

Dec. 5, 1967

W. B. RUGER ET AL

3,355,833

SINGLE SHOT DROP BREECHBLOCK RIFLE

Filed May 16, 1966

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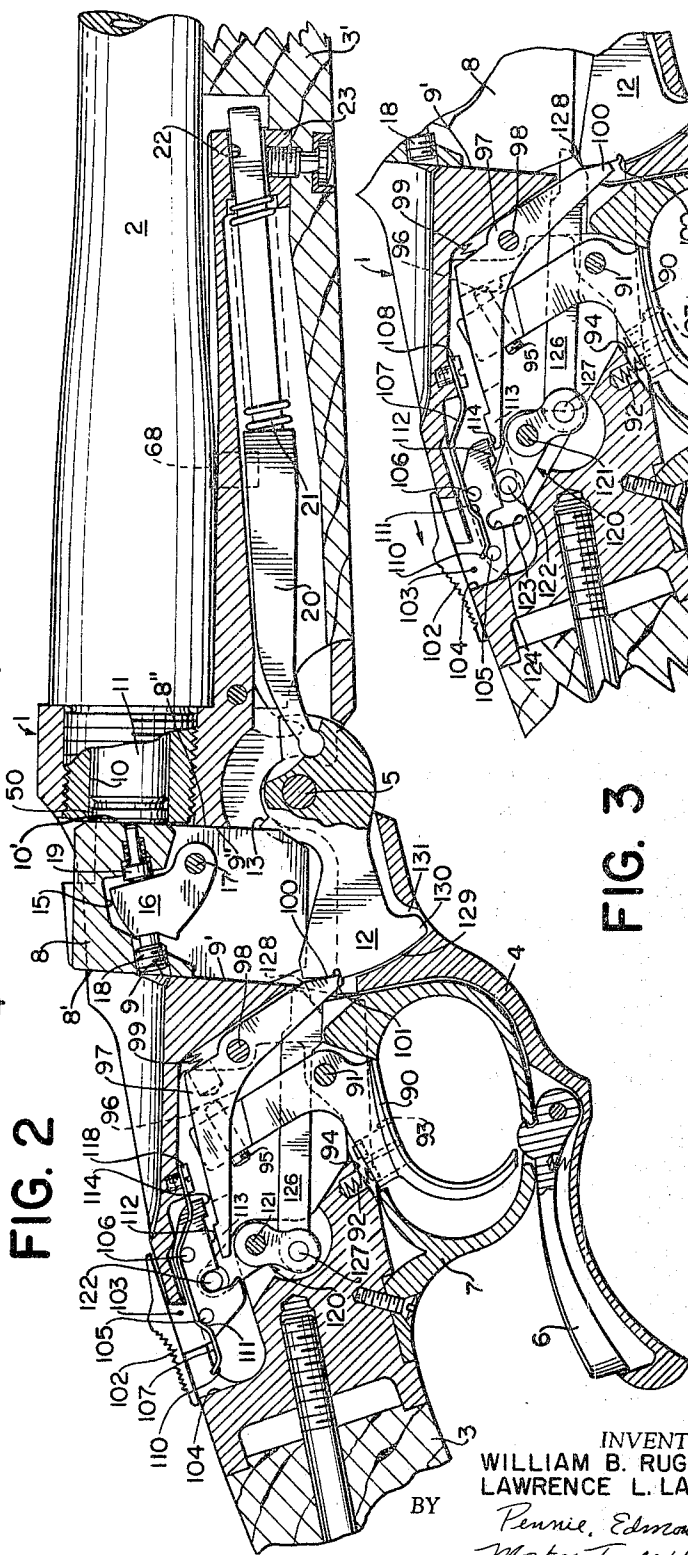
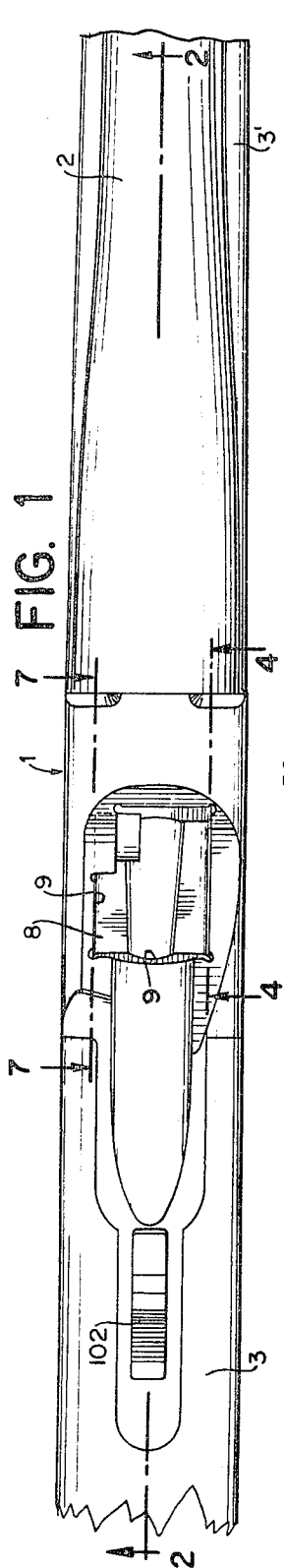


FIG. 3

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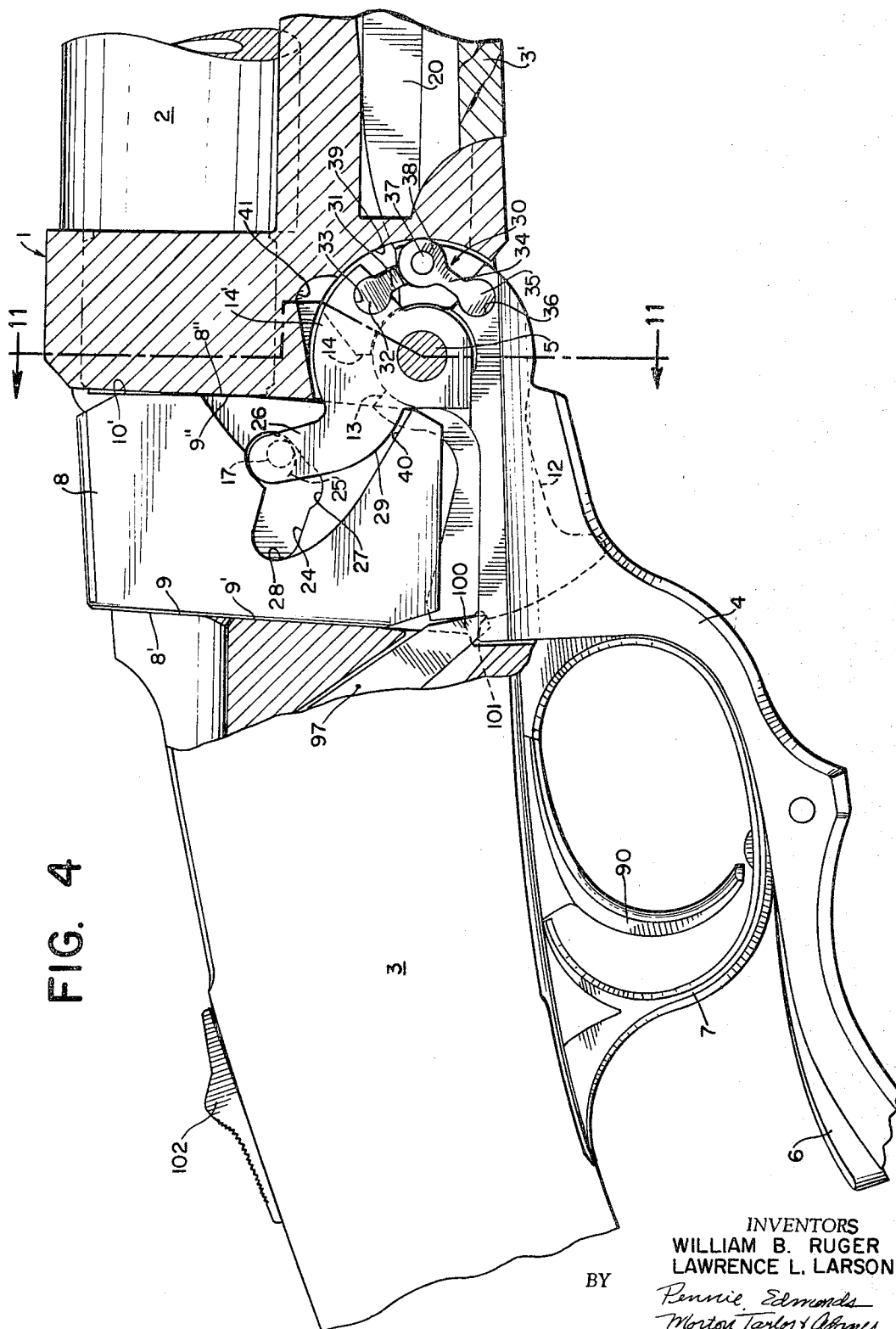
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6 Sheets-Sheet 2



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FIG. 5

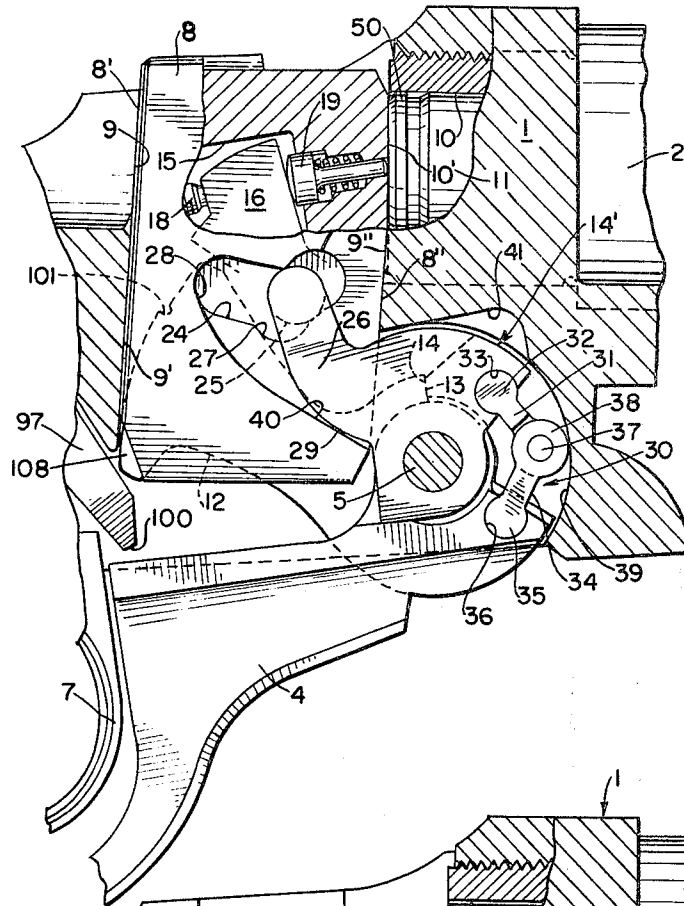
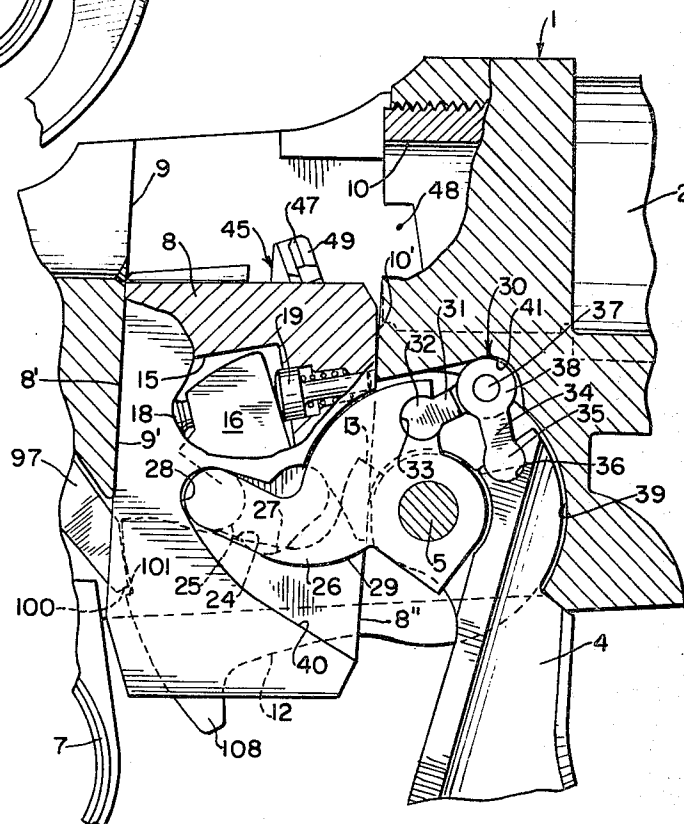


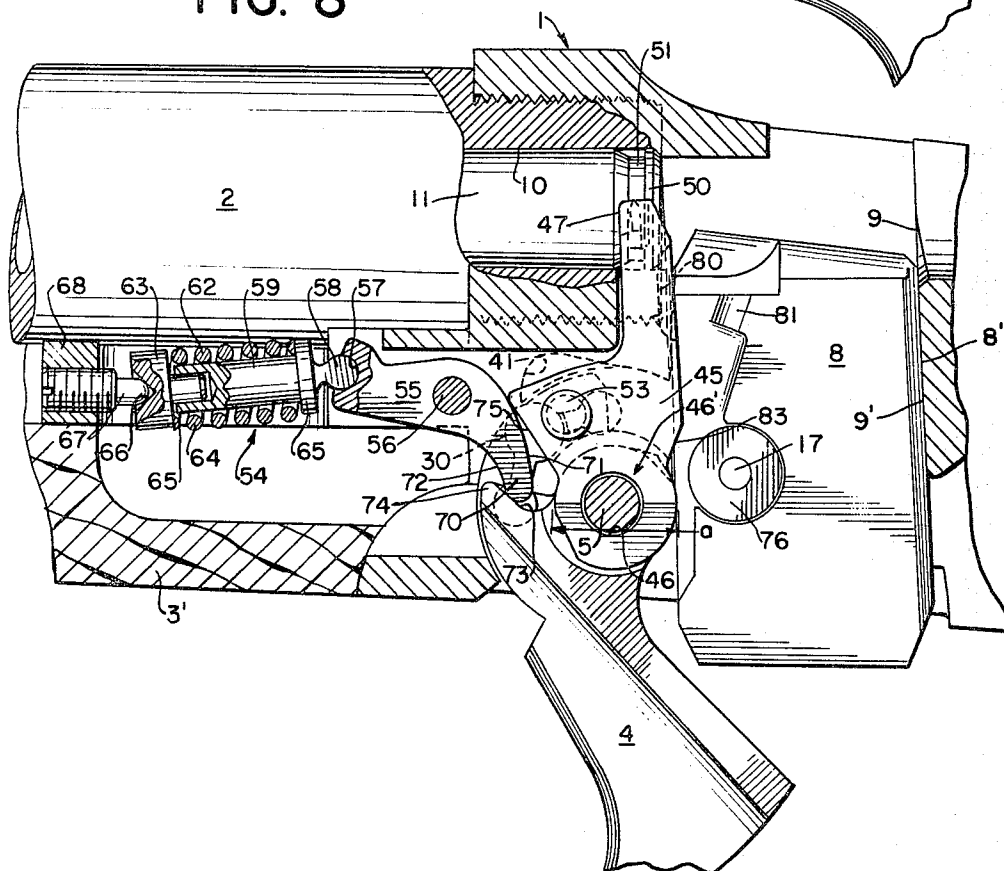
FIG. 6



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FIG. 9

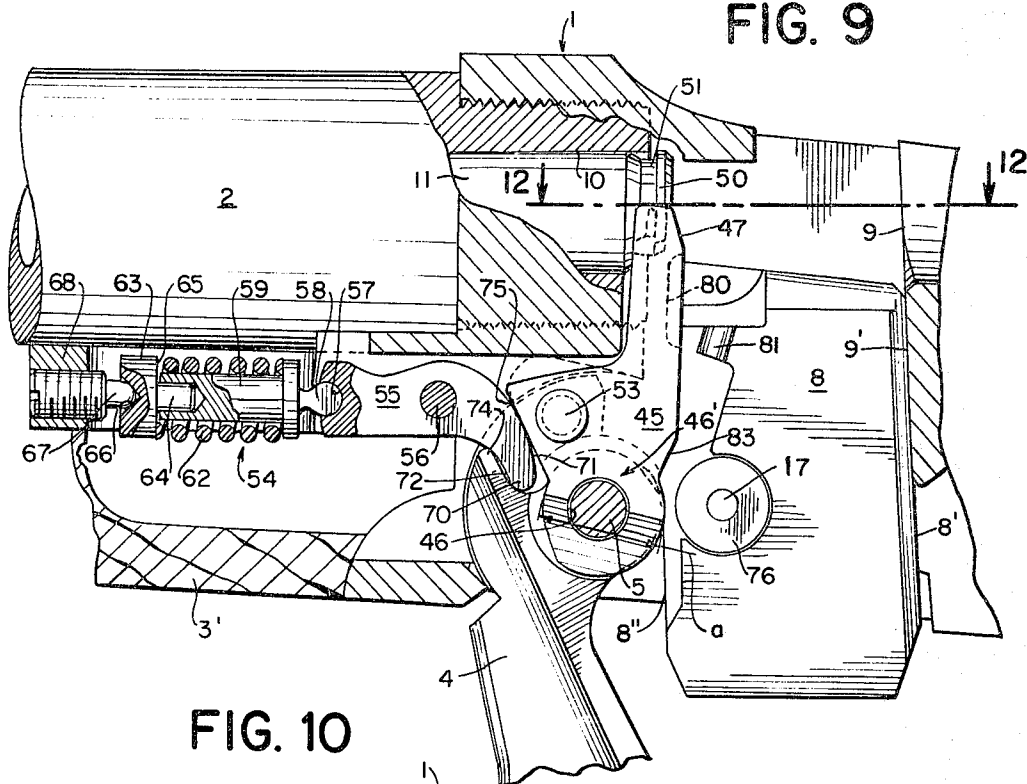
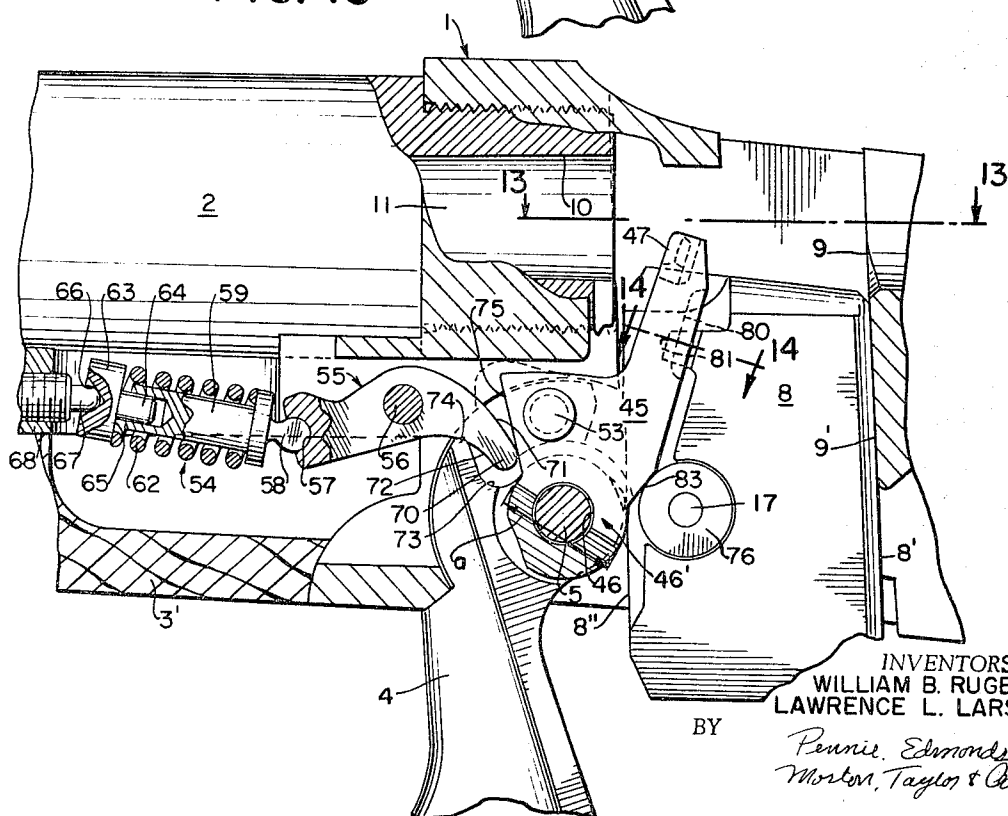


FIG. 10



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FIG. 11

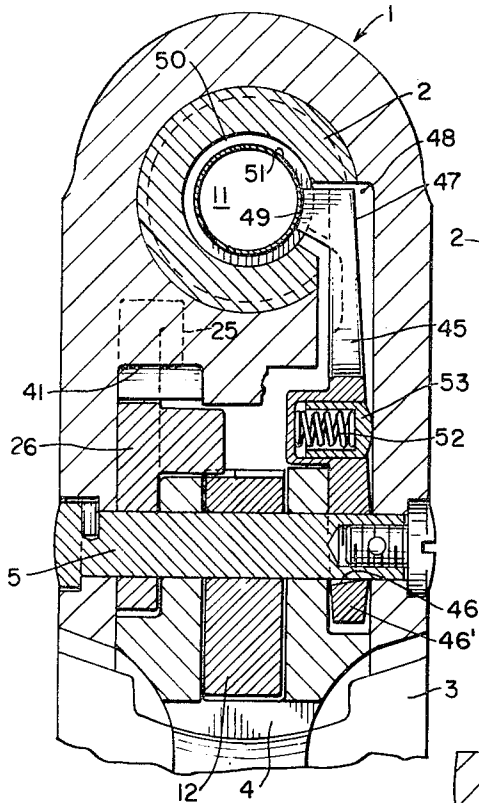


FIG. 12

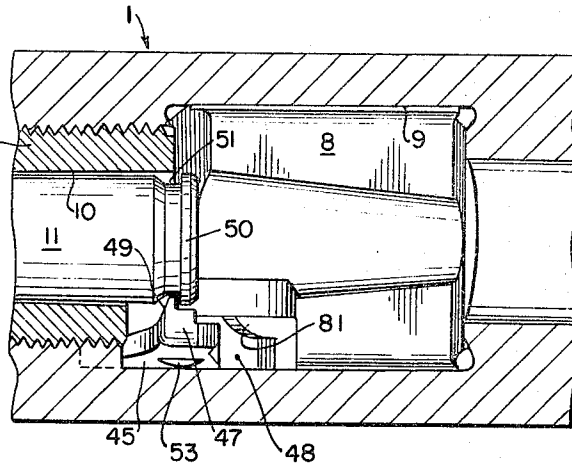


FIG. 13

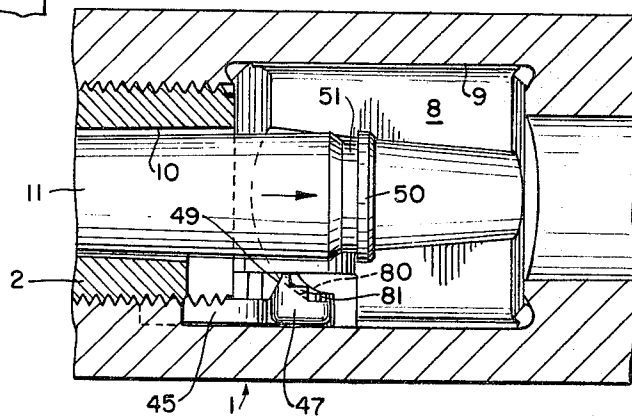
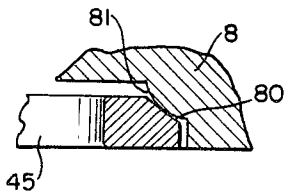


FIG. 14



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SINGLE SHOT DROP BREECHBLOCK RIFLE

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13 Claims. (Cl. 42—23)

ABSTRACT OF THE DISCLOSURE

The invention consists of a single shot rifle of the drop breechblock type which is moved upwardly and downwardly in a recess in the receiver by a hand lever.

The invention provides a breechblock operating system having the hand lever pivoted on a common pin with a hammer and an intermediate member which is operatively connected to the hand lever by a linkage. The intermediate member has a lever arm with a lug operating in a cam recess in the breechblock which is the means for lowering the breechblock when the hand lever is pulled down or opened and for holding the breechblock in its upper locked position for firing. The linkage causes the lever arm to move in unison with the hand lever in the initial downward movement and to continue to a position in which the hammer is fully cocked and the breechblock reaches its lowermost position at which point the linkage permits further lowering of the hand lever for actuating the extraction mechanism. The rifle also includes an extractor mechanism operated by the hand lever so as to effect initial movement of the cartridge case followed by a spring actuated snap-action which effects final extraction.

The hammer operates in a recess in the breechblock and drives the firing pin through a striker pivoted in the breechblock. The intermediate pivoted member has a shoulder which makes abutting contact with a shoulder on the hammer so that the hammer is moved from the fired position toward the cocked position before the breechblock is started downward. On the initial opening of the hand lever the hammer is retracted by the intermediate member and this allows the firing pin and the pivoted striker to be retracted by a spring on the firing pin prior to any downward movement of the breechblock. This same initial movement moves the lug from its locking position with the breechblock. Subsequent downward movement of the hand lever acting through the toggle linkage and lever arm commences the downward movement of the breechblock. When the breechblock has been lowered to a suitable degree, and the hammer has been moved to its cocked position, the toggle linkage between the hand lever and the intermediate member buckles and permits the lever to continue moving while the lever arm and breechblock remain at rest. This independent lever motion is used to extract and eject the cartridge case after the breechblock has been lowered below the path of the ejecting cartridge.

The cartridge ejecting mechanism comprises an ejector pivotally mounted on the same pin with the hand lever, intermediate member and hammer, and an over-center spring-loaded actuator which drives the ejector in its ejecting motion. The ejector is pivoted to swing on the pin and also constructed so that its hook end can move laterally in the longitudinal direction of the pin. The ejector has a cartridge engaging hook which is laterally and yieldably urged into engagement with the cartridge rim by a spring member. A toe on the hand lever contacts

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the cam of the over-center spring-loaded actuator and moves the cam so as to compress or load the over-center spring. The contact points of the toe and cam are so arranged as to give a powerful initial leverage on the extractor which can start the extraction of a binding cartridge case. As the hand lever motion continues, the ratio of leverage changes so as to impart an accelerating velocity to the ejecting cartridge. The over-center spring-loaded actuator imparts a sharp snap-action to the ejector as the cam is moved over center by the hand lever toe. As the ejector completes its stroke under the force of the over-center spring loaded actuator it contacts a cam surface on the breechblock which drives the hook laterally away from the cartridge rim, thus disengaging the hook of the extractor and allowing the case to complete its ejection without hindrance. This lateral motion of the ejector permits the use of rimless or semi-rimmed or rimmed cartridges. It also assures a firm, full engagement with the rim without the necessity of relying on close lateral fitting of parts and without concern of cartridge head diameter variation or tolerance affecting engagement.

As the ejection cycle is completed, the barrel chamber can be loaded with a fresh cartridge. This cartridge may be completely inserted into the chamber without regard to or interference from the ejector, whether using rimmed or rimless cases because, as the hand lever is moved back to the closed position, the ejector is cammed forward by a roller on the side of the rising breechblock, and the ejector hook will snap over the rim of the chambered cartridge by deflecting laterally in a clearance provided until the ejector hook is again aligned and engaged with the cartridge rim or groove thus completing the cycle.

The intermediate member which engages and retracts and cocks the hammer when the hand lever is operated also serves as a safety means to prevent the hammer from falling to a firing position unless the hand lever is fully closed and the breechblock locked closed.

The invention provides a safety mechanism which blocks both the sear and the hammer by means of a slidable thumbpiece. The safety mechanism comprises a slidable thumbpiece, a bellcrank driven by the thumbpiece, and a sliding bar driven by the bellcrank which blocks the hammer. As the thumbpiece is moved to safety position a projection from the thumbpiece blocks the sear. The thumbpiece has a cam slot in which a stud on the bellcrank is engaged and as the thumbpiece is moved to its safe position the bellcrank pushes the bar forward and cams the hammer away from engagement with the sear. Continued rearward movement of the thumbpiece causes the bellcrank stud to ride out of the thumbpiece slot and be held down by a flat surface on the underside of the thumbpiece. This final latched position blocks any movement of the bellcrank or sliding bar by inertia or other forces. Preferably the hammer has a tail portion so constructed that the thumbpiece cannot be moved to the safe position when the hammer is in the fired position because the sliding bar will engage the tail and prevent such movement. The hand lever and breechblock action may be cycled completely with the safety engaged and no damage or interference to the components can result.

These and other novel features of the invention will be better understood with reference to the following description and accompanying drawings in which:

FIG. 1 is a view from above of the receiver portion of a rifle of the invention;

FIG. 2 is an enlarged view taken at 2—2 of FIG. 1 in firing position;

FIG. 3 is a view similar to FIG. 2 showing the safety in safe position;

FIG. 4 is an enlarged view taken at 4—4 of FIG. 1;

FIG. 5 is a view partly in section showing the initial movement of the intermediate member and the hammer being retracted;

FIG. 6 is a view partly in section similar to FIG. 5 showing the hammer in full retracted position and the breechblock fully lowered;

FIG. 7 is a view partly in section at 7—7 of FIG. 1 showing the ejector mechanism;

FIG. 8 is a view similar to FIG. 7 showing the hand lever swung down and the breechblock part way down and the beginning of the ejector movement;

FIG. 9 is a view similar to FIG. 7 showing the breechblock fully lowered and the hand lever contacting the ejector cam to provide accelerated ejector motion;

FIG. 10 is a view similar to FIG. 9 showing the hand lever in its lowermost position, the snap action overcenter spring-loaded actuator having driven the ejector through the final ejection stroke;

FIG. 11 is a sectional view at 11—11 of FIG. 4 showing the hand lever, intermediate member, hammer and ejector mounted on a single pin;

FIG. 12 is a sectional view at 12—12 of FIG. 9;

FIG. 13 is a sectional view at 13—13 of FIG. 10, and

FIG. 14 is a fragmentary enlarged sectional view at 14—14 of FIG. 10 showing the breechblock ejection cam surfaces in contact.

The drop breechblock rifle illustrated in the drawings comprises a receiver 1, a barrel 2, a stock 3, and a forearm 3'. As best shown in FIGS. 1—6 the breechblock and hammer operating mechanism include a hand-operated lever 4 pivotally mounted on the pin 5 which extends completely through the receiver as shown in FIG. 11. The lever has a spring-operated latch 6 which holds it in the position of FIGS. 2 and 4 by engagement with the trigger guard 7. The breechblock 8 can move up and down in the upright opening or recess 9 in the receiver (FIGS. 6 and 9). In the upward position of the breechblock (FIGS. 2, 4 and 5) the breech end of the chamber 10 is completely closed behind the cartridge 11, and in the lower position (FIGS. 6 and 9) the chamber is completely open for the insertion of a cartridge. As shown in FIG. 4, the breechblock has parallel surfaces 8' and 8'' which fit closely with the parallel surfaces 9' and 9'' in the receiver and a flat surface 10' which is parallel to the base of the cartridge. The surfaces 8, 8' and 9, 9' slope downwardly and rearwardly about 3° with respect to the surface 10' which causes the surface 10' to move rearwardly of the cartridge as the breechblock is opened.

The hammer 12 is mounted on the pin 5 and has a shoulder 13 engageable by the surface 14 on the intermediate member 14' which is also pivotally mounted on pin 5. The lower central portion of the breechblock has an opening 15 in which the hammer 12 can swing into contact with the pivoted striker 16 which is mounted on pin 17 and held between the limit screw 18 and the spring-biased firing pin 19. The hammer is operated by the strut 20 which is actuated by means of spring 21. The necked down forward end of the strut is slidable in a hole 22 in the receiver extension 23 against which the spring bears. With reference to FIGS. 4, 5 and 6 the breechblock has a cam slot 24 in which a lug 25 on the lever arm 26 operates. As the lever 4 is moved downwardly, the lever arm 26, an extension of an intermediate pivoted member 14', moves along with it, driven by the toggle linkage 30. This linkage consists of a leg 31 with a radial head 32 pivotally engaged by a radial recess 33 in the lever arm 26 and a leg 34 with a radial head 35 pivotally engaged by a radial recess 36 in the hand lever 4. The legs 31 and 34 are pivotally connected by pin 37. The hub portion 38 of the linkage rides along the radial surface 39 in the receiver and thus provides a direct drive

of the lever arm 26 by the hand lever 4 during the initial portion of the motion.

After the rifle has been fired and the hand lever 4 has been moved from the firing position of FIG. 4 to the position shown in FIG. 5 there has been no downward movement of the breechblock but shoulder 14 on the lever arm has engaged the shoulder 13 on the hammer and moved the hammer from the firing position to the position shown in the broken lines of FIG. 5 before the breechblock can begin to move. The downward movement of the breechblock is started by contact of the cam 29 on the lever arm with surface 40 on the breechblock while the lug 25 approaches cam surface 27. This initial leverage advantage continues until lug 25 engages cam surface 27 and proceeds to cam surface 28 to finish the downward movement of the breechblock at an accelerated rate of travel. As the lever 4 is moved downward to the position shown in FIG. 6, the hub 38 has moved into the recess 41 which has permitted the toggle linkage 30 to buckle. This scissors movement of linkage 30 allows the hand lever 4 to continue moving while the lever arm 26 and the breechblock 8 rest in the breech-open position.

The mechanism for extracting and ejecting the cartridge case is best illustrated in FIGS. 7—13. The ejector 45 is pivotally mounted on the pin 5 but as shown in FIG. 11 the hole 46 in the ejector hub 46' is not cylindrical but is conical and this permits the hook end 47 of the ejector to be pushed in the longitudinal direction of the pin 5, towards the right (FIG. 11), in the space 48 as the sloped face of the ejector hook 49 rides over the rim 50 of the cartridge. The ejector hook is urged to the rim-engaging position of FIG. 12 by the spring 52 which is mounted in a capsule 53 bearing on a wall of the receiver. With reference to FIGS. 9, 10 and 11 it will be noted that the diameter *a* is relatively wide compared to the hole 46 and that the hub 46' bears on the wall of the receiver, the width of the hub *a* preventing the ejector from wobbling on the pin 5, a highly important feature which insures positive engagement of the hook behind the rim 50.

The snap action over-center spring-loaded actuator 54 comprises an ejector cam 55 which is pivotally mounted on the pin 56. The ejector cam has a recess 57 at one end in which the cylindrical end 58 of the pushing link 59 is held in pressed engagement by the spring 62. The spring bears against a base member 63 having a neck 64 slidable inside the link 59 which has a collar 65 against which the spring bears and a conical recess 66 providing a bearing for the adjustable pin 67 which is in threaded connection with a lug 68 on the receiver extension 23. The ejector cam 55 has an extended cam nose 70 having an upper cam surface 71 and an under bearing surface 72.

The hand lever 4 has a cam surface 73 extending to the end 74 which makes engagement with the nose 70 and surface 72. The ejector has a bearing surface 75 on which the cam surface 71 makes sliding contact. As shown in FIG. 7 the actuator 54 is in an over-center position which locates the ejector cam 55 so that the nose 70 and the surfaces 71 and 72 are out of contact with both the lever 4 and the extractor. In the breech-closed firing position of FIG. 7 the roller 76 which is freely rotatable on the pin 17 in the breechblock bears against the ejector 45 and insures that the hook 49 will engage with the rim of the cartridge case under the urging of spring 52.

As the hand lever 4 is lowered the breechblock 8 drops to the position shown in FIG. 8 removing the roller 76 from contact with the ejector and the surface 73 engages the nose 70 and moves it upwardly so that the surface 71 bears on the surface 75 of the ejector as shown. In this position the ejector cam increases the leverage of the lever on the ejector and thereby extracts a firmly held cartridge case from the chamber as in the position shown in FIG. 9.

As shown in FIG. 9 the actuator 54 is in a neutral straight-line position and the ejector cam 55 is acting only

as a linking intermediate between the hand lever 4 and the ejector 45. As the hand lever 4 is moved farther downward and the end 74 continues to bear on the surface 72 the end 57 of the ejector cam 55 is pushed to an over-center position causing the spring pressed member 59 to exert a rapid powerful thrust on the nose 70 moving it upwardly into bearing contact along the surface 75 which snaps the ejector to the position in FIG. 10 rapidly ejecting the cartridge case from the chamber. As the ejector moves rearward in this motion the beveled surface 80 on the ejector 45 engages the beveled surface 81 on the breechblock, as shown in FIG. 14, and this swings the hook end portion of the extractor to the right as viewed in FIG. 11 so that it is out of the way of the ejecting cartridge case as shown in FIG. 13. In the event that this spring-driven ejection is not desired, the adjustable pin 67 may be retracted to remove the compression force on spring 62 or alternatively the actuator 54, base member 63 and spring 62 may be completely removed. In this event, the final ejector position as shown in FIG. 10 would be arrived at by the pressure of extension 74 against surface 72 rotating extended nose 70 of the ejector cam along the surface 75 of the ejector 45 thus ejecting the cartridge case slowly or rapidly as the operator may desire to cycle the lever.

As the hand lever 4 is moved upwardly carrying the breechblock 8 upwardly the roller 76 strikes the beveled surface 83 of the extractor and swings it into its closing position and as the breechblock continues upward to its final closed position the roller 76 assumes the position shown in FIG. 7 as previously described, thus completing the cycle.

FIGS. 2 and 3 illustrate the safety mechanism of the invention in its operative connection between the hammer 12 and the trigger 90. The trigger is pivotally mounted on the pin 91 and is opposed by an adjustable spring 92 and the limit of motion of the trigger is determined by the screw 93 which is set to engage a surface 94 on the receiver and thus limit overtravel.

The upper arm of the trigger has an adjustable screw 95 which bears on the surface 96 of the sear 97. The sear is pivotally mounted on pin 98 and is pushed in a counter-clockwise direction as seen in the drawings by spring 99 to hold the sear end 100 in pressed engagement with the notch 101 of the hammer. The thumb-actuated safety 102 has a depending cam member 103 which is movable forward and backward in slot 104 on the upper tang of the receiver. This cam member has projected cylindrical pins 105 and 106 on which the two-positioned spring 107 secured to the receiver by screw 108 bears. In the safe position shown in FIG. 3 the safety 102 is held in the rearward position by the pressure of the inclined surface 110 on the pin 105. When the safety 101 is in the firing or forward position as shown in FIG. 2 the inclined surface 111 bears on pin 105 and this holds the safety in its forward position. The pin 106 merely serves as a stabilizing guide holding the safety against the receiver.

The cam member 103 has a recess 112 into which the end 113 of the sear is free to move when the trigger is pulled and thus release the hammer. When the safety is engaged as shown in FIG. 3, the depending lug 114 on the cam member blocks the end 113 of the sear and locks the sear in the safe position.

In addition to the aforementioned safety device the invention also provides means for retracting and blocking the hammer. This additional safety means comprises a link 120 which is pivotally mounted in the receiver on pin 121, and a bar 126 which is pivotally connected to the link 120 by the pin 127.

As the safety 102 is moved from the firing position as shown in FIG. 2 to the safe position of FIG. 3, the transverse stud 122 on link 120 rides out of notch 124 to bear on the under surface 112 thus pivoting the link 120 and moving the bar 126 to the position shown in FIG. 3 where the beveled surface 128 retracts the ham-

mer from engagement with the sear at notch 101. In this safe position the sear is blocked by depending lug 114 and the hammer is blocked by the end 128 of the bar 126.

In the event that the hammer is not in the cocked position but is in the lowered position or any position in between, the curved surface 129 on the hammer will block the forward movement of bar 126 thus preventing the movement of the safety to the safe position unless the hammer is suitably cocked and ready to fire.

As the safety 102 is moved to the firing position of FIG. 2 the stud 122 is picked up by the inclined edge 123 and is cammed upwardly into the notch 124. This movement pivots the link 120 pulling rearward the bar 126 so that it clears the path of the hammer, the surface 114 simultaneously moves forward clearing the sear end 113, and the rifle is made ready to fire. The action may be opened and closed for loading or unloading with the safety engaged as in FIG. 3 without difficulty and with safety. A dependable means to determine whether the hammer is cocked or uncocked is provided by the extension 130 on the hammer which projects a short distance through a hole 131 in the lever when the hammer is cocked as shown in FIG. 3.

We claim:

1. The improvement in drop breechblock rifles which comprises a receiver, a drop breechblock movable upward and downward in the receiver, a hand lever and an intermediate member both pivotally mounted on a common pin in the receiver and being rotatable with respect to each other, a hammer pivotally mounted on the pin, a recess in the breechblock in which the hammer swings from its cocked to its firing positions, a lever arm on the intermediate member in operative connection with the breechblock to open and close the breechblock, a linkage having an arm connected to the intermediate member and an arm connected to the hand lever whereby movement of the hand lever operates the breechblock and cocks the hammer.

2. The improvement in drop breechblock rifles defined in claim 1 which comprises a cam groove in the breechblock in operative connection with the lever arm, the cam groove being shaped to effect opening movement of the breechblock near the end of the movement of the hand lever.

3. The improvement in drop breechblock rifles defined in claim 1 in which the linkage is a toggle linkage having a cam surface at its pivot area, and a cam surface in the receiver on which the cam surface of the linkage travels during movement of the hand lever, the cam surface in the receiver being shaped to permit buckling of the linkage during the final movement of the hand lever permitting a large movement of the hand lever without moving the breechblock, and means on the intermediate member and the hammer which effects cocking of the hammer.

4. The improvement in drop breechblock rifles defined in claim 1 which comprises a spring operated strut for driving the hammer located on the receiver so as to direct its force on the hammer with a minimum turning moment with respect to the pin when the hammer is uncocked and with a maximum turning moment when the hammer is in firing position.

5. The improvement in drop breechblock rifles which comprises a receiver having a recess in which the breechblock moves upward and downward, a pin transversely mounted in the receiver; a hand lever, an intermediate member and a hammer pivotally mounted on the pin; said intermediate member and hammer being separately rotatable on the pin, a linkage in bearing connection at one end with the intermediate member and in bearing connection at another end with the hand lever, a lever arm on the intermediate member in operative connection with the breechblock to raise and lower the breechblock, and means on the intermediate member to cock the hammer before the breechblock is moved completely downward.

6. The improvement in drop breechblock rifles defined in claim 5 which comprises an ejector pivotally mounted on the pin and in operative connection with the hand lever, the ejector being mounted on the pin so that it can swing in the longitudinal direction of the pin to effect connection with the rim of a cartridge and in a plane normal to the axes of the pin in ejecting the cartridge.

7. The improvement in drop breechblock rifles defined in claim 5 which comprises a firing pin in the breechblock and a pivoted member in the breechblock which is struck by the hammer to transmit the blow to the firing pin.

8. The improvement in drop breechblock rifles which comprises a receiver, a drop breechblock in the receiver, a hand lever pivotally mounted on a pin in the receiver, a hammer pivotally mounted on the pin, an extension on the hand lever providing a cam surface, an ejector having a cartridge engaging hook mounted on the pin for movement in the longitudinal direction of the pin and pivotal movement on the pin, a spring pressing the hook of the extractor into engagement with a cartridge rim in the barrel chamber, an over-center ejector actuator having a lever with a nose having one side engaging the hand lever extension and another side engaging a surface on the ejector, whereby on initial downward movement of the hand lever the cam surface pushes the nose against the ejector to start extraction of the cartridge case, and continued movement of the hand lever causes the over-center actuator to effect a sudden thrust on the ejector effecting final ejection of the cartridge case.

9. The improvement in drop breechblock rifles as defined in claim 8 in which the ejector has a beveled surface, a beveled surface on the breechblock on which the beveled surface of the ejector engages during ejection and pushes the ejector out of the way of the ejecting cartridge case.

10. The improvement in drop breechblock rifles which comprises a receiver, a drop breechblock in the receiver, a hand lever pivotally mounted on a pin in the receiver, a hammer pivotally mounted on the pin, a trigger in operable connection with a sear, a safety mechanism comprising a slidable safety, the sear being pivoted and having an arm which can be engaged and blocked by the safety and

one arm having the sear end, a link pivotally connected to the receiver one end of which is in operable connection with the safety, a bar having a hammer blocking end connected to one end of the link which on movement of the safety to the safe position the blocking end engages the hammer and prevents it from moving.

11. The improvement in drop breechblock rifles defined in claim 10 which comprises a beveled end on the bar which, on movement of the safety to the safe position, further cocks the hammer releasing the sear connection, and means on the safety which engages the arm of the sear blocking it from being released by the trigger.

12. The improvement in drop breechblock rifles defined in claim 11 in which the safety has a cam slot which engages the link to move the bar to the safe and the firing positions.

13. The improvement in drop breechblock rifles which comprises a receiver, a drop breechblock movable upward and downward in the receiver, the breechblock having an angular forward face the upper portion of which is parallel to and in the same plane as the base of a cartridge in the barrel chamber when the breechblock is closed, the lower portion of the forward face being sloped rearward a few degrees, the breechblock having a rearward face parallel to the lower portion of the forward face, a recess in the receiver having opposite parallel faces on which the parallel faces of the breechblock are in slidable contact, a hand lever, and means connecting the hand lever to the breechblock to move it up and down in the recess, whereby the initial downward movement of the breechblock causes the breechblock to move rearward out of contact with the base of the cartridge.

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