Nov. 30, 1943. F. T. MOORE 2,335,688

FIRING MECHANISM FOR AUTOMATIC FIREARMS

Filed Dec. 10, 1940 2 Sheets-Sheet 1

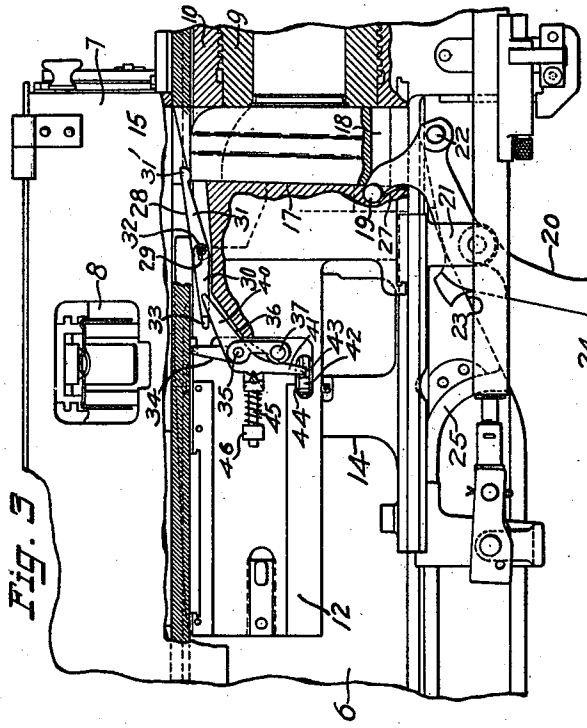


Fig. 3

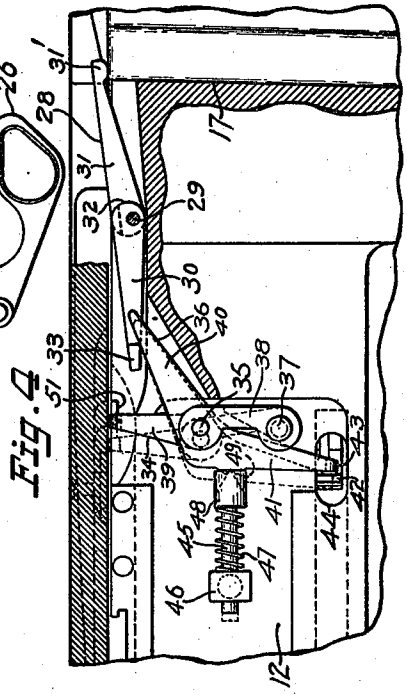


Fig. 4

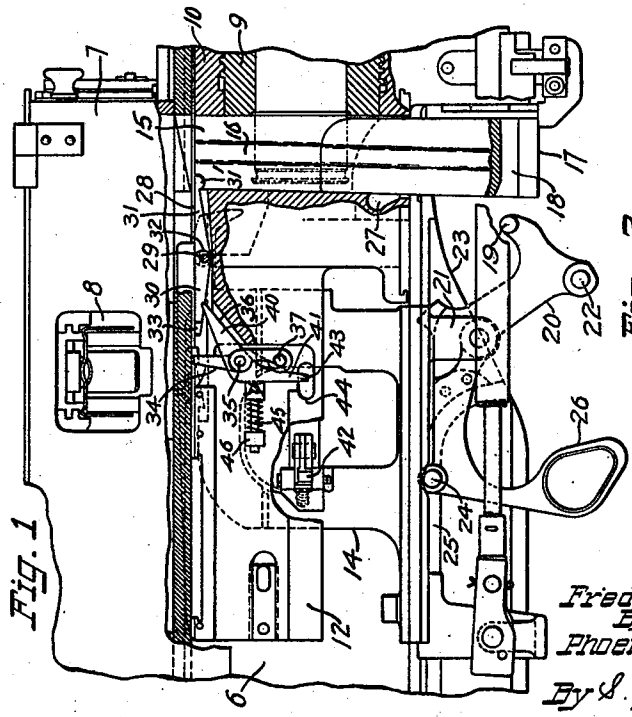


Fig. 1

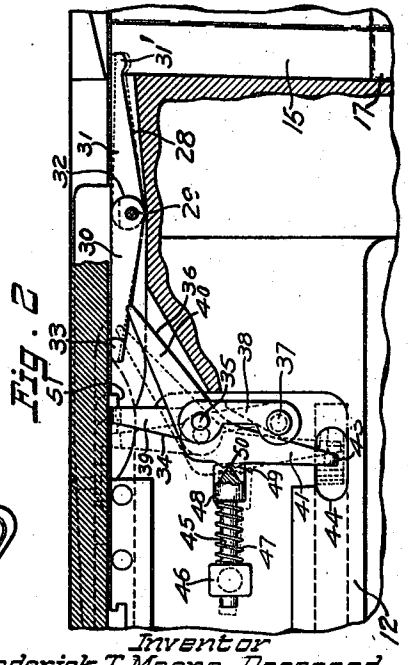


Fig. 2

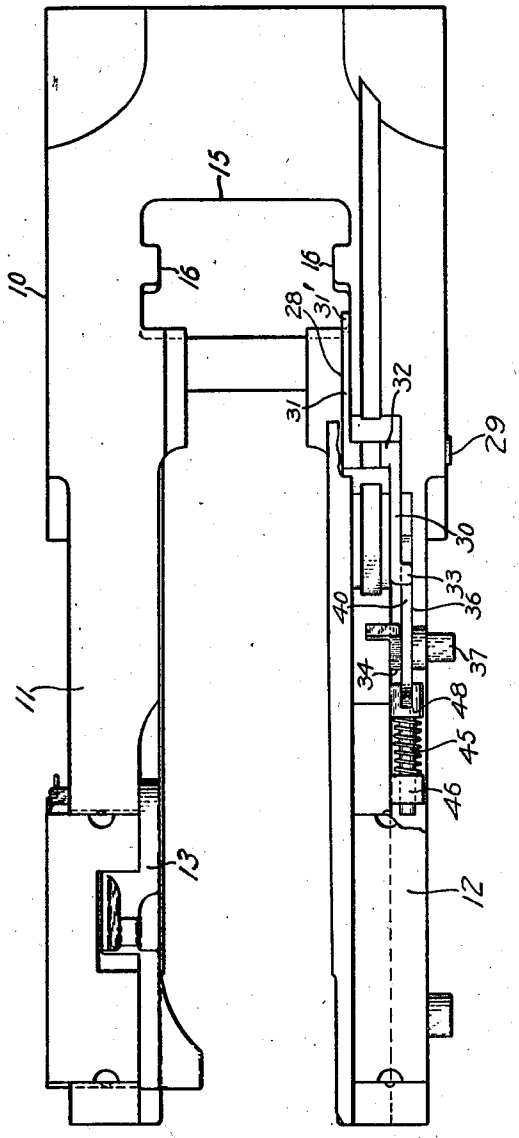
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FIRING MECHANISM FOR AUTOMATIC FIREARMS

Filed Dec. 10, 1940 2 Sheets-Sheet 2

Fig. 5



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Patented Nov. 30, 1943

2,335,688

UNITED STATES PATENT OFFICE

2,335,688

FIRING MECHANISM FOR AUTOMATIC FIREARMS

Frederick T. Moore, deceased, late of West Hartford, Conn., by Phoenix State Bank and Trust Company, administrator, Hartford, Conn., assignor to Colt's Patent Fire Arms Manufacturing Company, Hartford, Conn., a corporation of Connecticut

Application December 10, 1940, Serial No. 369,428

15 Claims. (Cl. 89—3)

The present invention relates to automatic firearms, and more particularly to firing mechanism for recoil operated automatic firearms.

In Browning Patent 1,525,065, the firing mechanism includes a firing pin having guided movement through a vertically reciprocable breech block. A hammer has guided movement in a lock frame reciprocably mounted in the breech casing and the hammer is held in cocked position by a sear pivotally mounted on the lock frame. In said patent, the trigger lever for releasing the sear from engagement with the hammer is also on the lock frame, and to insure that the sear will not be tripped to release the hammer until the breech block is in its full breech closing position, said patent provides intermediate mechanism between the trigger lever and sear to avoid direct engagement of the sear by the trigger lever. This intermediate mechanism is positioned by the breech block actuating lever itself so as to permit release of the sear and hammer only when the breech block has been established in its full breech closing position by the actuating lever.

The principal general object of the present invention is to provide relatively simple but positively certain mechanism to avoid misfiring by assuring releasing movement of the sear by the trigger lever only when the breech block is in its full breech closing position. This is accomplished by providing that the means for tripping or effecting release of the sear is established in sear releasing operative position by the breech block itself and is ineffective unless and until the breech block is established in its full breech closing position.

Another important feature of the invention resides in the construction and mounting of the trigger lever whereby it will move away from the sear release if the trigger is pulled and the breech block is not in its full breech closing position; but, on the other hand, if the breech block is in its full breech closing position the trigger lever will move toward and against the sear release to trip it and effect firing when the trigger is pulled.

Under the present invention the sear, sear release, and hammer are carried by the lock frame, the firing pin is mounted in the breech block, and the trigger bar in the casing as in Patent 1,525,065, but all other parts of the firing mechanism are carried by the barrel extension.

In the accompanying drawings is shown the now preferred embodiment of the invention, but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a fragmentary side elevational view of an automatic firearm embodying the invention with the right side of the breech casing broken away, and with parts shown in section. In this view the breech is open, a cartridge being inserted, and the movable parts are shown in the positions they occupy just prior to closing the breech.

Fig. 2 is a fragmentary view of mechanism embodying the invention shown in the same relative position as in Fig. 1 but illustrated on an enlarged scale.

Fig. 3 is a view similar to Fig. 1 but showing the breech block in full breech closing position and the mechanism ready for firing.

Fig. 4 is a fragmentary view similar to Fig. 2 but showing the trigger trip engaged by the breech block.

Fig. 5 is a top plan view of a barrel extension with mechanism embodying the invention applied thereto.

Referring to the drawings, the numeral 6 designates the breech casing on which is mounted the feed box 7 having a feed channel 8. The barrel 9 is connected to barrel extension 10 which is longitudinally reciprocable in the breech casing. The forward end of the barrel extension has a screw threaded bore receiving the rear end of the barrel, and rearwardly the barrel extension has left and right arms 11 and 12 respectively (Fig. 5). The ejector 13 is mounted on arm 11, and the lock frame 14 (Figs. 1 and 2) is slidably mounted in and carried by the breech casing and projects upward between arms 11 and 12 of the barrel extension. An opening 15 is provided vertically in the forward end of the barrel extension and ribs 16 along opposite sides of the opening afford guided movement of the breech block 17 when the breech block is inserted into the opening with grooves in its sides receiving the ribs 16. The parts thus far mentioned are described in detail in the aforementioned Browning Patent 1,525,065.

To effect synchronized movement of the breech block relative to the barrel extension and barrel so that the breech will be opened and closed at predetermined exact intervals, substantially the same mechanism of said Patent 1,525,065 may be employed and certain essential parts thereof

are shown in the drawings (Figs. 1 and 2) to clearly illustrate the present invention. Fig. 1 shows the breech block in its full open position with the breech block actuating mechanism about to engage the breech block and establish it in its full closed position of Fig. 3. The breech block is provided in its lower end with a T-slot 18 to receive studs 19 on the actuating lever 20 pivotally mounted between depending lugs 21 on the lock frame. The lever 20 is also provided with studs 22 adapted to cooperate with cam surfaces 23 formed on plates arranged on opposite sides of the casing and secured therebelow. The studs also cooperate with cam surfaces, not shown in this application but shown in Patent 1,525,065, toward the rear of the casing. Studs 24 on lever 20 engage cam grooves 25, and a handle 26 is provided for manual operation of the lever 20 and lock frame 14. Forward movement of the lock frame causes the lever to rotate in a counterclockwise direction due to the action of the studs 22 and 24 against their cooperating cam surfaces. This action causes the studs 19 to enter T-slot 18, and continued forward movement of the lock frame causes the lever through studs 19 to elevate the breech block to close the breech. A notch 27 in the rear wall of opening 15 receives studs 19 after the breech block reaches its full breech closing position, as shown in Fig. 2, to lock the breech block in closed position during firing.

As has been previously mentioned, in the gun shown in Patent 1,525,065, the trigger lever for releasing the sear from engagement with the hammer is operated through intermediate mechanism interposed between the trigger lever and sear, and positioned by the actuating lever of the breech block during its breech closing movement, to permit firing only when the breech block reaches its full closed position. The present invention provides an improvement over the sear releasing means of the said patent, and is operable directly by the breech block itself.

In the drawings the numeral 28 designates the trigger trip which is pivoted on a support specifically shown as stud 29 mounted through the right side of the barrel extension. The upper face of the barrel extension is formed to receive the trigger trip which has two arms 30 and 31 connected by a crossbar 32 through which the stud 29 extends to pivotally mount the trigger trip at the top of the barrel extension. The arm 31 is movable in a slot provided in the upper surface of the barrel extension and projects slightly into the opening 15 in the barrel extension within which the breech block is slidably mounted. The said projecting end of the arm 31 is designated by the numeral 31' and has a rounded surface for contact by the top of the breech block. The arm 30 has its free end offset laterally to engage the trigger connector presently described, the offset end of the arm 30 being designated by the numeral 33.

A trigger lever 34 is pivotally connected at 35 to the trigger lever connector 36 and is also pivotally mounted at its lower end on a support specifically shown as a stud 37 supported by the barrel extension. The trigger lever is bifurcated so that the trigger lever connector 36 can be mounted between the arms 38 and 39 to receive the pin or rivet 35 extending through the two arms of the trigger lever and the trigger lever connector. Thus under certain conditions as will be presently explained, the trigger lever 34 and trigger lever connector 36 move as a unit on the pivot 37, while under other conditions the trigger lever moves on its pivot 37 while the trigger lever connector shifts laterally with pivot 35.

The trigger lever connector is in the nature of a bell crank lever having an arm 40 extending toward the trigger trip 28 and disposed under the end 33 of the trigger trip arm 30. The other arm 41 extends downwardly and its end is bent inwardly, as indicated by 43, to extend through opening 44 in the barrel extension to engage the sear release 42 on the lock frame between arms 11 and 12 of the barrel extension. The trigger lever 34 and trigger lever connector 36 are normally biased to the full line position of Fig. 2 by spring plunger 45 held on the side of the barrel extension by lug 46. A coil spring 47 is mounted between the lug 46 and the plunger head 48. The arm 41 of the trigger lever connector is provided with projections or teeth 49 and the plunger head 48 is of ratchet formation on its outer end to engage with teeth 49 and notch 50 therebetween so that the plunger is properly held in operative position with respect to the trigger lever connector. The trigger trip is not biased by the action of the spring plunger which exerts a force against the trigger lever and trigger lever connector, but is freely movable on its pivot 29.

The construction and arrangement of the controlling means for the firing mechanism is such that when the trigger trip is not properly held against movement by the breech block in a predetermined position as shown in Figs. 3 and 4, the trigger lever may move freely on its pivot 37 which causes the arm 41 of the trigger lever to move away from the sear release 42; but when the trigger trip is held in the position of Figs. 3 and 4 by the breech block which occurs only when the breech block is exactly established in full breech closing position, then the arm 40 of the trigger lever connector is blocked against swinging movement by the end 33 of the trigger trip but may have sliding movement relative to the trigger trip. Also the trigger lever 39 can move on its pivot 37 which causes a reverse movement of the arm 41 of the trigger lever connector whereby it engages and moves the sear release 42.

Referring to Fig. 2, the trigger lever 34, trigger lever connector 36, and trigger trip 28 are shown in full lines in the positions they occupy when the breech block is down or in open position, and the parts are shown in dotted lines in the position they are compelled to assume if the breech block is not in full breech closing position when the trigger bar 51 is pulled against the upper end of the arm 39 of the trigger lever. It will be noted that the trigger lever 34 and trigger lever connector 36 then move as a unit on the pivot 37 which causes the end of the arm 41 to move away from the sear release 42. Referring now to Fig. 4, the trigger lever 34 and trigger lever connector 36 are shown in full lines in the same position as shown in full lines in Fig. 2. However, it will be noted that in Fig. 4 the trigger trip 28 has been rocked on its pivot by the force of the breech block exerted against end 31, and in this position the breech block is firmly locked in breech closing position by the means previously described. Consequently, when the trigger bar 51 is pulled to exert force against the upper end of arm 39 of the trigger lever in a rearward direction, the trigger lever 34 and trigger lever connector 36 are compelled to move to the dotted line position of Fig. 4. It will be noted that the pivot 35 has been shifted when the trigger lever swung on its pivot 37. The arm 40 had sliding movement relative to the trigger trip during

shifting of pivot 35, and the arm 41 was moved against the sear release 42 sufficiently to trip the sear and release the hammer, not shown in this application, but shown in said Patent 1,525,065.

What is claimed is:

1. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame movably carried by the casing, firing mechanism operable by movement of said lock frame, a support fixedly positioned with respect to the barrel, and means movably carried by said support and having a portion operable by the breech block during its movement to breech closing position to effect release of the firing mechanism only when the breech block is established in full breech closing position.

2. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame movably carried by the casing, firing mechanism operable by movement of said lock frame, a support fixedly positioned with respect to the barrel and means movably carried by said support and having a portion engageable by said breech block during its movement in breech closing direction and operable by the breech block during said movement to render said firing mechanism operable only when said breech block arrives at its full breech closing position.

3. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoill with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame movably carried by the casing, firing mechanism carried by said lock frame, means movable to release the firing mechanism, a support fixedly positioned with respect to the barrel and means movably carried by said support and having portions respectively disposed in the paths of movement of the breech block and said means to release the firing mechanism, said means carried by said support being positionable by the breech block to render the means for releasing the firing mechanism effective only when the breech block is in full breech closing position.

4. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism carried by said lock frame, means to release the firing mechanism, and means mounted on the barrel extension and disposed in the paths of movement of the breech block and said means to release the firing mechanism and positionable by the breech block to render the means for releasing the firing mechanism effective only when the breech block is in full breech closing position.

5. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism carried by said lock frame, a trigger bar to release the firing mechanism, a support fixedly positioned with respect to the barrel a trigger lever movably carried by said support and operable by said trigger bar, and means operable by the breech block to render movement of the trigger lever by the trigger bar effective to release the firing mechanism only when the breech block is in full breech closing position, said means being between said trigger lever, firing mechanism and the breech block.

6. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism carried by said lock frame, a trigger bar to release the firing mechanism, a trigger lever pivoted on the barrel extension and operable by said trigger bar, and means on said barrel extension operable by the breech block to render movement of the trigger lever by the trigger bar effective to release the firing mechanism only when the breech block is in full breech closing position, said means being between said trigger lever, firing mechanism and the breech block.

7. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism including a sear and sear release carried by the lock frame, a support fixedly positioned with respect to the barrel a trigger lever movably carried by said support and having a part adapted to actuate the sear release and effect firing, means to operate said trigger lever, and means to cause the sear release actuating part of said trigger lever to move away from the sear release when said trigger lever operating means is operated with the breech block not in full breech closing position and to move against said sear release to effect firing when the breech block is in full breech closing position.

8. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism including a sear and sear release carried by the lock frame, a trigger lever pivotally mounted on the barrel extension and having a part to actuate the sear release and effect firing, means to operate said trigger lever,

and means to cause the sear release actuating part of said trigger lever to move away from the sear release when said trigger lever operating means is operated with the breech block not in full breech closing position and to move against said sear release to effect firing when the breech block is in full breech closing position.

9. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism including a sear and sear release carried by the lock frame, a support fixedly positioned with respect to the barrel a trigger lever movably carried by said support and having a part adapted to actuate the sear release and effect firing, means to operate said trigger lever, and means responsive to movement of the breech block to cause the sear release actuating part of said trigger lever to move away from the sear release when said trigger lever operating means is operated with the breech block not in full breech closing position and to move against said sear release to effect firing when the breech block is in full breech closing position.

10. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism including a sear and sear release carried by the lock frame, a trigger lever having a part to actuate the sear release and effect firing, means to operate said trigger lever, and means on the barrel extension responsive to movement of the breech block to cause the sear release actuating part of said trigger lever to move away from the sear release when said trigger lever operating means is operated with the breech block not in full breech closing position and to move against said sear release to effect firing when the breech block is in full breech closing position.

11. In an automatic firearm including a casing with a barrel at the front thereof, the combination of a barrel extension in the casing for longitudinal reciprocating movement upon recoil and counter-recoil with the barrel, a breech block guided on the barrel extension for reciprocating movement transversely thereof to open and close the breech of the barrel, a lock frame carried by the casing, firing mechanism carried by said lock frame, a sear release, pivotally connected levers one of which is pivotally mounted on the barrel extension and supporting the other independent of the barrel extension, a trip member movable by the breech block during its breech closing movement and held in a predetermined position by the breech block when in its full breech closing position, said other of the pivotally connected levers having an arm engageable with the trip member and another arm engageable with the sear release, said one of the pivotally connected levers being operable by the trigger of the firearm, and the arrangement being such that the levers move as a unit when the trip member is not held in said predetermined position by the breech block with said other lever moving away from the sear release but said levers being relatively movable when the trip member is held in said predetermined position by the breech block whereby said other lever moves against the sear release to effect firing.

12. Control means for the firing mechanism of automatic firearms of the recoil operated type having a sear release and a reciprocable barrel extension provided with a breech block reciprocable therein to and from full breech closing position, said control means comprising in combination with said barrel extension, a trip member on the barrel extension adapted to be operated by the breech block, a lever pivotally mounted on the barrel extension, a second lever pivotally supported by the first lever and adapted to engage the sear release, and means normally maintaining said levers in respective predetermined positions, said second lever having one portion engageable with said trip member and another portion movable from its predetermined position toward its sear release engaging position when the first lever is moved on its pivot and the breech block is in full breech closing position and thereby adapted to hold the trip member in a predetermined position for engagement by said one portion of said second lever.

13. Control means for the firing mechanism of automatic firearms of the recoil operated type having a breech casing, a reciprocable barrel extension, a lock frame movably carried by the breech casing, firing devices including a sear and sear release carried by the lock frame, and a breech block slidably mounted on the barrel extension for reciprocating movement transversely thereof, said control means comprising in combination with said barrel extension, a trip bar pivotally mounted on the barrel extension with one end adapted to be disposed in the path of movement of the breech block and also adapted to be engaged by the breech block as it approaches breech closing position, a trigger lever on the barrel extension, and a connector pivotally supported by the trigger lever and adapted to be positioned thereby to engage the sear release and also be moved by the trigger lever away from its sear release engaging position when the breech block is not in its full breech closing position but said connector also being movable to its sear release engaging position to effect firing when the breech block is in full breech closing position and in which position said connector is adapted to normally hold the trip bar in a predetermined position for engagement by the breech block.

14. In combination with the firing mechanism of a recoil operated firearm including a barrel extension and a breech block supported thereby for transverse reciprocating movement relative thereto to open and close the breech, a trigger lever to manually effect release of the firing mechanism pivotally mounted on the barrel extension, a connector lever pivotally supported by the trigger lever and movable therewith as a unit and also movable relative thereto to effect firing when the breech block is in full breech closing position, and means operable directly by the breech block to control said movements of said levers whereby firing is possible only when the breech block is in its full breech closing position.

15. In combination with the firing mechanism of a recoil operated firearm including a barrel extension and a breech block supported thereby for transverse reciprocating movement relative

thereto to open and close the breech, a trigger lever to manually effect release of the firing mechanism pivotally mounted on the barrel extension, a connector lever pivotally supported by the trigger lever and movable therewith as a unit and also movable relative thereto to effect firing when the breech block is in full breech closing position, and a trip lever pivotally mounted on the barrel extension with one end positioned for engagement by the breech block and its other end engageable with the connector lever and effective to cause said relative firing movements of the trigger and connector levers only when the breech block is in its full breech closing position.

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Assistant Trust Officer,
Administrator of the Estate of Frederick T. Moore, Deceased.

CERTIFICATE OF CORRECTION.

Patent No. 2,335,688. November 30, 1943.

FREDERICK T. MOORE, DECEASED.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, lines 33 and 53, same page, second column, lines 14 and 51, and page 4, first column, line 18, after the word "barrel" insert a comma; page 3, first column, line 45, for "counter-recoill" read --counter-recoil--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of February, A. D. 1944.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

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