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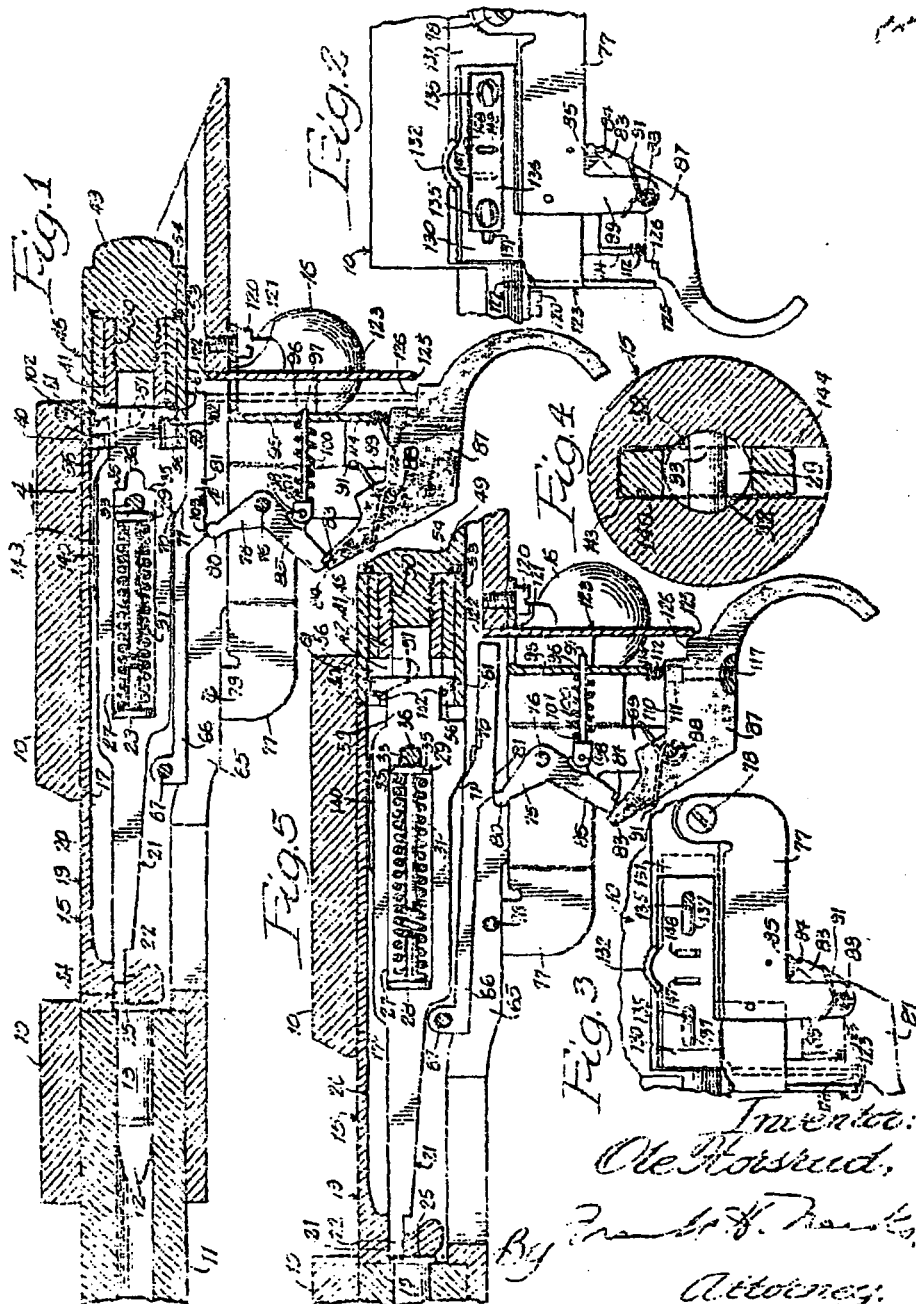
O. HORSRUD

2,310,238

FIREARM

Filed Aug. 7, 1939

2 Sheets-Sheet 1

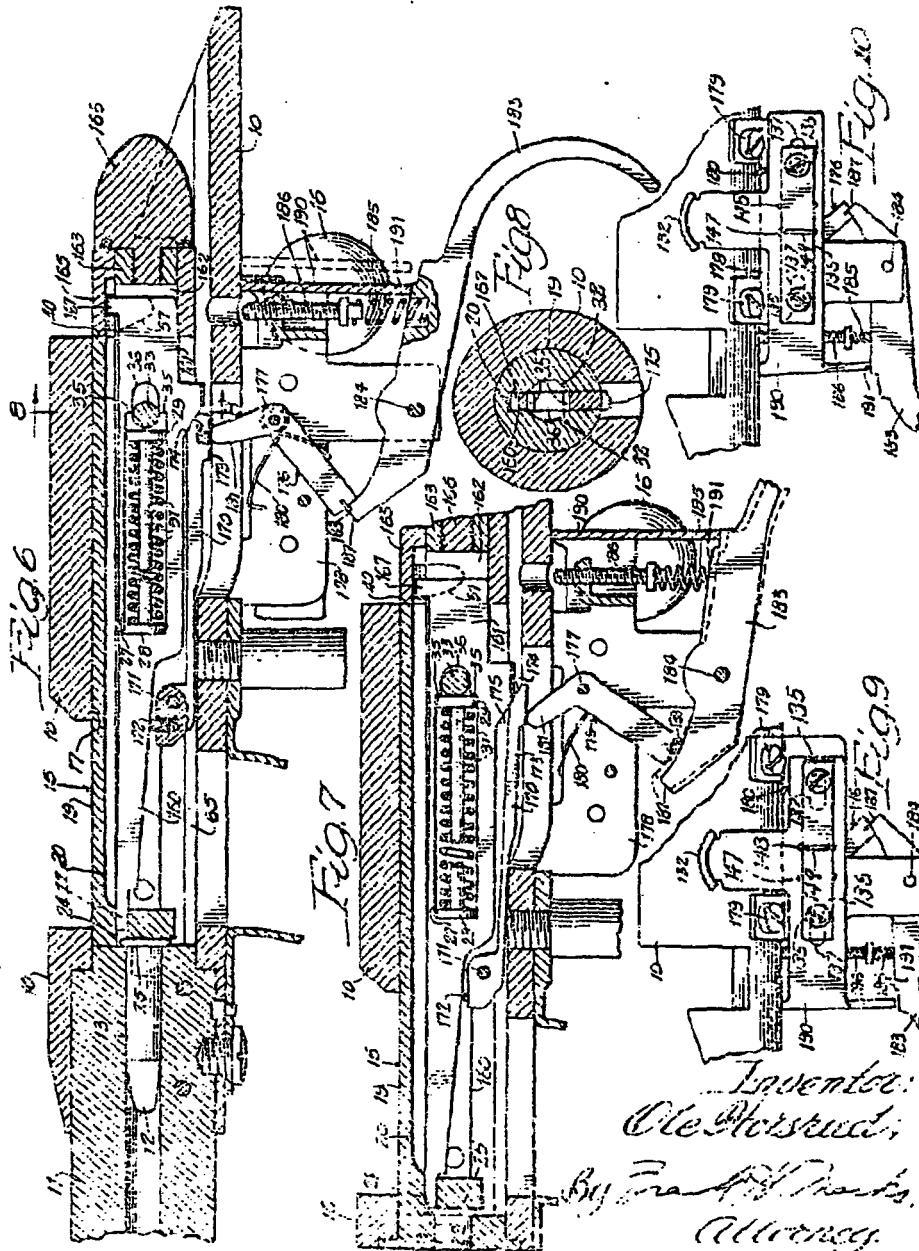


2,310,238

**FIREARM**

Filed Aug. 7, 1935

2 Shots-Sheet 2



## UNITED STATES PATENT OFFICE

2,310,238

FIREARM

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Application August 7, 1939, Serial No. 239,797

3 Claims. (Cl. 42-10)

This invention relates to firearms and is concerned more particularly with firing mechanism therefor.

Past firearm constructions have been more or less unsatisfactory because of excessive wear between certain parts of the control mechanism, resulting in impairment of accuracy and efficiency early in the life of the firearm. To overcome this defect and provide a firearm construction of enhanced reliability and of practically indefinite life is accordingly the essential object of my invention.

Another object is to provide a fire control mechanism in which substantially all of the wear occurs at places not vital to the accuracy and efficiency of the firing mechanism.

A further object is to provide a fire control mechanism in which wear at places vital to the efficiency of the mechanism is negligible.

It is a further object of the invention to provide an improved positive locking mechanism for a firearm.

It is another object to provide a firing mechanism such that a major part of the strain when the mechanism is cocked is taken by a relatively stationary member or members.

Another object is to provide a sear and striker assembly formed to minimize strain on the sear and sear control mechanism.

It is a further object to provide a firing mechanism in which friction between the sear and the striker is practically non-existent.

It is also an object to provide an improved adjustment for the trigger pressure.

A further object is to enable the sear to pass substantially instantaneously from fully obstructing position to fully unobstructing position.

Another object is to provide a striker and bolt construction affording minimum friction therebetween.

It is another object to enable the striker to be in full flight from its rearmost position.

Further objects and advantages of the invention will appear as the description proceeds.

The invention will be better understood upon reference to the foregoing description and the accompanying drawings, in which:

Fig. 1 is a fragmentary longitudinal sectional view of a firing mechanism embodying features of the invention, with the striker cocked.

Fig. 2 is a fragmentary elevation of a portion of the structure appearing in Fig. 1, but taken from the opposite side.

Fig. 3 is a view similar to Fig. 2 but with a portion removed to disclose certain details.

Fig. 4 is an enlarged sectional view taken substantially as indicated by the line 4-4 in Fig. 1.

Fig. 5 is a view similar to Fig. 1 but with the parts in the relations assumed when the striker fires the bullet.

Fig. 6 is similar to Fig. 1 but shows a modified firearm construction.

Fig. 7 is similar to Fig. 5 but shows the modified form.

Fig. 8 is a sectional view taken as indicated by the line 8-8 in Fig. 6.

Figs. 9 and 10 are fragmentary elevations showing the firearm unlocked and locked.

Referring now more particularly to the drawings, wherein the same reference characters designate the same parts, a receiver 10 is shown adjacent a barrel 11 adapted to receive a shell 12 in a shell 13. The receiver carries a bolt 14 provided with the usual handle 15 by which the bolt is adapted to be turned and translated in the bore 17 of the receiver.

The bolt comprises a forward section 19 having an elongated narrow recess 20 housing a striker or hammer 21 adapted for limited longitudinal movement in said recess. Said striker having a firing pin 22 which at all times is disposed in a hole 24 which renders the cap or primer 25 of the shell accessible to the pin. The striker 21 is of generally flat cross section conforming to the recess 20 and has a slot 27 for the accommodation of thrust bearings 28 and 29 between and about which a firing spring 31 is disposed, the sides of the recess 28 being enlarged as at 32 in Figs. 4 and 8 to accommodate said bearings and spring. A pin 33 mounted on the bolt 19 serves as a reaction member limiting the bearing 29 rearwardly. The rear end of the slot 28 provides shoulders 35 engageable with the bearing 29 and a recess 36 providing clearance for the pin 33 and having a wall engageable with the latter, thereby to limit the firing forward stroke of the striker.

In the form shown in Figs. 1 to 5, the bolt 14 has a rear peripheral shoulder 40 and an extension 41 of reduced diameter, said extension being diametrically slotted as at 42 in continuation of the recess 20 in the bolt. Rotatably and slidably fitted about the reduced extension 41 is a collar 43 to which the handle 15 is secured. The collar 43 may comprise rigidly connected outer and inner sleeves and is preferably slidably engageable with the shoulder 40. A retainer plug 44 releasably threaded at 45 within the rear end of the reduced portion 41 of the bolt is limited by said portion so that the collar 43 has sliding

engagement with the shoulder 53 on the plug, when the plug is threaded home. A friction spring ring 54 may be provided to take up play.

The collar 45 may have diametrically opposed slots 56 from which extend helical cam slots 57 as shown in Figs. 1 and 5. The striker 21 has a reduced rear extension or neck 59 projecting rearwardly into the reduced bolt portion 41 and disposed in the diametrical slot 42 thereof, and terminates rearwardly in cam follower lugs 61 adapted to project into the slots 57 of the collar 45. When the striker has fired and is thus in its foremost position, as shown in Fig. 5, the lugs 61 are disposed at the forward ends of the associated cam slots 57 and are so arranged that rotation of the collar 45 in the proper direction will cause the forward walls of the cam slots 57 to force the firing pin 21 rearward against the action of the spring 31. When the handle 16 is pulled and swung from its down position (Fig. 5) to its uppermost position, it rotates the collar 45 to effect a rearward camming of the striker 21.

The receiver 19 may have a suitable catch (not shown) cooperating with the bolt 15 to prevent rotation of the forward section 19 thereof while permitting the bolt to move axially in the bore 11.

The receiver 19 has a longitudinal channel or keyway 65 adapted to receive a sear 66 pivoted at its forward end as shown at 67 to the forward section 19 of the bolt. The sear extends rearwardly from the pivot 67 and has an inclined rearwardly facing abutment or shoulder 70 engageable with a forwardly facing abutment or shoulder 71 on the striker 21. These shoulders are adapted to be interengaged when the striker is in its rearmost or cocked position. At such time, the shoulder 70 on the sear 66 is adapted to obstruct the forward movement of the striker 21 and thereby prevent firing. The inclination of the surfaces 70 and 71 is such that, at the moment the sear is released, as will appear, the spring 31 will exert a force which, acting through the shoulder 71 on the striker, will cam the sear downward out of obstructing position and will cause the striker to fire. The inclination of said shoulders, moreover, is such that, while the sear is supported in obstructing position, substantially less than the full force of the spring 31 is communicated to the sear pivot pin 67, so that said pin is subjected to minimum stress consistent with correct design of the sear supporting mechanism, as will appear.

For controlling the position of the sear 66, I provide a bell crank lever dog 75 pivoted as at 76 on side plates of a bracket 77 or other suitable means mounted preferably on the receiver 19 as at 78 and elsewhere. The dog 75 has an upwardly extending arm 80 engageable with the bottom side 81 of the sear 66 when the shoulders 70 and 71 are interengaged, and is adapted to be rigidly held there by a latch 83 engaged in the recess 84 in the other arm 85 of the lever. The latch 83 is formed on a trigger 87 pivotally mounted as at 88 on a depending extension 89 on the bracket 77, and is urged upward by spring means 91. With the parts thus arranged, it is evident that firing on the striker pin 21 is positively prevented.

The bracket 77 may be U-shaped, providing a baffle 95 disposed rearwardly of the dog 75 and having a bearing opening 96 through which a pin 97 pivotally connected as at 98 to the arm 85 of the dog 75 is slidably extended. A spring 100 disposed about the pin 97 is engaged with

a shoulder 101 on the pin and with the bight 95 across the dog to swing clockwise as seen in Figs. 1 and 5, so as to urge the dog arm 80 toward the bolt on surface 81 of the sear 66. Compared to the spring 31, the pressure of the spring 100 is very light, so that it offers negligible resistance to the action of the spring 31 in thrusting the sear 66 downward when the latch 83 is released.

When the dog 75 is in locked position, as shown in Fig. 1, its contact point 103 is so disposed as to turn about the pivot 76 in response to the downward thrust resulting from the pressure of the spring 31 when the latch 83 is out of the recess 84.

Fig. 5 shows the relation of the parts when the firearm has been fired. To cock the firearm, the handle 16 is turned through a suitable angle in the receiver 19, say about 90°, thereby turning the collar 45 and the forward walls of the cam slots 57 to engage the lugs 61 and cam the striker rearwardly against the resistance of the spring 31. The forward ends of the lugs may be rounded as at 102 to minimize friction. The spring 31 at this time is pressing the latch 83 upward, and the spring 100 is urging the bell crank lever arm 80 toward the sear 66 and thus pressing the sear upward into engagement with the striker adjacent the shoulder 71 thereof. As the upward rotation of the handle 16 moves the striker rearward, the spring 100 moves the sear 66 upward to effect engagement between the shoulders 70 and 71, the arm 85 of the dog 75 also moving to bring the recess 84 thereof closer to the end of the latch 83. When the striker is fully withdrawn by the cam action, the spring 100 causes the shoulders 70 and 71 to be fully interengaged and the contact end 103 of the dog 75 to engage the bottom 81 of the sear 66, and enables the spring 91 to slip the latch 83 into the recess 84, all as shown in Fig. 1. At such time, with the handle 16 in its upper position, the forward walls of the cam slots 57 are engaged with the lugs 61 so as to permit the proper positioning of the sear and control mechanism therefor as just described. Now when the handle 16 is depressed, the sear 66, being locked by the dog 75 and trigger 87 in the position shown in Fig. 1, positively prevents the striker from moving forward. The downward movement of the handle 16 is limited by an abutment (not shown) in the receiver 19, and when the handle is brought to rest in its down position, the lugs 61 are aligned with the slots 57 in the collar 45, so that the forward walls of the cam slots 57 offer no obstruction to the firing stroke of the firing pin. Now the firearm is fully cocked, and, to fire the same, it is necessary merely to pull the trigger 87.

The rear part of the keyway 65 is formed to accommodate the sear 66 so that the entire bolt may be removed if desired.

It will be observed that the line of action of the force on the dog 75 in response to the pressure of the spring 31 is adjacent the axis of the pivot pin 76, so that the component in that direction of the force on the shoulder 71 on the shoulder 70 is resisted very largely by the pin 76 and the bracket 77 and accordingly by the receiver 19. Only a relatively small part of the force is taken by the latch 83 and transmitted thereby to the trigger pivot pin 88. In the movement of the trigger, there is friction between the latch 83 and the dog 75, and this friction, being relatively light, will not cause appreciable wear of the surfaces involved. Also, by virtue of the

fact that the latch 83 is subjected to a relatively light force, the trigger pivot pin 85 likewise is subjected to negligible wear. Moreover, even if excessive wear of the frictionally engaged surfaces of the dog 75 and latch 83 or of the trigger pivot pin 85 could take place, the sear 66 could be depressed to only a negligible extent by the spring 31 during the movement of the latch 83 to a position clear of the dog 75, so that the resulting wear on the surfaces 70 and 71 would be negligible. It is thus apparent that the operation of the trigger results in substantially no wear to the surfaces affecting the proper operation of the striker. When the trigger is pulled clear of the dog 75, the passage of the shoulder 71 over the shoulder 70 is practically instantaneous, the sear 66 offering substantially no resistance to such movement. Consequently, the friction between the surfaces 70 and 71 is practically non-existent and, as a result, the surfaces will remain in their original condition indefinitely, thus insuring the same accurate firing process throughout the life of the firearm.

The trigger has a bearing surface 110 extending rearwardly and below the bight 95, and has a recess 111 receiving the lower end of a spring 112. Received in the upper end of the spring is a projection 114 formed on the bracket bight 95. A screw 117 carried by the trigger is adapted to engage the spring 112 and to adjust the pressure thereof. The spring 112 is relatively light, compared to the spring 31, and accordingly, adjustment of the screw 117 will effect slight changes in the spring pressure on the trigger.

The bracket 77 may be fastened at the rear thereof to the receiver 10 in any suitable manner, as by a screw 120, and preferably has a slot 121 through which a keeper or latch 122, formed on a safety locking member 123, projects. When the firearm is cocked, as shown in Fig. 1, the lock member may be in inoperative position, as shown in Fig. 1, or it may be slid into operative position as shown by the dotted lines in Fig. 1. In this position, the keeper is substantially engaged with the bottom side 81 of the sear while the bottom 125 of the locking member is substantially engaged with a shoulder 126 on the trigger. Thus, the locking member positively locks both the sear and the trigger against releasing movement so that it is impossible for the striker 21 to fire.

The locking member 123 preferably has a side plate 120 slidably engaged with a face 131 on the receiver 10 and has a knurled or otherwise rounded thumb-engaging projection or handle 132 to facilitate movement of the locking member. The locking member 123 is preferably removably mounted as by screws 135 extending through a plate 136 and through slots 137 formed in the portion 130 of the locking member, said screws being threaded into the receiver 10. The screws and slots determine the limits of movement of the locking member. In case of the limits, the locking member is in inoperative position as shown in Figs. 1, 2 and 3 in full lines, and, in the other limit, the locking member is in operative position, as shown in dotted lines in Fig. 1. The projection 122 is preferably on the side of which the handle 132 is located, for greater convenience.

In the operation of rotating the handle 16 to aim the firearm forward, the forward walls of the cam slots 57 exert a rotative force on the striker in the direction of turning of the handle. With the arrangement illustrated in Fig. 1, the

upper left corner edge of the striker and the lower right corner edge of the striker, if sharp, might score the respective walls 140 and 141 of the recess 20 and would themselves become worn, with the result that the proper firing of the firearm might be seriously affected. The fit between the sides of the striker and the walls 140 and 141 of the recess 20 is preferably such as to allow substantially no more than free sliding movement of the striker. Since such a fit requires some clearance, it is obvious that if the corner edges referred to were sharp, there may be a biting knife-edge-to-surface friction contact possibly resulting in the deleterious wear above referred to. To obviate such results, I have rounded said corner edges as shown at 142 and 144, in Fig. 4 thereby providing for engagement between a flat wall and a relatively blunt curved surface as shown, so that friction will be minimized.

The sliding portion 130 of the lock member 123 may be formed with openings or indentations 147 and 148, and the cover plate 136 with a spring depression or detent 149 adapted to snap in the recess 148 when the locking member 123 is in inoperative position and in the recess 147 when the locking member is in locked position.

In the form of the invention appearing in Figs. 6 to 10, the striker or hammer 150 has a neck 161 slidably fitted in the slot 162 in the reduced rear end 163 of the bolt 15. A sleeve 165 journaled on said end 163 is slidably engaged with the bolt shoulder 40 and a cap 166 is threaded in said end. The sleeve has a cam slot 57 cooperative with a lug 167 on the striker neck 161 in the manner set forth above in connection with the lugs 54, so that when the ball handle 15 is raised the wall of said cam slot 57 in Fig. 6, retracts the striker against the resistance of the firing spring 31 to cocked position.

The sear 170 is pivoted to the receiver 10 at 171 and carries a spring 172 forward of the pivot, said spring bearing against the under side of the striker so as to at all times tend to turn the sear anti-clockwise. The rear end portion 173 of the sear has an inclined surface 174 complementary to an inclined surface 175 on the striker. A dog 176 pivoted at 177 to a bracket 178 mounted as at 179 on the receiver is constantly urged by a spring 180 to turn clockwise, an arm 181 of the dog being engageable with the rear end 173 of the sear to press the sear surface 174 against the striker surface 175.

A trigger 182 pivoted at 184 to the bracket 178 is urged clockwise by a spring 185 compressed between the trigger and an anchoring member 186 carried by the bracket and adjustable by hand or a suitable tool. Thus, the other end 187 of the trigger automatically snaps into engagement with the shoulder 188 of the dog 176, as shown in Figs. 6, 9 and 10, upon retraction of the striker as aforesaid.

The safety lock means of Figs. 6 to 10 differs from that previously described in that the slide 190 abuts the receiver 10 and not the sear 170. The mechanism is locked when the slide 190 engages the surface 191 of the trigger as shown in full lines in Figs. 6 and 9 and is unlocked when the slide is disposed rearwardly of said surface as shown in full lines in Figs. 7 and 8 and in dotted lines in Fig. 9.

It is evident from the foregoing that I have provided with a minimum of parts a construction which enables the firing spring 31 to exert its full force in driving the striker from its ex-

from rear position to its firing position without interference from the sear 55 or other means, so that the firing pin has acquired maximum momentum possible upon its striking the shell cap 25. The parts are easily accessible, the stresses resulting from maintaining the striker in cocked position are taken largely by the gun frame so as to substantially relieve the trigger, and wear between the surfaces which might seriously affect the efficiency of operation is negligible. A simple yet effective double acting lock is provided, and minute adjustments in the pressure on the trigger are possible. The receiver 10 may be provided with an opening (Figs. 1, 5, 6 and 7) through which a cartridge clip may be fed and used shells released.

The elements of the firing and fire control mechanism may be of steel or other metal or alloy of sufficient hardness to withstand the conditions of use of the firearm, as is understood by those skilled in the art.

Various changes coming within the spirit of the invention may be suggested by those skilled in the art, and hence I do not wish to be limited to the specific forms shown or uses mentioned.

I claim:

1. In a mechanism for maintaining a firing pin in cocked position, a receiver, a bolt therein, a striker in said bolt and having a forwardly facing shoulder, a sear mounted on said bolt and having a rearwardly facing shoulder engageable with the aforesaid shoulder when the striker is in cocked position, a lever pivotally supported from said receiver and engaged with said sear, a trigger supported from said receiver and holding said lever in engagement with said sear, and a spring for firing said striker, said spring being inoperative while said trigger holds said lever engaged with said sear, said trigger being disengageable from said lever to render said firing

spring operative, at least one of said shoulders being inclined upwardly and forwardly to enable said striker to cam said shoulders apart when said spring becomes operative.

2. A firearm comprising a bolt, a striker therein, a sear movable into and out of a position obstructing firing movement of said striker, said sear being movable by said striker out of obstructing position, means pivotally mounting said sear on said bolt, said means being disposed in advance of the place of engagement, releasable means for maintaining said sear in obstructing position, said sear extending longitudinally between the place of engagement and its pivot, so that the forward component of the force of the spring is withstood by said bolt, the releasable means comprising a member engaging said sear opposite the place of interengagement between said striker and sear to preclude bending of said sear by said striker.

3. A firearm, comprising a receiver, a bolt therein, a striker in said bolt, a sear pivoted on said bolt and movable into and out of a position obstructing firing movement of said striker, a spring for propelling said striker, said sear being movable by said striker out of obstructing position, means including a lever pivoted on said receiver for maintaining said sear in obstructing position, the sear pivot being disposed to transmit the forward component of the force of the spring-pressed striker on said sear to said bolt, said lever engaging said sear at such a point that when the sear is swung out of obstructing position, it will swing the lever, and means releasably retaining said lever in position to maintain the sear in obstructing relation to the striker, the lever pivot being disposed to withstand a major portion of the downward component of said striker on said sear.

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