

2,965,005

4 Sheets-Sheet 1

Fig 1.

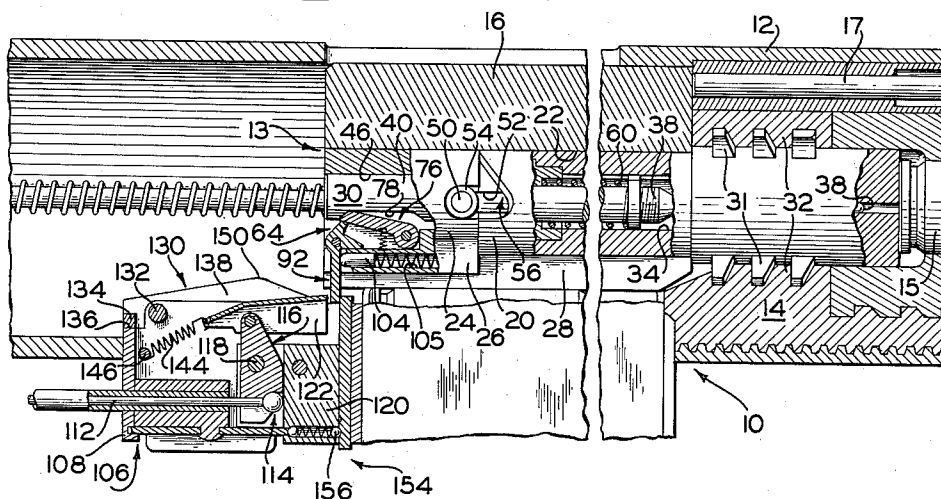
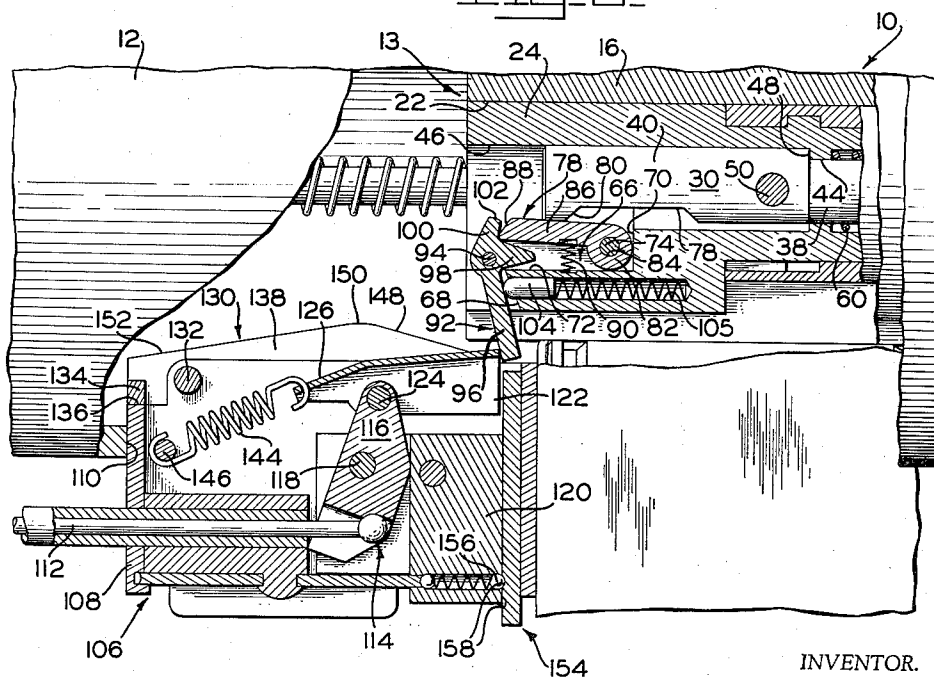


Fig. 2.



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Dec. 20, 1960

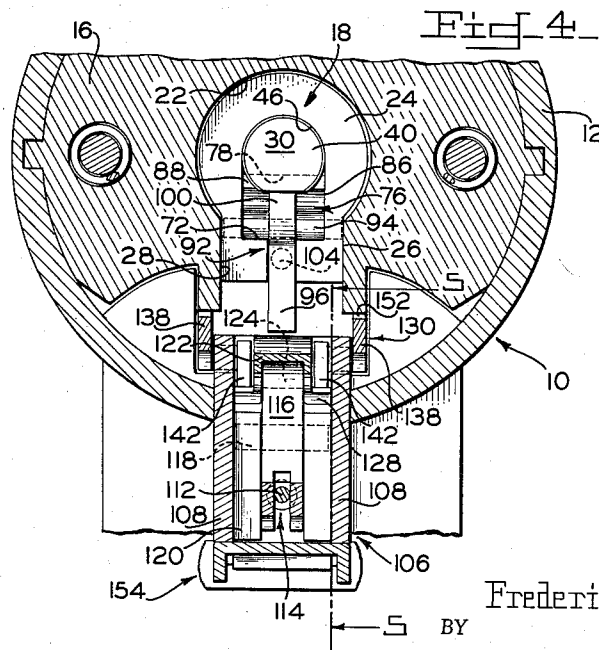
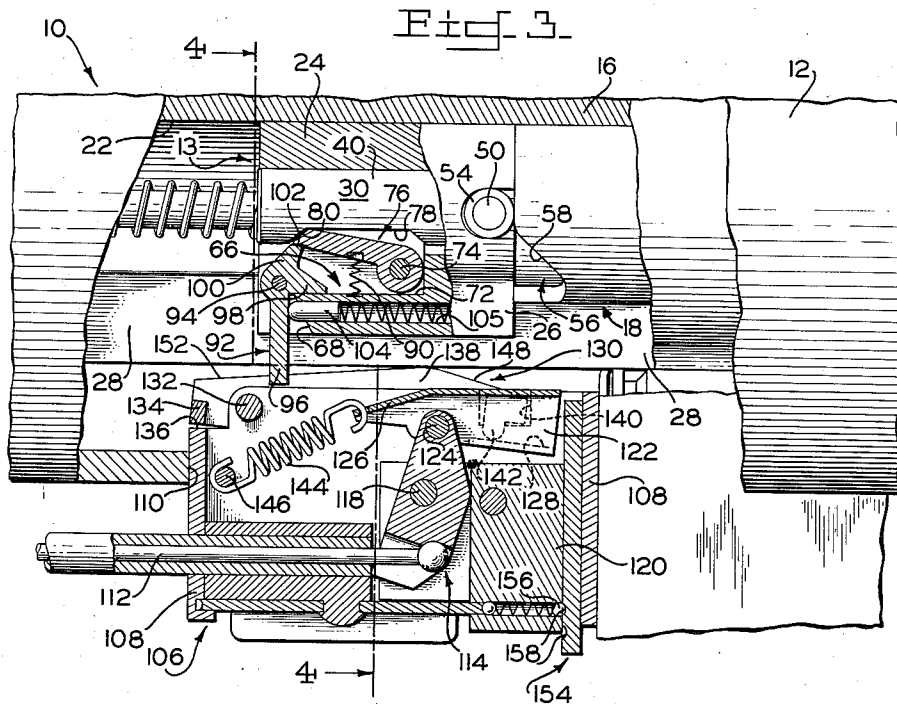
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FIRING PIN RELEASE FOR SEMI-AUTOMATIC FIREARMS

Filed March 4, 1959

4 Sheets-Sheet 2



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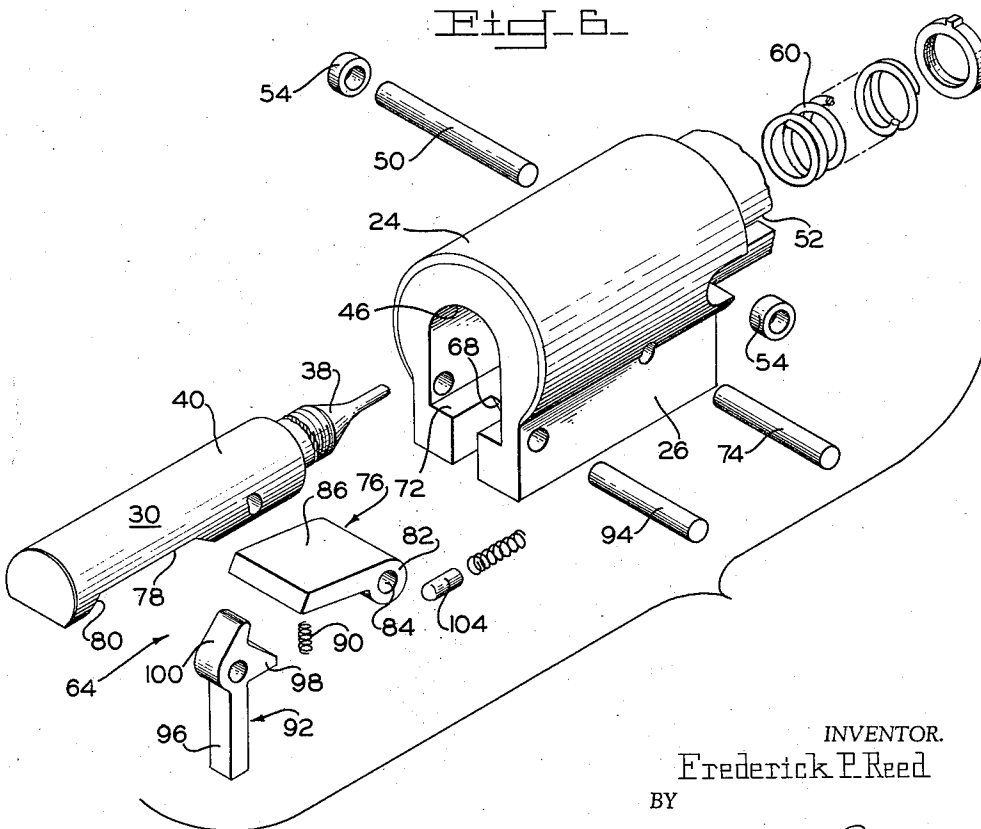
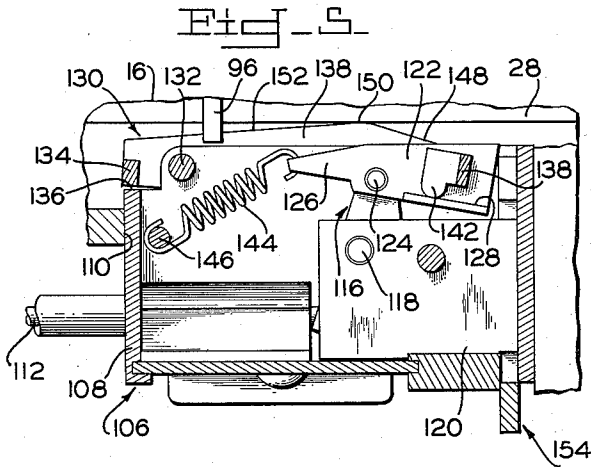
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FIRING PIN RELEASE FOR SEMI-AUTOMATIC FIREARMS

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4 Sheets-Sheet 3



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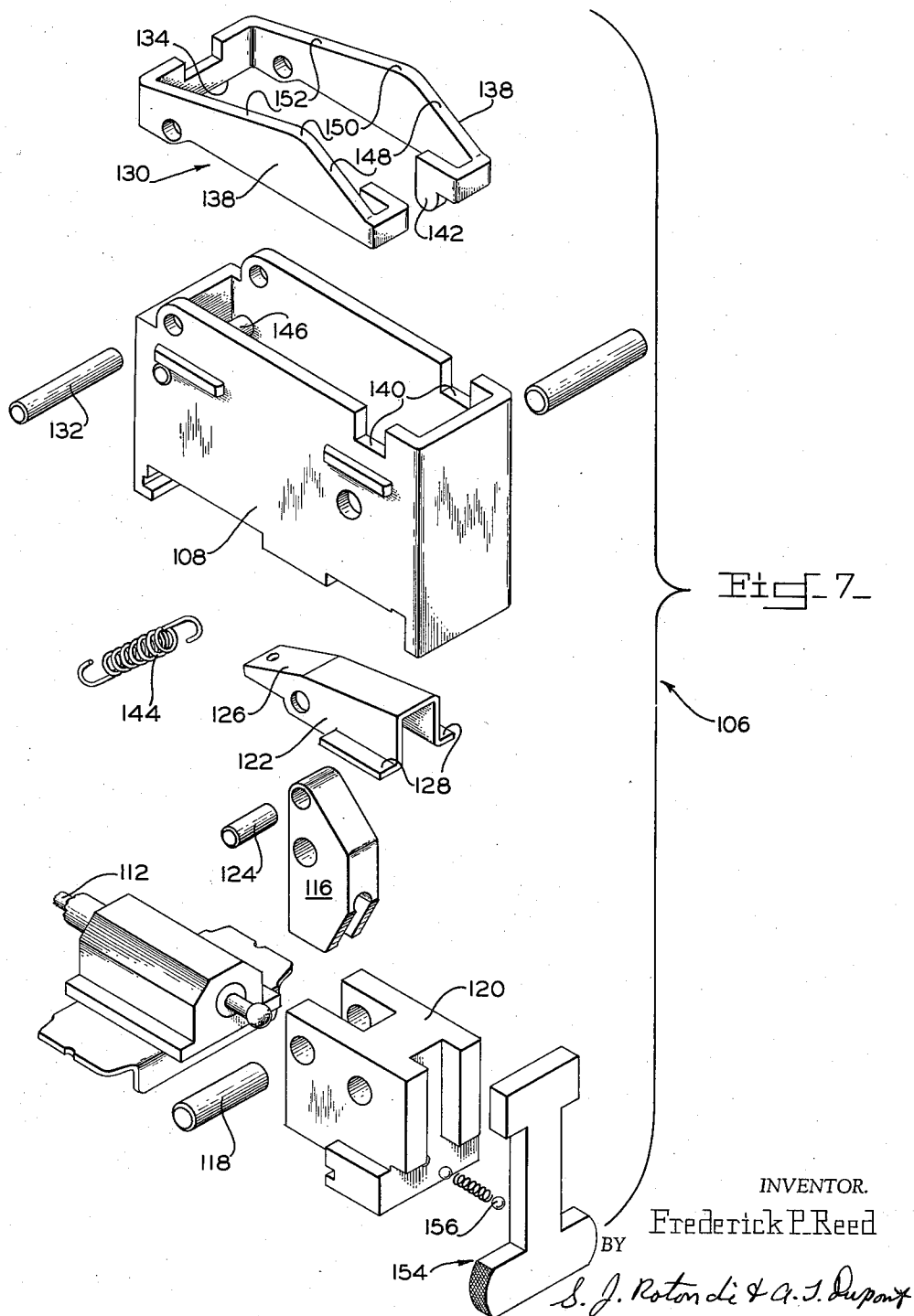
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FIRING PIN RELEASE FOR SEMI-AUTOMATIC FIREARMS

Filed March 4, 1959

4 Sheets-Sheet 4



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2,965,005

FIRING PIN RELEASE FOR SEMI-AUTOMATIC FIREARMS

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2 Claims. (Cl. 89—139)

(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 semiautomatic firearms and more particularly to firing mechanisms therefor.

It is the object of this invention to provide for firearms of semiautomatic types, which are fired from a closed bolt position, a firing mechanism which requires only a slight pull to release the firing pin.

It is another object of this invention to provide for semiautomatic firearms of stated type a firing mechanism wherein the trigger mechanism readily returns to normal position from a partial retraction thereof to assure safe operation.

It is still another object of this invention to provide for semiautomatic firearms of stated type, a firing mechanism which cannot be actuated to fire the firearm until the bolt is locked in battery position.

It is a further object of this invention to provide for such semiautomatic firearms, a firing mechanism in which the members are pivotally mounted to reduce the frictional resistance thereof to movement.

It is another and still further object of this invention to provide a firing mechanism with the above-mentioned advantages that is simple and rugged in construction and positive in operation.

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 longitudinally cross-sectioned side view of a firearm showing the bolt in locked battery position, the firing pin in cock position, and the firing mechanism made inoperable by the safety;

Fig. 2 is an enlarged view similar to Fig. 1 but showing the sear actuated to the release position;

Fig. 3 is a view similar to Fig. 2 but showing the sear in the hold position, the actuating cable pulled rearwardly and the bolt assembly out of locked battery position;

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

Fig. 5 is a view taken along line 5—5 of Fig. 4;

Fig. 6 is an enlarged exploded view of the trigger mechanism shown in perspective; and

Fig. 7 is an enlarged exploded view of the sear mechanism shown in perspective.

Shown in the figures is a firearm 10 which fires from a closed bolt position and which includes a cylindrical receiver 12, a cylindrical bolt assembly 13 slidably disposed in the receiver for reciprocation between a battery and a recoil position, a barrel assembly 14 for the discharge of a cartridge 15 and an operating rod 17 which is actuated responsive to the discharge of the cartridge. Bolt assembly 13 includes a carrier 16 which has sliding engagement with the inside wall of receiver 12 and a bolt 18 which is mounted in the carrier for telescopic extension from the front end thereof. Bolt 18 is composed of a body member 20 which is rotably dis-

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posed in a mating bore 22 provided axially through carrier 16 and a striker extension 24 which extends axially into the rear end of the body member so that such body member is rotatable relative thereto but is restrained from longitudinal displacement.

A rectangular tongue 26 extends downwardly from striker extension 24 to be slidably received by a longitudinally disposed mouth portion 28 which extends through carrier 16 from bore 22. Whereby, striker extension 24 is restrained from rotational displacement relative to carrier 16 while being longitudinally actuable therein. Body member 20 is connected to carrier 16 by cam means (not shown) so as to be rotatable between a lock and an unlock position during longitudinal movement of the carrier relative to bolt 18 when the bolt is disposed in the battery position. Locking is obtained through clockwise rotation of body member 20 by means of cooperating lugs 31 and 32 provided respectively in body member 20 and barrel assembly 14, and the locking is fully effected when carrier 16 is in contact with such barrel assembly.

A firing pin 30 is coaxially mounted for sliding reciprocation in striker extension 24 and extends forwardly therefrom through a suitable hole 34 provided therefor through body member 20. Firing pin 30 includes a cylindrical contact portion 38 and a butt portion 40 of larger diameter. Firing pin 30 is mounted in striker extension 24 for sliding reciprocation between a forward firing position and a rearward cock position in an axial hole 44 through the striker extension. Hole 44 has a diameter substantially the same as that of the rear end of contact portion 38 and is counterbored from the rear end of striker extension 24, as noted at 46, to slidably receive butt portion 40. A shoulder 48 is formed at the front end of counterbore 46 and such shoulder is longitudinally positioned so as to be contactable by the front end of butt portion 40 when firing pin 30 is in the firing position. A pin 50 extends diametrically through butt portion 40 to project from opposite sides thereof. Such projecting ends are slidably received by longitudinally disposed slots 52 in striker extension 24 for limiting the reciprocation of firing pin 30 to movement between the firing and cock positions and for preventing the rotational displacement thereof. A roller 54 is mounted on each of the projecting ends of pin 50.

Firing pin 30 is retracted to the cock position during rotation of body member 20 to the lock position through the cooperation of the rollers 54 with a pair of cam recesses 56 which extend forwardly into body member 20 from the rear end thereof. The recesses 56 extend into body member 20 deep enough to receive the rollers 54 when firing pin 30 is in the firing position and each of the recesses is substantially right triangular in configuration to include a cam surface 58 which extends angularly forward and in a clockwise direction from the rear end of body member 20 so that when such body member is rotated in a clockwise direction to the lock position, the rollers are moved along the cam surfaces 58 to retract the firing pin to the cock position. Firing pin 30 is conventionally biased to the firing position by a coil spring 60 operationally disposed between the firing pin and striker extension 24.

Firing pin 30 is releasably held in the cock position by a sear mechanism 64 which is mounted within striker extension 24 by means of a stepped recess 66 which extends forwardly from the rear end thereof between counterbore 46 and the bottom of tongue 26. The forward end of recess 66 is terminated by a first wall 68, which extends angularly upward and rearward from the bottom side of tongue 26, a second wall 70 which extends vertically downward from counterbore 46 and a longitudinal

surface 72 which joins the top of the first wall to the bottom of the second wall.

A pin 74 extends transversely through striker extension 24 so as to pass through recess 66 rearwardly of second wall 70 and above surface 72. Pin 74 pivotally supports a sear 76 which extends rearwardly therefrom for engageable cooperation, as hereinafter described, with a slabbed portion 78 in the underside of butt portion 40 which slabbed portion is terminated at the rear end by an engaging surface 80 which extends downwardly and rearwardly therefrom at a predetermined angle, as hereinafter described.

Sear 76 includes a hub portion 82, which is provided with an axial bore 84 for receiving pin 74 so as to be pivotal to a position for releasably holding firing pin 30 in the cock position, and an arm 86 which extends rearwardly therefrom. Arm 86 is rectangular in cross-section and is terminated at the free end by a cam surface 88 which mates angularly with engaging surface 80 and which is angularly disposed relative to the longitudinal axis of the arm so that when cam surface 88 and engaging surface 80 are in engagement the forward force applied against firing pin 30 by spring 60 is translated to an angular force on sear 76 so that if free to move the sear is cammingly displaced by the firing pin to disengage such cam and engaging surfaces.

A coil spring 90 is disposed between the underside of sear 76 and surface 72 for biasing the sear upwardly into resilient contact with firing pin 30 so that cam surface 88 is positioned for engagement with engaging surface 80 when adjacent thereto. However, the bias of spring 90 which resiliently holds the sear in position to retain firing pin 30 in the cock position is overcome by the forward pressure of spring 60 and the camming relationship of the sear relative to firing pin 30 so that the sear is actuatable when free to move to release the firing pin.

Sear 76 is releasably restrained from pivotal displacement from the firing pin holding position by a sear release 92 which is pivotally mounted on a pin 94 transversely mounted through tongue 26 so as to pass through recess 66 rearwardly of first wall 68 and above alignment with surface 72. Sear release 92 is pivotal to a position for blocking the displacement of sear 76 from the firing pin holding position and is provided with a depending leg portion 96 which extends downwardly through mouth portion 28 to project from carrier 16. A lug 98 extends forwardly from the sear release for engagement with surface 72 when the sear release is in the sear blocking position. A substantially rectangular engaging portion 100 extends upwardly from sear release 92 for engagement with the underside of sear 76 when the sear release is in sear blocking position to restrain displacement of the sear from the firing pin holding position. Engaging portion 100 is moved rearwardly clear of the sear when the sear release is actuated away from the sear blocking position. When sear 76 is out of the firing pin holding position, sear release 92 is releasably held out of the sear blocking position by the engagement of the end of the sear with the front side of engaging portion 100. The end of engaging portion 100 which is in sliding contact with the underside of sear 76 during pivotal movement of the sear release is arcuately formed, as noted at 102, to reduce the area of contact between the sear release and sear and thereby the frictional resistance of the sear release to movement. Sear release 92 is biased to the sear blocking position by a spring biased plunger 104 which is slidably mounted within a longitudinal well 105 extending forwardly from first wall 68, so that such plunger contacts the front side of leg portion 96.

Sear release 92 is actuatable for the release of sear 76 and therefore firing pin 30 by a trigger mechanism 106 which includes a housing 108 mounted to the underside of receiver 12 so as to be adjacent sear mechanism 64 when carrier 16 is in the forward position thereof. Trigger mechanism 106 extends upwardly into receiver 12

through a port 110 for cooperation with sear mechanism 64.

Trigger mechanism 106 is actuated by a cable 112 which is connected by ball and socket means 114 to the lower portion of a lever 116 which is pivotally mounted on a pin 118 transversely disposed in a rectangular mounting block 120 mounted in the lower, forward portion of housing 108. The upper end of lever 116 is pivotally connected to an actuator 122 by a transverse rod 124 which extends through such actuator forwardly of a tail portion 126 thereon. Actuator 122 has an inverted U-shaped configuration in cross section and is provided on the front portion thereof with a pair of flanges 128 which flare outwardly from the ends of the vertically disposed arm portions for engagement with a disconnector 130 as hereinafter described.

Disconnector 130 is pivotally mounted on a pin 132 which is mounted through housing 108 adjacent the rear wall thereof and such disconnector includes a base portion 134 which is engageable with the upper end of such rear wall. Such rear wall is reduced in height to form an engaging surface 136 which, when in contact with base portion 134, stops the upper movement of the front end of disconnector 130. A pair of arms 138 extend forwardly from the opposite ends of base portion 134 and along the outside of the side walls of housing 108. The front ends of the arms 138 are bent inwardly to pass through clearances 140 provided therefore in the side walls of housing 108 and then are bent again in a rearward direction. A semi-circular lug 142 is provided on the underside of each of the rearwardly extending portions of the arms 138 for engagement with the upper side of the flanges 128 to transfer pivotal motion between actuator 122 and disconnector 130. Base portion 134 is engageable with engaging surface 136 when the front end of actuator 122 is elevated to a connecting position so as to engage the end of leg portion 96 as sear release 92 for pivoting such sear release to the disengaging position when cable 112 is pulled rearwardly.

A coil spring 144 is connected at one end to tail portion 126 of actuator 122 and at the other end to a pin 146 which is transversely disposed through housing 108 below pin 132, whereby such actuator is biased rearwardly until stopped by the contact of the lower end of lever 116 with the rear side of mounting block 120. At the same time, the front end of actuator 122 is biased upwardly until disconnector 130 is stopped by the contact of base portion 134 with engaging surface 136. Because of the engagement of lugs 142 with flanges 128 the elevated position of actuator 122 is limited by the engagement of base portion 134 of disconnector 130 with engaging surface 136.

The arms 138 are triangularly formed in longitudinal cross section and include front portions 148 which extend upwardly and rearwardly from the front ends of the arms to peaks 150. Such front portions 148 are contacted by carrier 16 during recoil thereof to pivot disconnector 130 downwardly whereby the front end of actuator 122 is depressed so as to be disengaged from sear release 92 which is freed thereby to be pivoted as hereinafter described to the sear-engaging position thereof. Disconnector 130 is maintained in depressed position by the sliding engagement of the peaks 150 with the bottom side of carrier 16 until carrier 16 returns to forward position. Disconnector 130 is positioned relative to carrier 16 so that the arms 138 are engageably depressed, and thereby actuator 122 is pivoted away from engagement with sear release 92, until the carrier is in the fully forward position thereof to assure that bolt 18 is locked in battery position before firing pin 30 can be released.

Mounted in the front end of mounting block 120 for sliding vertical movement therein is a safety 154 which is movable into position to block forward movement of leg portion 96 of sear release 92 and thereby sear 76 is blocked from releasing firing pin 30. A spring biased de-

tent 156 mounted in the front side of mounting block 120 is receivable by one of two semi-cylindrical recesses 158 in safety 154 for indexing the safety in "safe" or "fire" position.

Thus, when firearm 10 is ready to be fired, carrier 16 is forwardly disposed in receiver 12, bolt 18 is locked thereby in battery position and firing pin 30 is releasably held in cock position by sear mechanism 64. The firearm is fired by a rearward pull on cable 112 which causes lever 116 to be pivoted, resulting in a forward movement of actuator 122 against leg portion 96 whereby sear release 92 is pivoted out of sear blocking position. When engaging portion 100 is clear of sear 76, such sear, through the camming engagement of engaging surface 80 with cam surface 88 and the bias of spring 69, is actuated from the firing pin holding position through the bias of spring 69 whereby firing pin 30 is free to be propelled forwardly by such spring to the firing position for the discharge of the chambered cartridge 15. With the release of firing pin 30 to the firing position, sear release 92 is blocked from returning to the sear blocking position when released from actuator 122 by the engagement of the end of sear 76 with the front side of engaging portion 100.

Carrier 16 is actuated rearwardly responsive to the discharge by operating rod 17, and during the initial period of such movement the rear end of the carrier engages front portions 148 of disconnecter 130 which is consequently pivoted to depress actuator 122 and thereby release sear release 92 therefrom. During the remaining travel of carrier 16 relative to bolt 18, body member 29 is rotated by cam means (not shown) whereby firing pin 30 is actuated rearwardly to the cock position through the cooperation of the rollers 54 with the corresponding cam surfaces 58 in the cam recesses 56. When firing pin 30 is adjacent cock position, cam surface 88 on sear 76 enters slatted portion 78 through the bias of spring 90 whereby the sear is pivoted to the firing pin holding position so that the cam surface is positioned for engagement with engaging surface 80. When sear 76 pivots to the firing pin holding position, sear release 92 is free to be pivoted through the bias of spring biased plunger 104 to the sear blocking position. Therefore, sear 76 is prevented from being actuated to release firing pin 30 until bolt assembly 13 returns to locked battery position, wherein carrier 16 is in the forward position thereof, and sear mechanism 64 is redispersed for actuation by trigger mechanism 106.

From the foregoing it is readily apparent that the firing mechanism of the present invention is operable with a minimum pull on cable 112 as the members are all pivotally mounted, and therefore the tensions of the operating springs for resiliently maintaining the members in normal positions may be considerably reduced. Moreover, sear 76 is readily returned to firing pin holding position if the operator should change his mind before cable 112 is pulled sufficiently to release the sear because the tension of spring 144 and the bias of the spring biased plunger 104 readily overcomes the frictional resistance of the members in sear mechanism 64 and trigger mechanism 106 to movement. Further, firing pin 30 cannot be actuated to fire firearm 10 until the bolt assembly 13 is in locked battery position.

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. In a firearm adapted to be fired from a closed bolt position and including a receiver with a bolt assembly slidably mounted therein for reciprocation between a recoil and a locked battery position, the combination of a firing pin forwardly biased in the bolt assembly from a cock to a firing position, a sear mounted on the bolt assembly for pivotal movement to a firing pin holding position, a camming surface disposed on said sear for engagement with an engaging surface on said firing pin when said sear is in the firing pin holding position for releasably retaining said firing pin in the cock position, said camming surface and said engaging surface being so angularly disposed that when in engagement the forward bias of said firing pin is translated to pivotal movement of said sear from the firing pin holding position, a sear release pivotally mounted on the bolt assembly for releasably blocking pivotal displacement of said sear from the firing pin holding position, a spring disposed between said sear and a longitudinal surface in the bolt assembly for biasing said sear into position to assure engagement of said camming surface with said engaging surface when said sear is in the firing pin holding position, a leg portion depending from said sear release for extension from the bolt assembly, a trigger housing mounted on the receiver to inclose the extending end of said leg portion, a lever pivotally mounted in said housing on a transversely disposed pin, a cable connected to one end of said lever for selective operation thereof, an actuator disposed for longitudinal movement in said housing against said leg portion for actuation of said sear release, said actuator being connected to the opposite end of said lever for movement against said leg portion when said cable is pulled, a spring connecting the rear end of said actuator to said housing for pivoting said lever to move said actuator longitudinally away from engagement with said leg portion and simultaneously pivoting said actuator upwardly into position to be engageable with said leg portion when said cable is pulled, and means operationally disposed between said actuator and the bolt assembly for engagement thereby to pivot said actuator out of engageable relationship with said leg portion when the bolt assembly is out of locked battery position to free said sear release for releasably blocking said sear in the firing pin holding position.

2. The combination of claim 1 wherein said means includes a disconnecter pivotally mounted on said housing for extension through a port in the receiver to be slidably engaged by said bolt assembly when out of locked battery position, said disconnecter including a pair of longitudinally disposed arms, cam portions on said arms engageable by the bolt assembly for pivoting said disconnecter, and lug portions on said arms engageable with flanges on said actuator for transferring pivotal movement of said disconnecter thereto for displacement thereof out of engageable relationship with said sear release.

References Cited in the file of this patent

UNITED STATES PATENTS

1,355,418	Pedersen	Oct. 12, 1920
1,472,126	Kewish	Oct. 30, 1923
2,053,264	Coupland	Sept. 8, 1936
2,376,726	Rossmann	May 22, 1945
2,780,965	Kunz	Feb. 12, 1957