Sept. 3, 1940. E. S. POMEROY 2,213,348

FIRE CONTROL MECHANISM FOR FIREARMS

Filed June 28, 1939 3 Sheets-Sheet 1

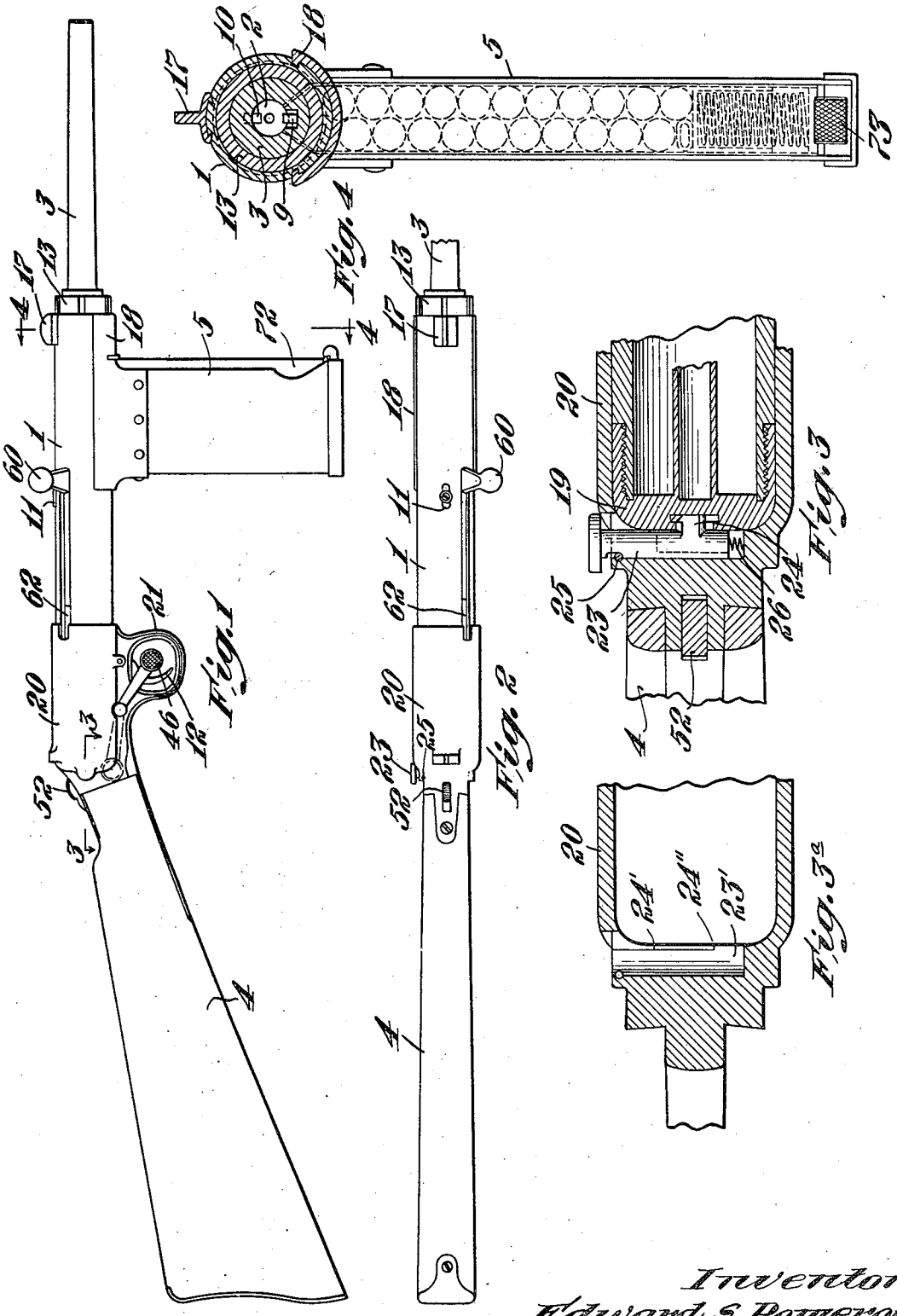


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 3a

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FIRE CONTROL MECHANISM FOR FIREARMS

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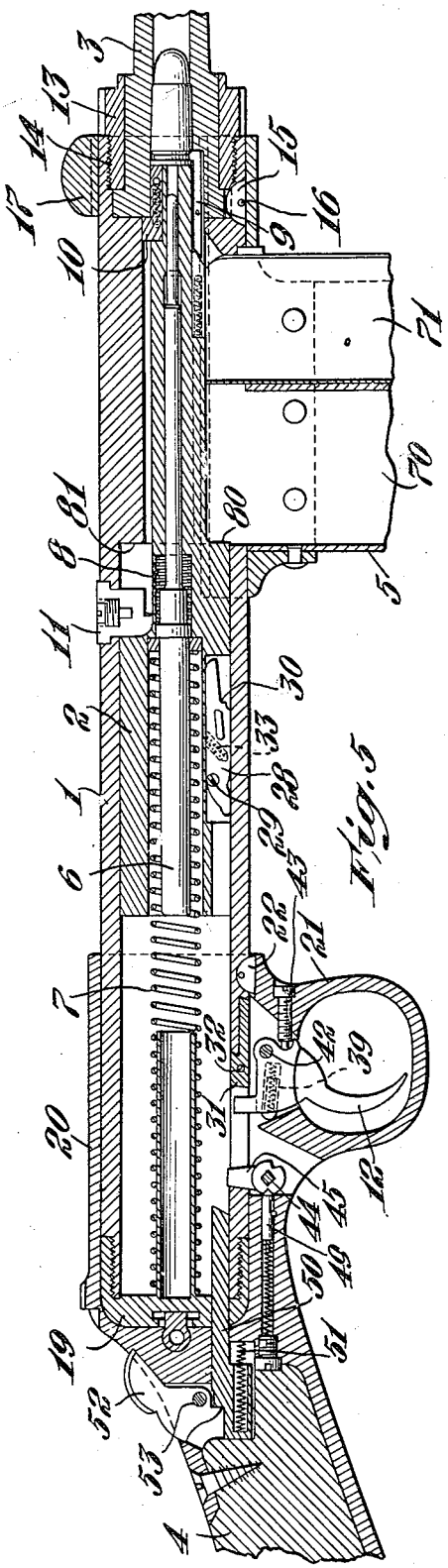


Fig. 5

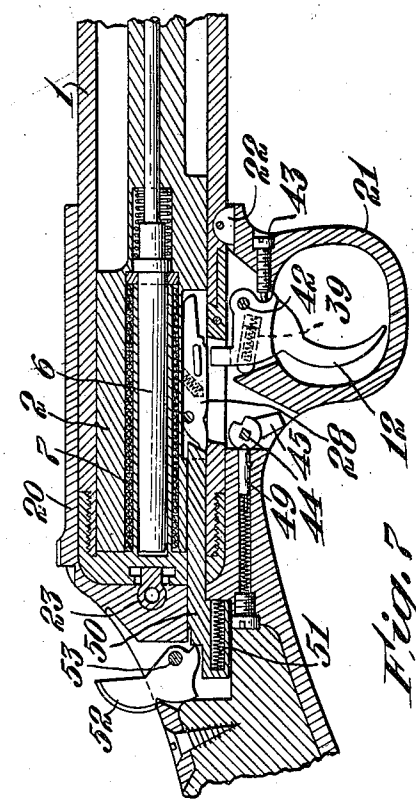


Fig. 7

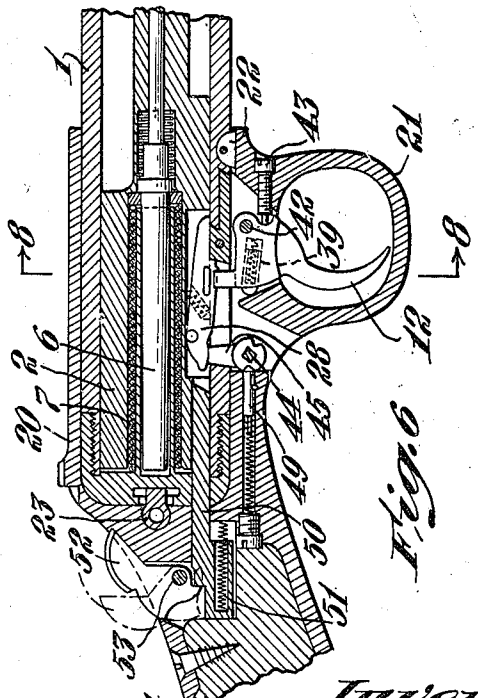


Fig. 6

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Filed June 28, 1939 3 Sheets-Sheet 3

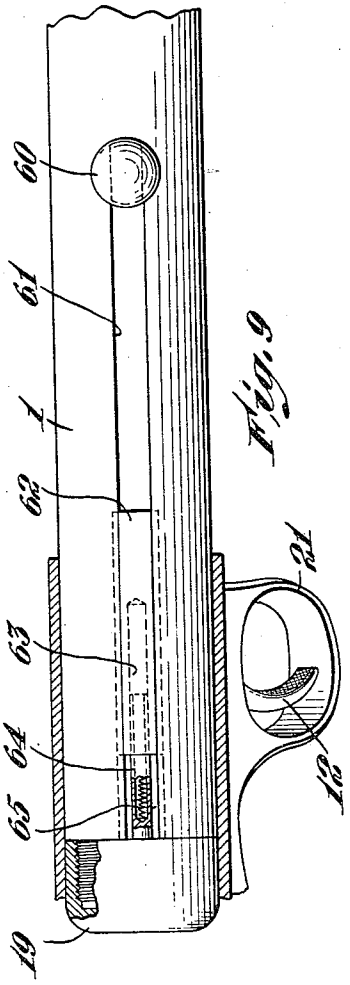


Fig. 9

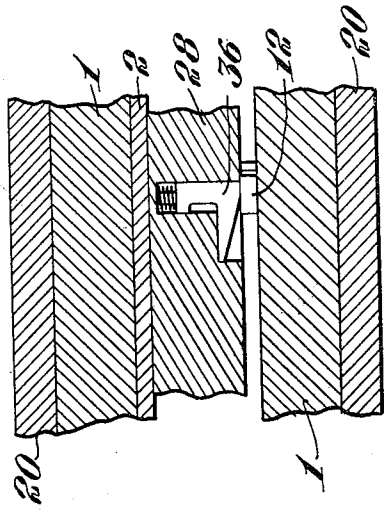


Fig. 11

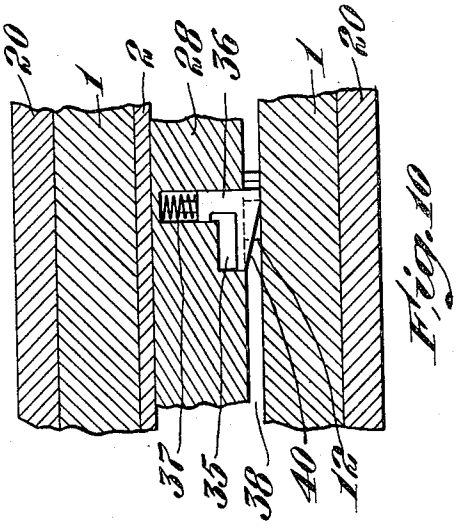


Fig. 10

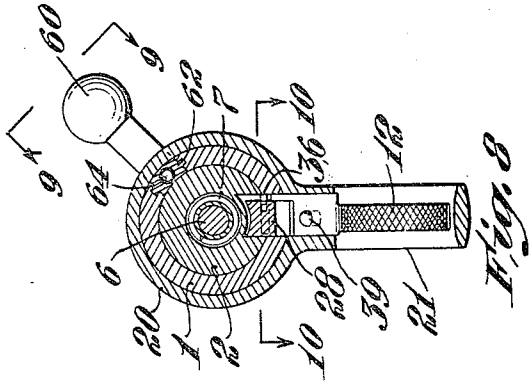


Fig. 8

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UNITED STATES PATENT OFFICE

2,213,348

FIRE CONTROL MECHANISM FOR FIREARMS

Edward S. Pomeroy, Springfield, Mass., assignor to Smith and Wesson, Inc., Springfield, Mass., a corporation of Massachusetts

Application June 28, 1939, Serial No. 281,557

8 Claims. (Cl. 42—4)

This invention relates to the control mechanism of automatic firearms and more particularly to trigger mechanism and means for rendering firearms either full-automatic or semi-automatic, objects of the invention including the provision of mechanism which is simple and inexpensive to construct, easy to assemble and disassemble and reliable and durable in use.

For the purpose of illustration a typical embodiment of the invention is shown in the accompanying drawings in which

Fig. 1 is a side elevation;

Fig. 2 is a top plan;

Fig. 3 is a section on line 3—3 of Fig. 1;

Fig. 3ª is a section on line 3—3 of Fig. 1 through only a part of the firearm;

Fig. 4 is a section on line 4—4 of Fig. 1;

Fig. 5 is a longitudinal vertical section showing the parts in loaded uncocked semi-automatic position;

Fig. 6 is a similar view showing the parts in cocked, semi-automatic, safe position;

Fig. 7 is a similar view showing the parts set for full-automatic operation and the bolt at the end of its automatic recoil;

Fig. 8 is a section on line 8—8 of Fig. 6;

Fig. 9 is a view from line 9—9 of Fig. 8;

Fig. 10 is a section on line 10—10 of Fig. 8; and

Fig. 11 is a similar view showing the parts in the position which they occupy when the bolt recoils before the trigger has been released.

The particular embodiment of the invention chosen for the purpose of illustration comprises a cylindrical receiver 1, a bolt 2, a barrel 3, a stock 4, a magazine 5, a firing pin 6, a main recoil spring 7, a firing pin spring 8, an extractor 9, an ejector 10, an ejector stop 11 and a trigger 12. As shown in Fig. 5 the barrel is held in the receiver by means of a ring 13 which is threaded into the receiver at 14. A key 15, which is mounted in a slot in the receiver by means of a pin 16, extends into a slot in the barrel to hold the barrel in predetermined angular relationship with the receiver. This is particularly important for the reason that the extractor 9 projects laterally from the forward end of the bolt into a slot in the rear end of the barrel as shown in Figs. 4 and 5. Before threading the ring 13 into the receiver the sight 17 is slipped on the forward end of the receiver, the sight having dovetail flanges fitting into grooves in the receiver as shown in Fig. 4. As shown in the same figure the magazine holder 5, which also serves as a fore-grip, also has dovetail flanges 18 sliding into grooves in the forward end of the receiver. Thus the ring 13 serves not only to hold the barrel on the receiver but also to retain the sight and magazine holder in position on the receiver. This means for retaining the barrel, magazine and sight on the receiver is claimed in my copending application Serial No. 281,558, filed on even date herewith.

As shown in Figs. 3, 5, 6, 7 and 9 the rear end of the bolt chamber is closed by a cap 19 which threads over the rear end of the receiver 1. Slidably fitted over the rear end of the receiver is a frame member 20 which comprises a trigger guard 21 and which carries the fire control mechanism. This frame member telescopes on the receiver from the rear and is held against rotation by a key 22 pinned to the receiver. The frame member 20 is retained in position by means of a latch 23 (Fig. 3) which has a lateral hook 24 engaging behind a shoulder on the rear end of the receiver cap 19. As shown in Figs. 5, 6 and 7 the diameter of the body of the latch is somewhat greater than the thickness of the laterally projecting hook 24; and as shown in Fig. 3ª the frame 20 is provided with a cylindrical socket 23' to receive the body of the latch with a slot 24' to accommodate the hook 24, the width of the slot being less than the diameter of the socket and the slot terminating at 24''. The endwise movement of the latch is limited by a pin 25 and a spring 26 normally urges the latch outwardly into the position shown in Fig. 3 where the hook 24 interengages with the receiver cap. To unlock the frame member from the receiver the latch is pressed inwardly against spring 26 until the part 24 is unhooked from the receiver cap 19.

Mounted in a groove in the lower side of the bolt 2 is a sear 28 which is pivotally attached to the bolt by a pin 29 to permit the sear to swing from the cocked position shown in Fig. 6 to the firing position shown in Figs. 5 and 7. The sear has a shoulder 30 for engagement behind an abutment member 31 which is secured in a slot in the bottom of the receiver by means of a pin 32, and the sear is continuously urged in a clockwise direction about the pin 29 by means of a spring 33 disposed in an oblique recess in the upper side of the sear and bearing against the bottom of the slot in the bolt. As shown in Figs. 10 and 11 the sear 28 is provided with a transverse slot 35 in which an L-shaped member 36 slides crosswise of the sear, the member being yieldingly urged to the right into the position shown in Fig. 10 by means of a spring 37. When the firearm is cocked and the member 36 projects across the space 38 the right-hand end of the member

overlies the tail of the trigger 12. Thus when the trigger is retracted against the action of the spring 39 the tail of the trigger engages the under side of the member 36 and lifts the sear out of engagement with the abutment 31, thereby permitting the bolt to go forward in response to the recoil spring 7. Should the trigger remain retracted when the bolt recoils the cam surface 40 of the member 36 engages the tail of the trigger and causes the member 36 to move into the position shown in Fig. 11. Thus, if the control mechanism is set for semi-automatic operation, the sear is free to drop into engagement with the abutment 31 whether or not the trigger is released before the bolt recoils. If the bolt recoils into cocked position before the trigger is released, the member 36 snaps back to the normal position shown in Fig. 10 when the trigger is subsequently released. As will be understood from the drawings the trigger is pivoted to the frame member 20 by pin 42 and the normal position of the trigger is adjusted by the screw 43.

To render the firearm safe when loaded and cocked a safety is provided in the form of a pin 44 carrying a lug 45 which is movable from the idle or firing position shown in Fig. 7 to the safe position shown in Figs. 5 and 6 where the lug 45 lies immediately beneath the tail of the sear so that the sear can not be swung in a counter-clockwise direction out of engagement with the abutment 31. The safety is actuated by an external handle 46 which, in the safe position, extends across the opening in the trigger guard as shown in Fig. 1, thereby obstructing the insertion of the finger into trigger-pulling position. The safety is yieldingly retained in each of its two positions by means of a spring-pressed plunger 49.

For full-automatic operation the firearm is provided with a member 50 which slides forwardly and rearwardly immediately behind the cocked position of the sear 28, the member being normally held in retracted position by means of a spring 51 but being movable to forward operative position by means of a control member 52 pivoted in a recess in the frame 20 on a pin 53 to swing from the semi-automatic position shown in Figs. 1, 2, 5 and 6 to the full-automatic position shown in broken lines in Fig. 6 and in full lines in Fig. 7. The forward end of the slide 50 is inclined downwardly and rearwardly to depress the tail end of the sear 28 as shown in Fig. 7 when the bolt recoils to its extreme rearmost position, which is slightly in the rear of the cocked position shown in Fig. 6. Thus when the slide 50 is in forward position the sear can not move back far enough to drop into engagement with the abutment 31 whether or not the trigger be retracted.

As shown in Fig. 9 the bolt is provided with an actuator 60 projecting out through a slot 61 in the receiver. In the rear end of this slot a slide 62 is dovetailed into the edges of the slot (Fig. 8), the slide having a longitudinal bore 63 into which projects a tube 64, the rear end of which is closed and bears against the edge of the cap 19. The spring 65 interposed between the slide 62 and the bottom of the tube 65 normally holds the slide 62 against the forward ends of its dovetail grooves. The slide 62, which is moved back by the actuator 60 when the bolt recoils, serves to close the actuator slot as far forwardly as the rear end of the bolt when the bolt is in the forward position shown in Figs. 5 and 9.

As shown in Fig. 5 the fore-grip 5 is divided into two compartments 70 and 71. The rear compartment 70 is open at the bottom and serves merely as a passageway through which empty cartridge cases are ejected downwardly. The forward compartment 71 contains the magazine 72 comprising the usual follower and follower spring for feeding the cartridges which are disposed in staggered relationship. The magazine may be removed from the open forward side of the fore-grip by pressing the detent 73 (Fig. 4) as described more fully in the copending application of Harold Wesson, Serial No. 281,565, filed on even date herewith.

The operation of the firearm is as follows. When semi-automatic operation is desired the safety 45 is moved to the position shown in Fig. 7, the controller 52 remaining in its normal semi-automatic position shown in Figs. 1, 2, 5 and 6, and the bolt is retracted by hand until the sear 28 drops into engagement with the abutment 31. When the trigger is then pulled the tail of the trigger engages the member 36 to lift the sear into the position shown in Fig. 7 whereupon the bolt is free to advance in response to the recoil spring 7. As the bolt goes forward it feeds a cartridge into the firing chamber and when the bolt reaches forward position it is abruptly stopped by engagement of the forward end 80 of the larger rearward end of the bolt with the shoulder 81 in the receiver. When the bolt stops abruptly the firing pin continues forwardly by its own inertia against the action of the spring 8 to fire the cartridge, the spring 8 then returning the firing pin to the position shown in Fig. 5. When the gun is fired the breech pressure blows back the bolt against the action of the recoil spring 7 until the sear 28 engages the abutment 31, but inasmuch as the forward end of the bolt projects into the barrel the projectile has left the barrel before the forward end of the bolt leaves the barrel. Thus when the bolt leaves the barrel the breech pressure has dropped to such a low value that there is little if any tendency for gases to blow back into the receiver. During the recoil of the bolt the extractor withdraws the empty cartridge case and, near the end of the recoil, the ejector 10 engages the ejector stop 11 to eject the case downwardly through the passage way 70. If the trigger has been released before the bolt reaches rearmost position the sear drops into engagement with the abutment 31 in obvious manner. If the trigger has not been released the tail of the trigger cams the member 36 inwardly from the position shown in Fig. 10 to the position shown in Fig. 11, thereby permitting the sear to drop into bolt-retaining position even though the trigger has not been released. When the trigger is subsequently released, the member 36 snaps out over the tail of the trigger ready for another firing.

For full operation the controller 52 is moved to the position shown in Fig. 7, causing the slide 50 to depress the rear end of the sear and thereby release the sear from the abutment 31. Firing then continues until the controller is released or the magazine becomes empty. Upon release of the controller it is returned to normal semi-automatic position by spring 51 acting through slide 50.

To disassemble the firearm the nut 13 is threaded out of the receiver to permit the barrel, sight and fore-grip to be slipped forwardly from the receiver. To remove the frame from the rear end of the receiver the catch 23 is pressed in-

wardly to unhook the part 24 from the receiver cap 19. The pin 43 is then retracted sufficiently to permit the trigger 12 to be swung in a counterclockwise direction about the pivot 42 until the tail of the trigger passes downwardly out of the slot in the bottom of the receiver. Then the frame 20 may be slipped rearwardly off the receiver. Thereafter the bolt may be removed from the rear end of the receiver by unthreading the cap 19 from the receiver.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, and manual means for disengaging the sear from the abutment.

2. A firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear pivoted on the bolt to move into engagement with said abutment, and a trigger for disengaging the sear from the abutment.

3. An automatic firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, manual means for disengaging the sear from the abutment, and means whereby the sear catches on the abutment if the trigger is still retracted when the bolt recoils.

4. An automatic firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, a trigger for disengaging the sear from said abutment, and a member intermediate the trigger and sear through the medium of which the trigger moves the sear out of engagement with said abutment, said member being movable transversely of said path and transversely of the path of movement of the sear relatively to the bolt and having a cam surface for camming it out of operative position if the trigger is still retracted when the bolt recoils.

5. An automatic firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, a trigger for disengaging the sear from said abutment, and a member carried by the bolt intermediate the trigger and sear through the medium of which the trigger moves the sear out of engagement with said abutment, said member being movable transversely of said path and transversely of the path of movement of the sear relatively to the bolt and having a cam surface engageable with the trigger for camming it out of operative position if the trigger is still retracted when the bolt recoils.

6. An automatic firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, a trigger for disengaging the sear from said abutment, and a member movably mounted on the sear through the medium of which the trigger moves the sear out of engagement with said abutment, said member being movable transversely of said path and transversely of the path of movement of the sear relatively to the bolt and having a cam surface for camming it out of operative position if the trigger is still retracted when the bolt recoils.

7. An automatic firearm comprising a bolt, an abutment for holding the bolt in retracted position, a sear carried by the bolt and movable transversely of the path of the bolt into engagement with said abutment, manual means for disengaging the sear from the abutment, and means movable into the path of the sear to prevent the sear from catching on said abutment during full-automatic operation while permitting the sear to catch on the abutment when the bolt is manually retracted.

8. An automatic firearm comprising a bolt, an abutment for holding the bolt in cocked position slightly in advance of fully-retracted position, a sear pivoted on the bolt so that a forwardly-facing shoulder on the sear may move behind said abutment when the bolt is retracted, and means movable into the path of the sear to hold the sear away from said abutment during the back-and-forth movement of the bolt.

EDWARD S. POMEROY.