

Nov. 4, 1958

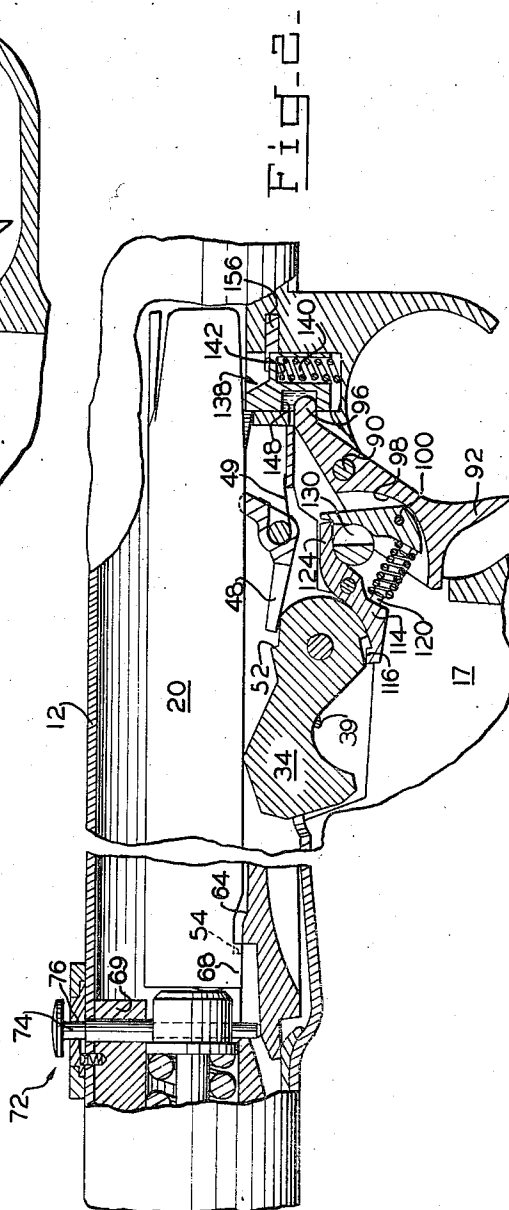
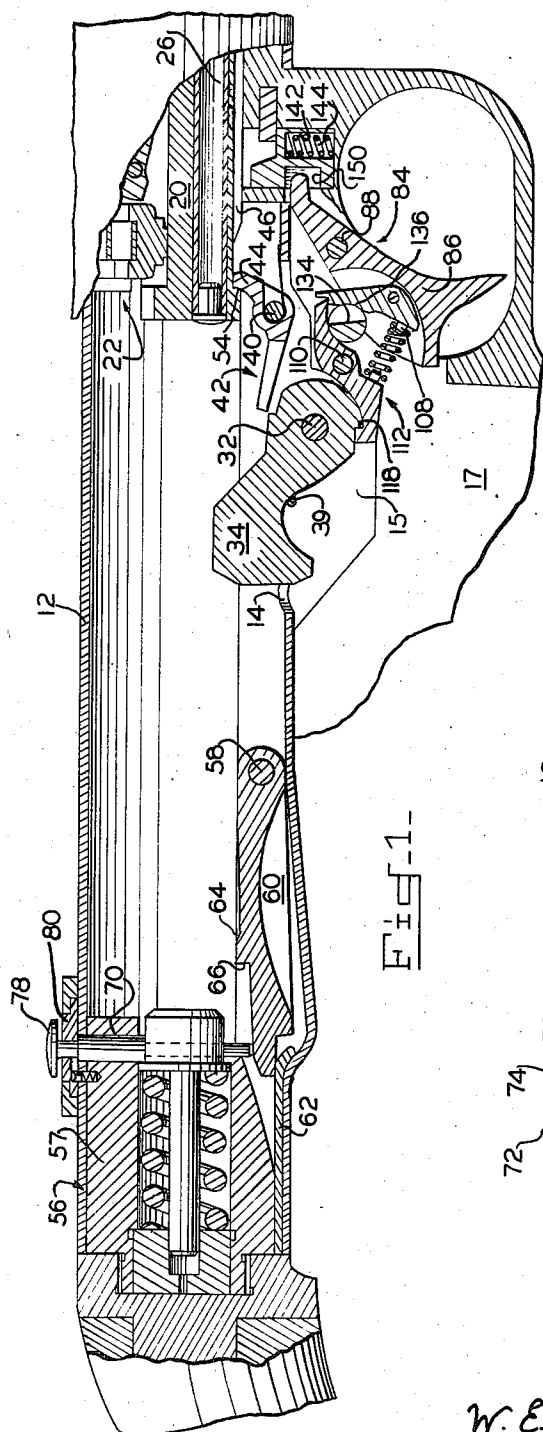
C. E. SIMPSON

2,858,741

SELECTIVE FIRING CONTROL FOR OPEN AND CLOSED BOLT POSITIONS

Filed July 11, 1956

3 Sheets-Sheet 1



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Fig. 3

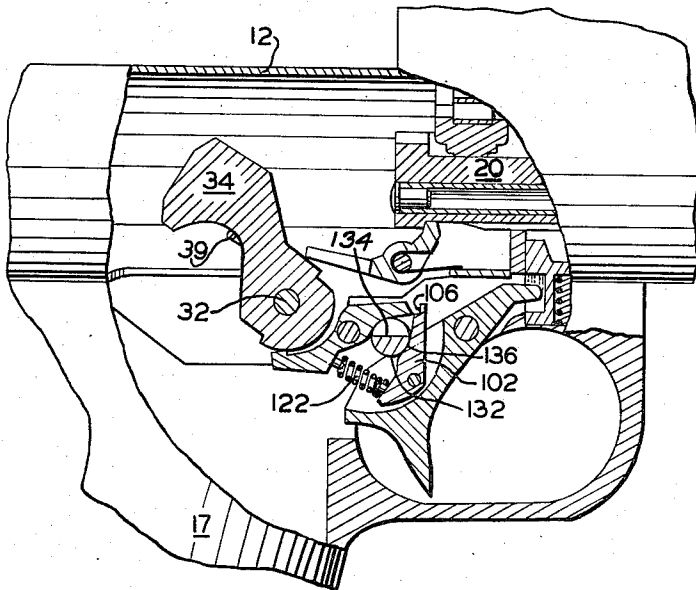
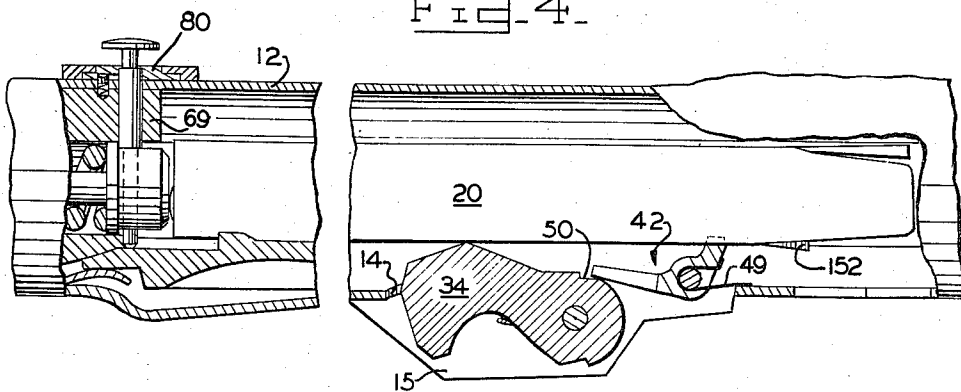


Fig. 4



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Fig-5-

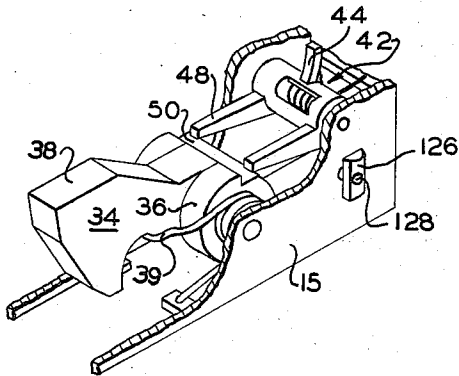


Fig-6-

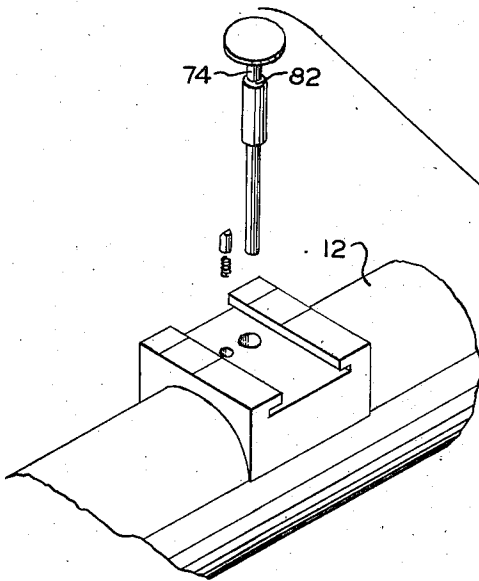
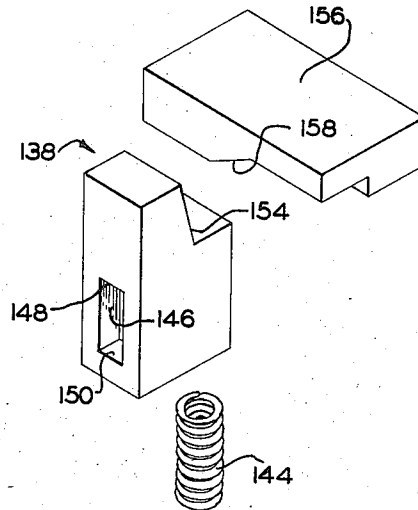


Fig-7

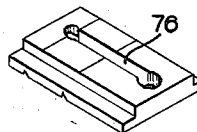
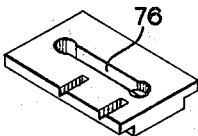


Fig-8-



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SELECTIVE FIRING CONTROL FOR OPEN AND CLOSED BOLT POSITIONS

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5 Claims. (Cl. 89-140)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to fire control mechanisms for firearms.

With the wide variety of conditions under which light firearms are used in modern warfare, it is important that they be adaptable to as many conditions as possible without requiring any major structural alterations.

It is, therefore, an object of this invention to provide for light firearms a fire control mechanism which may be easily switched between automatic and semiautomatic fire.

It is another object of this invention to provide for light firearms a fire control mechanism which has the advantages of firing from a closed bolt position during semiautomatic fire, for precision shooting, and from an open bolt position during automatic fire to reduce the danger of "cock-off" when the firearm is stopped in a closed bolt position after a burst of automatic fire.

It is a further object of this invention to provide for light firearms a fire control mechanism which may be operated by a conventional trigger means positioned at the front end of the receiver or by a trigger means at the rear of the receiver when the conventional trigger is not accessible because of mounting conditions as when mounted on a bipod or a tripod.

It is a still further object of this invention to provide for light firearms a fire control mechanism having a pistol grip with conventional trigger mechanism for shoulder fire which is readily removed from the firearm when hindering the mounting thereof.

It is another and still further object of this invention to provide a fire control mechanism wherein the automatic sear acts as a safety to prevent the operation of the firing mechanism until the bolt is locked in battery position.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a cross-sectioned elevational view of the fire control mechanism showing the mechanism adjusted for automatic fire from a closed bolt position with trigger control and the bolt in the battery position;

Fig. 2 is a view similar to Fig. 1 but showing the mechanism adjusted for automatic fire from an open bolt position with trigger control and the bolt releasably held in recoil position;

Fig. 3 is a cross-sectioned elevational view of the trigger and sear assemblies of the fire control mechanism showing the mechanism adjusted for semiautomatic fire from a closed bolt position and the hammer released from the sear by the trigger;

Fig. 4 is a view similar to Figs. 1 and 2 but with the pistol grip assembly removed and the firearm being operable automatically from the open bolt position by the bolt release in the rear of the receiver;

Fig. 5 is a perspective view of the hammer and hammer release;

Fig. 6 is an enlarged perspective view of the front bolt stop and the locking member therefor;

Fig. 7 is an enlarged exploded view of the rear bolt release and the lock member therefor; and

Fig. 8 is an enlarged perspective bottom view of the locking member for the rear bolt release.

Shown in the figures is a light firearm having a substantially tubular receiver 12 produced with a longitudinal opening 14 along the underside thereof and a pair of flanges 15 which depend from the longitudinal sides of such opening and are received by a detachable pistol grip assembly 17. Receiver 12 is terminated at the rear end by a shoulder fitting butt section (not shown) which, with the receiver, forms the stock of the firearm.

Slidably mounted in receiver 12 is a bolt 20 which reciprocates between a battery and a recoil position and successively carries cartridges from a feeding mechanism 22 to the chamber of the firearm barrel (not shown). Bolt 20 is actuated to the recoil position by the recoil of the firearm and is biased to battery position by suitable spring means. A locking device (not shown) releasably secures bolt 20 in battery position. Slidably mounted through bolt 20 is a firing pin 26 having a hammer engaging portion that protrudes from the rear end of such bolt.

Extending through flanges 15 rearwardly of the rear end of bolt 20, when in battery position, is a pin 32 on which there is pivotally mounted a hammer 34 having a semi-cylindrical hub portion 36 and a striker portion 38 which extends from such hub portion so as to be contactable with firing pin 26 when the bolt is in battery position. A spring 39 biases hammer 34 for rotation against firing pin 26 and such hammer is counterrotated to a cocked position against the bias of such spring through the camming engagement of striker portion 38 by bolt 20 during recoil flight.

Extending laterally through flanges 15 forwardly of pin 32 is another pin 40 upon which there is pivotally mounted a hammer release 42 having an actuator arm 44, that extends upwardly to be slidably received in a longitudinal slot 46 along the bottom of bolt 20, and a bifurcated latching arm 48 that extends rearwardly from such actuator arm at approximately right angles for engagement with hub portion 36 as hereinafter described. A spring 49 biases hammer release 42 for rotation so that latching arm 48 resiliently engages the perimeter of hub portion 36. Provided in the circumference of hub portion 36 is a laterally disposed recess 50 which forms a catch having a substantially radial side 52 which is contactable with the ends of arm 48 to releasably hold hammer 34 in the cocked position when rotated thereto by bolt 20. Slot 46 is terminated at the rear end by a wall 54 which is engageable with actuator arm 44 for rocking hammer release 42 to release hammer 34 after bolt 20 is locked in battery position.

Mounted in the rear end of receiver 12 is a buffer assembly 56 which absorbs the recoil forces of bolt 20 and is contained within a cylindrical housing 57. Extending transversely through receiver 12 forwardly of buffer assembly 56 is a pin 58 upon which there is pivotally mounted a rear bolt stop 60 that extends rearwardly from such pin along the lower portion of receiver 12. Mounted in receiver 12 rearwardly of pin 58 is a flat spring 62 which engages the bottom side of rear bolt stop 60 to bias such rear bolt stop upwardly into the path of bolt 20. Provided on the top side of rear bolt stop 60 is a cam portion 64 which inclines upwardly and rearwardly and is terminated at the rear end by a downwardly extending shoulder 66. Whereby, a downwardly extending lug 68 on the rear end of bolt 20 depresses rear bolt stop 60,

when in engagement with cam portion 64 during rearward flight of the bolt, and stops the bolt from proceeding forwardly to battery position by the engagement thereof with shoulder 66 on such rear bolt stop.

Extending forwardly from the front face of housing 57 is a boss 69 having a vertically disposed bore 70, through which slidably receives a cylindrical bolt release 72. The bottom end of bolt release 72 engages the top rear bolt stop 60 and the upper portion which is of smaller diameter and is noted at 74 extends upwardly through a bore 76 in the wall of receiver 12. A button 78 terminates rod portion 74 and provides the means for manually depressing bolt release 72 which in turn depresses the rear bolt stop 60 to release bolt 20. A lock 80 is mounted to the top side of receiver 12 for slidable transverse movement and is arranged to cooperate with the shoulder 82 formed by the junction of rod portion 74 with the larger diameter portion of bolt release 72 to releasably secure bolt release 72 in a down position so that rear bolt stop 60 is not engageable with bolt 20.

Included in the detachable pistol grip assembly 17 is a trigger assembly 84 which includes an elongated body portion 86 having a transverse bore 88 through the upper portion to receive a pin 90 for pivotally mounting such trigger assembly. A fingerpiece 92 depends from the lower portion of body portion 86. A lug 96 extends forwardly from the upper portion of body portion 86 for a purpose to be described hereinafter. Extending forwardly into the rear portion of body portion 86, below pin 90, is a cavity 98, and mounted laterally to such body portion, so as to pass through such cavity, is a pin 100. A vertically-disposed disconnecter 102 is pivotally mounted on pin 100 between the top and bottom ends. The rear top portion of disconnecter 102 is stepped down, as noted at 106, and protruding from the rear side of disconnecter 102, below pin 100, is a cylindrical nub 108.

Extending transversely through pistol grip assembly 17 between trigger assembly 84 and hammer 34 is a pin 110 upon which there is centrally mounted for rotation a sear 112 which is substantially S-shape in configuration. The lower arm portion of sear 112, noted at 114, extends rearwardly under the lower portion of hub portion 36 of hammer 34 and is terminated by an upwardly extending hook portion 116 which is engageable with a mating catch portion 118 in such hub portion immediately after hammer 34 is released for rotation by hammer release 42. The end of the upper, forwardly extending arm portion of sear 112, noted at 124, is received by step portion 106 in disconnecter 102. Whereby, upward movement of disconnecter 102, produced by a rearward pull on fingerpiece 92 rotates sear 112 for disengagement from hammer 34. Provided on the front side of lower arm 114 is a nub 120 similar to nub 108 and such nubs are received by opposite ends of a compressible coil spring 122. Whereby, hook 116 is biased for resilient engagement with catch portion 118.

Extending through pistol grip assembly 17, immediately below forward arm 124 of sear 112 and rearwardly of the upper portion of disconnecter 102, is a selector 126 which is comprised of a cylindrical shaft 128 mounted through such pistol grip assembly and handle means located outside of such assembly to selectively rotate the selector between a semiautomatic position and an automatic position. Provided in shaft 128 where adjacent disconnecter 102 is a cut 130 which forms a semicylindrical portion 132 having a planar face 134.

When selector 126 is in semiautomatic position, as shown in Fig. 3, face 134 is horizontally disposed and semicylindrical portion 132 is in position to be engaged by disconnecter 102 along the semicircular periphery. Whereby, when fingerpiece 92 is retracted to fire the firearm, disconnecter 102 is moved upwardly, as hereinbefore disclosed, and through the bias of spring 122, the upper portion of such disconnecter slides upwardly on semicylindrical portion 132. However, during upward move-

ment of disconnecter 102, a protruding cam portion 136 on the rear side of the upper portion of such disconnecter causes such disconnecter to be pivoted away from sear 112 after rotating such sear sufficiently to release hammer 34.

When selector 126 is rotated to automatic position, face 134 is rotated so that semicylindrical portion 132 is away from disconnecter 102, as shown in Fig. 1, and thereby, when fingerpiece 92 is retracted to fire the firearm, such semicylindrical portion is not engageable by cam portion 136. Consequently, disconnecter 102 remains in contact with sear 112 by the bias of spring 122 after the actuation of such sear to release hammer 34 and such sear remains out of engagement with such hammer as long as fingerpiece 92 is held retracted.

A substantially rectangular front bolt stop 138 is slidably mounted in pistol grip assembly 17 in a mating vertically-disposed well 140 which is positioned forwardly of trigger assembly 84 and is in communication with the interior of receiver 12 at a position which is slightly forward of the front end of bolt 20 when in recoil position. Extending upwardly from the underside of front bolt stop 138 is a bottomed hole 142. A compressible spring 144 is housed within hole 142 and engages the bottom of well 140 to bias such bolt stop upwardly into receiver 12. Extending into front bolt stop 138 from the rear side thereof is a recess 146 which receives lug 96 of trigger assembly 84 and is provided with a top side 148 and a bottom side 150.

Bottom side 150 is so positioned that, when trigger assembly 84 is in normal position and such bottom side is in engagement with lug 96, the upper portion of such front bolt stop extends upwardly into receiver 12 so as to be engageable by a lug 152 on the front end of bolt 20 to releasably hold such bolt in the recoil position. Front bolt stop 138 extends upwardly into receiver 12 sufficiently so that lug 152 is not released thereby until after sear 112 has been disengaged from hammer 34 during retraction of fingerpiece 92. Top side 148 is so spaced from bottom side 150 that front bolt stop 138 is compressible by bolt 20 without disturbing trigger assembly 84 when such trigger assembly is in normal position. A cam surface 154 extends upwardly and rearwardly from the front side of front bolt stop 138 to the top side thereof to be engageable by bolt 20 during recoil thereof to depress such front bolt stop, and such bolt stop remains depressed by engagement with the bottom side of the bolt until such bolt returns to recoil position. A lock 156 is slidably mounted in pistol grip assembly 17 for transverse movement and is provided with a cam portion 158 which is arranged to cooperate with front bolt stop 138 to selectively move such front bolt stop to a down position out of engagement with bolt 20.

Operation

When it is desired to fire the firearm automatically with trigger control, selector 126 is rotated to automatic position, front bolt stop 138 is locked down in inoperative position by lock 156, and rear bolt stop 60 is locked down in inoperative position by lock 80. The firearm is then charged by conventional means so that when a round is chambered in the barrel, bolt 20 is locked in battery position and hammer 34 is held cocked by sear 112. Fingerpiece 92 is then retracted until disconnecter 102 actuated thereby rotates sear 112 sufficiently to release hammer 34 which pivots to fire the chambered cartridge.

Bolt 20 is accelerated to recoil position by the recoil force of the fired cartridge and during recoil flight engageably pivots hammer 34 to a recoil position. Bolt 20 is returned to a battery position by spring means (not shown), and, during the later portion of the counter-recoil travel, hammer 34 is released from contact with the underside of the bolt, permitting the hammer to be

biased forwardly until cocked by the engagement of the

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end of latching arm 48 of hammer release 42 with side 52 of recess 50 in hammer 34. Hammer 34 remains so engaged in cocked position until bolt 20 is locked in battery position. The final forward movement of bolt 20, after being locked, rotates hammer release 42 to release hammer 34 by engagement of wall 54 with actuator arm 44. If fingerpiece 92 remains held back for continued fire, sear 112 is held out of engagement with hammer 34 and fire continues until the fingerpiece is permitted to return to normal position. Whereupon, hook 116 on sear 112 is in position to engage hammer 34 after the hammer is released by hammer release 42, thus, preventing further fire by holding the hammer until fingerpiece 92 is retracted for renewed firing.

When it is desired to fire semiautomatically from fingerpiece 92, front and rear bolt stops 138 and 60, respectively, are locked in inoperative position as for automatic fire, and selector 126 is rotated to semiautomatic position wherein face 134 is positioned horizontally, and semicylindrical portion 132 is positioned underneath so as to be engageable by cam portion 136 on disconnecter 102. Whereby, when fingerpiece 92 is retracted, disconnecter 102 is moved upwardly against forward arm 124 of sear 112 which is rotated thereby to release hammer 34 and continued pull on fingerpiece 92 causes cam portion 136 to pivot disconnecter 102 out of engagement with sear 112 by engagement with semicylindrical portion 132. Thus, sear 112 is freed to be biased into position for reengaging hammer 34 by spring 122 when such hammer is released by bolt 20 during counterrecoil movement. Thereby, only one round is fired. When fingerpiece 92 is released to return to normal position, spring 122 biases disconnecter 102 and sear 112 into reengagement so that another round may be fired when the fingerpiece is again retracted.

To fire the firearm automatically from open bolt position by means of fingerpiece 92, selector 126 is set in automatic position, rear bolt stop 60 is locked down and front bolt stop 138 is released by lock 156 to be engageable with bolt 20 for holding the bolt in open position. When fingerpiece 92 is retracted to operate the firearm, sear 112 is rotated out of engagement with hammer 34 during the initial movement of such fingerpiece and during the remainder of the travel depresses front bolt stop 138 by means of lug 96 to release bolt 20. Upon release, bolt 20 travels forwardly to pick up a cartridge from feeding mechanism 22 and chamber such cartridge. After bolt 20 is locked in battery position, further travel of the bolt engages and trips hammer release 42, as hereinbefore described, the release hammer 34 for firing the chambered cartridge. This cycle is continued as long as fingerpiece 92 is held retracted. When fingerpiece 92 is released, bolt 20 is stopped in open position by front bolt stop 138 and will remain at rest until such fingerpiece is again retracted for the next burst to fire.

When the mounting of the firearm makes fingerpiece 92 inaccessible to the operator or pistol grip assembly 17 is in the way, such pistol grip assembly is removed from the firearm whereupon the firearm is actuatable from rear bolt stop 60. Thus, with front bolt stop 138 locked down, the cycle of operation is similar to that described for firing from an open bolt position by fingerpiece 92 except that bolt 20 is controlled by rear bolt release 60 through bolt release 72.

It is seen that in all of the various means of fire control, hammer release 42, besides controlling hammer 34 directly during automatic fire, also acts as a safety to prevent premature release of the hammer.

From the foregoing it is clearly apparent that there is herein provided a fire control mechanism for firearms which is simple and safe in operation and rugged in construction, and which permits selective operation of the firearm from open bolt or closed bolt position and by

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a trigger forward of the stock control means in the rear of the stock.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

I claim:

1. For a firearm provided with a receiver with a bolt reciprocable therein between a recoil and a battery position and a firing pin slidably mounted in the bolt, a firing mechanism including a hammer pivotally mounted to the receiver for actuation from a firing pin engaging position to a cock position by the bolt during movement to the recoil position, a release member pivotally mounted to the receiver for releasably holding said hammer in the cocked position, said release member being actuatable by the bolt to release said hammer for engaging the firing pin to fire the firearm when the bolt reaches battery position, a bolt release member mounted to the rear end of the receiver for selectively engaging the bolt when in the recoil position to fire the firearm automatically from open bolt position, and a pistol grip assembly releasably mounted to the receiver, said pistol grip assembly including trigger actuated means releasably engageable with the front end of the bolt for firing the firearm automatically from open bolt position and with said hammer for selectively firing the firearm semiautomatically or automatically from closed bolt position.

2. For a firearm provided with a bolt reciprocable between a recoil and a locked battery position and having a hammer actuated firing pin therein, a firing mechanism comprised of a pivotal hammer spring-biased from a cock to a firing pin actuated position, a sear device engageable with said hammer during movement thereof from the cock position, a spring-biased trigger, disconnecting means pivotally mounted to said trigger for releasably transferring movement of said trigger to said sear device for releasing said hammer, selector means rotatable between an automatic and a semiautomatic position and being cooperable with said disconnecter means for disconnecting said sear from said trigger after actuation of the sear to release said hammer when said selector means is in a semiautomatic position, means for reengaging said sear to said trigger when in normal position, a pivotally mounted release having one end engageable with a catch in said hammer for releasably securing said hammer in the cock position, an arm extending from said release to be engaged by the bolt when in the locked battery position to rock said release for releasing said hammer, a bolt stop engageable with the front end of the bolt to releasably secure the bolt in the recoil position, and means integral with said trigger for actuating said bolt stop to release the bolt after said hammer is released by said sear to be engaged by said release.

3. For a firearm provided with a bolt reciprocable between a recoil and a locked battery position and having a hammer actuatable firing pin therein, a firing mechanism comprised of a pivotal hammer spring-biased from a cock to a firing pin actuating position, a sear engageable with said hammer during movement of said hammer from the cock position, a spring-biased trigger, disconnecting means pivotally mounted to said trigger for releasably transferring movement of said trigger to said sear for releasing said hammer, selector means rotatable between an automatic and a semiautomatic position and being cooperable with said disconnecter means for disconnecting said sear from said trigger after actuation of said sear to release said hammer when said selector means is in a semiautomatic position, means for reengaging said sear to said trigger when in normal position, a pivotally mounted release having one end engageable with a catch in said hammer for releasably securing said hammer in the cock position, an arm extending from said release for engagement by the bolt when in the locked battery posi-

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tion to rock said release for releasing said hammer, a bolt stop engageable with the front end of the bolt to releasably secure the bolt in the recoil position, a recess in said bolt stop provided with a bottom side, and a lug portion extending from said trigger into said recess for engagement with said bottom side to actuate said bolt release to release the bolt from the recoil position after said trigger has actuated said sear to release said hammer.

4. The firing mechanism as defined in claim 3 including means for selectively rendering said bolt stop inoperative.

5. The firing mechanism as defined in claim 3 includ-

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ing means for biasing said bolt stop into position to engage the bolt and into engagement with said trigger for actuation thereby.

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