perform reliably despite wear which may occur after a long time, for the action of the ejector spring will compensate for any wear of the ejector.

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.

What is claimed is:

1. In a firearm of break-down type having a tiltable barrel with an axial chamber for a shell with a base shoulder, the combination of an ejector with a head to thrust against the shoulder of a chambered shell for its ejection from the chamber; means on the barrel for mounting said ejector for movement axially of the chamber for a shell ejection stroke and also for movement with its head radially of the chamber into and from engagement with a chambered shell adjacent the base shoulder thereof; a spring urging said ejector on its ejection stroke; and sear means having a lock shoulder between said chamber and spring and being operable to retract the shoulder from said ejector for its release for an ejection stroke, said spring being also arranged to exert on said ejector while locked to said sear shoulder and during an ejection stroke a force yieldingly urging the same with its head radially into engagement with a chambered shell.

2. In a firearm of break-down type having a tiltable barrel with an axial chamber for a shell with a base shoulder, the combination of a track on the barrel longitudinally of and spaced from the chamber; a longitudinal ejector with a head at one end to thrust against the shoulder of a chambered shell for its ejection from the chamber, said ejector extending longitudinally of the chamber and being carried by the barrel between the chamber and track for a shell-ejection stroke axially of the chamber and with freedom to move in any other direction substantially in a plane in which the chamber axis lies; spring means on the barrel urging said ejector on its ejection stroke; a sear having a lock shoulder between said chamber and spring means and being normally urged with its shoulder into interlock with said ejector and operable to release the latter for an ejection stroke; and a stop on the barrel to limit the ejection stroke of said ejector, said spring means being also arranged to produce in said ejector while interlocked with said sear and during an ejection stroke a directional torque yieldingly tilting the same in said plane with its head into engagement with a chambered shell adjacent the base shoulder thereof and with its other end into engagement with said track.

3. The combination in a firearm as set forth in claim 2, in which said stop limits the ejection stroke of said ejector to a fraction of a shell length, and there is further provided an element on the barrel cooperating with said ejector prior to the end of its ejection stroke in tilting said ejector from engagement with a shell being ejected.

4. The combination in a firearm as set forth in claim 2, in which said stop limits the ejection stroke of said ejector to a fraction of a shell length, and there is further provided an element on the barrel cooperating with said ejector throughout a final part of its ejection stroke in camming said ejector into firmer engagement with a shell being ejected for braking the ejection of the latter at least at the end of the ejection stroke of said ejector.

5. The combination in a firearm as set forth in claim 2, in which said stop limits the ejection stroke of said ejector to a fraction of a shell length, and said stop also cooperates with said ejector prior to the end of its ejection stroke in tilting said ejector from engagement with a shell being ejected.

6. The combination in a firearm as set forth in claim 2, in which said stop limits the ejection stroke of said ejector to a fraction of a shell length, and said stop also cooperates with said ejector throughout a final part of

its ejection stroke in camming said ejector into firmer engagement with a shell being ejected for braking the ejection of the latter at least at the end of the ejection stroke of said ejector.

7. In a firearm of break-down type having a tiltable barrel with an axial chamber for a shell with a base shoulder, the combination of a track on the barrel longitudinally of and spaced from the chamber; a longitudinal ejector with a head at one end to thrust against the shoulder of a chambered shell for its ejection from the chamber, said ejector extending longitudinally of the chamber and being carried by the barrel between the chamber and track for a shell-ejection stroke axially of the chamber and with freedom to move in any other direction substantially in a plane in which the chamber axis lies; a compression spring urging said ejector on its ejection stroke; a sear on the barrel having between said chamber and spring a shoulder interlockable with said ejector and being operable to release the latter for an ejection stroke; and a stop on the barrel to limit the ejection stroke of said ejector, said compression spring being so interposed between said ejector and sear as to urge the latter into interlock with the former and also produce in said ejector while interlocked with said sear and during an ejection stroke a directional torque yieldingly tilting the same in said plane with its head into engagement with a chambered shell adjacent the base shoulder thereof and with its other end into engagement with said track.

8. In a firearm of break-down type having a tiltable barrel with an axial chamber for a shell with a base shoulder, the combination of a track on the barrel longitudinally of and spaced from the chamber; a longitudinal ejector with a head at one end to thrust against the shoulder of a chambered shell for its ejection from the chamber, said ejector extending longitudinally of the chamber and being carried by the barrel between the chamber and track for a shell-ejection stroke axially of the chamber and with freedom to move in any other direction substantially in a plane in which the chamber axis lies; a sear with a shoulder on the barrel normally urged with its shoulder into interlock with said ejector and operable to release the latter for an ejection stroke; a stop on the barrel to limit the ejection stroke of said ejector; and a preloaded spring on the barrel between said sear shoulder and track and arranged to exert on said ejector a force directed substantially longitudinally of the chamber on the side of the center of mass of said ejector away from the chamber to urge said ejector on its ejection stroke and produce in said ejector while interlocked with said sear shoulder and during an ejection stroke a directional torque yieldingly tilting the same in said plane with its head into engagement with a chambered shell adjacent the base shoulder thereof and with its other end into engagement with said track.

9. In a firearm of break-down type having a tiltable barrel with an axial chamber for a shell with a base shoulder, the combination of a depending lug on the barrel having a groove with a median plane in which the chamber axis lies with the bottom of the groove extending longitudinally of and being most remote from the chamber; a longitudinal ejector with a head at one end to thrust against the shoulder of a chambered shell for its ejection from the chamber, said ejector being longitudinally received in said lug groove for a shell-ejection stroke axially of the chamber and with freedom to move therein in any other direction in said plane; a sear with a shoulder pivotally mounted in said lug groove for interlock of its shoulder with said ejector and for retraction therefrom to release the latter for an ejection stroke; a pin in said barrel lug extending into the groove therein to limit the ejection stroke of said ejector; and a preloaded compression spring in said lug groove between the bottom thereof and said sear shoulder and interposed between said ejector and sear to urge the latter into interlock with the former, and to urge said ejector on its ejection stroke as well as produce in said ejector while interlocked with said sear shoulder and during an ejection stroke a directional torque yieldingly tilting the same in said plane with its head into engagement with a chambered shell adjacent the base shoulder thereof and with its other end into engagement with said groove bottom.

10. The combination in a firearm as set forth in claim 9, in which said pin limits the ejection stroke of said ejector to a fraction of a shell length, and said ejector has a slot with one end semi-circular into which said pin extends with clearance in any position of said ejector except throughout a final part of its ejection stroke when it is engaged by said one slot end, with said pin located to cooperate with a part of said one slot end in camming said ejector from engagement with a shell being ejected prior to the end of the ejection stroke of said ejector.

11. The combination in a firearm as set forth in claim 9, in which said pin limits the ejection stroke of said ejector to a fraction of a shell length, and said ejector has a slot with one end semi-circular into which said pin extends with clearance in any position of said ejector except throughout a final part of its ejection stroke when it is engaged by said one slot end, with said pin located to cooperate with a part of said one slot end in camming said ejector into firmer engagement with a shell being ejected for braking the ejection of the latter at least at the end of the ejection stroke of said ejector.

12. The combination in a firearm as set forth in claim 9, in which said pin limits the ejection stroke of said ejector to a fraction of a shell length, and said ejector has a slot with one end semi-circular into which said pin extends with clearance in any position of said ejector except throughout a final part of its ejection stroke when it is engaged by said one slot end, with said pin being adjustable to cooperate with different parts of said one slot end in camming said ejector from engagement with a shell being ejected prior to the end of the ejection stroke of said ejector and in camming said ejector into firmer engagement with a shell being ejected for braking the ejection of the latter at least at the end of the ejection stroke of said ejector, respectively.

13. In a firearm of break-down type having a tiltable barrel with a chamber, the combination of a track on the barrel longitudinally of and spaced from the chamber; an ejector member having a shell ejection stroke and being carried by the barrel between the chamber and track with freedom to move in any direction substantially in a plane in which the barrel axis lies; a sear normally urged into interlock with said ejector member and operable to release the latter for an ejection stroke; spring means on the barrel arranged to urge said ejector member on its ejection stroke and produce in said ejector member a directional torque holding the same tilted in yielding engagement with said track and with a chambered shell for the ejection of the latter with said ejector member; and a stop member on the barrel to limit the ejection stroke of said ejector member to a fraction of a shell length, one of said members having cam surfaces adapted throughout a final part of the ejection stroke of said ejector member to cooperate with the other member in camming said ejector member from engagement with a shell being ejected prior to the end of the ejection stroke of said ejector member and in camming said ejector member into firmer engagement with a shell being ejected for braking the ejection of the latter at least at the end of the ejection stroke of said ejector member, respectively, and said stop member being adjustable to bring either of said cam surfaces and said other member into cooperative relation with each other.

References Cited in the file of this patent

UNITED STATES PATENTS

763,458	Beach	June 28, 1904
1,322,287	Burton	Nov. 18, 1919
2,108,130	Lewis	Feb. 15, 1938