April 14, 1959 W. B. BUTLER 2,881,547

MULTI-PART BREECH BOLT MECHANISM

Filed July 29. 1955 5 Sheets-Sheet 1

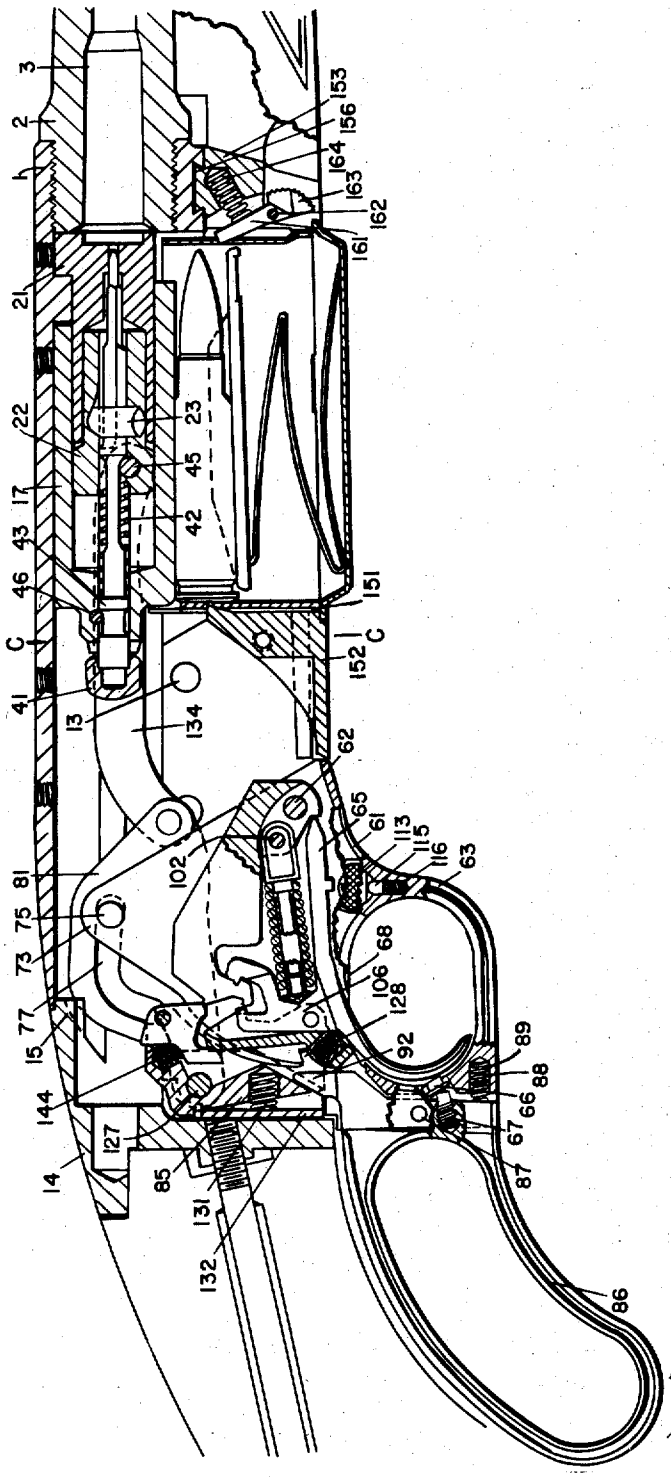


FIGURE 1

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MULTI-PART BREECH BOLT MECHANISM

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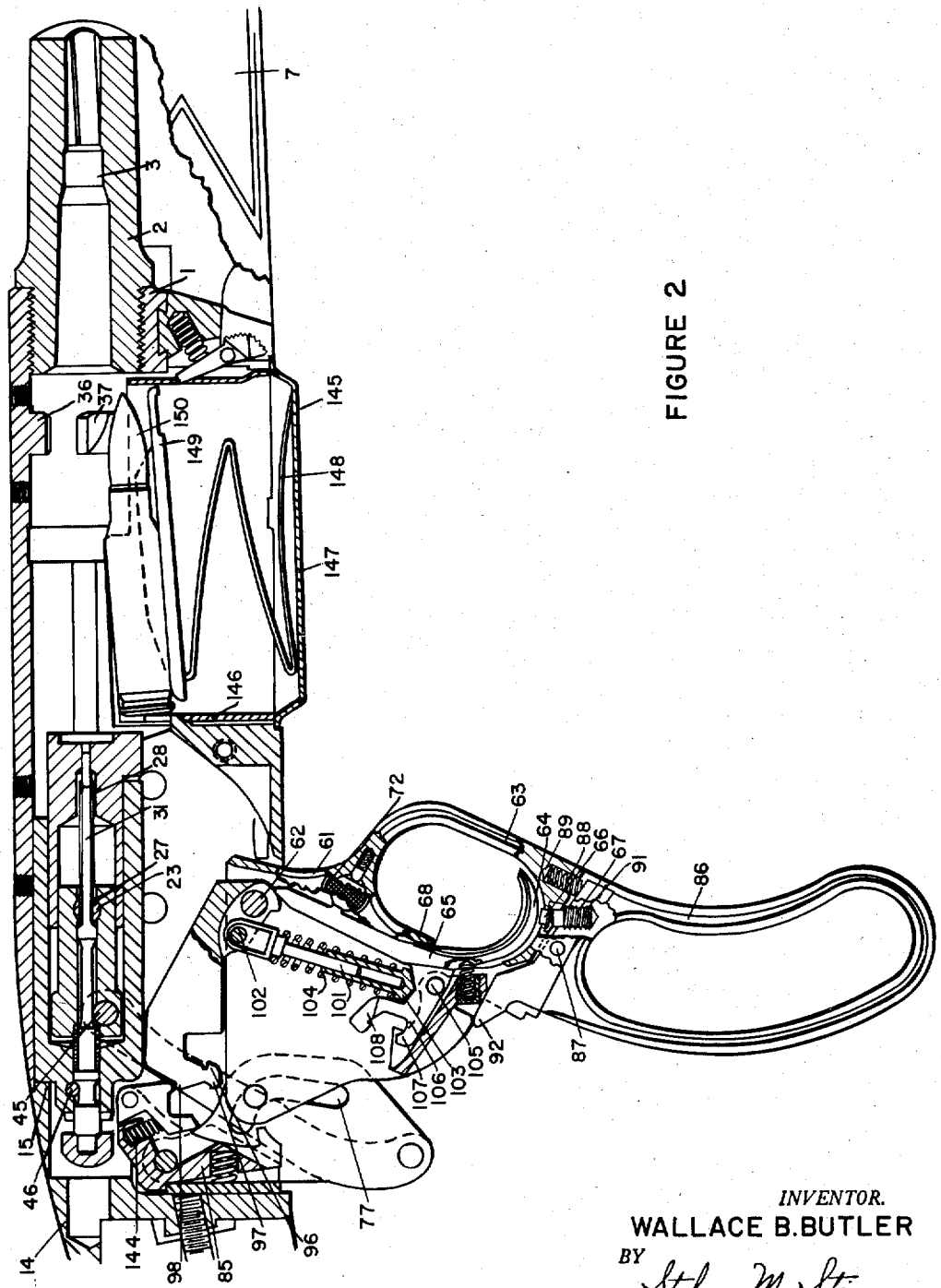


FIGURE 2

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MULTI-PART BREECH BOLT MECHANISM

Filed July 29, 1955 5 Sheets-Sheet 3

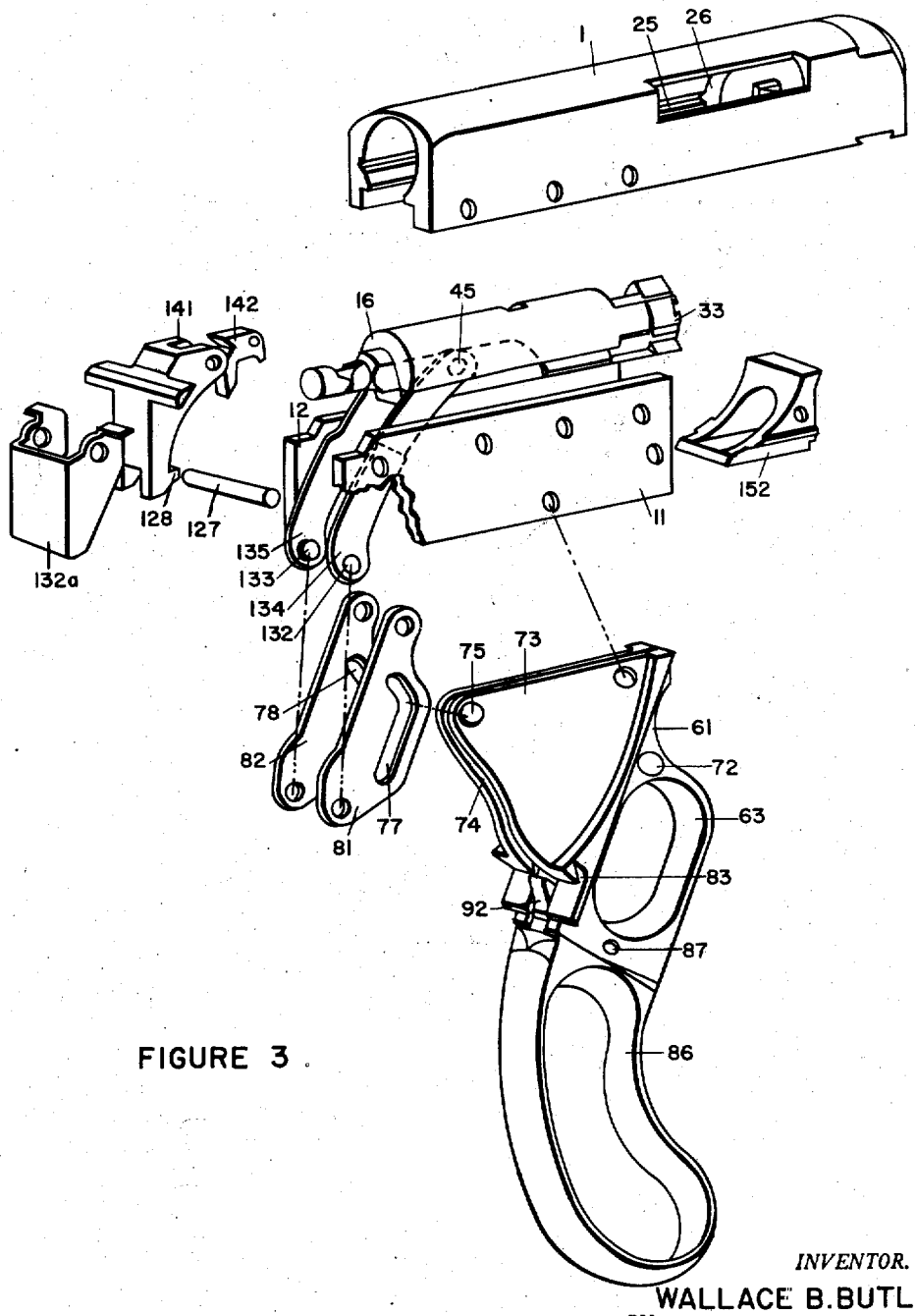


FIGURE 3.

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MULTI-PART BREECH BOLT MECHANISM

Filed July 29, 1955 5 Sheets-Sheet 4

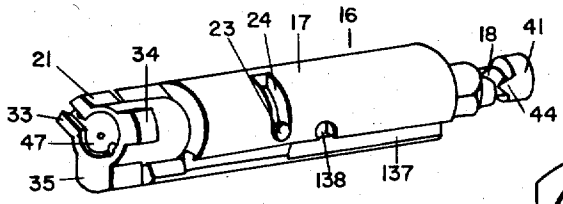


FIGURE 11

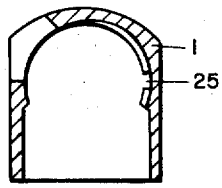


FIGURE 13

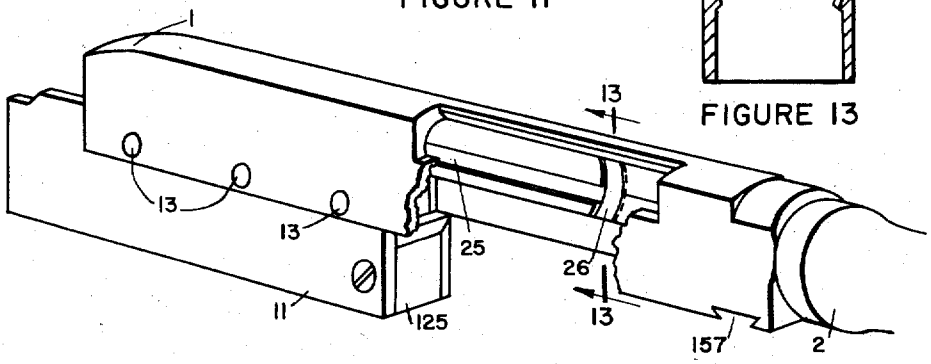


FIGURE 12

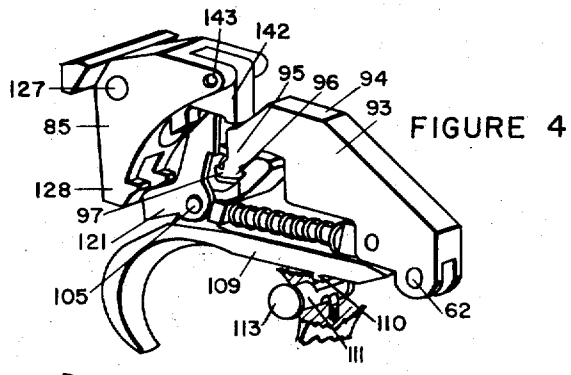


FIGURE 4

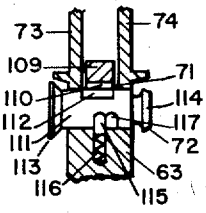


FIGURE 8

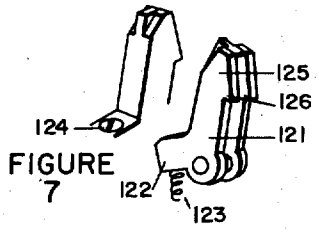


FIGURE 7

FIGURE 6

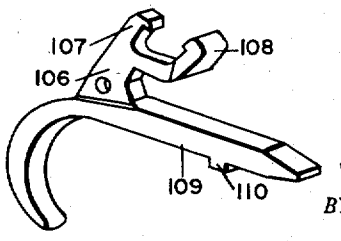


FIGURE 5

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MULTI-PART BREECH BOLT MECHANISM

Filed July 29. 1955 5 Sheets-Sheet 5

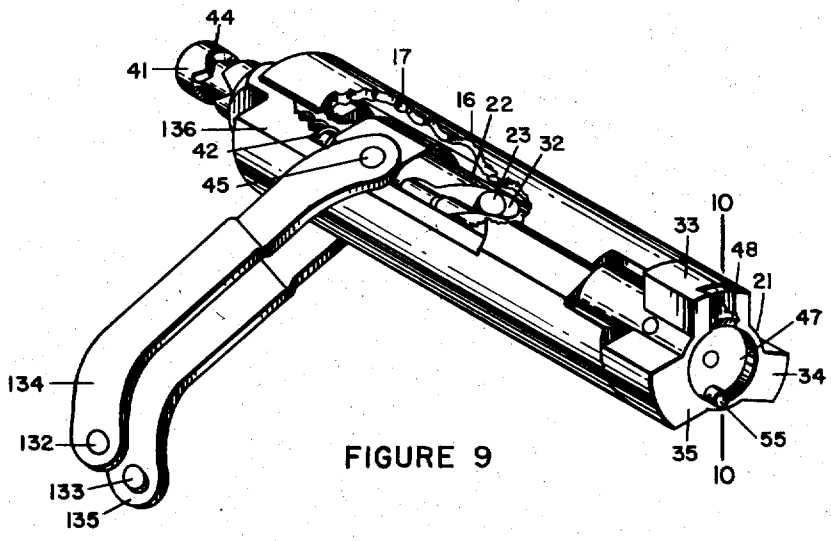


FIGURE 9

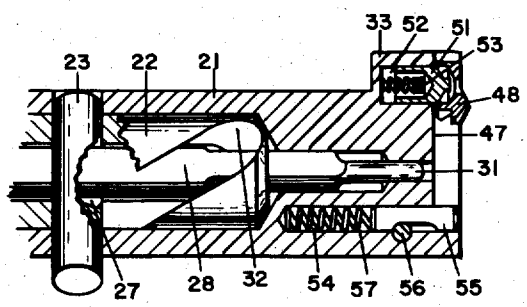


FIGURE 10

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2,881,547

MULTI-PART BREECH BOLT MECHANISM

Wallace B. Butler, Branford, Conn., assignor to Olin Mathieson Chemical Corporation, New Haven, Conn., a corporation of Virginia

Application July 29, 1955, Serial No. 525,136

2 Claims. (Cl. 42—16)

This invention relates to a firearm and more particularly to a rifle having a novel lever action.

A most desirable lever action rifle is one low in cost, light in weight, safe in operation, easy to operate and useful in firing both low and high powered ammunition. To be low in cost, it must be economically manufactured. To be light in weight, it must be constructed of parts of small dimensions and/or of light weight material. To be safe in operation, it must be capable of being reloaded and rearmed while the hammer, the trigger and the firing pin are automatically made inoperable, inaccessible or incapable of causing firing while the lever is in the unlatched position. To be easy to operate, a minimum amount of effort should be possible for rearming, reloading and recocking the gun. And to be useful for firing high powered ammunition, the strength of the material employed and of the assembly when in battery position must be capable of withstanding forces applied to the locking mechanism by high pressure generating propellants. Heretofore, no such gun has ever been successfully produced.

An object of this invention is to provide a lever action rifle of novel, low cost design. Another object of this invention is to provide a lever action rifle capable of firing high powered ammunition even though light in weight. And another object of this invention is to provide a lever action rifle having an unusually short lever stroke enabling quicker and easier loading, arming and cocking of the rifle. Still another object of this invention is to provide a lever action rifle having a linkage design which has a high mechanical advantage at the beginning of the opening stroke to provide maximum force for unlocking the bolt and for primary extraction, low mechanical advantage during the main part of the stroke to provide high bolt travel velocity, and moderately high mechanical advantage at the end of the stroke to provide adequate force for stripping a cartridge from the magazine at the beginning of the closing stroke. A further object of this invention is to provide a lever action rifle having a superior breech locking ability due to its use of a rotatable bolt capable of accelerated rotating speed caused by a novel arrangement of links and cam surfaces. A still further object of this invention is to provide a lever action rifle having a bolt which acts as the closure for the ejection port of the receiver. And a still further object of this invention is to provide a lever action rifle having a free floating receiver in order to facilitate takedown of the gun. Another object of this invention is to provide a lever action rifle which, even though in cocked condition, is safe from accidental firing should the lever be actuated because the cocking mechanism is locked within and moves with the guard assembly connected to the lever. Another object of this invention is to provide a lever action rifle wherein the trigger at all times pivots within the lever thus providing an additional safety against accidental firing of the gun. And another object of this invention is to provide a lever action rifle having an automatic hammer and trigger

locking mechanism which prevents accidental firing when the bolt is in non-battery position. Another object is to provide a novel trigger safety capable of right or left-hand operation. Another object is to provide a novel magazine assembly. Another object is to provide a novel closure means completely sealing the ejection port of the gun. Other objects will become apparent to those skilled in the art upon reading the following detailed disclosure, in which:

Figure 1 is a partial vertical view of the lever action rifle of this invention as it appears when in a cocked and a ready fire position,

Figure 2 is a partial vertical view of the lever action rifle of this invention as it appears when in an open-action position, with the lever fully pivoted, and the bolt completely rearward,

Figure 3 is a perspective view of the receiver, receiver sideplates, bolt assembly, front and rear links, lever guard assembly, recoil abutment, guard latch, hammer catch, rear link pin and magazine spacer shown in position for assembly into the lever action gun of this invention,

Figure 4 is a perspective view of an assembly of the hammer, hammer spring, trigger, trigger safety, hammer lock, hammer catch and guard latch used in the lever action gun of this invention,

Figure 5 is a perspective view of the trigger used in the lever action gun of this invention,

Figure 6 is a right front perspective view of the hammer lock shown in Figure 4,

Figure 7 is a right rear perspective view of the hammer lock shown in Figure 4,

Figure 8 is a cross sectional view of the trigger safety shown in Figure 4, showing its operation upon the trigger while in an "off" position,

Figure 9 shows a fragmentary, perspective view of the bolt assembly and front links used in the rifle of this invention,

Figure 10 is a vertical cross-sectional view of forward section of the bolt assembly shown in Figure 9 taken on line **10—10**,

Figure 11 is a left front perspective view of the bolt assembly shown in Figure 9 particularly showing the operation of the bolt sleeve lock pin,

Figure 12 is a broken left front perspective view of the receiver, receiver sideplates, magazine spacer and part of the barrel of the gun of this invention showing particularly the bolt sleeve lock pin horizontal and vertical sliding channels, and

Figure 13 is a cross sectional view of the receiver of Figure 12 taken on line **13—13**.

The objects enumerated above are accomplished, broadly speaking, by constructing the lever-action rifle with a reciprocating bolt of the rotatable locking type to which a set of toggle jointed links are connected. The rear links of each set contain angular slots in which ride lever studs of the lever of the gun, the slots being so designed as to enable a short lever stroke having an optimum mechanical operating advantage upon the action of the gun. Pivotable safety members; namely, a hammer catch, a hammer lock, a disconnector and a trigger pull safety operated by the lever latch of the gun prevent premature firing. A novel cross pin safety adjustable for either left or right hand operation prevents accidental firing. A novel method of affixing the barrel to the one piece gun stock with a barrel stud screw cooperating with a recoil block designed to act as a "boss" over the receiver incorporates a "floating receiver" feature into the gun. And a novel use of the bolt body to completely close the ejection port provides a gun having light weight, high strength, safe operation, useful for high and low powered ammunition firing, easy to disassemble and having features for clean operation under highly adverse conditions.

As seen in the figures of the drawing, the lever action rifle of this invention has a receiver **1** into which a barrel **2** having a chamber section **3** threadably engaged to the forward end of the receiver, is secured. The barrel **2** has a forearm stud **4** extending downward from its undersurface. The stud **4** is affixed to the barrel **2** by a barrel dovetail slot **5**. A forearm screw **6** extends through the forward part of gunstock **7** and is threaded into stud **4** to secure the gun action to its stock. The receiver is of hollow design, being tubular in shape at its forward end and of inverted U shape at its rear end. Two receiver sideplates **11** and **12** extend downwardly from the ends of the inverted U-shaped section of the receiver **1**. Each sideplate is riveted to the receiver by rivets **13**. A recoil block **14** closes off the rear end of the receiver **1**. Boss **15** of the block **14** locates the receiver with respect to the block. Within the hollow of the receiver is the bolt assembly **16** which is capable of reciprocable movement within said receiver (see Figures 1, 3 and 12 and 14 especially). The bolt assembly has an outer bolt sleeve **17**. The sleeve is of elongated cup design with indents **18** on its rear surface. It operates a rotatable bolt **21** through the action of a bolt carrier **22** and a pin **23**. Pin **23** extends diametrically through the carrier **22** and through a vertically disposed elongated sleeve slot **24** on the left side of the sleeve (see Figure 11). When the bolt assembly **16** is in operation within the receiver **1**, the pin extends into a horizontally disposed pin riding channel **25** on the inner surface of the receiver (see Figure 12). The channel **25** connects with a vertically disposed radial groove **26** having an off-center mid point to the axis of the receiver. The purpose of the channel and groove is to permit rotary swinging as described below of pin **23** only when the action is almost closed. Pin **23** has an elongated slot **27** through its body. A flat **28** on the firing pin fits through the slot and the slot acts against the flat. The pin **23** is cammed by a cam slot **32** within the bolt carrier **22** to cause a rotary swinging of said pin. Through such rotary movement the bolt and the firing pin rotate about their axis. Extending radially from the outer surface of the rotatable bolt are locking lugs **33**, **34** and **35**. These lugs engage radially inwardly extending lugs **36**, **37** and **38** of the receiver, when the bolt is completely rotated and in battery position.

Within an axial cavity in the sleeve **17** (see Figures 1 and 9 especially), the bolt carrier **22** and the bolt **21** is contained a firing pin **31** having flat **28** on its body. The pin extends rearwardly through the rear wall of the sleeve. A firing pin head **41** is secured to this rearward extending portion of the firing pin by welding, brazing, soldering or the like. A firing pin spring **42** encircles the firing pin and spring loads it to the rear by being biased against annular shoulder **43** of the pin. The firing pin head has forwardly extending lugs **44** (see Figures 9 and 11 respectively especially) which when properly aligned, enter into the indents **18** on the rear surface of the sleeve **17**. Front link pin **45** and firing pin retaining pin **46** act to retain the firing pin, and the spring within the axial cavity of the bolt sleeve.

Partially disposed vertically across the rim portion of the cartridge seat face **47** of the bolt **16** is a claw-like extractor **33** (see Figure 10 especially). Extractor plunger **51** which extends longitudinally into a cavity **52** within the locking lug **33** of the bolt and which contains an extractor spring **36**, secures the claw-like extractor to the bolt. The bolt also has an ejector cavity **54** in which is contained an ejector **55** held in place by an ejector pin **56** (see Figure 10). The ejector is spring loaded forwardly by an ejector spring **57** to cause pressure against the base of the cartridge case abutting against the cartridge seat face **47** of the bolt.

Rearward of the bolt assembly is a lever-guard assembly **61** pivoted to rotate about hammer pin **62**. The assembly **61** at its lower forward extremity is of hollow,

oval (bow) shape to form a trigger guard **63** for the fingerpiece **64** of the trigger member **65**. Within a cavity in the rear portion of the guard is a trigger stop **66** cammed forward by an adjustable trigger stop screw **67** within the lever. There is a slot **68** through which the trigger member **65** extends upwardly. The guard **63** also has an annular gun safety cavity **71** at its forward section to receive safety **72** described below (see Figure 8). Affixed to the upper surface of the bow-shaped trigger guard are two upwardly extending, triangularly shaped, flat or wing members **73** and **74**, the flats of which are parallel to the sides of the gun and enclose the hammer assembly of the gun as discussed more fully below. At the upper extremity of each of these triangularly shaped members and extending outwardly therefrom are two wing or guard studs **75** and **76** (see Figure 3 especially). These act as cam followers within cam slots **77** and **78** of rear links **81** and **82**. On the rear edges of the triangularly shaped members of the guard are recesses **83** and **84**, having abutment faces on their upper edges for engagement by the guard latch **85** to lock the guard in a closed and latched position, that is, an uppermost pivoted position.

Angular bow-shaped finger lever **86** pivoted for rotation about finger lever pin **87** extends from the rear portion of the trigger guard **63**. Finger lever spring **88** mounted within a cavity **89** within the trigger guard **63**, spring loads the lever in a clockwise direction around the finger lever pin **87**. An adjustable trigger stop screw **67** acting as a cam against trigger stop **66** resides within a threaded cavity **91** on the forward edge of the lever just below lever pin **87**. Extending upwardly from said finger lever at its most forward and upward portion is a guard latch release cam **92** which acts upon the guard latch **85** by camming its lower portion to the rear when the finger lever is pivoted downwardly against the force of the finger lever spring **88**.

Within the two upward extending triangular wing members **73** and **74** of the guard and pivoted upon hammer pin **62** is hammer **93** (see Figure 4 especially). It has a firing pin striking surface **94**. Extending from said striking surface is a T-shaped lug **95** which acts as the cocking shoulder of said hammer. The lug contains a front cocking shoulder **96** and a rear cocking shoulder **97**. The hammer has a hammer catch shoulder **98**. The front cocking shoulder of the T-shaped lug can be considered the sear engaging shoulder while the rear cocking shoulder of the hammer can be considered the disconnector engaging shoulder.

Secured to the hammer at a point just above the hammer pin **62** is a hammer spring guide rod **101** (see Figure 2). It is pivoted to the hammer by hammer spring guide rod pin **102**. The hammer spring guide rod has an elongated cup shaped hammer spring guide **103** telescoped over it. The hammer spring guide **103** has a cap thereon beneath which is a hammer spring **104**. This spring loads the hammer spring guide **103** against the trigger member **65** at a point above the trigger pin **105**. By such location, it tends to pivot the trigger member **65** about the trigger pin **105** in a counter-clockwise fashion. The other end of the hammer spring assembly, by being affixed to the hammer at a point just above the hammer pin **62** spring loads the hammer when compressed so that the hammer will rotate about the hammer pin **62** with great speed and force.

As stated before, the trigger member **65** consists of a downwardly extending finger piece **64** and is pivoted at trigger pin **105** (see Figures 1, 2 and 4 and 5 especially). It has an upwardly extending Y-shaped member **106**, each arm of which engages one of the cocking shoulders of the hammer. The rear arm **107** acts as a disconnector and the forward arm **108** acts as the firing sear. The trigger also has a forwardly extending safety member **109** that engages a safety of the cross-bolt type. Extending downwardly from said safety arm **109** of the trigger

is a safety lug **110** which engages the cross-bolt safety **80** of the gun.

The safety **72** of the gun comprises a horizontally disposed cross rod **111** having an upward facing notch **112** therein which when aligned under safety lug **110** permits downward movement of the safety member **109** of the trigger member **65**. The safety is "off" when such movement is possible. The safety is "on" when the lug **110** is misaligned from notch **112** so that lug **110** is stopped from downward movement by the round body of the cross rod **111** (see Figure 4). At each end of the rod are finger pieces **113** and **114** which by appropriate finger pressure by the shooter align or misalign notch **112** with safety lug **110**. Spring biased against the rod is a plunger **115** and a plunger spring **116** which with downward facing double grooved notch **117** on the rod, acts as a ratchet in the movement of said safety. Appropriate left or right handed operation of the safety can be effected by merely reversing the disposition of cross rod **111** with respect to its finger pieces **113** and **114**. This is done by disengaging plunger **115** and plunger spring **116** from notch **117** by turning rod **111** ninety degrees. The rod **111** is removed, reversed and reinserted into the cavity.

Pivoted for rotation about trigger pin **105** is a hammer lock **121** (see Figures 1, 2, 4, 6 and 7 especially). Within its diagonally downward extending portion **122** is contained a trigger spring **123**, the force of which is adjustable by a cap-shaped trigger spring adjusting screw **124**. The hammer lock's upward extending portion **125** is of a forwardly opening channeled structure and has engaging shoulders **126** thereon on its forward edge for engagement with the rear cocking shoulder **97** of the hammer **93**. It acts to lock the cocked hammer as well as to operate the hammer catch described below.

Approximately rearward of said hammer lock **121** is a guard latch **85** pivoted to rotate about rear link pin **127** (see Figures 3 and 4 especially). The lower extending portion of the guard latch contains guard latch lugs **128** for engagement with the recesses **83** and **84** of the triangularly shaped members **73** and **74** of the guard **61**. Said lugs **128** are spring loaded against the triangular members by guard latch spring **131** abutting against guard latch abutment **132***a* which is affixed to the receiver sideplates **11** and **12** of the gun through rear link pin **127**. The lugs bear against the hammer lock **121** at its downward extending portion **122**.

Also pivoted to the rear link pin **127** is a pair of rear links **81** and **82** which operate outside but parallel to the triangularly shaped wing members **73** and **74** (see Figure 3 especially). They contain cam slots **77** and **78** into which wing studs or cam followers **75** and **76** extend. At the rearmost portion of the front links and integral therewith are link connector pins **132** and **133** which extend inwardly and connect, in a pivoting fashion, the rear links **81** and **82** and the front links **134** and **135**. The linkage is basically a toggle joint. The front links operated outside the rear links are connected to the bolt sleeve lock **22** and are capable of pivoting about front link pin **45**. The front ends of the front links **134** and **135** reciprocate during action of the lever within two downwardly facing grooves **136** and **137** on the side undersurface of the sleeve **17** (see Figures 12 and 14). Annular orifice **138** on one side of the sleeve **17** permits insertion of the front link pin **45** during assembly. Pivoted to the upper forward portion and partially within a forwardly and vertically extending cavity **141** within the guard latch **85** is a hammer catch **142** (see Figures 3 and 4 especially). Hammer catch pin **143**, disposed across the cavity acts as the pivot pin for said hammer catch. A hammer catch spring **144** within and beneath the guard latch acts to pivot the hammer catch about the hammer catch pin **143** in a counter-clockwise fashion. The hammer catch **142** engages the hammer at the hammer catch shoulder **98**.

Located to the rear and downward of the chamber section **3** of the barrel **2** is a magazine assembly **145** (see Figure 1). This assembly consists of a rectangularly shaped magazine case **146** having a magazine base **147**. This base supports a Σ shaped leaf magazine spring **148** which spring loads a magazine follower **149** upwardly. On top of said magazine follower rest cartridges **150** (only one shown) in vertical staggered relationship. The entire magazine assembly is contained within a rectangular slot **151** located beneath the receiver just rearward of the chamber in gun stock **7**. Two magazine locks or latches **152** and **153** engage the magazine to hold it in cartridge dispensing fashion against the bolt assembly. The rear magazine latch **152** is encased within two receiver sideplates **11** and **12** and affixed thereto by receiver latch screws, the distance between the plates being determined by the width of the latch **152**. The front magazine lock housing **153** is attached to the receiver by a dovetail **156** (see Figures 1 and 10 especially) on its upper surface in engagement with a dovetail slot **157** (see Figure 12) on the forward undersurface of the receiver **1**. Lock housing **153** has a downwardly and rearwardly sloping surface which with corresponding sloping surface on the stock **7** acts to wedge the receiver **1** upon the boss **15** of the recoil block **14** when the action is affixed to the gun stock **7**. This effects a "floating receiver" while the barrel is tied down through forearm screw **6**. Within a rearwardly facing cavity in its body is contained a magazine lock **161**, pivoted upon magazine lock pin **162** which is disposed across the cavity. The lower end of the magazine lock flares out into a fingerpiece **163**. A magazine lock spring **164** spring biases the upper end of the magazine lock against the front surface of the magazine to lock it in place. To disengage the lock, pressure is applied against the fingerpiece and the upper end pivots out of engagement with the magazine case **146**.

The entire assembly is affixed to and resides within a longitudinal cavity within gun stock **7**. Forearm screw **6** holds the assembly to the stock while inclined surfaces load the assembly rearwardly. The separate recoil block **14** is affixed to the stock **7** by a recoil block screw **165** which extends through a longitudinal cavity within the shoulder piece of the gun stock. The boss **15** of the recoil block **14** holds the receiver to the stock in a substantially "loose" fashion thereby effecting a "floating" receiver.

The gun may also have a rear sight **166**, a pistol grip **167** and the like. Obviously, parts not shown such as a front sight, swivels, a butt plate, etc. can also be affixed to the gun of this invention if desired. These latter parts have not been shown due to the obvious and known manner of application.

Assuming that the gun has just been fired and that a cartridge case is present in the chamber section of the barrel, the parts of the gun operate in the following manner.

The shooter first grasps the finger lever **86** and pulls it downwardly and forwardly. In so doing, the lever pivots counter-clockwise about finger lever pin **87** and trigger stop screw **67** cams against trigger stop **66** which in turn cams against finger piece **64** of the trigger to prevent its rearward movement. Guard latch release cam **92** of the lever cams against the guard latch **85** and forces its lower end rearwardly to compress guard latch spring **131**. Such movement of the guard latch causes it to release the recesses **83** and **84** of the wing members **73** and **74** of the guard. Simultaneously, with such release, the upper end of the guard latch **85** also pivots clockwise allowing the hammer catch **142** to move over the hammer **93** as the hammer lock **121** pivots clockwise by force of trigger spring **123**. Movement of the hammer lock releases the hammer catch **142** and it pivots counter-clockwise until it reaches its stop point.

The entire guard assembly including the trigger assem-

bly, the hammer spring assembly, the hammer lock assembly and the safety pivot about the hammer pin **62**. As the guard assembly pivots about the hammer pin, the wing studs or cam followers **75** and **76** move rearwardly and downwardly while contained within the two cam slots **77** and **78** of two rear links **81** and **82**. Such movement causes the rear links to pivot in a clockwise fashion about rear link pin **127**. As the lever guard and rear links pivot downwardly, the two front links **134** and **135** are pulled rearwardly through link connector pins **132** and **133** by the force of said downward pivoting movement. As these front links travel rearwardly, they pivot downwardly in a counter-clockwise fashion about front link pin **45**. This action continues until the guard assembly has been rotated its full stroke or through an angle of approximately 60°. The rear links **81** and **82** will have been rotated about rear link pin **127** to a substantially vertical position, i.e., substantially vertical to the center line of the gun. The back ends of the front links will be in their most completely downward position with the links at an angle to the center line.

Simultaneously, with the pivoting of the front and rear links and with the opening of the toggle joint, the carrier **22** is pulled rearwardly. At first in being so pulled, it causes pin **23** to rotate in "propeller" fashion by the helical cam slot **32** within the carrier **22** and since the bolt **21** is affixed to the pin **23**, the bolt rotates. The bolt subsequently travels rearwardly but is not rotated in such movement because the pin **23** has moved to the extreme rear position of the cam slot **32**. Pin **23** also causes rotation of the firing pin **31** through action of the pin's slot **27** against flat **28** of the firing pin. By such rotation, the lugs **44** of the firing pin head **41** are misaligned from indents **18** on the rear surface of the sleeve **17**. A safety against firing thereby results since the firing pin is now unable to be hammered completely forward. By proper positioning and design of the cam slots **77** and **78** within the rear links **81** and **82**, the relationship of finger lever travel to bolt rotation can be varied. In the gun shown in the drawings, one half or 30 degrees of the total lever stroke is used to rotate the bolt and the remaining half of the lever stroke is used to completely retract the bolt. This effects a short lever stroke with a maximum of breech lock strength. This is performed in the rifle shown by the angular shape of the slot wherein a substantial part of travel upon the lever cam slot surface shown in Figure 11 effects rotation of the bolt. When the bolt is fully rotated, the vertical cam surface on the rear links shown in Figure 1 comes into play and steps up the lever advantage to break the cartridge seal and to start retraction of the bolt. Subsequently, the lever advantage is stepped down to cause a maximum speed for bolt travel. The bolt in being unlocked disengages its locking lugs **33**, **34** and **35** from lugs **36**, **37** and **38** of the receiver.

Rearward movement of the bolt sleeve assembly causes extraction of the fired cartridge case from the chamber **3** of the barrel **2** by extractor **48**. When the bolt sleeve assembly reaches a point wherein the front lip of the expended cartridge case clears the ejection opening **167** on the right side of the receiver (see Figure 10), the ejector **55** ejects the case by pivoting it about the extractor through the ejection opening.

The rearward movement of the bolt sleeve assembly also causes pivoting of the hammer **93** in a counter-clockwise fashion since the assembly moves against the hammer. The hammer pivots in a counter-clockwise fashion until it is in an almost horizontal position where its hammer catch shoulder **98** is engaged by the hammer catch **142** which has been pivoted in a counter-clockwise fashion by the force of hammer catch spring **144**. It is thus held in a position for subsequent engagement by the Y-shaped member **106** of the trigger member **65**.

As the lever is pivoted back to its original firing position, that is, clockwise, the bolt assembly is driven forward. During its forward travel, the bolt **21** engages cartridge **150** which has been dispensed upwardly by the magazine spring **148** and drives it into the chamber section **3** of the barrel **12**.

The last 30 degrees of travel of the lever into its fire position is used to rotate the bolt in a clockwise fashion to engage its locking lugs **33**, **34** and **35** with the inwardly direction lugs **36**, **37** and **38** of the receiver **1**. Also, as the lever nears its seating position, i.e., its closed and latched position, the rear surfaces of the guard **61** cam the guard latch **85** to pivot it clockwise. This clockwise pivoting or retraction of the guard latch causes a clockwise pivoting of the hammer catch **142** which in turn cams the hammer **93** to pivot in a counter-clockwise fashion downward to meet the rising Y-shaped member **106** of the trigger. Depending upon the position of the trigger, either the rear or disconnector shoulder **107** or the front or sear shoulder **108** of the Y-shaped member engages the rear cocking shoulder **97** or the front cocking shoulder **96** respectively of the T-shaped lug **65** of the hammer. Complete seating of the lever causes the guard latch **85** to engage the recesses **83** and **84** of the guard and thereby lock it. In so doing, it causes the hammer lock **121** to pivot counterclockwise about the trigger pin and thereby retract the hammer catch **142** and compress the hammer catch spring **144** to disengage the hammer catch from the hammer catch cocking shoulder **98** of the hammer. If the trigger fingerpiece **64** has been depressed while operating the lever and is now released, the trigger member **65** pivots counter-clockwise about the trigger pin **105** and the disconnector or rear arm **107** of the trigger is disengaged from the rear cocking shoulder **97** of the hammer. The hammer rotates clockwise but the front arm or sear **108** of the trigger member **65** then engages the front cocking shoulder and the gun is ready to be refired. The safety **72** may now be operated by depressing the left hand finger piece **113** towards the right. This causes safety lug **110** of the trigger to be disposed above the unnotched portion of the safety rod **111** and the trigger **65** is locked against clockwise pivoting about trigger pin **105**. Should the shooter be left-handed, the safety may be operated in reverse fashion by completely removing the safety assembly and reversing it in the annular cavity of the trigger guard. The trigger may be pulled when the safety **72** is placed in an "off" position by depressing the right hand finger piece **114** to the left or vice versa depending on the safety's left or right hand operator as discussed above.

In firing the gun, the finger piece **64** of the trigger is depressed to rotate the trigger member **65** about its trigger pin **105**. Such rotation causes release by the front or sear arm **108** of the trigger member **65** of the front cocking shoulder **96** of the hammer **93**. The hammer pivots about hammer pin **62** by the force of compressed hammer spring **104**. The hammer striking surface **94** of the hammer strikes against the head **41** of the firing pin, and drives it against the slight force of the firing pin spring **42** into the igniter of the cartridge contained within the chamber of the gun to fire the gun.

The gun is reloaded and rearmed using the method described above.

Should the lever be operated without firing the cartridge, that is, with the hammer cocked, the action described hereinafter occurs. The lever **86** pivots about the finger lever pin **87** to unlock the guard latch **85** from engagement with the clawlike slots **83** and **84** of the guard **61**. In unlocking the guard **61**, the guard latch **85** pivots clockwise to release the hammer lock **121** which then pivots clockwise by force of trigger spring **123**. Movement of the hammer lock releases the hammer catch **142**. The hammer catch spring **144** causes counter-clockwise movement of the hammer catch to engage the hammer **93** at its hammer catch shoulder **98**. Continued movement of the guard **61** causes downward camming of the hammer **93** by the hammer catch **142** acting through the guard latch **85**. Hammer lock **121** then engages the disconnector cocking shoulder of the hammer to lock it in a cocked

position. Immediately after engagement of the hammer lock **121**, the recesses **83** and **84** of the wing members **73** and **74** of the guard are released by the guard latch **85**. Since the hammer lock has locked the hammer against movement, the lever can be safely rotated without fear of releasing the hammer to cause firing while the bolt is in non-battery position. The guard assembly that rotates about the hammer pin in this case as compared to that described above, comprises the lever, the trigger assembly, the hammer spring assembly, the hammer, the hammer lock assembly and the safety. Complete rotation of the lever about the hammer pin, therefore, occurs while the hammer is not only locked in a cocked position but also while the hammer pivots about its pin without further compression of the hammer spring. Any movement of the trigger during operation of the lever has no effect upon the hammer since it is locked by the hammer lock.

When the lever is returned to its ready-fire position, the hammer lock **121** becomes disengaged from the hammer by the force of the guard latch **85** camming against the diagonally downward section **122** of the hammer lock **121**. The gun can now be fired during which the action described above occurs.

The gun described herein is subject to obvious modifications but such modifications are to be construed within the purview of this invention.

The invention having thus been described, what is desired to be secured by Letters Patent is as follows:

1. In a firearm including a receiver, a bolt mechanism comprising a protective sleeve slidably mounted and operable to reciprocate within the receiver, a bolt having a bore and carrying a transversely disposed pin rotatably mounted within the sleeve, a bolt carrier having a cam slot slidably mounted within the sleeve and having a portion thereof projecting into the bore of the bolt, said cam slot and said pin cooperating in conjunction with the receiver and the sleeve to rotate the bolt with respect to the sleeve and with respect to the carrier and to reciprocate the sleeve, the carrier and the bolt as a unitary assembly in sequential fashion.

2. In a firearm including a receiver, a bolt mechanism comprising a protective sleeve slidably mounted within the receiver, a bored bolt rotatably mounted within the sleeve and carrying a transversely disposed pin, a bolt carrier formed with a cam slot slidably mounted within the sleeve and projecting into said bored bolt, said carrier being connected to the bolt by means of said pin and said slot, said carrier being operable to rotate the bolt with respect to the sleeve and to reciprocate the sleeve and the bolt as a unit whereby said cam slot and said pin are protected from the deleterious effect of soil matter during said rotational and said reciprocal motion.

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