Dec. 19, 1944. J. G. SEITZ 2,365,440

FIREARM

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Fig. 1.

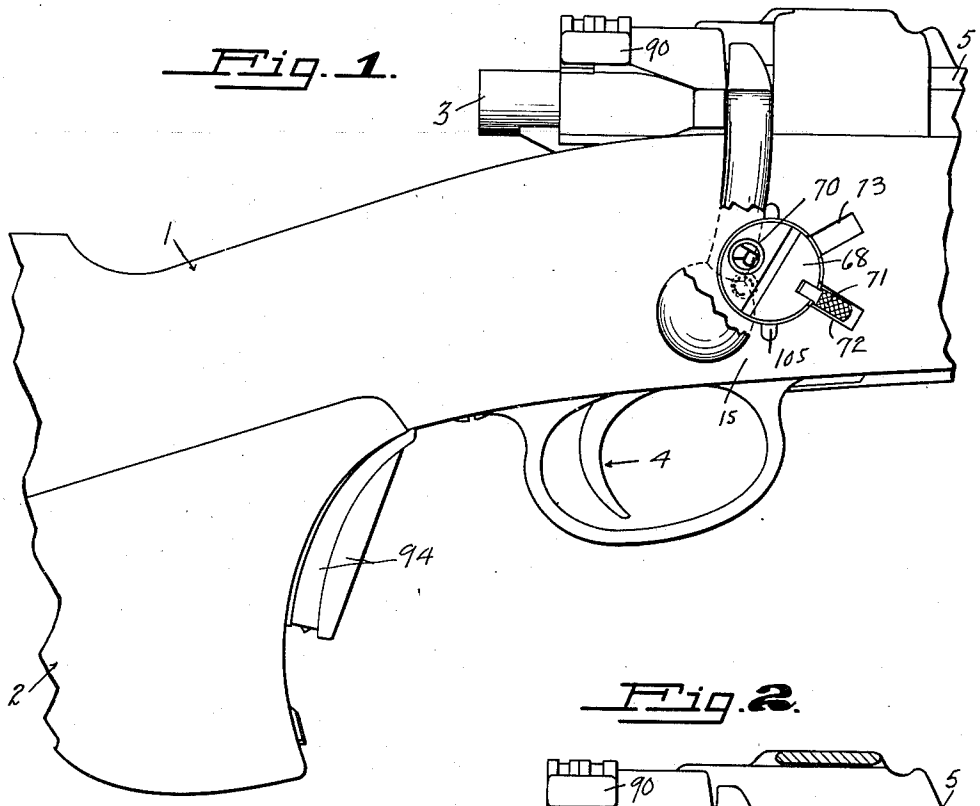
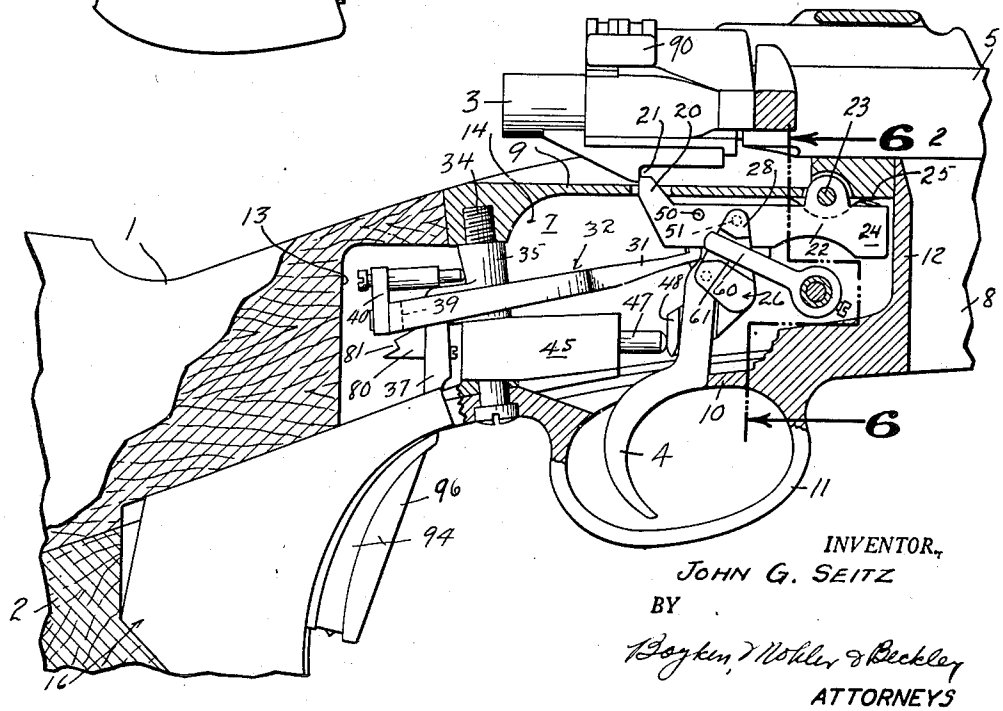


Fig. 2.



INVENTOR,
JOHN G. SEITZ
BY
Boyken, Wohler & Beckley
ATTORNEYS

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Fig. 3.

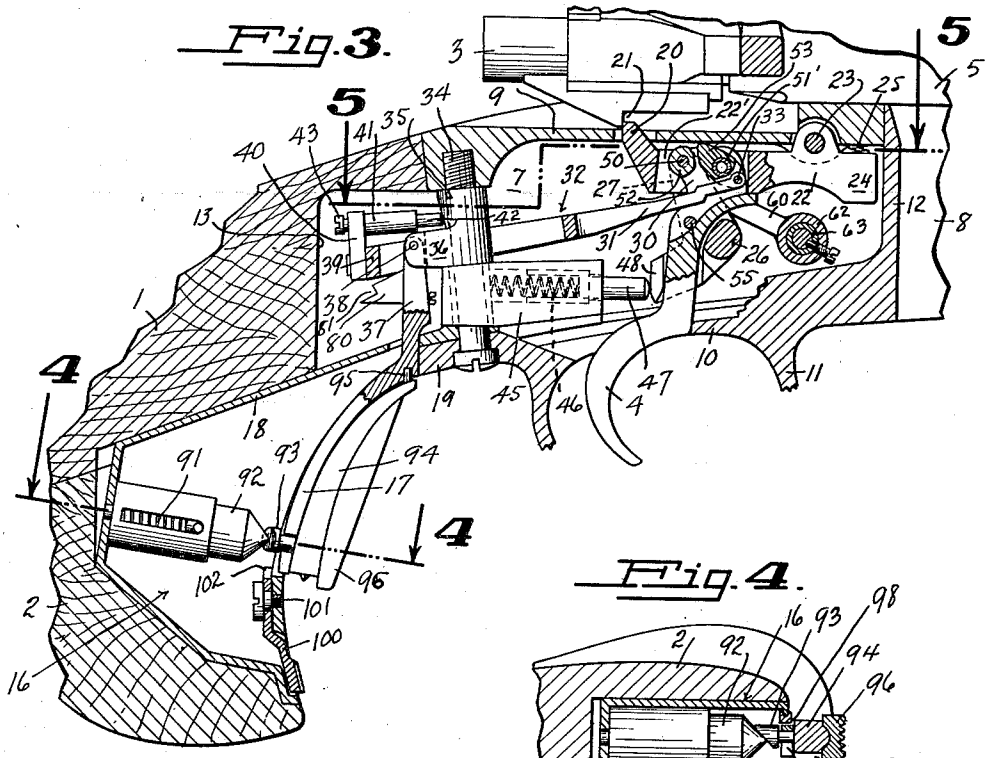


Fig. 4.

Fig. 5.

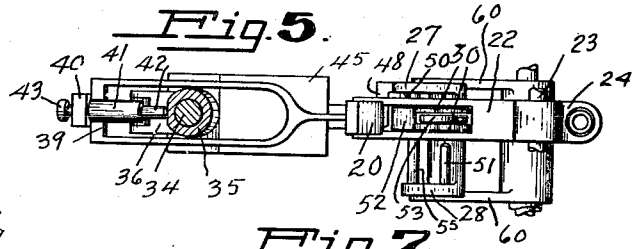


Fig. 6.

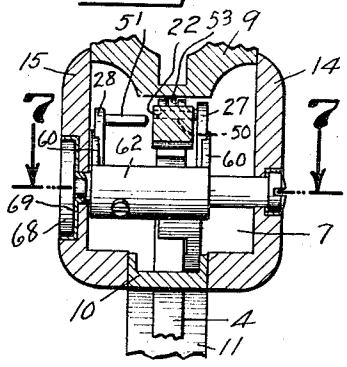
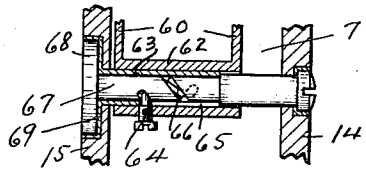


Fig. 7.



INVENTOR,
JOHN G. SEITZ
BY
Boykin, Mollet & Beckley.
ATTORNEYS

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UNITED STATES PATENT OFFICE

2,365,440

FIREARM

John G. Seitz, San Francisco, Calif., assignor to Samuel I. Keene, San Francisco, Calif.

Application November 3, 1943, Serial No. 508,773

7 Claims. (Cl. 42—69)

This invention relates generally to firearms, and more specifically to the firing mechanism of a small arm that is trigger actuated for firing.

I am aware that attempts have been made to provide a small arm with a trigger actuated firing mechanism in which the piece can be fired by retracting the trigger in the usual manner or by releasing the retracted trigger, as desired. However, insofar as I know, the means heretofore proposed for accomplishing this result does not effect a complete conversion of the firing mechanism from one type of actuation thereof to the other and vice versa. Instead, in prior attempts, the operator must manually re-set an element or elements after each firing in order to enable firing by a release of the trigger as distinguished from a pull of the latter. Thus, what has been done heretofore is not a strict conversion inasmuch as the firing mechanism automatically adjusts itself "compression" firing, or for actuation during retraction of the trigger after it has been fired. Obviously such an arrangement is highly dangerous since an operator might forget to re-set the conversion device after firing by the trigger release method, and the piece would be accidentally fired by an early retraction of the trigger in expectation of again firing by the release method. Also, the re-setting devices heretofore suggested are so readily operated as to be inadvertently manipulated without knowledge of the operator, and nothing indicates the occurrence of such manipulation. Thus the operator cannot be sure how the firing mechanism will be released, whether by a retraction of the trigger or by a release thereof after such retraction. The menace of such a mechanism is too apparent to require further comment.

Also, I am not aware that any safety means has been heretofore devised for a firing mechanism that is actuatable by releasing the trigger or by retracting the latter. Conventional firing mechanisms actuatable for firing by manual force applied to retracting the trigger are to some extent safety devices in themselves, since the firing is dependent upon an actual application of force to the trigger. However, where the firing is done by a release of the trigger after a retraction, the problem of providing a safety means is quite different. It is simplicity itself to provide means for obstructing the retraction of a trigger or to secure the cocking piece or hammer against release by retraction of a trigger. But where the firing mechanism is actuated by releasing the retracted trigger, and the trigger is retracted and is manually held preparatory to a release for firing, the provision of some means that can be actuated in safety at this point to permit release of the trigger without actuating the firing mechanism is a quite different problem. In one case the operator merely needs to refrain from pulling the trigger to prevent firing, but in the other case, where the trigger has been pulled and the release of the hammer or cocking piece is to be effected by release of the trigger, the operation has proceeded to the point where operator has no choice but to fire the piece in the absence of some readily and safely actuatable safety means.

One of the objects of this invention is the provision of means for effectively and quickly converting a firing mechanism from the type actuatable by retraction of the trigger to one that is actuatable by release of the retracted trigger and vice versa.

Another object is the provision of effective and easily actuatable safety means for rendering safe a mechanism that is convertable from one type of actuation to another as has been above mentioned.

A still further object is the provision of an improved safety mechanism for a firing mechanism that is actuatable for firing by the release of a retracted trigger and which safety device is directly on the pistol grip of a firearm as distinguished from the more horizontal stock portion.

Other objects and advantages will appear in the description and drawings.

In the drawings,

Fig. 1 is a fragmentary elevational view of the portion of a conventional rifle in which my invention is incorporated, part of the bolt arm being broken away to show the element for effecting a conversion of the firing mechanism that is adapted to be manipulated by the fingers.

Fig. 2 is a vertical sectional view taken through the portion of Fig. 1 but with most of the firing mechanism shown in elevation.

Fig. 3 is a vertical sectional view similar to that of Fig. 2 except that certain elements of the firing mechanism and safety device are in section.

Fig. 4 is a fragmentary sectional view taken along line 4—4 of Fig. 3.

Fig. 5 is a fragmentary sectional view taken along line 5—5 of Fig. 3 but with the stock and housing for the firing mechanism omitted.

Fig. 6 is a fragmentary sectional view taken along line 6—6 of Fig. 2.

Fig. 7 is a fragmentary sectional view taken along line 7—7 of Fig. 6.

In the description, where the words "forward"

or "forwardly," or where the words "rear" or "reawardly" are used, they designate positions relative to the muzzle and butt of the firearm, the former being the foremost end.

In detail, the firearm illustrated comprises a stock 1 provided with a pistol grip portion 2, cocking piece 3, trigger 4, bolt 5, and the usual barrel extending forwardly of the bolt. The elements of the firing mechanism that are between the trigger and cocking piece are positioned in chamber 7 that is rearwardly of the magazine 8. The term "cocking piece" refers to the hammer, firing pin, or the like. The upper wall 9 of said chamber is directly below cocking piece 3 and the lower wall 10 is the upper side of the trigger guard bow 11. The forward wall 12 of the chamber separates it from the magazine and the stock is cut away in the usual manner to provide the rear side 13 and opposed lateral sides 14, 15 of said chamber (Fig. 6).

The pistol grip portion 2 of the stock may be recessed to receive a housing 16, the forward side of which may be slotted for generally oscillatory movement of a safety actuating lever 17 therein transversely thereof, and which lever closes the slot at all times. The safety device that includes lever 17 will later be described more in detail.

The housing 16 is preferably substantially adjacent the trigger guard bow 11, and the upper wall 18 is substantially a rearward continuation of a rearward extension 19 of the upper side of the guard bow (Fig. 3).

The upper side 9 of the chamber 7 is apertured in the usual way for upward passage therethrough of the sear nose 20 for engagement by the latter in the sear notch 21 that is rigid with the cocking piece. This sear notch is conventional, as is the sear nose.

Sear 22 is a horizontally elongated member carrying the sear nose at its rear end, said sear having a vertical, open ended passageway 22' formed therein forwardly of said sear nose (Fig. 3) and forwardly of said passageway the sear is pivotally secured by a horizontal pin 23 to the upper side of chamber 8 at a point adjacent the forward end of said chamber. The sear extends slightly past said pin forwardly therefrom as at 24, and a spring 25 interposed between said part 24 and the wall 9 tends to yieldably urge the sear nose 20 upwardly at all times.

The trigger 4 extends through an opening in the upper side 10 of the guard bow into chamber 7, and carries a block 26 adjacent its upper end rigid therewith (Fig. 2). This block 26 is formed at its upper end with a pair of spaced, opposed, upstanding ears 27, 28 (Fig. 5) that are at opposite sides of the sear 22 at the point where passageway 22' is formed in the latter. The ear 27 extends slightly rearwardly with respect to the ear 28, although their opposed sides are parallel.

The trigger 4 porjects at its upper end into the passageway 22' and said upper end is slotted to provide opposed side walls 30 (Fig. 5) between which extends the forward end portion 31 of a link 32. The forward end of portion 31 is pivotally secured to one end of a cam member 53 by a pin 33 as will be later described more in detail.

The rear end of link 32 is formed with a vertically opening closed slot extending longitudinally of the link. A bolt 34 extends from the rearward extension 19 of the guard bow 11 through said slot in link 32 and is threadedly secured at its upper end in the rear end of the upper side 9 of chamber 7. On this bolt and in said slot is a sleeve 35 that has a rearward extension 36 formed thereon. The upper end 37 of the safety lever 17 is pivotally secured by a horizontal pin 38 to said extension 36.

The rear end 39 of the link 32 carries an upstanding ear 40 that in turn carries a sleeve 41. Sleeve 41 extends toward the sleeve 35 that is on bolt 34. A spring (not shown) is in sleeve 41 and is interposed between a pin 42 that is reciprocable in the forward end of said sleeve 41 and an adjusting screw 43 that is threaded into the rear end of said sleeve (Figs. 3, 5). The pin 42 is adapted to engage a flat rear surface on sleeve 35 above the ear 36, and this forms a yieldable connection between the link 32 and sleeve 35 that is rigid on post 34. The sleeve 41 rides on ear 36 or on the upper end of lever 17, thus the link 32 is supported at its rear end for reciprocation longitudinally thereof when the trigger is actuated, as will be explained later on.

Below sleeve 35, and integral therewith if desired, is a block 45 that is apertured for bolt 34. This block extends forwardly of the bolt 34 and is formed with a horizontal bore opening outwardly of its forward end toward the trigger 4. A spiral spring 46 is in said bore and reacts between the closed end thereof and a pin 47 that projects from the forward open end of said bore and into engagement with a lateral extension 48 on block 26. As block 26 is rigid with the trigger, the spring 46 thus functions to yieldably urge the trigger to its forward position preparatory to manipulation of the same by the trigger finger. This spring is the one that causes release of the cocking piece when the trigger is retracted and the adjustment is made for the actuation of the firing mechanism by movement of the trigger toward its normal forward position.

While I have specified the block 26 as being rigid with the trigger, the said block is adapted to be moved transversely of the upper end of the trigger, but said block will move with the trigger as though it were rigidly formed therewith upon any oscillatory movement of the latter.

The ear 27 of block 26 carries a pin 50 that projects laterally therefrom generally toward the other ear, while ear 28 of block 26 carries a pin 51 that projects generally toward ear 27. The angularity between the ears 27, 28 is such that the pins 50, 51 are spaced apart and are parallel with the pin 50 being rearwardly of pin 51 (Figs. 2, 5). The pins 50, 51 are of the same length, and each is just sufficiently long to extend through the sear 20 and into both sides of the passageway 22', said sides being apertured for said pins. However, the ears 27, 28 are spaced apart slightly more than twice the width of sear 22, and the free ends of the pins 50, 51 are spaced at opposite sides of a plane bisecting the space between said ears (Figs. 5, 6).

Above the forward end of link 32 the upper end of the trigger is formed with a cylindrical cross element 52 that is apertured in alignment with the pin 50 and with the apertures therefor that are in the sides of passageway 22'.

A cam member 53, to which link 32 is connected as has been mentioned in describing the link, is rotatably carried on a hollow bushing 51'. This bushing is secured at its ends to the sides 30 of the slot that is in the upper end of the trigger, and the bore through the bushing is adapted to receive the pin 51, since the bushing is coaxial with the pin when the trigger is in its forward, normal position.

A pin 55 is positioned below the forward end of link 32, and is secured at its ends to the ears

27 and 28 of block 26. This pin extends slidably through the trigger and coacts with either the pin 50 or pin 51 to hold the block in the proper position on the trigger.

Either the pin 50 or the pin 51 extends through the upper end of the trigger, according to whether block 26 is moved laterally so that ear 27 is adjacent sear 22 (Fig. 5) or whether ear 28 is adjacent the sear. When pin 50 extends through the trigger, as in the drawings, this pin is the fulcrum or pivot on which the trigger is adapted to swing. If pin 51 in bushing 51', and consequently extends through the trigger, then the trigger will swing about it.

The movement of the block 26 to one side or the other is effected by means of spaced arms 60 that project across opposite sides of said block in grooves 61 formed in said sides (Fig. 2). These grooves are so formed as to permit reciprocation of the block and sliding engagement with the arms during said reciprocation.

The arms 60 are carried on a sleeve 62 that is rotatable and longitudinally slidable on a bushing 63 secured to wall 14 of chamber 7. A pin 64 is secured to sleeve 62 and projects radially inwardly therefrom through a slot 65 in bushing 63 that extends longitudinally of the latter (Fig. 7). The inner end of said pin 64 extends past said slot and into a spiral groove 66 in the outer side of a shaft 67 that is coaxial with sleeve 62 (Fig. 7).

The shaft 67 is rotatably supported at its ends in the sides 14, 15 of the chamber 7, one end having a disk 68 formed integral therewith and seated in a circular recess in the outer side of wall 14. The bushing 63 may be extended into said recess to form a bearing for said disk, the outer side of the latter being flush with the outer side of wall 15. The portion 69 of said bushing is parallel with disk 68 and in the base of the recess in which the disk is positioned, and may carry the indicia "R," and "C" thereon, which indicia are respectively adapted to be uncovered by an aperture 70 in disk 68 upon a predetermined degree of rotation of the latter (Fig. 1). In Fig. 1 the letter "R" appears, meaning that the adjustment is made so that the firing mechanism will be actuated upon release of the retracted trigger. If the disk were turned clockwise through substantially a full turn until the letter "C" appeared, it would mean that the firing mechanism is adjusted for compression fire.

Secured to the periphery of disk 68 is a small arm 71 that projects radially outwardly therefrom, and which arm is pivoted to the disk so that the outer end can be swung to a position at right angles to the disk for turning the latter. Said arm may be yieldably or frictionally held either in a recess 72, as shown in Fig. 1, or in a recess 73 when the disk is turned for compression fire.

The conversion from "release" fire to "compression" fire is accomplished by reason of the axial movement of pins 50, 51 through the shifting of arms 60 laterally as the pin 64 is moved axially of shaft 67 upon rotation of the latter by handle 71.

Referring back to the safety lever 17, I provide a rearward projection 80 on the upper end thereof. This projection has a notch 81 formed in its outer end (Fig. 2), and which notch is so positioned that a swinging of lever 17 rearwardly will move the notch upwardly and into the path of the rear end 39 of link 32 after the trigger has been retracted and the link is ready for forward movement with the trigger under influence of spring 46. If the lever 17 is in the position shown in Fig. 3, which is the normal forward position thereof, the end 39 of the link will not be caught in the notch 81, hence the sear will not be released. However, if the end 39 is caught by the notch, assuming the lever 17 is swung into housing 16, then the cam member 53 with which link 32 is pivotally connected, will be actuated upon a return of retracted trigger to pull the sear down and to thereby disengage the sear nose 20 from the sear notch 21, thus releasing the cocking piece. The reason for this actuation is that the cam 53 is revolved downwardly and rearwardly about shaft 50 when the trigger is retracted and the major axis of the cam approaches vertical in which position the high point on the cam is directed upwardly. Upon a return of the trigger, the lower end of the cam will be held so that its high side will come into engagement with the upper side 9 of chamber 7. This engagement occurs before the trigger reaches the position shown in the drawings, thereby forcing the sear down upon continued movement of the trigger to its normal inoperative position.

When the disk 68 is rotated for moving the pin 51 through bushing 51' so that the pivot point is changed, it being seen that pin 50 will then be inoperative, a retraction of the trigger will swing the cross member 52 into engagement with the top of chamber 7, thus directly pulling the sear nose down as the trigger continues to swing rearwardly. In the case of compression fire, the usual safety 90 (Fig. 1) will function as a safety, if desired. Such safety is conventional, the one illustrated being that on the 1903 model U. S. Army Springfield rifle.

The safety lever 17 is spring urged forwardly on pivot 38 by a coil spring 91 (Fig. 3) that reacts against a reciprocably supported plunger 92. Plunger 92 in turn engages a head 93 of a pin that is carried by the lower end of an elongated member 94.

This member 94 generally follows the longitudinal contour of the lever 17 and is pivoted to said lever at its upper end by a pivot pin 95 for lateral swinging of the lower end of said member. Also, member 94 normally projects forwardly of the forward side of the pistol grip 2 and from the slot in the forward side of the housing 16. A facing element 96 may extend longitudinally of the forward side of member 94 (Fig. 4) and may laterally extend slightly beyond the lateral dimensions of the said member so as to provide shoulders 97 that will engage the forward side of housing 16 at opposite sides of slot 98 upon rearward swinging of the safety lever, thus forming a stop for the lever.

The lower end of lever 17 is formed with a slot 99 (Fig. 4) that extends transversely of the length of the lever, and a restricted diameter neck on the pin carrying head 93 is in said slot, the head 93 of said pin being at one side of the slot adjacent plunger 92 and the lever itself being on the other side.

The outer or forward end of plunger 92 is conical, and the outer or rear end of the head 93 is slanted to correspond to one of the slanted sides of the forward end of said plunger (Fig. 4). The force of the plunger against the slanted end of head 93 will cause member 94 to be swung on post 95 to one side a sufficient distance to move part of the rear surface of member 94 over the housing 16 at one side of slot 98. Hence if the member 96 is urged straight back, the mem-

ber 94 cannot move into the slot and this is important since it materially reduces the chance of the lever 17 being accidentally swung rearwardly. However, the outer face of the element 96 is serrated so as to form vertical grooves, and when the middle finger of the operator extends across this face and normally grips the pistol grip, the lever will be pulled slightly to one side and over the slot 98 to readily move into said slot, thus moving the projection 81 on the upper end of said lever upwardly into the path of end 39 of link 32 when the firing mechanism is set for firing by release of the trigger.

The lever 94 as seen in Fig. 4 is particularly adapted for use by a right handed person, and upon each firing the right hand will, of course, release the lever and operate the conventional bolt handle shown in Fig. 1.

It is clear from the foregoing explanation that the compression firing may be accomplished in the usual manner, in which case safety lever 17 is inoperative.

As a further safety feature, I may secure to housing 16 at the lower end of the slot in its forward side a small arm 100 that is pivoted thereto intermediate its ends by a pivot 101. This arm has an upper end 102 that may be swung to a position obstructing rearward swinging of the lower end of lever 17 when the lower end of said arm is swung in one direction, but when the lower end is swung in the opposite direction, the slot is cleared for swinging of the lever 17 as described.

Operation of the trigger 4 for either compression fire or for release firing may be easily prevented by rotating the disk (Fig. 1) until the arm or handle 72 is over the notch 105, and then swinging the handle partially into said notch to hold the disk against accidental turning. This movement will bring both of the pins 50, 51 into the sear, thus preventing rotation of the trigger about either of said pins.

Thus I provide a single movable means that is operable for converting the firing mechanism into one of the compression fire type, or into a release fire type, or one that is locked against either type of firing. Once the mechanism is converted from one type to the other it will remain converted until the conversion means is actuated manually.

It is also pertinent to note that the safety lever 17 shown herein is combined with a true pistol grip in which the latter has a substantially vertical forward face that is adapted to be quickly engaged by the hooked fingers of the hand for pulling the stock against the shoulder even without gripping the pistol grip, although the latter may be gripped firmly in a movement that is simultaneous with moving the stock against the shoulder or at any time.

Having described my invention, I claim:

1. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; a device adjustably connecting said sear and said trigger for releasing said sear only upon retraction of said trigger or only upon release thereof and during its return to said normal position as desired; and a control means movable for selectively adjusting said device for causing the release of said sear during the desired directional movement of said trigger.

2. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; an element connecting between said sear and said trigger for causing movement of said sear out of said holding position upon movement of said trigger to retracted position only; means movable for rendering said element inoperative; and a member arranged and adapted to connect said sear and said trigger for actuation of said sear to release said cocking piece only upon release of said trigger from retracted position when said element is rendered inoperative; said means for rendering said element inoperative being connected with said member for rendering the latter operative immediately upon its said movement for rendering said element inoperative.

3. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; a device adjustably connecting said sear and said trigger for releasing said sear only upon retraction of said trigger or only upon release thereof and during its return to said normal position as desired; and a control means movable for selectively adjusting said device for causing the release of said sear during the desired directional movement of said trigger; means for releasably securing said control means against accidental movement upon actuation thereof to a position for causing said release of said sear upon retraction or release of said trigger as the case may be.

4. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked when in holding position, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; a sear actuating mechanism connecting said trigger with said sear for releasing said sear from said holding position upon retraction of said trigger or upon return of said trigger to said normal forward position; a control device movable between two predetermined positions and connected with said sear actuating mechanism for rendering the latter operative for releasing said sear only upon retraction of said trigger or only upon release of said trigger according to which one of said two positions said control device has been moved.

5. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked when in holding position, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; a sear actuating mechanism connecting said trigger with said sear for releasing said sear from said holding position upon retraction of said trigger or upon return of said trigger to said normal forward position; a control device movable to either of two positions for selectively rendering said sear actuating means operative for releasing said sear only upon retraction of said trigger or only upon release of the latter as desired and according to which one of said two positions said device is moved.

6. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked when in holding position, a finger retractable trigger that is spring urged to a normal forward position upon release thereof after retraction; a sear actuating mechanism connecting said trigger with said sear for releas-

ing said sear from said holding position upon retraction of said trigger or upon return of said trigger to said normal forward position; a control device movable between two predetermined positions and connected with said sear actuating mechanism for rendering the latter operative for releasing said sear only upon retraction of said trigger or only upon release of said trigger according to which one of said two positions said control device has been moved; said control device comprising a pair of pivots for respectively supporting said sear for pivotal movement about one of two different axes according to the position of said control device, and said sear being movable out of said holding position upon pivotal movement of the sear about either of said axes, said sear actuating mechanism being operable for so pivoting said sear only upon retraction of said trigger when one of said pivots supports said sear and only upon release of said trigger when the others of said pivots supports said sear.

7. In a firing mechanism including a cocking piece, a single sear for releasably holding said cocking piece cocked, a finger retractable trigger for releasing said sear from its holding position, and which trigger is spring urged to a normal forward position upon release thereof after retraction; a pair of sear actuating elements respectively actuatable by retraction of said trigger or upon return movement of the trigger after such retraction for releasing said sear; control means movable between two positions and connected with said sear actuating elements for rendering one or the other of the latter inoperative according to one of the two positions to which it is moved.

JOHN G. SEITZ.