United States Patent

Kennedy et al.

[15] **3,670,442**

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[54] SAFETY DEVICE FOR FIREARMS

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[21] Appl. No.: **84,653**

[52] **U.S. Cl.** .....**42/70 F,** 42/69 B, 42/70 R

[51] **Int. Cl.** **F41c 17/08,** F41c 17/00

[58] **Field of Search**.....42/70 F, 70 R, 69 B; 89/128, 89/129, 139–142, 154

[56] **References Cited**

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[57] **ABSTRACT**

A firearm has a receiver incorporating a longitudinally reciprocatable bolt assembly which is movable between retracted or recoil and battery positions in the receiver. A trigger, including a sear, is pivotally mounted in the receiver. A hammer is pivotally mounted in the receiver in such a manner that movement of the bolt from the battery position to the recoil position urges the hammer into a cocked position. The hammer includes a first sear abutment to engage a sear on the trigger, a second sear abutment and a bolt stop sear abutment. A disconnector is pivotally mounted on the trigger pin. A compression spring is interposed between the rearward extremities of the disconnector and the trigger to urge the forward portion of the disconnector into contact with the top surface of the trigger. The disconnector includes a hook sear abutment on an intermediate portion which is adapted to engage the second sear abutment on the hammer when the trigger is in a depressed position. Should the disconnector or hook sear be removed from the firearm, the bolt stop sear abutment on the hammer is adapted to engage the bolt assembly during movement from the recoil position to the battery position for preventing the conversion of the firearm into a machine gun.

7 Claims, 6 Drawing Figures

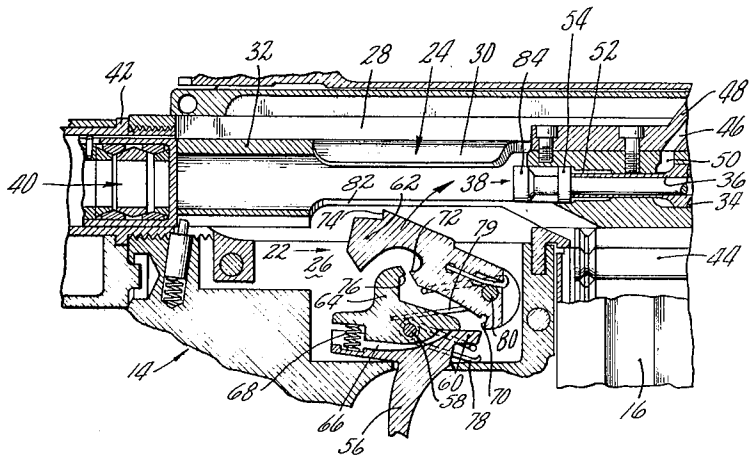

FIG. 1

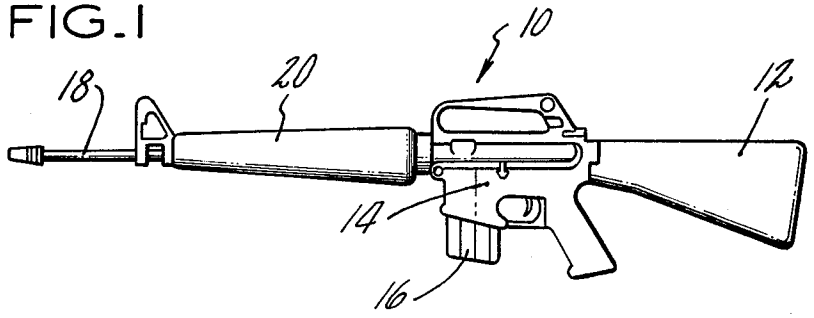

FIG. 2

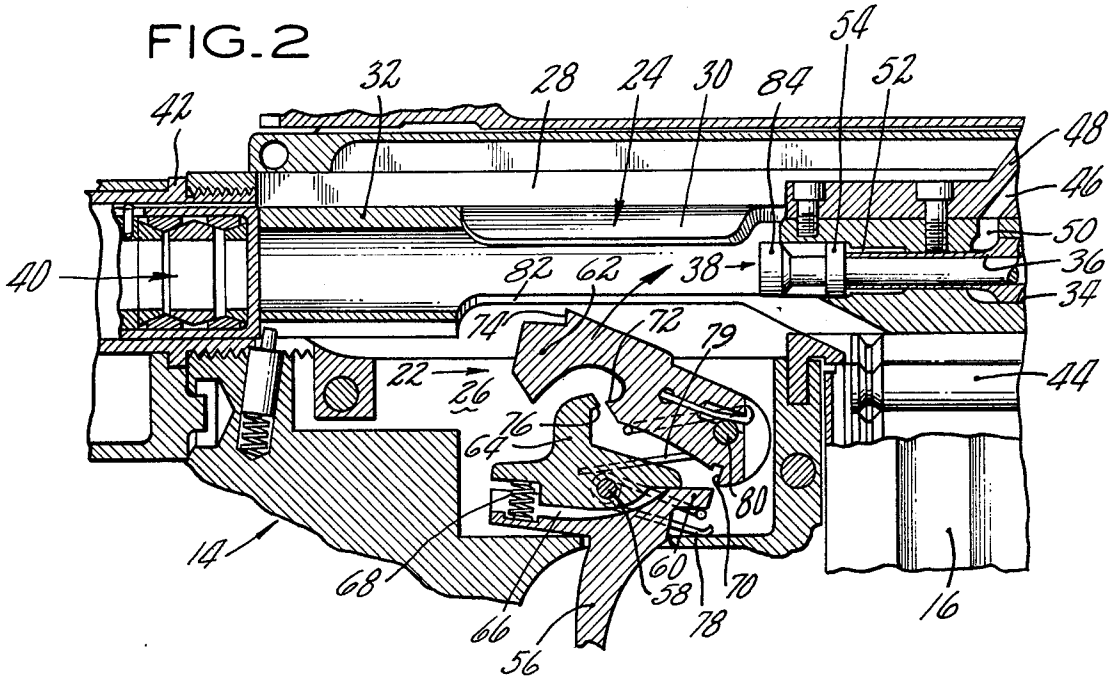

FIG. 3

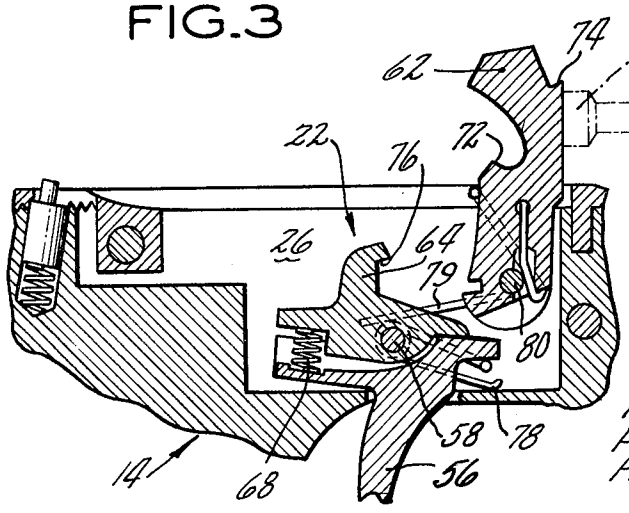

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FIG. 4

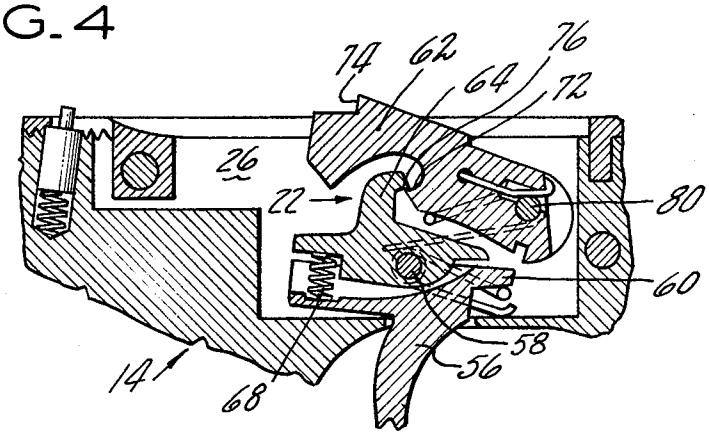


FIG. 5

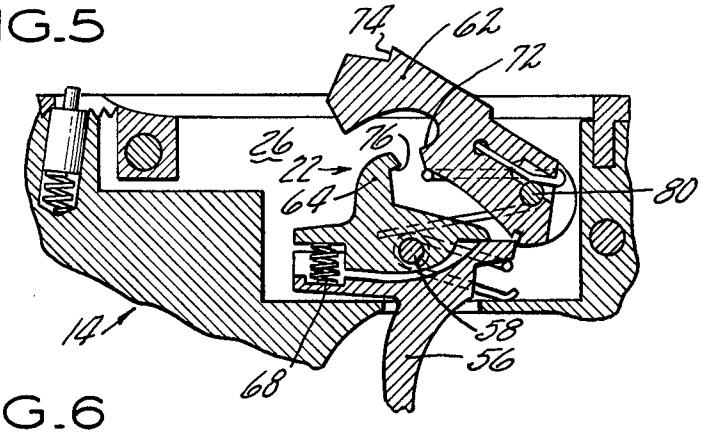
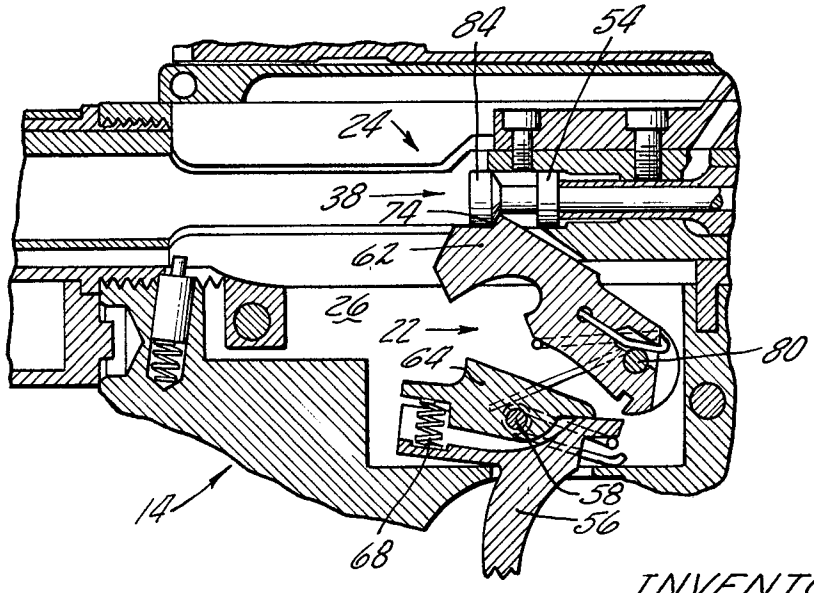


FIG. 6



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SAFETY DEVICE FOR FIREARMS

BACKGROUND OF THE INVENTION

The present invention relates to firearms, and more particularly to semiautomatic firearms. Even more particularly, the present invention relates to safety devices for semiautomatic firearms which are intended to prevent the conversion of the firearm into an automatic firearm.

Numerous semiautomatic firearms, known in the prior art, may be converted into fully automatic firearms by minor alterations and/or removal of the parts of the firing system. In many semiautomatic firearms, this conversion can be effected in a relatively short period of time. The majority of existing semiautomatic firearms can be converted into fully automatic firearms by the mere removal of the disconnector of the trigger mechanism. With many of these existing semiautomatic firearms, a skilled mechanic can effect this conversion within fifteen minutes.

SUMMARY OF THE INVENTION

The present invention provides an arrangement for a semiautomatic firearm, whereby removal or alteration of the components of the trigger thereof will not render the firearm automatic. The invention provides a means which will automatically keep the firearm from being converted into a machine gun by the alteration and/or removal of existing parts. The invention is adapted for inclusion on all semiautomatic firearms in which the recoil travel of the breach mechanism or bolt assembly is used to recock the firing mechanism.

A preferred form of a trigger mechanism, according to the invention, comprises a trigger pivotally mounted in a receiver and possessing a trigger sear which cooperates with a first sear abutment on a hammer to retain the hammer in a cocked position. Upon a rearward pivotable movement of the trigger, the trigger sear is dislodged from the first sear abutment of the hammer, permitting the hammer to pivot under the bias of a hammer spring about its pivot. A bolt assembly, mounted in the receiver for longitudinal movement therein, is adapted to move the hammer to the cocked position against the bias of the hammer spring. A disconnector is pivotally mounted in the receiver intermediate the trigger and the hammer and includes a hook sear abutment thereupon which is adapted to be engaged with a second abutment on the hammer during recoil travel of the bolt assembly when the trigger in its rearward position. The hammer also includes a stop abutment thereupon which adapted, under certain conditions, to prevent the return of the bolt assembly to the battery position from the recoil position. If the disconnector or hook sear is removed from the mechanism, the stop abutment engages a surface on the bolt assembly during forward movement of the bolt assembly from its recoil position. Thus, even though the disconnector be removed, the trigger mechanism will prevent a firearm, in which it is incorporated, from firing automatically due to the engaging contact between the stop abutment and the bolt assembly during forward movement of the bolt assembly.

It is possible to incorporate the invention not only in semiautomatic firearms, but also in existing automatic firearms. This design feature may be incorporated in automatic firearms by merely providing a stop abutment on the hammer, if an existing surface will not serve as a stop abutment, and removing a small amount of material from the bolt assembly to expose a surface with which the stop abutment can engage during forward movement.

Accordingly, it is a primary object of the present invention to provide a means for insuring that a semiautomatic firearm cannot be readily converted into an automatic firearm.

It is another object to provide a means by which an automatic firearm may be converted into a semiautomatic firearm, wherein the conversion thereof back to its original state cannot be achieved in a facile manner.

A further object is the provision, in a semiautomatic firearm having a trigger disconnector, hammer and bolt assembly, of a means to render the firearm inoperative should the disconnector be removed in an attempt to convert the semiautomatic firearm into an automatic firearm.

A still further object is to provide a trigger mechanism, having a trigger, disconnector with a sear thereupon, hammer and bolt assembly, wherein the hammer is adapted to preclude forward movement of the bolt assembly into a battery position, should the disconnector be removed or the sear fail.

An even further object is the provision of a trigger mechanism, including a hammer and a bolt assembly, in which the hammer and bolt assembly are respectively provided with abutments which are adapted to contact one another during forward movement of the bolt assembly into a battery position if an attempt is made to defeat the semiautomatic functioning of the firearm.

These and other objects and advantages of the invention will become apparent from the following detailed description of an exemplary embodiment of the invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a semiautomatic firearm incorporating a trigger mechanism according to the invention.

FIG. 2 is a fragmentary vertical sectional view of the receiver portion of the semiautomatic firearm of FIG. 1, in which the hammer is rotating towards the firing pin.

FIG. 3 is a fragmentary vertical sectional view showing the hammer in firing position.

FIG. 4 is a fragmentary vertical sectional view showing the components of the trigger mechanism when the bolt assembly has returned the hammer to a cocked position and the trigger is depressed.

FIG. 5 is a fragmentary vertical sectional view showing the components of the trigger mechanism after the trigger has been released from the depressed position of FIG. 4.

FIG. 6 is a fragmentary vertical sectional view illustrating the engagement between the bolt assembly and the hammer occasioned during the movement of the bolt assembly from the recoil to the battery position when the hook sear of the disconnector is removed in an attempt to make the firearm automatic.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in greater detail, wherein like reference characters indicate like parts throughout the several figures, there is shown in FIG. 1 a firearm **10**, which is a semiautomatic firearm. The firearm **10** includes a stock **12** mounted on a receiver **14**, the receiver having a cartridge magazine **16** mounted therein. A barrel **18** is operatively connected to the receiver and has a hand grip **20** mounted thereupon for isolating the hand of a shooter from direct contact with the barrel. As shown in FIG. 2, the receiver **14** embodies a trigger mechanism, generally indicated at **22**, and a bolt assembly, generally indicated at **24**. The receiver **14** is composed of a lower receiver **26**, housing the lockwork of the rifle, and an interconnected upper receiver **28**, which is provided with a longitudinal cavity or chamber **30**, in which is mounted the bolt assembly **24** for reciprocating movement therein. The bolt assembly **24** includes an elongated bolt carrier **32** which is of the type shown and described in U.S. Pat. No. 2,951,424. A gas chamber **34** is defined by the carrier **32** and has a bolt **36** mounted therein for movement relative to the bolt carrier. The bolt **36** envelops a firing pin **38** extending axially therethrough. The firing pin **38** is adapted to engage and fire a cartridge when the bolt assembly is in battery position, that is, locked in the forward extremity of the receiver **14**, as illustrated in FIG. 2.

A recoil device **40** (partially shown) is housed in a receiver extension **42** which is threadably secured to the receiver **14**. A

gas port (not shown), which is connected to the barrel **18** forward of the terminus of the firing pin **38**, serves to actuate the automatic recoil which causes ejection of a spent cartridge shell and subsequent successive chambering of cartridges **44** located in the magazine **16**. Upon firing the firearm illustrated in FIG. **1**, the bullet passes outwardly through the barrel **18** under the impetus of the expanding powder gases. The portion of these gases which reaches the aforementioned gas port passes therethrough and into a gas passage tube (not shown) connecting the gas port with a mating port **46** located within a bolt carrier key **48**. The mating port **46** communicates with an annular chamber **50** which forms a part of the gas chamber **34**. As more fully set forth in the abovementioned U.S. Pat. No. 2,951,424, chamber **50** fills with high pressure exhaust gas which drives the bolt carrier **32** rearwardly within cavity **30** and initially causes an annular shoulder **52** of the carrier **32** to engage the flange **54** of the firing pin **38**.

For purposes of describing the instant invention, it will suffice to note that these gases will impart a rearward momentum to the bolt assembly which is absorbed by the compression of the recoil device **40** until the bolt assembly has reached its recoil or retracted position. Upon dissipation of the rearward momentum of the bolt assembly **24**, the recoil device returns the bolt assembly to the locked battery position illustrated in FIG. **2**. During the recoiling operation, the expended cartridge shell is, of course, ejected and a new cartridge is fed from the magazine **16** into the firing chamber (not shown).

The trigger mechanism **22** is somewhat similar in design and operation to that mechanism described in U.S. Pat. No. 3,045,555, but, of course, it is designed to furnish only semiautomatic operation of the firearm **10**. The trigger mechanism **22** comprises a trigger **56** which is pivotally mounted within the lower receiver section **26** by transversely oriented pivot pin **58**. Trigger **56** has an elongated upper portion which includes a forward trigger sear **60** adapted, in a manner hereinafter described, to retain a hammer **62**. Additionally mounted on the pivot pin **58** is a disconnector **64**, the lower portion of which is located within a groove **66** in the upper portion of the trigger **56**. A compression spring **68** is interposed between the bottom of the groove **66** and the under side of the disconnector **64** in order to urge the disconnector in a clockwise direction about pivot pin **58**.

The hammer **62** is provided with a first sear abutment **70** in the forward portion thereof and a second sear abutment **72** in the intermediate portion thereof. The hammer **62** is also provided with a bolt stop abutment **74** in the upper portion thereof which is adapted to engage the bolt assembly **24** in a manner hereinafter described.

The disconnector **64** includes a vertically extending portion which incorporates a hook sear abutment **76**. The trigger **56**, by virtue of its pivotal mounting on pin **58**, is adapted to pivot from a first position, in which the sear **60** thereof engages the first sear abutment **70** of the hammer **62**, to a second position angularly spaced in a clockwise manner from the first position, in which the hook sear abutment **76** on the disconnector **64** engages the second abutment **72** of the hammer **62**. The hammer **62** is maintained in a cocked non-firing position by the cooperative interengagement between either the trigger sear **60** and the first sear abutment **70** or the hook sear abutment and the second sear abutment, the interengagements being respectively maintained by the bias of a trigger spring **78** and the pressure of the shooter's finger.

Upon rearward pivotal movement of the trigger **56** about its pivot pin **58** against the bias of the trigger spring **78**, the hammer swings upwardly under the bias of a hammer spring **79** about its mounting pivot **80**. During upward swinging between a cocked position and a firing position, in which it abuts the firing pin **38**, the hammer passes through a bottom longitudinal aperture **82** formed in the bolt assembly carrier **32**. Upon striking the firing pin **38**, a chambered cartridge is fired from the barrel **18**. When the bolt assembly **24** recoils under the influence of the expanding gases in the barrel, the hammer **62** is urged by the carrier **32** in a downward or counterclockwise direction. Assuming that the trigger **56** is retained in its depressed or second position during this downward movement of the hammer **62**, the second sear abutment **72** of the hammer **62** will engage the hook sear abutment **76** of the disconnector **64** after slightly displacing the disconnector in a counterclockwise direction about the pivot **58**. Conversely, if the trigger **56** is immediately returned to its first position after the firing of the chambered cartridge, the hammer **62** will be retained in its cocked position by the engagement of the trigger sear **60** and the first sear abutment **70**. Normally, the trigger will be momentarily retained in its second position after the firearm has been fired, and thus the recoil of the bolt assembly **24** normally causes the second sear abutment **72** to engage hook sear abutment **76**. When the trigger is released after this engagement has been effected, the trigger sear **60** will move into engagement with the first sear abutment **70** after the second sear abutment **72** and the hook sear abutment **76** move out of engagement. After this occurs, the mechanism is poised to fire another cartridge.

The carrier **32** of the instant invention differs slightly from those described in the aforementioned patents in that a portion thereof has been removed to permit the bolt stop abutment **74** to contact the rearmost flange **84** of the firing pin **38**, if the second sear abutment **72** and the hook sear abutment **76** fail to engage one another due to the removal, alteration or breakage of abutment **76** or abutment **72**, or the complete removal of the disconnector **64** from the mechanism, it can be seen, in FIG. **2**, that the elongated aperture **82** extends to flange **54** of firing pin **38**, and thereby permits the stop abutment **74** to engage the flange **84** on its right side or forward surface.

The various configurations, which the trigger mechanism may assume, are shown in FIGS. **3** through **6**. Referring to FIG. **3**, the hammer is shown in its firing position after it has struck the firing pin **38** and fired a chambered cartridge from the barrel **18**. It will be noted that in this position of the hammer, an operator of the firearm will normally maintain the trigger **56** in its second position which is therein illustrated.

Turning now to FIG. **4**, it will be noted that the hammer **62** has been urged into engaging contact with the disconnector **64** by the recoil of the bolt assembly **24**, the trigger **56** being retained in its second or depressed position. In this configuration, the hammer **62** is prevented from swinging upwardly to strike the firing pin by the contact between the second sear abutment **72** and the hook sear abutment **76**. It should be readily apparent that if the trigger mechanism were modified so that the abutments could not engage one another, the hammer **62** would again strike the firing pin **38** upon forward movement of the bolt assembly were it not for the exposed flange **84**.

When the trigger **56** is released from its second position, illustrated in FIG. **4**, the abutments **72** and **76** move out of engagement by virtue of the pivoting of trigger **56** under the bias of trigger spring **78**; and the trigger sear **60** and the first sear abutment **70** of the hammer **62** move into engaging contact to retain the hammer in a cocked configuration, as shown in FIG. **5**. It will be noted that, with reference to FIG. **5**, the trigger **56** is in its first position. In this configuration, depression of the trigger **56** results in disengagement between the trigger sear **60** and the first sear abutment **70**, thereby permitting the hammer **62** to swing upwardly in a clockwise fashion and strike the firing pin **38**.

FIG. **6** shows the trigger mechanism of FIGS. **2–5**, wherein the hook sear abutment **76** of the disconnector **64** has been completely removed in an attempt to convert the semiautomatic firearm into an automatic firearm or machine gun. As FIG. **6** shows, this modification will not defeat the semiautomatic nature of the firearm, as the bolt stop abutment **74** will engage the forward side of the rearward flange **84**, thereby preventing completion of the movement of the bolt assembly from the recoil position to the battery position. It will be understood that it is within the scope of the invention to form a mating abutment on the lower portion of the carrier to engage a stop abutment on the hammer.

As will be appreciated from the foregoing, existing automatic firearms, such as those shown in the aforementioned U.S. Patents, or any other semiautomatic or automatic firearm which utilizes the movement of a breach or bolt assembly to cock the hammer, may be readily modified in accordance with the invention. To modify an automatic firearm to attain a structure in accordance with the invention, it is merely necessary to remove the automatic sear, provide a suitable abutment or abutments on the bolt assembly, and, if necessary, an abutment on the hammer to engage the one on the bolt assembly. The invention thus provides an economical means for changing an automatic firearm to a semiautomatic firearm which cannot easily be converted into an automatic firearm. A salutary feature of the above-described invention is the fact that it not only prevents conversion of a firearm, into which it is incorporated, into an automatic firearm, but also does not adversely effect the semiautomatic operation of the firearm.

As will be apparent to those skilled in the art, further modifications and adaptations of the above-described structure are possible without departure from the spirit and scope of the invention as defined in the appended claims.

What we claim is:

1. In a trigger mechanism, the combination comprising:
a receiver;
a bolt assembly mounted for longitudinal movement in the receiver between recoil and battery positions;
a hammer pivotally mounted in the receiver such that movement of the bolt from the battery position to the recoil position urges the hammer into a cocked position; and
means to prevent movement of the bolt assembly from the recoil position to the battery position when the hammer is not retained in the cocked position.

2. The combination, as defined in claim 1, wherein the movement preventing means comprises:
a stop abutment on the hammer; and
a surface on the bolt assembly, the surface being engageable by the stop abutment during movement of the bolt assembly from the recoil position to the battery position.

3. The combination, as defined in claim 1, further including:
a trigger having a sear thereupon pivotally mounted in the receiver;
a disconnector having a hook sear abutment thereupon operatively connected to the trigger;
a first sear abutment on the hammer for engagement by the sear abutment on the trigger to retain the hammer in the cocked position; and
a second sear abutment on the hammer for engagement by the hook sear abutment when the trigger is depressed to retain the hammer in the cocked position.

4. In a trigger mechanism, the combination comprising:
a receiver;
a bolt assembly mounted for longitudinal movement in the receiver between recoil and battery positions;
a hammer pivotally mounted in the receiver such that movement of the bolt from the battery position to the recoil position urges the hammer into a cocked position; and
surface means on the bolt assembly to engage the hammer during movement of the bolt assembly from the recoil to the battery position when the hammer is not retained in the cocked position.

5. The combination, as defined in claim 4, further including:
a trigger, having a sear thereupon, mounted in the receiver;
a disconnector, having a hook sear abutment thereupon, operatively connected to the trigger;
a first sear abutment on the hammer for engagement by the sear on the trigger to retain the hammer in the cocked position; and
a second sear abutment on the hammer for engagement by the hook sear abutment when the trigger is depressed to retain the hammer in the cocked position.

6. In a trigger mechanism, the combination comprising:
a receiver;
a bolt assembly mounted in the receiver for longitudinal movement therein between recoil and battery positions;
a hammer pivotally mounted in the receiver such that movement of the bolt from the battery position to the recoil position urges the hammer into a cocked position; and
means on the hammer to engage the bolt assembly to prevent movement thereof from the recoil position to the battery position.

7. In a trigger mechanism, the combination comprising:
a receiver;
a bolt assembly mounted for longitudinal movement in the receiver between recoil and battery positions;
a trigger, having a sear thereupon, pivotally mounted in the receiver for movement between a first position and a second position;
a hammer pivotally mounted in the receiver such that movement of the bolt from the battery position to the recoil position urges the hammer into a cocked position;
a first sear abutment on the hammer to engage the sear on the trigger when the hammer is in the cocked position and the trigger is in the first position;
a second sear abutment on the hammer;
a rotatable disconnector, having a hook sear thereupon, operatively connected to the trigger, the hook sear being engageable with the second sear abutment on the hammer to retain the hammer in the cocked position when the trigger is in the second position; and
a stop abutment on the hammer to engage the bolt assembly to prevent movement of the bolt assembly from the retracted position to the battery position if the hook sear or disconnector is removed from the mechanism.

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