Aug. 20, 1957 E. P. SIMMONS 2,803,080

CARTRIDGE DEFLECTOR FOR SHOTGUNS

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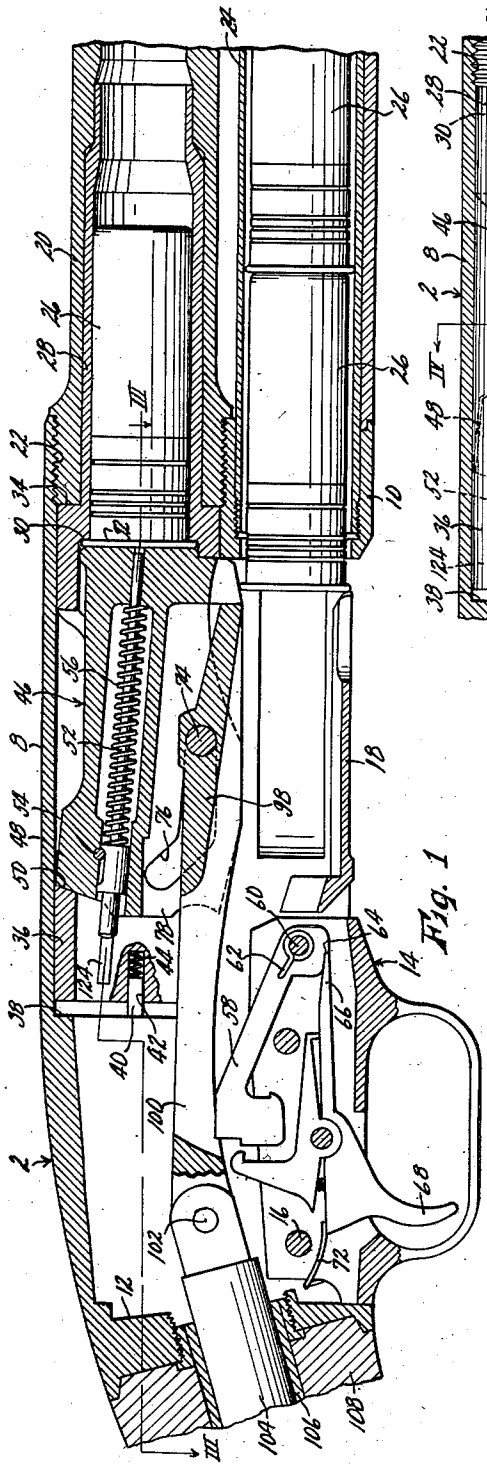


Fig. 1

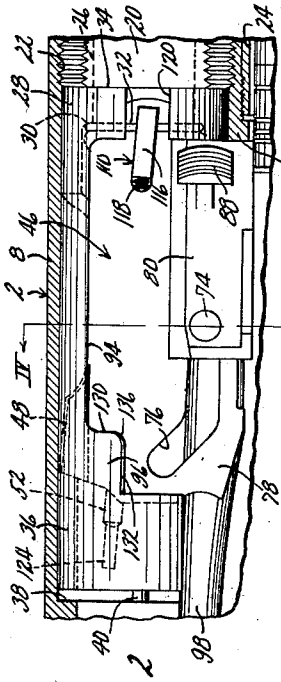


Fig. 2

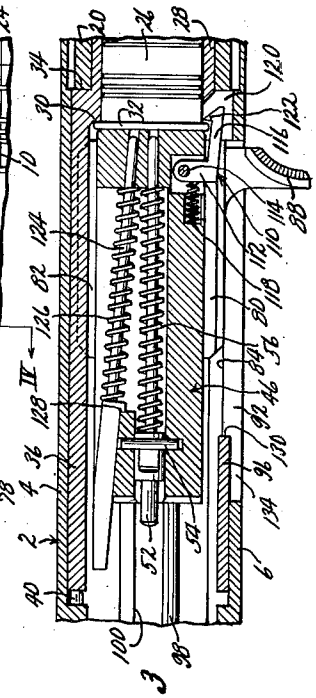


Fig. 3

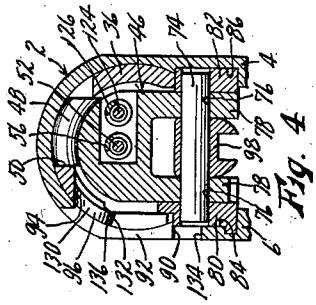


Fig. 4

INVENTOR.
Ernest P. Simmons
BY Hamilton & Hamilton
Attorneys.

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CARTRIDGE DEFLECTOR FOR SHOTGUNS

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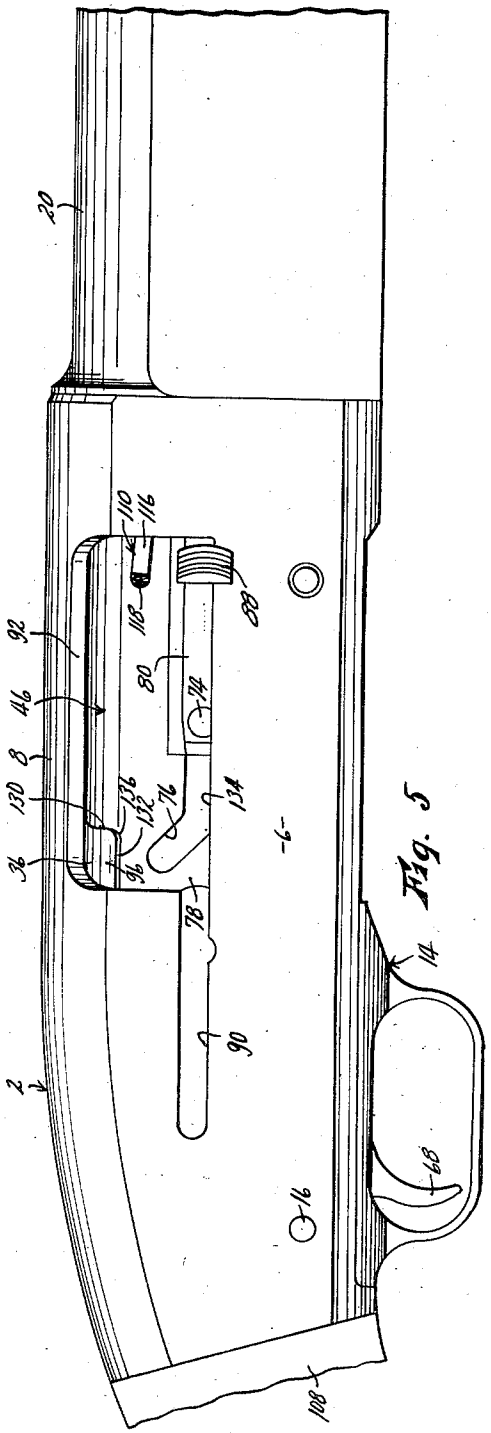


Fig. 5

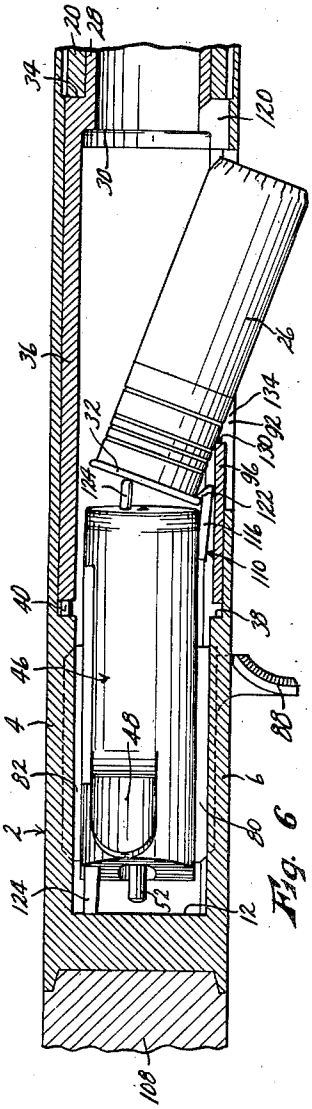


Fig. 6

INVENTOR.
Ernest P. Simmons
BY Hamilton & Hamilton
Attorneys.

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CARTRIDGE DEFLECTOR FOR SHOTGUNS

Ernest P. Simmons, Kansas City, Kans., assignor to Olin Mathieson Chemical Corporation, a corporation of Virginia

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3 Claims. (Cl. 42—25)

This invention relates to new and useful improvements in shotguns, and has particular reference to the means for ejecting the cases of exploded shells when the gun is fired.

In the usual shotgun, as the bolt recoils rearwardly after the gun is fired, an extractor carried by the bolt engages the rim of the exploded shell and pulls said shell out of the chamber. As the bolt reaches the rearward limit of its travel, an ejector rod is projected through the head of the bolt and impinges on the base of the shell. Since said ejector pin is offset laterally from the extractor tooth, the ejector serves to pivot the shell case transversely outwardly through an opening formed in the gun housing, or receiver. The shell case is thus ordinarily ejected with considerable speed and force and often strikes other gunners standing near. This is particularly true in match shooting, where the gunners often stand abreast on a firing line.

The principal object of this invention, therefore, is the provision of means for decreasing or dampening the force and speed with which the gun will eject expended shells, so that they will fall very close to the gun rather than being projected considerable distances. In general, this object is accomplished by placing a deflector in the injection opening, disposed as will be fully described hereinafter, so as to interrupt the movement of the shell and consume most of the momentum thereof. This deflector engages and obstructs the shell after it has been engaged by the ejector, and thus does not act through the shell to retard or brake the bolt movement. In automatic guns, the bolt in its movement also actuates the reloading mechanism, and the ejection brake therefore should not limit or retard the bolt action.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability to be applied to pre-existing guns with a minimum of alteration and expense.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawing, wherein:

Fig. 1 is a longitudinal vertical mid-sectional view, with parts left in elevation, of the receiver, chamber, and related portions of an automatic shotgun embodying the present invention.

Fig. 2 is a fragmentary view similar to Fig. 1, with additional parts left in elevation.

Fig. 3 is a fragmentary, slightly irregular sectional view taken on line III—III of Fig. 1, with parts left in elevation.

Fig. 4 is a fragmentary sectional view taken on line IV—IV of Fig. 2.

Fig. 5 is an external side elevational view of the general area of the gun shown in Fig. 1.

Fig. 6 is a sectional view taken on line III—III of Fig. 1, with the parts shown in the position assumed at a moment during the actual ejection of a shell case and with parts left in elevation.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to the receiver portion of an automatic shotgun of the split-

chamber type, said receiver being hollow and elongated longitudinally of the gun, and having left and right side walls 4, and 6, top wall 8, front wall 10, rear wall 12, and being open at the bottom. The rearward portion of the bottom opening is closed by a trigger frame 14 held in the receiver by an assembly pin 16. The forward portion of the bottom opening is occupied by a shell carrier 18 carried movably by trigger frame 14. Said shell carrier in itself, forms no part of the present invention, but its function will be described briefly below.

The gun barrel 20 is threaded into a bore 22 formed through front wall 10 of the receiver, and communicates with the interior of the receiver. A magazine tube 24 is disposed beneath and parallel to the barrel, and is also threaded at its rearward end into front wall 10 of the receiver in communicating relation with the interior of said receiver. Shells 26 carried in said magazine tube are urged rearwardly by a magazine spring, not shown, carried in the forward end portion of said tube.

Carried for longitudinal sliding movement in the rearward end portion of the barrel is a tubular chamber 28 adapted to receive a shell 26 therein as best shown in Figs. 1 and 3. Said chamber is provided at its rearward end with an internal shoulder 30 against which the rim 32 of the shell abuts, and an external shoulder 34 which normally abuts the rearward end of the barrel. The chamber is provided with a rearward extension 36 disposed within receiver 2, said extension having the form generally of a downwardly opening semi-cylinder. The rearward end of said extension terminates in spaced relation to a forwardly facing shoulder 38 formed internally in receiver 2. As best shown in Figs. 1–3, a pin 40 is carried slidably in a bore 42 formed in the wall of said extension, and is urged rearwardly against shoulder 38 by a compression spring 44 carried in said bore. The chamber shoulder 34 is thus urged forwardly at all times toward engagement with the rearward end of the barrel.

The bolt 46, when the gun is closed, is disposed within chamber extension 36, the forward end thereof abutting the rearward end of the shell in the chamber, as shown in Figs. 1–3. Adjacent its rearward end, said bolt is provided with an upwardly projecting lug 48, which projects into a slot 50 formed in the top portion of chamber extension 36, whereby to lock the bolt against rearward movement relative to the extension. The mating surfaces of lug 58 and slot 50 are inclined whereby to provide a cam action forcing the bolt firmly forwardly as the lug rises into the slot. The bolt carries a firing pin 52 therein. Said firing pin is urged rearwardly in said bolt against a stop pin 54 by a spring 56, so that the forward end thereof is normally disposed rearwardly of the forward end of the bolt, and the rearward end thereof projects rearwardly from the back end of the bolt. A hammer 58 pivoted in trigger frame 14 at 60 is urged pivotally forwardly by spring 62 to strike the rearward end of the firing pin to drive it forwardly to detonate the shell in the chamber in the usual manner. Said hammer is normally retained in its cocked position by the engagement in a notch 64 thereof of the toe 66 of a trigger 68 pivoted in frame 14 at 70. When the trigger is pulled rearwardly against the pressure of trigger spring 72, the toe 66 thereof is disengaged from hammer notch 64, and the hammer functions as described.

The bolt is supported in the receiver by a horizontal pin 74 extending transversely of the gun and passing through a pair of matching slots 76 formed in a pair of side walls 78 which are integral with and depend from the bolt. The forward end portions of said slots, in which pin 74 is disposed when the bolt is closed, are substantially horizontal. The rearward portions of said slots are inclined upwardly and rearwardly, for a purpose which will appear. Pin 74 extends outwardly from the sides of

the bolt, and the ends thereof are mounted in slides **80** and **82**. Said slides are mounted for forward and rearward sliding movement respectively in grooves **84** and **86** formed in the inner surfaces of receiver side walls **6** and **4** (see Fig. 4). The right slide **80** is provided with a thumb-piece **88** which projects outwardly through a slot **90** formed in receiver side wall **6**, whereby the slide may be operated manually. Said slot is upwardly enlarged as at **92** to form an opening in the receiver wall through which expended shell cases may be ejected. As best shown in Fig. 5, said ejection opening is substantially rectangular, being of a length and height sufficiently great to permit movement of a shell therethrough. As best shown in Fig. 2, the wall of chamber extension **36** adjacent receiver wall **6** is also cut away as indicated at **94** to form an opening registering with opening **92**. Opening **94** is partially blocked by a rectangular obstruction or deflector **96** at the upper rear corner thereof. The function of this deflector in combination with the usual extractor and ejector forms the subject matter of this invention, and will be fully discussed below.

A link **98** is pivoted on pin **74** between bolt side walls **78**, and extends rearwardly through the receiver. Hammer **58** operates through a slot **100** formed in said link. At its rearward end, said link is pivoted at **102** to an inertia rod **104** which is carried for longitudinal sliding movement in a tubular extension **106** of the receiver, said extension being disposed in the stock **108** of the gun. A recoil spring, not shown, is disposed in tube **106** behind rod **104**, and urges said rod forwardly.

The general operation of the gun is as follows: When the gun is fired as previously described, the chamber **28**, extension **36**, and bolt **46** first recoil rearwardly as a unit against the pressure of spring-loaded pin **40**, since the bolt is locked in the chamber extension by lug **48**. The bolt motion is also transmitted through pin **74** and link **98** to inertia rod **104**, imparting substantial momentum thereto. The rearward movement of the chamber is arrested after a very short travel by engagement of the rearward end of extension **36** with receiver shoulder **38**, but inertia rod **104** continues rearwardly by its momentum, carrying pin **74** rearwardly in bolt slots **76**. When pin **74** engages the inclined rearward portions of said slots, it cams the rearward end of the bolt downwardly, lowering bolt lug **48** from slot **50** of the chamber extension. The momentum of the inertia rod then carries the bolt rearwardly independently of the chamber. During this movement the expended shell case is withdrawn from the chamber by extractor **110**. Said extractor comprises a generally L-shaped lever having one arm **112** pivoted in the bolt on vertical pivot pin **114** and projecting outwardly from the bolt transversely of the gun at the side thereof containing ejection opening **92**, and an arm **116** extending forwardly along the side of the bolt to a point ahead of the bolt. Arm **116** is urged resiliently toward the bolt by a spring **118** carried in the bolt. Arm **116** extends forwardly, when the bolt is in battery position, into a notch **120** formed through the rim of chamber **28** between shoulders **30** and **34** thereof, and is provided at its forward end with a tooth **122** which engages the forward side of the rim **32** of the shell in the chamber.

The bolt also carries an ejector pin **124** for longitudinal sliding movement in approximately parallel relation to but spaced apart from the firing pin. The forward end of the ejector pin is operable to be projected forwardly through the face of the bolt to engage the base of the shell, but is normally urged rearwardly by a spring **126** carried in the bolt to retract the forward end thereof within the bolt. In the retracted position, a shoulder **128** (Fig. 3) formed on the ejector engages a matching shoulder in the bolt, and the rearward end of the ejector projects rearwardly from the bolt.

As the bolt approaches the rearward limit of its recoil movement, extractor **110** pulling the expended shell case **26** therewith as previously described, the rearward end of ejector **124** strikes the back wall **12** of the receiver (see Fig. 6) and is stopped thereby. The bolt continues its rearward movement, thereby causing the forward end of the ejector to project forwardly of the bolt, striking the base of shell **26** and pivoting it sharply about extractor tooth **122**, and outwardly through the ejection opening **92** of the receiver. If it were not for the presence of deflector **96** in the ejection opening, the shell case would be ejected with substantial speed and force, spinning on a vertical transverse axis. Normally the shell is thrown so far and with such force as to constitute a distinct annoyance, if not an actual hazard, to other shooters or persons standing nearby.

On the other hand, it is not practical to reduce the ejection force itself by reducing the momentum of the bolt itself, as by strengthening the recoil spring, lightening the weight of the inertia rod, or the like. In an automatic gun the bolt must perform certain functions which for efficiency require the full momentum of the bolt. For example, during its recoil stroke, the bolt and link **98** function to recock the hammer **58**, and on its return stroke the bolt engages mechanism, not shown, carried by trigger frame **14** and operable to elevate shell carrier **18** to move a new shell into the path of the bolt to re-load the gun. Deflector **96** serves to absorb or dissipate the momentum of the ejected shell after the action of the ejector itself on the shell is completed, and does not affect the momentum of the bolt.

Considering in detail the action of deflector **96**, it will be seen that as the shell is pivoted about extractor tooth **122**, and either at the time or immediately after bolt **46** has completed its rearward movement, so that the shell is moving only by its own momentum, the shell will strike the forward edge **130** of deflector **96**. The striking of any obstruction in its path will of course dissipate at least a portion of the energy of a thrown body. Moreover, it will be noted also that forward edge **130** is and must be located to the rear of the center of gravity of the shell case, in order that the forward end portion of the shell cases will continue its outward movement even after the shell case strikes the obstruction. In other words, after the shell case strikes edge **130**, it continues to spin in the same direction, but the axis of spin is shifted suddenly from extractor tooth **122** to deflector edge **130**. This means that the angular momentum of the rearward or base portion of the shell case behind edge **130** must be suddenly reversed. This reversal also uses up a portion of the total momentum of the shell case and reduces the distance it will travel.

Furthermore, it will be noted that the lower edge **132** of deflector **96** is disposed above the center line of the shell case, so that as the case engages the forward edge of the deflector, and pivots therearound, said deflector cams the shell case downwardly. Since the vertical distance between the lower edge **132** of the deflector and the lower edge **134** of ejection opening **92** is less than the diameter of the shell case, the downward camming of the shell case by the deflector causes the shell to ride along the bottom edge **134** of the ejection opening with a degree of friction, which further uses or dissipates the momentum of the shell case and cause it to fall close to the gun. The friction is still further increased by rounding or bevelling the lower forward corner of deflector **96**, as indicated at **136**. This causes the shell case to be wedged with greater force against the edge **134** of the ejection opening and hence increases the frictional brake thereon. The angle of the bevel could be varied to provide closer control of the ejection throw if desired.

While I have shown and described a specific embodiment of my invention, it will be apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. The combination, with a shotgun including a receiver having a generally rectangular ejection opening formed in a side wall thereof, said opening being of a size to permit transverse movement of a shell case therethrough, a chamber disposed forwardly of said opening and adapted to contain a shell to be fired, a bolt carried in said receiver for forward and rearward movement, the face of said bolt being movable from a position abutting the base of a shell in said chamber to a position approximately registering with the rearward edge of said ejection opening, an extractor carried by said bolt and operable to grip the rim of a shell in said chamber at the side thereof adjacent said ejection opening, means operable by the recoil force of the gun to move said bolt to its rearward position, whereby said shell is extracted from the chamber by said extractor and moved into substantial registry with said ejection opening, and an ejector carried by said bolt and operable during the final portion of the rearward movement of the bolt to extend through the face of the bolt and engage the base of said shell in transversely offset relation from said extractor, whereby said shell is pivoted outwardly through said ejection opening around said extractor, of a deflector comprising: a member partially obstructing said ejection opening, said deflector extending forwardly from the rearward end of said opening to a point forward of the front end of said ejector, as it projects from said bolt, said deflector extending inwardly from a side edge of said ejection opening, the distance between the inner edge of said deflector and the opposite side edge of said ejection opening being less than the diameter of said shell case.

2. The structure as set forth in claim 1 wherein said deflector extends inwardly from a side edge of said ejection opening, the distance between the inner edge of said deflector and the opposite side edge of said ejection opening being less than the diameter of said shell case, and wherein the forward end of said deflector is disposed rearwardly of the center of gravity of a shell case gripped by said extractor as said bolt reaches its rearward position.

3. The structure as set forth in claim 1, wherein said deflector extends inwardly from a side edge of said ejection opening, the distance between the inner edge of said deflector and the opposite side edge of said ejection opening being less than the diameter of said shell case, and wherein the deflector is bevelled at the juncture of the forward and inner side edges thereof, said bevel converging rearwardly toward the opposite side edge of said ejection opening.

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